Root Causes

2026 Research Symposium

Program & Abstract Book

Cultivating Change: Advancing Health Equity Beyond the Clinic

April 18, 2026

Duke University School of Medicine

ROOT CAUSES

Root Causes 2026 Research Symposium

AGENDA AT A GLANCE

5:00 PM

Poster Presentations

Trent Semans Center for Health Education
Great Hall

5:45 PM

Dinner

Trent Semans Center for Health Education
Great Hall

6:00 PM

Top Abstract Talks

Trent Semans Center for Health Education
Great Hall

Panel Presentation

Trent Semans Center for Health Education
Great Hall

Root Causes 2026 Research Symposium

PANELISTS

Dr. Howard Eisenson, MD

Medical Professor,
Department of Family Medicine and Community Health

Dr. Naomi Duke, MD, PhD, MPH

Associate Professor,
Department of Pediatrics

Ms. Natacha Cross-Rubio

Complex Case Manager,
Project Access of Durham County

Root Causes 2026 Research Symposium

Cultivating Change: Advancing Health Equity Beyond the Clinic

ROOT CAUSES

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PANELISTS

Dr. Howard Eisenson, MD

Medical Professor,
Department of Family Medicine and Community Health

Dr. Howard Eisenson is a native of New York state, attended Union College in Schenectady, NY and upon graduation came to North Carolina in 1975 to attend medical school at Duke. He subsequently completed residency training in family medicine at Duke. Through the years Dr. Eisenson has been privileged to serve in a variety of medical roles – as a primary care provider in the Durham community, as Director of Duke University's Student Health program, as Director of the Duke Diet and Fitness Center (a residential lifestyle change program) and his most recent full time job, as Chief Medical Officer of Lincoln Community Health Center, Durham's only Federally Qualified Health Center. In 2008 he was a founding Board member of Project Access Durham County, a program connecting approximately 1,500 low income and uninsured patients yearly to donated medical and surgical services, and he continues on the PADC Board to this day. Since 2021 working part-time for both Lincoln and Duke, he leads a small team providing in-home primary care to homebound, mostly low income Durham adults.

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PANELISTS

Dr. Naomi Duke, MD, PhD, MPH

Associate Professor,
Department of Pediatrics

Dr. Naomi Nichele Duke, MD, PhD, MPH, is an Associate Professor. Working at the intersection of medicine, sociology, and population health, Dr. Duke brings a unique perspective to address social drivers in maternal and child health and adult chronic disease onset. Her work focuses on advancing knowledge and advocacy efforts around the relevance of childhood social context for adult health and the intergenerational transmission of health, including morbidity and mortality related to stress physiology, perceptions of physical and emotional weathering, and health-related behaviors. Her work includes focus on understanding relationships between shared sociocultural context and concordance and discordance in cardiometabolic outcomes across generations. Dr. Duke is an academic affiliate with multiple multidisciplinary research centers and collaborations, including the Duke Center for Child & Family Policy, the Duke University Population Research Institute, the Network for Innovative Methods in Longitudinal Aging Studies at the University of Michigan, and the Center for Healthy Aging Behaviors and Longitudinal Investigations at the University of Chicago. She is an MPI on two NIH-NIA R01-funded studies: the Add Health Parent Study Phase 2, a study of intergenerational linkages in health, cognition, social and economic well-being, between parents and their adult children; and the Midlife Health in the Rural South: Risk and Resilience Study, which examines aging at midlife in rural counties in eastern North Carolina.

Root Causes 2026 Research Symposium

PANELISTS

Ms. Natacha Cross-Rubio

Complex Case Manager,
Project Access of Durham County

Natacha Rubio is a clinical case manager at Project Access of Durham County with over a decade of experience in community-based care. Her work centers on advocating for vulnerable populations and addressing barriers to healthcare and social services. She is currently a student at Duke Divinity School, where she is further developing her interdisciplinary approach to care. Natacha is committed to advancing equitable, person-centered support systems that promote dignity, access, and long-term resilience in underserved communities.

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TOP ABSTRACT TALKS

Relational Autonomy and Workforce Precarity in Community-Based Disability Services

Samantha Cohen

Duke Undergraduate
Department of Cultural Anthropology

Samantha Cohen is a senior and cultural anthropology major at Duke University. Her work explores disability support labor through ethnographic research, with a focus on care and everyday systems of support. She will be applying to medical school this summer and is interested in questions at the intersection of health, culture, and lived experience.

Access to health for la comunidad latina: a community-engaged curriculum designed to promote understanding of insurance

Sara Bernate Angulo

Medical Student
Duke University School of Medicine

Sara Bernate Angulo is triple Blue – she graduated with a B.S in public health from UNC-Chapel Hill and is currently a third-year medical student in the Primary Care Leadership Track at Duke and a Master of Public Health graduate student at UNC. Her interests lie in optimizing nutrition, enhancing cultural accessibility to care, and improving maternal and child health, particularly in underserved populations through collaborative partnerships. In her free time, she is also an avid reader, a coffee enthusiast, and a novice birdwatcher.

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POSTERS

★ = Top Abstract = Root Causes Research

#	Abstract Title	Presenting Author
1	**Sustained Nutrition Support for a High-Risk Population: A Cohort Analysis of the Root Causes Fresh Produce Program**	**Haley Hutchinson**
2	Enhanced Access to Sustained Nutrition Support: A Cohort Analysis of High-Risk Pediatric Participants in the Root Causes Fresh Produce Program	Nicole Miller
3	**The Evolving Landscape of Housing in Durham, NC from 2021-2025: A descriptive study**	**Justin Zhao**
4	Beyond the Plate, Beyond the Visit: Advancing Nutritional Education, Prevention, and Positive Childhood Experiences through Project PLATE Wrap-Around Services	Ashmi Trivedi
5	**Pairing Food Access and Obesity Treatment: A Pilot Program for Redistributing Fresh Produce to a Community-Based Wellness Program for Children with Obesity**	**Drew Armstrong**
6	Variance Adaptive Gradient Boosted Bootstrap Modeling for Equitable Identification of Treatment Non-Completion in Behavioral Health Systems	Graham Zulu
7	**Metabolic Health and Cardiovascular Disease Among Adults with Central Obesity in the United States: Evidence from NHANES 2011–March 2020**	**Emmanuel Agyei**
8	Structural Drivers for Racial Disparity in Preventable Hospitalizations: A Machine Learning Analysis of U.S. Counties	Keshav Jha
9	**Associations of Difficulty Seeing or Refractive Error Correction with Mental Health and Social Outcomes in Children**	**Priyanka Ramulu**
10	Unmet Social Needs by Clinical Risk Profile in Dual-Eligible Patients: Implications for Targeted Interventions	Abigail Rader

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11	Project Haven: A Student-Led Community Resource Navigation Initiative Addressing Social Determinants of Health Across North Carolina	Harsha Rajkumar
12	Helpdesk Benefit Booth: A Project to Address Food Insecurity in Durham, NC	Daliya Rizvi
13	Access to health for la comunidad latina: a community-engaged curriculum designed to promote understanding of insurance ★	Sara Bernate Angulo
14	Descriptive analysis of Student-Led Food Delivery on Food Insecurity and Social Isolation Among Durham Seniors	Jeana Chun
15	Bystander CPR Response Confidence: Does Educational Level Matter?	Skyler Gubbels
16	Integration of Student-Led Social Care Navigation into Endocrinology Clinics to Address Social Determinants of Health	Austin Brown
17	Pediatrics Supporting Parents: Creation and Implementation of an Early Relational Health Scavenger Hunt in Pediatric Primary Care	Eujin Chung
18	Post-Hospitalization Medication Adherence in Homebound patients: Preliminary Findings from the Just for Us Program	Claire Sibold
19	Impact of post-discharge meal delivery on hospital readmissions among food-insecure older adults discharged home	Tara Kinard
20	Utilizing Telephonic Outreach to Improve Blood Pressure Control Among Patients at a Federally Qualified Health Center (FQHC)	Jenifer Allen

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POSTERS

★ = Top Abstract = Root Causes Research

#	Abstract Title	Presenting Author
21	A Comparative Study of the Cuban Healthcare System: Lessons for Accessible and Humane Medical Care	Sagnik Das
22	AV3: A Novel Approach to Counteracting Resistant Ae. aegypti	Ishaan Narsinghani
23	Longitudinal associations between patient and caregiver quality of life following hemtopoietic stem cell transplantation	Daniel Yang
24	Relational Autonomy and Workforce Precarity in Community-Based Disability Services ★	Samantha Cohen
25	Themes and Barriers in Financial Toxicity for Cancer Clinical Trial Participants	Lucy Fu

1

Sustained Nutrition Support for a High-Risk Population: A Cohort Analysis of the Root Causes Fresh Produce Program

Haley Hutchinson, Nicole Miller, Andrea Lane, Jessie Chen, Trevor Sytsma, Fan Xu, Scott Brummel, Ranee Chatterjee, Amanda Brucker, Patrick Hemming, Susan Spratt, Eugenia McPeek Hinz

Introduction: The Root Causes Fresh Produce Program (FPP), founded by Duke medical students in 2017, is an innovative 'Food is Medicine' program designed to address food insecurity of Duke Health patients through a volunteer-driven model. Unlike similar programs that operate on a time-limited basis, FPP provides sustained access to locally sourced produce through biweekly door-to-door produce deliveries without time restrictions. Participants are referred to the program from Duke Health based on self-reported financial need or food insecurity.

Methods: We conducted a retrospective cohort analysis of FPP participants enrolled between March 2020 and December 2024. The study population included participants at least 18 years old at first delivery with available electronic health record (EHR) data. Participant records were linked to EHR to examine baseline demographics, disease prevalence, and healthcare utilization patterns. Baseline values were defined as the most recent observation prior to first delivery date within a 2-year lookback window. Descriptive statistics characterized the cohort: continuous variables were presented as mean ± SD or median (IQR) depending on distribution, and categorical variables were reported as N (%) among non-missing observations. Longitudinal program retention was assessed through participation duration metrics.

Results: Of the 454 adult participants included, median program participation was 81 weeks (IQR 37-172) and followed a bimodal distribution, with one group newly enrolled and another showing sustained participation approaching four years. Participants were predominantly middle-aged (mean age 53±15 years), female (65%), and Non-Hispanic Black (65%), with substantial underinsurance: 33% Medicaid, 32% Medicare, 10% dual-eligible, and 21% self-pay. At baseline, chronic disease burden was high: 75% having hypertension, 57% diabetes, 49% obesity by diagnosis (86% overweight or obese by BMI). In the two years prior to enrollment, 90% had at least one outpatient visit (median 16 visits among those with ≥1), 64% had emergency department visits (median 2 visits), and 49% had inpatient admissions (median 2 admissions).

Conclusions: The Root Causes FPP demonstrates that a student-founded, volunteer-run model can achieve sustained participation among food-insecure adults with high chronic disease burden and healthcare utilization. The program's unique features (no time limits, local produce sourcing, and longitudinal participant tracking linked to EHR data) create opportunities for studying the long-term health impacts of this sustained nutrition-based intervention in a high-risk population. Limitations include unmeasured produce consumption and potential gaps in baseline data for participants with limited prior Duke Health engagement. Future analyses will assess changes health metrics over time since enrollment to evaluate the program's health impact and potentially establish a model for scalable 'Food is Medicine' interventions.

2

Enhanced Access to Sustained Nutrition Support: A Cohort Analysis of High-Risk Pediatric Participants in the Root Causes Fresh Produce Program

Nicole Miller, Haley Hutchinson, Sara Bernate Angulo, Pooja Lalwani, Sebastian Perez-Espina Andrea Lane, Jessie Chen, Trevor Sytsma, Fan Xu, Scott Brummel, Ranee Chatterjee, Amanda Brucker, Susan Spratt, Patrick Hemming, Eugenia McPeek Hinz

Introduction: The Root Causes Fresh Produce Program (FPP) is a “Food is Medicine” (FIM) initiative addressing food insecurity in Durham county through a volunteer-driven, community-partnered model. Early program enrollment relied on provider referrals from clinics across the county, but this general referral approach resulted in lower enrollment of pediatric participants compared with adults. To address this, FPP launched Project PLATE in 2023, its first pediatric-focused initiative designed to increase representation by expanding referral pathways to include pediatric clinics and introducing on-site enrollment for families presenting for well-child care.

Methods: We conducted a retrospective cohort study of pediatric participants enrolled in FPP between March 2020, when the direct-to-door delivery model began, and December 2024. Program data were linked to electronic health records to assess demographics, participation trends, and cardiometabolic risk factors. Baseline clinical values were defined as the most recent measurement within one year prior to first produce delivery. We summarized cohort characteristics using descriptive statistics and analyzed temporal enrollment.

Results: A total of 253 pediatric participants were enrolled during the study period, after exclusions 214 participants remained for analysis. Children younger than 3 years were excluded. Mean age was 10.6±3.7 years; 66% were ages 3–12 and 34% were 12–18. Participants were predominantly Hispanic (57%) or Black/African American (34%); 89% were insured by Medicaid. Enrollment increased rapidly in 2020 (76 participants/year), then slowed substantially in 2021-2022 (mean 11.5 participants/year; 23 cumulative new participants across both years), reaching 99 total participants by the start of 2023. After implementation of Project PLATE in 2023, enrollment increased to 214 participants by December 2024 (mean 57.5 participants/year; 115 cumulative new participants across both years)—a fivefold increase compared to 2021–2022. Among pediatric participants with available data, 77% met criteria for obesity including 50% with severe obesity, 34% had prediabetes and 3.6% met criteria for diabetes. While total cholesterol and LDL were generally within acceptable ranges among those tested, 45% had borderline or high triglycerides, and nearly 10% demonstrated elevated alanine aminotransferase levels.

Conclusions: Implementation of pediatric-specific programming was associated with a substantial increase in enrollment of children with high baseline cardiometabolic risk in a community-based food delivery intervention. These findings illustrate the intersection of food insecurity and cardiometabolic disease risk among children, underscoring the need for coordinated healthcare-community interventions aiming to mitigate long-term disease burden in vulnerable pediatric populations. Future work will evaluate these measures longitudinally to assess changes associated with program participation.

3

The Evolving Landscape of Housing in Durham, NC from 2021-2025: A descriptive study

Justin Zhao, Claire Sibold, Trisha Dalapati, Maddie Brown, Donna Biederman, Nicole Helmke

Introduction: The Point in Time (PIT) is an annual one-night census mandated by the US Department of Housing and Urban Development to count individuals – unsheltered and sheltered – experiencing homelessness. PIT provides a local snapshot of the landscape of homelessness and informs how federal funding for housing resources will be directed. WellNest, a Duke University student-run organization was piloted in 2021 and operated at full capacity beginning in 2022. WellNest provides moving assistance, furniture, and longitudinal social support to Durham community members transitioning into stable housing through referrals from community partner organizations.
Methods: The present study examined trends in homelessness in Durham since the conception of WellNest and assessed whether changes in PIT counts correlated with WellNest referral volume. Annual PIT data was reviewed from the past 5 years (2021-2025) along with WellNest referral volume.
Results: Preliminary results demonstrate that PIT counts have fluctuated annually. WellNest referrals have generally increased since its first year, rising from 6 in the inaugural pilot year to 28 referrals in 2025. The number of chronically homeless individuals peaked at 154 in 2022, consistent with a spike of 459 adults without children experiencing homelessness. Similarly, WellNest experienced a jump to 27 referrals during 2022. The following year, PIT data indicated a decrease in housing insecurity in 2023, with 76 chronically homeless individuals and 375 adults without children experiencing homelessness. However, housing insecurity has appeared to continue rising since that time. The housing trend is also consistent with the number of referrals WellNest has received, which declined to 17 in 2023 but has since increased to 28 in 2025.
Conclusion: Overall, we conclude with limited data points that the WellNest referral volume is parallel to trends in homelessness in Durham as measured by annual PIT data. So far in 2026, WellNest has assisted 2 individuals and 8 families with young children. With current operations, WellNest appears capable of assisting with 5-10% of the homeless population's transition into stable housing annually. WellNest will continue to align our service-learning efforts with local housing continuum efforts and government-led interventions, which will allow local resources to be better allocated to individuals who remain unhoused.

4

Beyond the Plate, Beyond the Visit: Advancing Nutritional Education, Prevention, and Positive Childhood Experiences through Project PLATE Wrap-Around Services

Ashmi Trivedi, Nicole Miller

Introduction: Childhood nutrition influences growth, chronic disease prevention, cognitive development, and long-term health behaviors, yet many families in Durham, NC face barriers including food insecurity, limited nutritional literacy, and reduced access to culturally relevant nutritional support. Wrap-around Services of Project PLATE was developed as a pediatric nutrition initiative to address these challenges through practical, family-centered interventions that strengthen healthy eating, improve relationships with food, and support equitable health outcomes. In addition to nutrition education, the program recognizes shared mealtime experiences as positive childhood experiences (PCEs), which are associated with resilience and buffers the effects of adverse childhood experiences (ACEs) by strengthening caregiver connection and preventing chronic health conditions.

Program Description: Project Plate targets pediatric populations aligned with four goals: educate, empower, advance equity, and engage. The educational component delivers interactive, culturally sensitive nutrition learning that translates clinical guidance into practical family strategies, while empowerment focuses on building a positive relationship with food and food choices. Equity addresses food insecurity and related social drivers that affect growth, chronic disease prevention, and continuity of pediatric care, and engagement frames food and mealtime as opportunities to promote early relational health. Current program development includes a bilingual food journal with tracking, storytelling, mindfulness, and goal-setting; cooking classes where families prepare low-cost meals emphasizing balanced plates; and garden-based experiences where families plant and explore foods together to strengthen familiarity, curiosity, and connection to the foods they grow and eat. Delivery is planned through pediatric clinic and community partnerships.

Outcomes: Program goals include increasing willingness to try new foods, improving caregiver confidence in preparing affordable healthy meals, strengthening family mealtime engagement, and increasing trust between families and health providers. Anticipated outcomes include improved nutrition knowledge, stronger food reflection habits, increased fruit and vegetable exposure, and improved follow-up with preventive pediatric care. By embedding positive food routines and family participation, the program also aims to support emotional regulation and reduce stress-related barriers to healthy behavior.

Conclusion: Project Plate extends nutrition counseling beyond clinic visits by combining prevention, family engagement, and culturally responsive education. Framing food routines as both a health intervention and a source of PCEs positions nutrition as part of whole-health care across the lifespan and ACEs mitigation. This model offers a scalable framework for pediatric community health that links nutrition, healthy behaviors, and long-term wellbeing.

5

Pairing Food Access and Obesity Treatment: A Pilot Program for Redistributing Fresh Produce to a Community-Based Wellness Program for Children with Obesity

Drew Armstrong, Matt Skinner, Scott Brummel

I**ntroduction:** Rates of childhood obesity are at a historic high, and food insecurity is associated with obesity in children and families. The current Bull City Fit program is an evidence-based wellness program for children with obesity, but it does not address the high rates of food insecurity among families. The Duke Fresh Produce Program routinely has leftover produce after delivery to food-insecure families, but there is no current method to transfer the fresh produce to families at Bull City Fit. A connection that delivers fresh produce to Bull City Fit is significant because this may reduce food insecurity, improve dietary quality, prevent chronic illness, and improve the overall health of children with obesity.

Methods/Program Description: The intended population for our pilot program was children with obesity participating in Bull City Fit, located at the Edison Johnson Recreation Center in Durham. Currently, participants have a median age of 10 years, and are 52% female, 17% non-Hispanic white, 39% Hispanic, 38% non-Hispanic Black, and 31% have an annual family income of less than $20,000. Of these children, 36% experience food insecurity. The Fresh Produce Program hosts a food table that offers free fresh produce to families with food insecurity or anyone who would like a bag of food. For the pilot, we collected food that was not distributed, drove it to Bull City Fit, which is a 10-minute drive (3.5 miles), and redistributed the food into separate bags in accordance with the number of families present. At the end of the Bull City Fit session, a bag of food was offered to each family so no family felt singled out for distribution.

Results: On all three days, there were approximately 12-15 bags of food left over in excess after the food table session at Root Causes. Redistribution resulted in plentiful bags containing both produce and protein, and no families declined a bag of food. Families accepted the bag, and one child was noticed walking away, eating a fresh carrot after a physically active session. Thus, 100% of food brought to Bull City Fit was taken home by families. We did not collect data on the impact of the food bags on family food insecurity, child dietary quality, or child health, but this would be a good topic for future research.

Conclusions: We found that it is feasible and acceptable for families to receive food after their Bull City Fit sessions. This program may reduce food waste, as well as improve food security and dietary quality in children with obesity. This connection is a promising new intervention, and if successful, this program could help improve the health of children with obesity.

6

Variance Adaptive Gradient Boosted Bootstrap Modeling for Equitable Identification of Treatment Non-Completion in Behavioral Health Systems

Graham Zulu

Introduction: Accurate identification of individuals at risk of behavioral health treatment non-completion is critical for advancing health equity, as premature disengagement disproportionately affects populations facing structural barriers such as housing instability, food insecurity, and limited access to supportive resources. Traditional regression-based prediction models often impose linearity and struggle to accommodate the heterogeneity and noise inherent in real world public health data, limiting their utility for equitable intervention targeting.

Methods: This study introduces the Variance Adaptive Gradient Boosted Bootstrap Model (VAGBBM) an ensemble learning framework designed to explicitly regulate variance amplification during model training while preserving the bias reduction advantages of gradient boosting. Using administrative data from a statewide public substance use treatment system in Colorado (N = 1,158 adults), the proposed approach integrates bootstrap aggregated gradient estimation, learner specific step size optimization, and variance adaptive weighting to stabilize loss signals under sampling variability. Model performance was evaluated against penalized logistic regression using classification, discrimination, and calibration metrics.

Results: The VAGBBM achieved high overall performance, with accuracy of 0.89 compared to 0.90 for penalized regression, and substantially higher specificity (0.99 vs 0.94), yielding a balanced accuracy of 0.91. Discrimination performance was strong for both approaches, with area under the receiver operating characteristic curve values of 0.93 for the proposed model and 0.94 for penalized regression, and area under the precision recall curve values of 0.83 and 0.85, respectively. Calibration metrics modestly favored penalized regression, with slightly lower Brier score (0.08 vs 0.09) and log loss (0.25 vs 0.31).

Conclusion: Despite comparable overall accuracy, the variance adaptive framework demonstrated particular strength in identifying individuals at elevated risk of non-completion, a critical consideration for equity focused prevention and outreach strategies. These findings suggest that explicitly regulating variance in ensemble learning can enhance the reliability of predictive tools used by clinics and community partners to allocate limited resources and prioritize early intervention beyond the clinic.

7

Metabolic Health and Cardiovascular Disease Among Adults with Central Obesity in the United States: Evidence from NHANES 2011–March 2020

Emmanuel Agyei, David Donkor , Samuel Osei , Frederick Frederick , Evelyn Gyau-Boakye , Maxwell Emmie , Adwoa Amoah , Sandra Boateng , Dennis Tsagli , Eunice Akomaning

Introduction: Central (abdominal) obesity is strongly associated with cardiometabolic dysfunction and cardiovascular disease (CVD), but CVD burden varies by metabolic health phenotype. Using nationally representative U.S. data, we assessed whether metabolically unhealthy central obesity (MUCO) is associated with higher prevalent CVD than metabolically healthy central obesity (MHCO), whether CVD prevalence increases with greater metabolic abnormality burden, and whether these associations differ by age, sex, and race/ethnicity.

Methods: We conducted a cross-sectional analysis of NHANES 2011–March 2020 among adults aged ≥20 years with central obesity defined by Adult Treatment Panel III waist circumference criteria (≥102 cm in men; ≥88 cm in women). Metabolic phenotype was defined by four abnormalities: elevated blood pressure, dysglycemia, low HDL cholesterol, and hypercholesterolemia. Participants were classified as MHCO (0–1 abnormality) or MUCO (≥2 abnormalities), with abnormalities summed (0–4) to assess dose–response. The outcome was self-reported physician-diagnosed CVD. Survey-weighted Poisson regression with log link estimated adjusted prevalence ratios (PRs).

Results: Among 11,657 centrally obese adults (representing 128.4 million U.S. adults), 6,997 were MHCO and 4,660 MUCO. Weighted CVD prevalence was higher in MUCO than MHCO (15.7% vs 7.3%). After adjustment for age, sex, and race/ethnicity, MUCO was associated with greater CVD prevalence (PR=1.48; 95% CI: 1.30–1.68). Each additional metabolic abnormality was associated with a 29% higher CVD prevalence (PR=1.29; 95% CI: 1.21–1.38). The relative association was strongest among adults aged 20–39 years despite low absolute prevalence.

Conclusion: Among U.S. adults with central obesity, metabolic unhealthiness is linked to substantially higher CVD prevalence in a graded, dose–response manner, supporting phenotype-based cardiovascular risk stratification beyond waist circumference alone.

8

Structural Drivers for Racial Disparity in Preventable Hospitalizations: A Machine Learning Analysis of U.S. Counties

Keshav Jha

Introduction: Preventable Hospitalizations are a widely used metric to indicate access to primary care and upstream social determinants of health (SDoH). Racial disparities in these hospitalizations reflects the presence of structural inequities beyond clinical factors. While many of these disparities are well documented, less is known about which county level structural conditions shape this inequity and whether drivers differ across high and low racial disparity counties. Identification of these structural patterns is crucial to develop equity focused prevention strategies.

Methods: Using 2025 County Health Rankings analytic data (n = 1444 U.S. counties), we constructed a Black-White racial disparity ratio defined by the rate of preventable hospitalizations of black Medicare beneficiaries divided by that of White beneficiaries. Twelve structural SdoH indicators were selected that include measure of housing instability, insurance coverage, food insecurity, and educational attainment. A random forest regression with 5-fold cross validation was used to model continuous disparity. Stratified analysis compared feature importance across high-disparity and low-disparity counties. A secondary classification model evaluated the ability of structural drivers to predict high disparity counties.

Results: Of the counties analyzed, structural factors explained 14.8% of the variation in continuous disparity. Severe housing problems, uninsured rate, food insecurity, primary care provider ratio, and education attainment emerged as leading predictors. Analysis between high and low disparity counties showed difference in predictor prevalence. Educational attainment played a larger role in low-disparity counties. In secondary classifications structural predictors identified high disparity counties with an AUC of 0.739.

Conclusion: County level structural features account for a measurable portion of racial inequities in preventable hospitalizations and can distinguish high disparity counties. Structural patterns across counties suggest that equity-focused strategies should focus on access constraints and quality of life features. These findings support context-specific prevention strategies.

9

Associations of Difficulty Seeing or Refractive Error Correction with Mental Health and Social Outcomes in Children

Priyanka Ramulu, Courtney Kraus

Introduction: Using the National Health Interview Survey (NHIS) from 2019-22, we examined associations between refractive error correction and difficulty seeing with mental health outcomes.
Methods: Guardians of 28,168 children ages 5-17 reported whether children wore refractive error correction or had difficulty seeing; associations of each with mental health outcomes were determined in multivariable models adjusting for age, sex, developmental delay, race, region, insurance coverage, vision insurance, parental education, and income-poverty ratio.
Results: Compared to those without difficulty seeing, kids with difficulty seeing were more likely to report depressive symptoms [OR=1.56 (1.31-1.86), p<0.001], anxiety [OR=1.76 (1.48 to 2.09), p<0.001], difficulty making friends [OR = 2.02 (1.64-2.50), p<0.001], mental health/behavior medication [OR= 1.66 (1.29-2.13), p<0.001] , or therapy/counseling [OR= 1.59 (1.28-1.97), p<0.001]. Compared to children without refractive error correction, kids wearing refractive error correction were more likely to report depressive symptoms [OR=1.21 (1.11-1.33), p<0.001], anxiety [OR= 1.24 (1.14-1.36), p<0.001], difficulty making friends [OR=1.19 (1.05, 1.35), p=0.008] mental health/behavior medication [OR = 1.48 (1.29-1.70), p<0.001], or therapy/counseling [OR= 1.25 (1.11 - 1.40), p<0.001].
Conclusion: United States children with refractive error correction or difficulty seeing experience a higher rate of mental health disturbances, similar across all study years.

10

Unmet Social Needs by Clinical Risk Profile in Dual-Eligible Patients: Implications for Targeted Interventions

Abigail Rader, Scott Heiser, Erica Webb, Robert Overton, Oyinkansola Ajanaku, Azalea Kim

Introduction: Dual-eligible Medicare beneficiaries have complex medical and social needs, yet face fragmented care across two insurance programs, creating gaps in coverage, coordination, and service delivery. Dual-Eligible Special Needs Plans (D-SNPs) integrate care for this population, but with the heterogeneity and complexity of these patients amidst finite resources, organizations must decide which patients receive intensive intervention and what that intervention looks like. We examine whether a clinical risk stratification algorithm can reveal meaningful variation in the type and co-occurrence of unmet social needs (SN) across risk groups, informing targeted resource allocation.
Methods: We conducted a retrospective analysis of dual-eligible patients enrolled in a D-SNP plan in Southeast Michigan who completed a home-based clinical encounter between July 2023 and May 2024. During these visits, community health workers administered structured SN screening items adapted from the AHC Health-Related SN Screening Tool across five domains: food insecurity, housing instability, utility needs, safety concerns, and loneliness. Patients were classified into low-risk (LR), rising-risk (RR), and high-risk (HR) groups using an XGBoost machine learning clinical risk stratification model trained on demographics, morbidity burden, behavioral health (depression, anxiety, PTSD), medication complexity, and labs to predict a 6-month composite utilization outcome. Unmet social needs were compared between HR and combined LR/RR groups using chi-square tests.
Results: Among 1,399 D-SNP enrollees (mean age 64.1 ± 12.5 years; 64.1% female), 562 (40.2%) screened positive for at least one unmet SN, and 141 (10.1%) had two or more. Of these, 650 (46.5%) were classified as LR, 465 (33.2%) as RR, and 284 (20.3%) as HR. Rates of any positive screen were similar across groups. HR patients had the highest rate of 2+ unmet needs, 32 (11.3%), compared with RR, 46 (9.9%), and LR, 63 (9.7%). Compared with LR/RR patients, HR patients had significantly higher rates of housing instability (12.7% vs 7.7%, $p = 0.01$) and safety concerns (9.9% vs 5.1%, $p < 0.01$), while LR/RR patients had significantly higher rates of loneliness (21.1% vs 14.4%, $p = 0.02$) (Table 1). Food insecurity and utility needs did not significantly differ.
Conclusions: Unmet SNs are highly prevalent in D-SNP patients across all risk strata, underscoring the complexity of this population wherein even comparably lower-risk patients are not low-need. However, HR patients show a slightly higher rate of co-occurring needs, and the nature of those needs differs. Organizations serving dually eligible beneficiaries should use patient identification methods to deploy scarce clinical and non-clinical resources. Risk stratification in combination with proactive screening using fit-for-purpose social needs instruments can help refine interventions to target specific gaps.

11

Project Haven: A Student-Led Community Resource Navigation Initiative Addressing Social Determinants of Health Across North Carolina

Harsha Rajkumar, Romit Chunduri, Neil Nimmagada, Govind Gurnani, Alec Vazquez

Introduction: Social determinants such as food insecurity, housing instability, and limited access to community resources play a major role in shaping health outcomes. However, many individuals struggle to navigate fragmented social service systems, leaving critical needs unmet even when resources exist. Project Haven is a student-led initiative designed to address this gap by connecting community members with local services that support health and stability beyond the clinical setting.
Program Description: Project Haven operates through partnerships with NC211, the Duke School of Medicine Root Causes program, the North Carolina Red Cross, and the North Carolina Department of Adult Correction. Through these collaborations, the program leverages existing statewide referral networks to identify individuals in need of assistance and facilitate connections to services such as food assistance, housing support, disaster relief, and reentry resources across multiple counties in North Carolina. Student volunteers assist individuals in identifying unmet social needs, navigating community resources, and facilitating referrals through structured service platforms.
Evaluation Plan: The program is currently implementing a program evaluation framework to assess its impact. Data being collected include types of social needs identified, referral categories, geographic distribution of requests, referral completion rates, and follow-up outcomes related to service access. Additional data on community partner engagement and volunteer activity are being tracked to evaluate program implementation and scalability.
Conclusion: By strengthening connections between community members and existing service networks, Project Haven highlights the potential of student-driven, cross-sector collaborations to address social determinants of health and promote health equity beyond traditional healthcare settings.

12

Helpdesk Benefit Booth: A Project to Address Food Insecurity in Durham, NC

Daliya Rizvi, Ariana Vaida, Austin Brown, Sai Gayathri Kurup, Hannah Auddino, Susan Spratt

Introduction: Food insecurity is a critical social determinant of health linked to chronic disease, poor mental health outcomes, and increased healthcare utilization. Although federal programs, such as the Supplemental Nutrition Assistance Program (SNAP) and the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), aim to mitigate food insecurity, there are structural barriers that continue to limit enrollment, most prevalent of which are complex and time-intensive application processes. Participation gaps persist across North Carolina, highlighting the need for accessible, community-based solutions that address barriers beyond eligibility alone.
Methods: The Duke Help Desk Benefit Booth project aims to support low-income individuals and families in Durham, NC, particularly those who are eligible for SNAP and WIC but not currently enrolled. This project is a community-centered initiative designed to reduce enrollment barriers through direct assistance in-person or asynchronously. The established Help Desk model made up of students who are trained to become “community resource navigators” (CRNs) will provide SNAP and WIC application support, benefits education, and individualized guidance. Key implementation steps include stakeholder engagement, formal benefits-enrollment training, strategic site selection, and iterative evaluation to ensure cultural competence, responsiveness, and long-term feasibility.
Results: In its initial phase, The Benefit Booth project has trained 5 community resource navigators in the SNAP application, hosted a health policy briefing on SNAP and WIC funding for Duke students, reached several local community organizations, hosted a pop-up booth at Root Causes, donated over 100 food items to Bagging It 4 Kids, and is planning another pop-up booth at a local clinic. The Benefit Booth is also planning to implement mandatory SNAP training for CRNs in the Spring recruitment cycle. Anticipated outcomes include increased SNAP and WIC enrollment, reduced administrative barriers, and improved participant confidence in navigating public assistance systems.
Conclusions: By shifting from passive referral models to proactive community engagement, the Benefit Booth project advances health equity beyond the clinic and addresses food insecurity through sustainable, community-driven interventions.

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Access to health for la comunidad latina: a community-engaged curriculum designed to promote understanding of insurance

Sara Bernate Angulo, Harsha Rajkumar, Romit Chunduri, Neil Nimmagada, Govind Gurnani, Alec Vazquez

Introduction: Social determinants such as food insecurity, housing instability, and limited access to community resources play a major role in shaping health outcomes. However, many individuals struggle to navigate fragmented social service systems, leaving critical needs unmet even when resources exist. Project Haven is a student-led initiative designed to address this gap by connecting community members with local services that support health and stability beyond the clinical setting.

Project Haven operates through partnerships with NC211, the Duke School of Medicine Root Causes program, the North Carolina Red Cross, and the North Carolina Department of Adult Correction. Through these collaborations, the program leverages existing statewide referral networks to identify individuals in need of assistance and facilitate connections to services such as food assistance, housing support, disaster relief, and reentry resources across multiple counties in North Carolina.

Student volunteers assist individuals in identifying unmet social needs, navigating community resources, and facilitating referrals through structured service platforms. The program is currently implementing a program evaluation framework to assess its impact. Data being collected include types of social needs identified, referral categories, geographic distribution of requests, referral completion rates, and follow-up outcomes related to service access. Additional data on community partner engagement and volunteer activity are being tracked to evaluate program implementation and scalability.

By strengthening connections between community members and existing service networks, Project Haven highlights the potential of student-driven, cross-sector collaborations to address social determinants of health and promote health equity beyond traditional healthcare settings.

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Descriptive analysis of Student-Led Food Delivery on Food Insecurity and Social Isolation Among Durham Seniors

Jeana Chun, Ananya Koneti, Maguette Seye

Introduction: Food insecurity and transportation barriers disproportionately affect older adults, contributing to poor nutrition, chronic disease exacerbation, and social isolation. Although healthcare systems are increasingly screening for social determinants of health, many lack sustainable mechanisms to address identified needs. Student-led community partnerships may help bridge gaps between academic medical centers and structurally marginalized populations.
CARE Connections is an interdisciplinary, student-run program launched in 2020 to reduce social isolation and address social drivers of health among older adults in Durham, NC. We describe the food delivery component of this longitudinal program and evaluate whether it reaches communities with higher social vulnerability. This analysis assesses whether a student-led delivery model is serving census tracts with high social vulnerability and examines its potential role in addressing food insecurity and isolation among Durham seniors.
Methods: CARE Connections is a student-run program providing weekly well-check calls, resource referrals, and food delivery for older adults in Durham. The delivery team partners with the Feed My Sheep food pantry to provide food to homebound, food-insecure seniors identified through community partnerships. The program currently serves 51 households across six Durham ZIP codes (27701, 27703, 27704, 27705, 27707, 27713), with deliveries occurring twice monthly. To evaluate whether the program reaches communities facing structural disadvantage, household addresses were geocoded to census tracts and linked to the 2022 CDC Social Vulnerability Index (SVI) for North Carolina. The overall SVI percentile ranking was used to characterize community-level vulnerability.
Results: The program delivers food twice monthly to 51 senior households. In 2025, 702 deliveries were completed. SVI is a measure of community vulnerability based on factors including poverty, disability, housing, and transportation, with higher scores (0–1) indicating more vulnerability. Among households with available data (n = 50), the mean census tract SVI percentile was 0.84. Eighty percent of households were located in census tracts within the highest national quartile of vulnerability (SVI ≥ 0.75), and 66% were located in the highest decile (SVI ≥ 0.90).
The largest concentration of participating households was in ZIP codes 27707 and 27701, suggesting the program primarily operates in neighborhoods with high socioeconomic and structural vulnerability.
Conclusion: The CARE Connections delivery program reaches communities where structural barriers to food access are most pronounced. Twice-monthly deliveries, combined with well-check calls and resource referral, create a sustained structure for food access rather than a one-time intervention. This model illustrates how student-led, community-integrated programs can contribute to local infrastructure addressing social drivers of health.

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Bystander CPR Response Confidence: Does Educational Level Matter?

Skyler Gubbels, PA-S (1), Samantha Fortier MPH (1), PA-S, Haejin Lovelace, PA-S (1), Heather R. Batchelder, MA, LPA, HSP-PA (2), Janelle Bludorn, MS, PA-C, DFAAPA (2)

Background: Out-of-hospital cardiac arrest (OHCA) is a leading cause of mortality in the United States with survival dependent on initiation of bystander cardiopulmonary resuscitation (CPR). Although bystander CPR is associated with improved survival and neurological outcomes, delivery is uneven. Analyses of national registry data demonstrate persistent racial and sex disparities in administration of bystander CPR and subsequent outcomes following OHCA, especially in historically redlined neighborhoods. This study investigates chest compression-only CPR (CO-CPR) alongside AED instruction to individuals within historically marginalized communities to investigate understanding and attitudes towards delivering CPR and using an AED in the context of education level. Specifically, we aim to address how level of education impacts attitudes towards initiating and carrying out CPR as a bystander.

Methods: This descriptive study assessed how completing CO-CPR training impacted confidence in performing bystander CPR, especially in minority communities. In 2024, participants (n=61) were asked to complete two anonymous surveys: one prior to completing the CPR course and one immediately after. Surveys assessed demographics, CPR/AED experience, barriers to attending CPR training, and perceived difficulty in performing CPR post training. Descriptive analyses were used to summarize participant characteristics. Paired T-tests evaluated difference in participants' comfort, importance, and likelihood in performing CPR, by education level. Mixed ANOVA evaluated where there were significant differences in confidence performing CPR by education level (levels: High School/GED or Some College; College; Graduate School & Above).

Results: Across all education levels, paired t-tests showed the largest increases in confidence for applying AED and performing CPR, while confidence in calling 911 did not change significantly.A mixed ANOVA showed that while participants' confidence in reacting if they saw someone collapse with SCA, checking for responsiveness from the individual, finding an AED nearby, applying the AED, performing CPR in a real-life situation, and continuing CPR until a medical team arrived significantly increased between pre- and post-workshop, it did not significantly differ by education level. Further, confidence in asking someone to call for help using 911 did not significantly change pre- and post-workshop.

Discussion: Confidence in performing CPR significantly changed between pre- and post-surveys, indicating an interaction over time; however, no significant difference was found based on education level. Regarding limitations, the relatively small sample size varied across different education groups. Although no significant interaction related to education was observed, this does not imply that such an interaction is absent. Future research aims to evaluate education's impact on confidence levels by utilizing a bigger sample.

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Integration of Student-Led Social Care Navigation into Endocrinology Clinics to Address Social Determinants of Health

Austin Brown, Anika Mohan, Perisa Ashar, Will Sun, Mary Ho, Allyson Rhinehard, Susan Spratt

Introduction: Unmet social needs, including food insecurity and barriers to public benefits, are major drivers of poor outcomes in patients with endocrine diseases such as diabetes and obesity. Social instability undermines medication adherence, nutritional management, appointment attendance, and continuity of care, contributing to poor glycemic control and persistent health disparities. Despite growing recognition of the importance of social care integration, many outpatient clinics lack scalable, workflow-integrated infrastructure to identify and track social needs during routine care.
Methods: We implemented a student-led social care navigation program embedded within the outpatient Duke Endocrinology Clinic in Durham, North Carolina. Undergraduate volunteers were trained in motivational interviewing, health systems navigation, and standardized social needs workflows. Students utilized NCCARE360, a statewide electronic social referral platform enabling referral tracking, documentation, and case resolution. We conducted a retrospective analysis of patients supported between February 1, 2023 and October 29, 2025.
Results: During the study period, 477 patients (mean age 53.8 ± 16.8 years; 59.2% female; 45.8% African American) were supported, generating 1,027 referrals across multiple social need domains. The most frequently identified needs included benefits eligibility screening (45.2%), access to food pantries (9.5%), and emergency food assistance (8.9%). Among community-based referrals, 30.4% were accepted, while others were rejected (28.0%), completed off-platform (19.6%), auto-recalled or recalled, or remained in intermediate workflow states. At the patient level, 112 of 477 patients (23.5%) had at least one external referral accepted. Among referrals that progressed to cases, resolution rates varied by service domain. Food assistance cases had the highest proportion resolved (42.7%). Resolution rates were also notable for benefits navigation (37.5%) and clothing and household goods (41.2%), but lower for utilities (1.9%), transportation (4.5%), and physical health services (12.9%). Across domains, unresolved or open cases commonly reflected inability to contact clients, service unavailability, or ineligibility.
Conclusions: Embedding a student-led social care navigation program within endocrinology clinics enabled systematic identification, referral, and case-level resolution of social needs using a statewide electronic platform. Despite substantial attrition, meaningful proportions of patients obtained services, highlighting the value of integrating social care into routine endocrine practice. This model offers a scalable, policy-aligned approach to expanding clinic capacity while providing experiential education in health equity and systems-based care.

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Pediatrics Supporting Parents: Creation and Implementation of an Early Relational Health Scavenger Hunt in Pediatric Primary Care

Eujin Chung, Tiffany Solomon, Danielle Little, Dr. Debra Best, Dr. Elizabeth Erickson

Introduction: Pediatrics Supporting Parents (PSP) is a national initiative to transform pediatric care to promote early social-emotional development (SED) and foster parent-child relationships. One of PSP's community partnerships is the Durham Partners for Early Relational Health (DPERH). DPERH is a network of Duke pediatricians, community experts, and parent partners that implements novel practices to support PSP's goals in a community-informed manner. This project aims to create an Early Relational Health Scavenger Hunt (ERHSH) that promotes practices for early childhood SED to amplify the experience of pediatric visits at the Duke Children's Primary Care Clinic in North Durham.
Methods: DPERH is composed of community rooted leaders, pediatricians, and student interns. PSP created the ERHSH as a novel approach to wait times during pediatric visits at the clinic. The group created English and Spanish scavenger hunts for three age groups (See Figure 1). Age-appropriate activities encourage collaboration between the child and caregiver(s) to promote SED and demonstrate models of positive parenting that can be replicated at home. Children can exchange a completed scavenger hunt for a token to use at the clinic's free book vending machine. Parents are encouraged to provide feedback on the activity via a QR code to a survey on the back of the ERHSH.
Results: The ERHSH was successfully launched in November of 2024 and is now being offered to tens of patients daily. The scavenger hunts are printed on paper and placed at parent resource walls of four clinic areas. Clinic staff and PSP interns promote the scavenger hunt in clinic and support families in the use of the book vending machine. PSP interns restock the scavenger hunts and iteratively edit the activities as necessary. Since the launch, clinic staff have observed family enthusiasm about the ERHSH and calmer waiting rooms.
Conclusions: The ERHSH is unique as it takes advantage of wait times during pediatric visits. In contrast to typical pediatric appointments, the ERHSH provides holistic support to families, at every point of the visit, by providing models of child engagement that may be replicated at home, propagating the ERHSH's aims to improve SED and early relational health. Future directions include in-clinic observations to quantify and qualitatively evaluate the use of the ERHSH. Furthermore, responses on the feedback form should be analyzed to understand the impact of the ERHSH and iteratively use community feedback for improving scavenger hunt activities.

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Post-Hospitalization Medication Adherence in Homebound patients: Preliminary Findings from the Just for Us Program

Claire Sibold, Seth Kornbau, Tia Najam, Carry Mayo, Kaitlyn Granda, Sheila Anderson, Crystal Bethea, Carol Siebert, Howard Eisenson

Introduction: Medication nonadherence is a preventable contributor to increased mortality, morbidity, and healthcare costs in the United States. It is problematic in the post-hospitalization period, where medication adherence has been cited as a modifiable risk factor for hospital readmission rates. Home-based interventions that target medication adherence in the post-hospitalization period show promise in addressing some of these challenges. Just for US (JFU) is a Duke Community Health and Lincoln Community Health Center collaboration that provides home-based healthcare to homebound older adults in Durham. Given that JFU providers see home-bound patients for hospital follow ups, there is an opportunity to assess medication adherence in this population to help guide future interventions to support the transition from hospital to home.
Objective: To evaluate medication adherence in the JFU population at hospital follow-up visits between 2024-2025.
Methods: We retrospectively reviewed patients enrolled in JFU between January 2024 - April 2025 following IRB approval. Two members of the study team independently reviewed electronic health records to extract information. Admission diagnoses and discharge medication changes were determined by reviewing discharge summaries available in Epic. Hospital follow-up visit notes with JFU providers were reviewed for mention of medication adherence.
Results: 76 JFU patients were included in the study. Of these patients, 55% (n=42) were hospitalized at least once in the study period. There were 85 total hospitalizations among all patients combined. The five most common admission diagnoses among all recorded hospitalizations were congestive heart failure (n=9 admissions), urinary tract infection (n=7), respiratory failure/dyspnea (n=6), pneumonia (n=5), and sepsis (n=4). There were 51 total JFU hospital follow up visits within the study population. The average time to follow up was 11.5 days (min.=2, max.=34), for patients whose first health care encounter after hospitalization was with a JFU provider. Post-discharge home visit notes were reviewed for mention of medication non-adherence/confusion. Hospitalizations were assigned as having no difficulties with post-discharge medications (n=27), difficulties with adhering to discharge medication instructions (n=11), uncertainty about adherence due to lack of mention in note (n=27), and no medication changes related to discharge diagnosis (n=21).
Conclusion: Over half of homebound adults in our sample had a hospitalization within the study period, and several patients had multiple hospitalizations. Time to follow-up data shows JFU clinicians provide timely home-based hospital follow-up care for a high-risk population.

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Impact of post-discharge meal delivery on hospital readmissions among food-insecure older adults discharged home

Tara Kinard, Susan Spratt, Abby Hoffman, Kim Smashe, Margaret Holtam, Charlene Garvin, Eugenia McPeek-Hinz

Problem: As patients transitioned from hospital to home, inconsistent workflows across care settings and limited operational pathways hindered reliable identification of food-insecure older adults and timely connection to available community resources. As a result, eligible patients were inconsistently referred to the Meals on Wheels (MOWs) Post Discharge Meals program, despite the program's capacity to meet this need.
Background: Older adults experiencing food insecurity face higher risk for complications and hospital readmissions. Although post discharge meal delivery programs show promise in supporting recovery at home, evidence remains limited, and health systems often lack standardized processes to screen for food insecurity and link patients to community based nutrition supports such as MOWs.
Aim: Evaluate the impact of short term post discharge meal delivery on hospital readmissions among food insecure older adults and implement a scalable, reliable framework for integrating food insecurity screening, resource assessment, and referral workflows into discharge and follow up processes.
Evaluation: Retrospective analysis
Comparison: Patients who received meals vs. patients who did not
Adjusted for: Age, sex, Area Deprivation Index (ADI), Epic Readmission Risk Score
Outcome: Meal receipt was associated with significantly lower 14-day hospital readmissions, with attenuated effects by 30 days
This program would not have been successful without the Duke WELL Care Transitions Team who implemented the identification and referral to MOWs within the transitional care call workflow. For the entire duration of the program from 9/07/2022 to 9/29/2025: 1404 referrals for 1241 patients were sent. Of these 951 were processed by the centralized Meals on Wheels of North Carolina and forwarded to local senior meal delivery entities. Of the 951 successfully forwarded Duke Health sent 913 (96%) of all referrals across the state.

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Utilizing Telephonic Outreach to Improve Blood Pressure Control Among Patients at a Federally Qualified Health Center (FQHC)

Jenifer Allen, Holly Biola, Bradi Granger, Tiffany Hayes, Seronda Robinson, Daniel Tounsel III, Caroline Metz, Josh Lin, Nishka Dalal, Melanie Espinoza-Carmona, Samantha Coke, Amylyn De Paz-De Paz, Perisa Ashar, Jerry Barajas-Nuñez, Laura Norman

Introduction: Hypertension (HTN), a leading cause of preventable stroke, kidney and cardiovascular disease, and death, remains uncontrolled in over 45% of Americans. Among patients receiving HTN care at FQHCs, only 60.1% had controlled BP in 2019. This study evaluated a telephone-based outreach intervention aimed at improving BP control through self-management in this population.
Methods: A pre–post, single-cohort telephone-based quality improvement study was conducted from August to December 2025 at a Durham County Federally Qualified Health Center (FQHC). Patients with severe hypertension were contacted by trained student ambassadors (SAs) who provided hypertension education, goal-setting support, BP self-monitoring guidance, and referrals for health-related social needs (HRSN) across three calls. During in-person “Hypertension Heroes” classes, patients received free BP monitors and education on BP self-monitoring and lifestyle modification.
Results: Among 284 participants, the average age was 56.3 years and 47.5% were female while 52.4% were male. To date, 129(45.4%) have completed one or more calls, 71(55%) of those have expressed interest in acquiring a BP cuff, and 10(7.75%) have set goals. The mean pre-intervention BP was 155/87 mmHg. Among those reached, 14(10.9%) have reported social needs ranging from medication access to food insecurity. Additionally, 71(55%) patients have reported additional needs that require follow-up. Post-intervention BP will be assessed in January 2026.
Conclusions: The final results will illustrate how providing patients with appropriate skills and resources can improve BP control. They will also highlight the role of patient engagement and HTN education in promoting regular BP monitoring and reporting.

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A Comparative Study of the Cuban Healthcare System: Lessons for Accessible and Humane Medical Care

Sagnik Das

Introduction: Healthcare systems worldwide vary in their structure, accessibility, and patient outcomes. Cuba's Family Doctor Program was launched in 1984 as a key part of Cuba's healthcare system. It focuses on preventative care, universal coverage, and patient-centered treatment. Each family doctor is responsible for the primary care of a small population, often around 600 to 800 people. The objective of this study is to determine whether Cuba's patient-centered Family Doctor Program leads to comparable health outcomes to the U.S. despite limited resources and explore lessons that could be applied to improve healthcare outcomes in other parts of the world with limited resources.

Methods: A mixed-methods approach was employed, incorporating both quantitative and qualitative analyses. Public health data from the World Health Organization was collected across ten key health indicators, including life expectancy and neonatal mortality rates, to compare Cuba and the U.S. A Principal Component Analysis (PCA) was performed to determine the weight of each health indicator in assessing healthcare system effectiveness. Scores were assigned to Cuba and the U.S. by calculating the percent difference between each indicator's value and the global average, then multiplying by the indicator's weight. Following this, scores were summed across ten indicators to generate a final comparative metric of health outcomes. Additionally, semi-structured interviews with Cuban family doctors, medical students, and American professors at the Latin American School of Medicine (ELAM) provided qualitative insights into Cuba's healthcare practices. Thematic analysis was conducted to contextualize the statistical findings.

Results: The findings indicate that Cuba's Family Doctor Program achieves comparable health outcomes to developed nations like the U.S and provides very good access to care. Cuba is able to achieve comparable healthcare outcomes with less resources, thus making the Family Doctor Program quite efficient. Interviews with medical professionals and locals in Cuba highlight the Family Doctor program's emphasis on universal healthcare coverage, preventative medicine, and a humanitarian approach to medicine, despite limited resources and low physician salaries, as key contributors to that efficiency.

Conclusion: Cuba's healthcare outcomes underscore the benefits of a patient-centered approach. These results suggest that incorporating elements of Cuba's system—such as community-based primary care and expanded preventative initiatives—could improve healthcare efficiency in other healthcare systems with low resources (similar to Cuba). However, challenges like economic sustainability and systemic reform must be carefully considered in adapting these lessons.

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AV3: A Novel Approach to Counteracting Resistant Ae. aegypti

Ishaan Narsinghani, Felipe Andreazza, Funmilayo Egunjobi, Ke Dong

The mosquito Aedes aegypti has been widely established across Sub-Saharan Africa, South America, and North America as a known vector of dengue virus, yellow fever, Zika, among others, posing a pervasive threat to global health. For decades, vector control strategies have centered around a class of insecticide termed pyrethroids to control Ae. aegypti populations globally, preventing downstream viral transfer. Such insecticides target the voltage-gated sodium channel (Nav)––a transmembrane protein that is critically involved in sodium-ion flow, the generation of action potentials, and, ultimately, neurologic function. In targeting Nav, such pyrethroids have proven highly-effective, insect-specific targets of Aedes aegypti for decades. However, as humans have continued to apply pyrethroids, certain pyrethroid-resistant strains of Ae. aegypti have increased in their relative frequency worldwide. The resistance is often caused by mutations (termed knockdown resistance, or kdr) that are frequently located at or close to pyrethroid binding sites 1 and 2 (PyR1, and PyR2) on Nav. Further, as Ae. aegypti occupies a growing number of ecological niches, identifying a novel mechanism to counteract knockdown resistance––and prevent downstream vector-borne diseases–– is essential. Thus, to manage the substantial public health threat of knockdown resistance, the present study tests a novel short peptide toxin from the sea anemone Anemonia viridis, termed AV3, against pyrethroid-resistant Ae. aegypti. By operating on an entirely new binding site––namely receptor site 3 in domain IV of the Nav––we provide compelling evidence that AV3 will circumvent the tremendous rates of knockdown resistance selected by pyrethroids in Ae. aegypti field populations. However, due to the novelty of AV3 as an insecticide, its mode of action on Nav is not well understood. Thus, the present study serves as the first to determine how downstream mutations on Nav modulate AV3's effects on insect sodium channels. Here, we employ site-directed mutagenesis to introduce targeted mutations into insect Nav, express these mutant channels in Xenopus oocytes, and perform Two-Electrode Voltage Clamp (TEVC) recording to assess how AV3 modulates wild-type and mutant insect Nav function. We provide compelling evidence that Arginine to Glutamate missense mutations at charge position one, DIV, S4 of Nav increase AV3's effects by prolonging sodium influx. Additionally, charge reversal at the fourth and sixth positive residues confers resistance to AV3's effects. By understanding how specific downstream mutations modulate AV3 susceptibility, we establish the first framework for predicting when AV3 acts as an effective agent against field-relevant Ae. aegypti genotypes. Ultimately, in establishing AV3 as an effective and mammalian-safe tool against virus-harboring Ae. aegypti, the present study establishes a new, preventative, epidemiological approach to combatting vector-borne diseases worldwide.

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Longitudinal associations between patient and caregiver quality of life following hematopoietic stem cell transplantation

Daniel Yang, Jesse Troy, Brenda Branchaud, Kris Herring, Areej El-Jawahri, Thomas Leblanc

Introduction: Caregivers of patients undergoing hematopoietic stem cell transplantation (HSCT) experience high rates of psychological distress, yet patient-level factors most strongly associated with caregiver outcomes over time remain poorly understood. We evaluated longitudinal associations between patient and caregiver quality of life (QoL) following HSCT.
Methods: We conducted a secondary analysis of the PROTECT randomized trial of integrated palliative care during HSCT. Among enrolled patient-caregiver dyads, we measured patient (FACT-BMT) and caregiver (CarGOQoL) QoL at baseline, week 2, and months 3, 6, and 12. Only patient-caregiver dyads that completed both measures were included in analyses at each timepoint. Linear mixed-effects models were used to assess the relationship between changes in patient QoL and changes in caregiver QoL, adjusting for time and treatment arm.
Results: Among 186 enrolled patient-caregiver dyads, patients had a mean age of 55.2 ± 12.4 years and 65% were male. Mean CarGOQoL remained stable from baseline through month 12 (range: 74.1–75.9). FACT-BMT declined at week 2 (91.9 ± 20.4) compared to baseline (105.0±18.8), then recovered and improved by month 3 through month 12 (Table 1). In multivariable mixed-effects modeling, within dyads, visits where the patient's QoL exceeded their usual level were associated with higher caregiver QoL (β=0.11 per 1-point above the patient's mean; $p<0.001$), adjusted for time and arm.
Conclusions: While average caregiver QoL remained stable throughout the follow-up period despite changes in average patient QoL, individual caregiver QoL closely tracked their patient's QoL over the post-HSCT follow-up period. Patient-reported QoL represents a clinically meaningful marker to identify at-risk caregivers. Interventions targeting patient QoL may yield dual benefits for patient-caregiver dyads.

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Relational Autonomy and Workforce Precarity in Community-Based Disability Services

Samantha Cohen

Introduction: Community-based disability services in the United States prioritize autonomy, independence, and community integration as key outcomes. Policies such as Medicaid Home- and Community-Based Services (HCBS) waivers and self-directed models have expanded opportunities for disabled adults to live outside institutions. However, these systems depend on a direct care workforce that is chronically underpaid, understaffed, and administratively burdened. While autonomy is framed as an individual outcome, less attention is paid to the labor, funding structures, and family resources required to sustain it. This study examines how autonomy is produced and constrained within community-based services, highlighting structural gaps in workforce support and service delivery.

Methods: This qualitative ethnographic study draws on three years of participant-observation as a Direct Support Professional (DSP) in a shared home of two adult women with disabilities. Data include fieldnotes, semi-structured interviews with residents, DSPs, and family members, and analysis of Medicaid and HCBS policy frameworks. The study centers three stakeholder groups (service recipients, direct care workers, and families) to examine how policy structures shape daily life. Thematic analysis focused on decision-making, staffing patterns, documentation requirements, and resource disparities within self-directed and agency-managed models.

Results: Findings show that autonomy in community-based care is contingent upon workforce stability, funding adequacy, and family involvement. Everyday decisions about food, recreation, and health are shaped by safety protocols, documentation demands, and caregiver discretion. DSP labor, which is embodied, emotional, and often extending beyond paid hours, sustains the appearance of independence while remaining undervalued. Staffing shortages and turnover limit community participation and heighten anxiety about institutionalization. Disparities in family financial support and housing ownership further influence power dynamics within shared living arrangements. Autonomy emerges not as an individual capacity, but as a resource-dependent and uneven outcome of policy design and labor conditions.

Conclusions: These findings suggest that sustaining meaningful community living requires greater investment in the direct care workforce and more equitable funding structures. Strengthening wages, training, and compensation for off-the-clock labor may improve care continuity and reduce instability in HCBS systems. By reframing autonomy as a relational and structurally supported outcome, this study contributes to policy discussions on disability rights, workforce development, and health equity in long-term services and supports.

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Themes and Barriers in Financial Toxicity for Cancer Clinical Trial Participants

Lucy Fu, Matthew Libre, Ernaya Johnson, Stephanie Sun; Sharon Shriver, Mark Fleury

Introduction: In the United States, patients seeking participation in cancer clinical trials face significant financial obstacles, such as transportation and housing. Crowdfunding on platforms like GoFundMe (GFM) has become popular for raising funds to cover medical expenses and other necessities. Understanding the cancer-related crowdfunding economy, especially the discrepancy between funds requested and received, reveals gaps in health care affordability among survivors. Currently, support for ancillary clinical trial costs is limited due to sponsors' legal concerns under the Anti-kickback Statute. Examining this economy related to clinical trials can identify patient needs and inform policy changes to provide better financial support.

Methods: This was a retrospective observational cross-sectional study using large-scale secondary (web-scraped) data from GFM between January 1, 2021 to May 31, 2023. Of these, OpenAI's large NLP model (ChatGPT, version 3.5) was used to identify entries about cancer clinical trials. Entries not describing individuals seeking financial assistance to participate in clinical trials were excluded (1083 qualified for inclusion). 100 of these were preliminarily analyzed for themes of financial burden caused by transportation, insurance, and employment. We plan to expand thematic analysis to the overall dataset.

Results: Of the preliminary set of 100 patients analyzed, three main categories of financial barriers emerged: transportation, employment disruption, and insurance coverage. Many patients cited barriers in multiple categories, and 47% struggled with transportation, 29% with job disruptions, and 34% with insurance coverage for additional medical expenses. The average financial goal was $30,503.72, which is 54.73% higher than the GFM average among cancer patients.

Conclusion: Preliminary findings suggest that cancer patients pursuing clinical trials face substantial financial toxicity, with crowdfunding campaigns frequently citing transportation costs, insurance gaps, and employment disruptions as major drivers of need. Early analysis suggests potential disparities between requested and received funds, highlighting persistent shortfalls in financial support for trial-related ancillary costs. These findings underscore structural limitations of the current U.S. safety net and the unintended consequences of policies that restrict direct financial assistance from trial sponsors due to concerns about coercion. By characterizing the crowdfunding economy in cancer clinical trial participation, this study provides insight into unmet social and financial needs that may influence trial access and equity. An expanded thematic and quantitative analysis of the full dataset will further clarify these gaps and inform policy efforts to reduce financial barriers, promote equitable trial participation, and strengthen protections for vulnerable patients.

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