BIOGRAPHICAL SKETCH

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NAME: Nadia Liyanage-Don

eRA COMMONS USER NAME (credential, e.g., agency login): NADIALD

POSITION TITLE: Assistant Professor of Medicine

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
Harvard University, Cambridge, MA	BA	05/2012	Neurobiology
Boston University School of Medicine, Boston, MA	MD	05/2016	Medicine
Columbia University Irving Medical Center, New York, NY	Residency	08/2019	Internal Medicine
Columbia University Irving Medical Center, New York, NY	Fellowship	06/2021	General Medicine
Columbia Mailman School of Public Health, New York, NY	MS	06/2021	Epidemiology

A. Personal Statement

I am a practicing general internist and tenure track Assistant Professor of Medicine in the Center for Behavioral Cardiovascular Health (CBCH) at Columbia University Irving Medical Center (CUIMC). In addition to my clinical training in internal medicine, I completed a general medicine research fellowship and earned a master's degree in epidemiology. My overall career goal is to become an independent, federally funded, physician scientist with expertise in the design and implementation of behavioral interventions to improve health outcomes and reduce disparities in cardiovascular disease. Specifically, I am interested in uncovering biopsychosocial mechanisms that lead to poor blood pressure control in underserved patients. I hope to use this understanding to develop, test, and implement blood pressure lowering interventions that are both effective and equitable. My research thus far has examined how factors such as unmet social needs, language preferences, and traumatic medical events affect adherence to preventative cardiovascular medications. I have also collaborated with colleagues at two other large academic medical centers in the U.S. to conduct a multi-site study investigating the impact of the COVID-19 pandemic on blood pressure control in primary care. I worked on developing and evaluating a multicomponent intervention to increase uptake of the recently updated U.S. Preventive Services Task Force guidelines on hypertension screening, including barriers, facilitators, equity, and cost-effectiveness. I currently serve as a co-investigator on an NIH-funded grant led by my primary mentor, Dr. Ian Kronish, which applies human-centered design to implement remote blood pressure monitoring in an inner-city primary care network and to rigorously assess its impact on hypertension quality metrics. In this role, I have studied the effect of the program on improving blood pressure, reducing healthcare costs, and increasing equitable patient engagement in hypertension self-management. I have also successfully obtained my own pilot funding grants, one to test the effectiveness of an app-based intervention for improving mental health and health behaviors in survivors of critical illness, and another to evaluate the feasibility and acceptability of universal medication nonadherence screening in patients with multiple chronic conditions. I recently received a KL2 Mentored Career Development Award from Columbia University to design and test a novel remote monitoring intervention aimed at improving inhaler adherence among patients with COPD. My work has resulted in nearly a dozen manuscripts, most of which have been first-author and published in high-impact journals. I also routinely present my research at national and international scientific conferences and provide peer-review of other articles in my field. Through these experiences, I have gained valuable knowledge and training in the basic principles of patient-oriented research, including intervention design, data collection, and statistical analysis. However, there are several essential skills that I have yet to master to become a well-rounded, productive, innovative clinical investigator

and leader in the field of hypertension disparities research. To achieve these skills, I am applying for an NIH K23 Mentored Patient-Oriented Research Career Development Award. I have proposed a comprehensive plan to obtain advanced training in the following areas: 1) cardiovascular disease epidemiology and disparities, 2) advanced statistical methods in hypertension research, 3) qualitative methodology and intervention design, 4) spatial epidemiology and environmental health, and 5) research dissemination and transition to independence. I have assembled an interdisciplinary team of highly successful NIH-funded senior advisors who are experts in their fields, have extensive experience mentoring early investigators, and will provide complementary skillsets to ensure the success of my research proposal and to foster my continued growth toward independence. Each module of my training plan will include didactics, applied learning, and scheduled meetings with my research team. In parallel, I will carry out the activities of my research proposal, which aims to examine the impact of health-related social needs on blood pressure control, medication adherence, and clinician inertia, as well as explore how programs to screen for and intervene on health-related social needs may be leveraged to improve hypertension outcomes. This structured program of research and career development activities will address the gaps in my training, ensure successful completion of my proposed project, and facilitate my transition into an independent investigator in the field of hypertension disparities research.

1. Gotanda H, **Liyanage-Don N**, Moran AE, Krousel-Wood M, Green JB, Zhang Y, Nuckols TK. Changes in Blood Pressure Outcomes Among Hypertensive Individuals During the COVID-19 Pandemic: A Time Series Analysis in Three US Healthcare Organizations. Hypertension. 2022 Dec;79(12):2733-2742.
2. **Liyanage-Don N**, Birk J, Cornelius T, Sanchez G, Moise N, Edmondson D, Kronish I. Medications as Traumatic Reminders in Patients With Stroke/Transient Ischemic Attack-Induced Posttraumatic Stress Disorder. Stroke. 2021 Jan;52(1):321-324.
3. **Liyanage-Don N**, Cornelius T, Romero EK, Alcántara C, Kronish IM. Association of Hispanic ethnicity and linguistic acculturation with cardiovascular medication adherence in patients with suspected acute coronary syndrome. Prev Med Rep. 2021 Jun 17;23:101455.
4. **Liyanage-Don N,** Fung D, Phillips E, Kronish IM. Implementing Home Blood Pressure Monitoring into Clinical Practice. *Curr Hypertens Rep*. 2019 Feb 12;21(2):14.

Ongoing and recently completed projects that I would like to highlight include:

KL2 TR001874, NIH/NCATS
Shimbo (PI), Role: Trainee, Pilot PI
07/01/2023-06/30/2025
Institutional Career Development Core

P50 MD017341, NIH/NIMHD
Shimbo (PI), Role: Trainee, Pilot PI
12/01/2023-11/30/2024
Investigator Development Core

P30 AG064198, NIH/NIA
Kronish (PI), Role: Co-I, Pilot PI
07/01/2022-06/30/2024
Columbia Roybal Center for Fearless Behavior Change

R01 HL152699, NIH/NHLBI
Kronish (PI), Role: Co-I
06/15/2021-05/31/2026
Implementing Remote Patient Monitoring to Improve Hypertension Control in a Primary Care Network

B. Positions, Scientific Appointments, and Honors

Positions and Scientific Appointments
2023-present Evidence-Based Medicine Preceptor, Columbia University Irving Medical Center
2022-present Program Committee, Climate Change Interest Group, American Psychosomatic Society
2021-present Environmental Health Interest Group, Member, Society of General Internal Medicine
2021-present Research Faculty, Center for Behavioral Cardiovascular Health (CBCH)

2021-present Assistant Professor of Medicine, Columbia University Irving Medical Center
2020-2021 Post-COVID Clinic Director, Columbia University Irving Medical Center
2020-present Subcommittee Chair, CBCH Equity, Diversity, & Inclusion (EDI) Initiative
2020-present Asylum Evaluator, Columbia Human Rights Initiative Asylum (CHRIA)
2020-present Medicine Resident Selection Committee, Columbia University Irving Medical Center
2019-present Ambulatory Medicine Didactic Lecturer, Columbia University Irving Medical Center
2019-present Ambulatory Medicine Clinical Preceptor, Columbia University Irving Medical Center
2019-2021 General Medicine Research Fellow, Columbia University Irving Medical Center
2016-2019 Internal Medicine Resident, Columbia University Irving Medical Center

Honors

2023 ASPIRE! Mentoring Program, Columbia University Irving Medical Center
2023 Inclusivity for Impact, Equity, & Engagement (I2EyE) Scholar, American Psychosomatic Society
2022 Young Investigator Colloquium Scholar, American Psychosomatic Society
2022 Summer Scholar, International Behavioral Trials Network
2021 Early-Stage Investigator Award, Academy of Behavioral Medicine Research
2021, 2023 Awardee, NIH Loan Repayment Program
2021 Postdoctoral Clinical Fellow Research Award, Columbia University Irving Medical Center
2020, 2022 MD Travel Award, American Psychosomatic Society
2019 Medical House Staff Research Award, Columbia University Irving Medical Center
2012-2016 Awardee, Boston University School of Medicine Scholarship
2012 Member, Phi Beta Kappa National Honor Society
2008-2012 Awardee, National Merit Scholarship

C. Contributions to Science

1. Impact of health-related social needs on medication adherence

Background: Medication adherence is a key preventive health behavior, yet many patients do not take their medications as prescribed. This is particularly true for patients from racial and ethnic minority groups, many of whom experience adverse social determinants of health, such as economic instability, unsafe living conditions, and lack of access to medical care. These detrimental social and environmental conditions often give rise to a variety of health-related social needs, or a lack of basic resources (e.g., food, housing) that negatively impact health. Health-related social needs have been strongly linked to disparities and poor health outcomes, yet less is known about their impact on medication nonadherence. I examined electronic health record data from a convenience sample of breast cancer patients at a large academic medical center in NYC to determine the impact of health-related social needs on nonadherence to prescribed endocrine therapy.
Central Findings: Approximately one-quarter of patients were nonadherent to endocrine therapy, which was more common among those of Black race and Hispanic ethnicity. In addition, 20% reported food insecurity, 12% reported housing instability, and 7% reported lack of reliable transportation. Food insecurity and lack of reliable transportation, though not housing instability, were more common in patients who were nonadherent to endocrine therapy, even after adjusting for age, race, and ethnicity.
Influence: This work suggests that medication nonadherence may be a mechanism through which unmet social needs lead to poor health outcomes and disparities. Screening for and addressing health-related social needs may be an effective strategy for improving medication adherence.
Role: I proposed the research hypotheses, planned the analyses, and led the writing.

a. **Liyanage-Don N**, Sathe C, DeStephano D, May B, Lee S, Beauchemin M, Accordino M, Hershman D, Kronish I. Association Between Screen-Detected Health-Related Social Needs and Nonadherence to Endocrine Therapy in Patients with Breast Cancer. Abstract submitted to: Society of General Internal Medicine Annual Meeting; May 2024; Boston, MA.
b. **Liyanage-Don N**, DeStephano D, May B, Sathe C, Lee S, Beauchemin M, Accordino M, Hershman D, Kronish I. Association Between Social Determinants of Health and Self-Reported Medication Nonadherence in an Outpatient Breast Cancer Clinic. Oral presentation at: American Psychosomatic Society Annual Meeting; March 2024; Brighton, UK.
c. **Liyanage-Don N**, DeStephano D, Desanti de Oliveira B, Shin S, Beauchemin M, Wright J, Kronish IM, Hershman D, Accordino M. Feasibility of systematically screening for medication nonadherence at an outpatient breast cancer clinic. Oral presentation at: American Psychosomatic Society Annual Meeting; March 2023; San Juan, PR.

2. Design and evaluation of a remote blood pressure monitoring intervention
Background: Remote Patient Monitoring (RPM), which uses wireless blood pressure (BP) devices to transmit home BP data to the electronic health record, is recommended by national guidelines as an evidence-based approach to improve hypertension (HTN) control. Less is known about barriers and facilitators to program referral, extent of patient participation, and disparities in access and engagement. I evaluated the impact and implementation of a HTN RPM program that was introduced into a safety net primary care network in NYC.
Central Findings: There were no significant sociodemographic differences in patient enrollment or engagement in our HTN RPM program over six months. The majority of patients were sufficiently engaged in monitoring during the first month to qualify for reimbursement. Engagement progressively declined over later months, but this occurred irrespective of age, sex, race, ethnicity, or language. Increased frequency of home BP monitoring was associated with lower systolic and diastolic BP. Clinician interviews identified inadequate knowledge, lack of support structures, and concerns about workflow interruptions as barriers to program uptake.
Influence: These findings highlight the importance of strategies that promote equitable and sustained patient engagement to maximize the impact of RPM programs on BP control. They also reveal key barriers to clinician uptake that must be considered when designing and implementing such programs.
Role: I proposed the research hypotheses, planned the analyses, and led the writing.

a. **Liyanage-Don N**, Bellows BK, Bryant K, Singer JR, Ye S, Moise N, Cheng J, Lopez-Sanchez MJ, Fraser A, Kalra R, Dandan N, Kronish IM. Association Between Frequency of Home Blood Pressure Measurement and Subsequent Blood Pressure Outcomes Among Patients Enrolled in a Remote Patient Monitoring Program for Hypertension. Poster presentation at: Society of General Internal Medicine Annual Meeting; May 2023; Aurora, CO.
b. **Liyanage-Don N**, West H, Bryant K, Singer JR, Blanco L, Moise N, Fraser A, Kalra R, Dandan N, Kronish IM. Equitable Patient Engagement in a Remote Patient Monitoring Program for Hypertension. Oral presentation at: Society of General Internal Medicine Annual Meeting; May 2023; Aurora, CO.
c. **Liyanage-Don N**, Onyilofor C, Lopez MJ, Bryant K, Singer J, West H, Fraser A, Kronish IM. Primary Care Physician Barriers and Facilitators to Referring Patients to a Remote Patient Monitoring Program for Hypertension. Oral presentation at: American Heart Association Hypertension Scientific Sessions; Sept 2022; San Diego, CA.
d. **Liyanage-Don N**, Singer JR, Bryant KB, West H, Bellows BK, Flatow J, Fraser A, Cheng J, Kronish IM. Patient Engagement in and Revenue Potential of a Remote Patient Monitoring Program for HTN. Poster presentation at: Society of General Internal Medicine Annual Meeting; May 2022; Orlando, FL.

3. Improving uptake of out-of-office blood pressure monitoring in primary care
Background: The US Preventive Services Task Force recommends out-of-office blood pressure (BP) testing to exclude white coat hypertension (WCH) prior to hypertension (HTN) diagnosis. Despite improved availability and coverage of home and 24-hour ambulatory BP monitoring (HBPM, ABPM), both are infrequently used to confirm diagnoses. To increase uptake of out-of-office BP monitoring, we used the Behavior Change Wheel (BCW) framework to create a multicomponent intervention and implementation strategy that included clinician education, electronic decision support tools, and local adaptation of an accessible ABPM service.
Central Findings: In the year prior to program implementation, no eligible patients were ordered for ABPM. In the three years after the program launched, 436 patients were referred, 256 (59%) initiated testing, 246 (96%) completed testing, and 123 (50%) were found to have WCH. Patient and clinician surveys showed high overall satisfaction with the program. However, the average cost per patient was ~$200, of which Medicaid/Medicare only reimbursed $62. Although our strategy increased ABPM, there was no change in HBPM, largely driven by limited clinician recall on how and why to order, as well as logistic challenges in the ordering process.
Influence: ABPM can be successfully implemented in primary care, with high rates of testing completion, WCH detection, and patient and clinician satisfaction. However, reimbursement may be insufficient to cover costs, highlighting a need for expanded insurance coverage to ensure economic viability. Stronger and more frequent delivery of implementation strategies may also be needed to substantially increase out-of-office BP monitoring.
Role: I collaborated with co-authors on research question conceptualization, data analysis, and writing.

a. **Liyanage-Don N**, Moise N, Phillips E, Carter E, Alcantara C, Serafini M, Schwartz J, Kronish I. Impact of a Theory-Informed Implementation Strategy on Clinician Barriers to Out-of-Office Blood Pressure Monitoring for Patients with New Hypertension. Abstract submitted to: Society of General Internal Medicine Annual Meeting; May 2024; Boston, MA.
b. **Liyanage-Don N**, Moise N, Quispe K, Mizhquiri Barbecho J, Shim HG, Kronish IM. Feasibility of Implementing a 24-hour Ambulatory Blood Pressure Monitoring Testing Service into Primary Care. Oral presentation at: Society of General Internal Medicine Annual Meeting; May 2019; Washington D.C.

c. **Liyanage-Don N**, Fung D, Phillips E, Kronish IM. Implementing Home Blood Pressure Monitoring into Clinical Practice. Curr Hypertens Rep. 2019 Feb 12;21(2):14.

4. Impact of COVID-19 on blood pressure trends

Background: The COVID-19 pandemic required strict social distancing to curb transmission, severely limiting access to healthcare. High-quality data on how the pandemic affected population-level hypertension (HTN) control was limited. Although many health organizations rapidly developed or expanded telemedicine services to provide remote patient care, the impact of these services on blood pressure (BP) trends was unknown.
Central Findings: I collaborated with colleagues at Cedars-Sinai and Ochsner Health to examine changes in BP among hypertensive adults followed at 3 large health systems (n=137,593). During the pandemic, systolic and diastolic BP increased by 1.79 mm Hg and 1.30 mm Hg, respectively, and the proportion of patients with controlled BP decreased by 3.43 percentage points. A trend showing increasing control in the pre-pandemic period flattened during the pandemic. In contrast, examination of home BP data from patients enrolled in our local HTN RPM program found significant reductions in mean systolic and diastolic BP during the pandemic.
Influence: Our findings demonstrated that the COVID-19 pandemic was associated with worsening population-level BP control. However, among those engaged in a local HTN RPM program in NYC, BP trends appeared to improve during the pandemic, suggesting that ongoing access to health care via RPM and other telemedicine modalities may mitigate the adverse impacts on BP control in future disasters or emergencies.
Role: I collaborated with co-authors on research question conceptualization, data analysis, and writing.

a. Gotanda H, **Liyanage-Don N**, Moran AE, Krousel-Wood M, Green JB, Zhang Y, Nuckols TK. Changes in Blood Pressure Outcomes Among Hypertensive Individuals During the COVID-19 Pandemic: A Time Series Analysis in Three US Healthcare Organizations. Hypertension. 2022 Dec;79(12):2733-2742.
b. **Liyanage-Don N**, Schwartz JE, Moise N, Bryant KB, Bono A, Kronish IM. Improvement In Blood Pressure Using Remote Patient Monitoring During COVID-19. Poster presentation at: American Heart Association Hypertension Scientific Sessions; Sept 2020; Meeting held virtually

5. Correlates of cardiovascular medication nonadherence

Background: Adherence to secondary prevention medications after acute cardiovascular events, such as heart attack or stroke, is critical for reducing recurrent events, yet up to half of patients do not take their medications as prescribed. Multiple factors influence medication nonadherence at the patient, provider, and health system level, though the underlying mechanisms remain poorly understood. To better understand these mechanisms, I examined patterns of medication nonadherence among patients who presented to the emergency department with suspected acute coronary syndrome (ACS) or stroke.
Central Findings: In one study, I found that patients who developed post-traumatic stress symptoms (PTSS) after a suspected stroke were more likely to report that their medications made them feel nervous or anxious, made them think about having another stroke, and made them skip or avoid taking their medications. Thus, PTSS appear to trigger aversive cognitive associations with medications, which may explain these patients' poorer adherence rates. In another study, I found that Hispanic patients presenting with suspected ACS were subsequently more adherent to their cardiovascular medications than non-Hispanic patients. However, among native Spanish-speaking Hispanic patients, greater English proficiency was associated with worse medication adherence, suggesting that linguistic acculturation plays a role in adherence.
Influence: Elucidating the precise biopsychosocial pathways that influence medication-taking behaviors is key in the identification of patients at high risk for nonadherence and in the development of interventions that can effectively improve adherence.
Role: I proposed the research hypotheses, planned the analyses, and led the writing.

a. **Liyanage-Don N**, Cornelius T, Romero EK, Alcántara C, Kronish IM. Association of Hispanic ethnicity and linguistic acculturation with cardiovascular medication adherence in patients with suspected acute coronary syndrome. Prev Med Rep. 2021 Jun 17;23:101455.
b. **Liyanage-Don N**, Birk J, Cornelius T, Sanchez G, Moise N, Edmondson D, Kronish I. Medications as Traumatic Reminders in Patients With Stroke/Transient Ischemic Attack-Induced Posttraumatic Stress Disorder. Stroke. 2021 Jan;52(1):321-324.

Complete List of Published Work:
https://www.ncbi.nlm.nih.gov/myncbi/nadia.liyanage-don.2/bibliography/public/