<u>Medstar Health Research Institute Inc</u> Application Summary

Charles and Mary Latham Fund Board Meeting

Request Date:	October 12, 2023
Project Title:	A Mixed-Methods Study Examining Utilization of Palliative
	Care for Patients Living with Long-Term (LT) LVAD Therapy
Request Amount:	\$11,000.00
Program Area:	Medical Research

Organization Information	Contact Person for Application
Medstar Health Research Institute Inc	Dr. Rao Anirudh
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Hyattsville, MD 20782	13016391848 MHRI-Submissions@medstar.net
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Organization's annual operating budget: \$52,000,000.00

Tax Status Notes Not-for-profit 501C3

Background

Founded in 1963, the MedStar Health Research Institute is the research division of MedStar Health. We provide scientific, administrative, and regulatory support for clinical research throughout the MedStar Health system.

As the research arm of the MedStar Health academic healthcare system, our contribution to the healing work performed across the region and in the communities we serve is led by our commitment to advance health. Led by Dr. Neil Weissman, the Institute supports more than 1,000 associates dedicated to advancing health through research across the region at more than 40 MedStar Health sites.

Situated at the crossroads of academics and real-world healthcare environments, the MedStar Health Research Institute (MHRI) creates new knowledge that provides the latest advances for patients at nearly 300 sites of care in the region. Our researchers cover many areas and types of research, across the six comprehensive research networks aligned with our clinical and operational service lines, advancing the health of our patients today and tomorrow.

Project/Program Budget (if applicable):

Project/Program Title: A Mixed-Methods Study Examining Utilization of Palliative Care for Patients Living with Long-Term (LT) LVAD Therapy

Project Summary (250 words or less)

Citizens of Washington, DC have some of the highest rates of heart disease in the country, and heart disease is the leading cause of death (1). Though patients with left ventricular assist devices (LVADs) have improved survival compared to patients who are medically managed, patients experience unique LVAD related harms that impact their quality of life. Therefore, these patients require specialized, comprehensive, holistic care to improve quality of life and to promote goal-concordant care. Palliative care specialists are integral members of the multidisciplinary care team necessary for patients with long-term LVAD (LT-LVAD) therapy. However, many patients may not receive this important service until they are hospitalized.

A seminal study of palliative care in patients with heart failure demonstrated that outpatient palliative care improved health related quality of life (HRQoL), depression, anxiety, and spiritual distress compared to usual care. Although LT-LVAD has become a standard therapeutic tool for patients with advanced heart failure, a key barrier to progress is that the impact of longitudinal palliative care on HRQoL is unknown. To overcome this limitation, this project will (1) quantify the current utilization of palliative care services with the LT-LVAD population at MedStar Washington Hospital Center (MWHC), with attention to the location of consultation (inpatient vs. outpatient) and (2) analyze patient and provider perceptions regarding barriers and facilitators to receiving palliative care. This proposed study will provide the basis for developing a prospective randomized control study to improve HRQoL in patients with LT-LVADs in Washington, DC.

Statement of Problem

The advent of left ventricular assist devices (LVAD) has transformed the care of patients with advanced heart failure (HF). Over 25,000 patients received LVADs in the period from 2010 to 2019 and the annual volume of LVAD implantation is increasing (2). LVAD technology can be used as bridge-to-transplantation (BTT) or as long-term (LT) (or "destination") therapy and have been shown to improve both quality of life and survival, and now may be considered as an alternative to heart transplantation in certain populations (3,4).

Palliative care is a medical specialty focused on improvement of quality of life and reduction of suffering in patients with serious illness throughout their disease trajectory. A growing body of literature increasingly highlights the crucial role of palliative care services in the general HF population. The Palliative Care in Heart Failure (PAL-HF) trial demonstrated that patients who received outpatient palliative care had consistent and significant improvements in health-related quality of life (HRQoL), depression, anxiety, and spiritual distress scales compared to patients receiving usual care (5). There may be differences between which patients are referred for inpatient palliative care and outpatient palliative care, and consequently, differences in the impact of the palliative care team. Patients who receive primarily inpatient consultation may have acute needs, such as post-

operative pain management, or a poor medical prognosis whereas patients who are established in the outpatient setting may demonstrate greater improvements in HRQoL compared to those who are not.

In comparison to general HF populations, there is very little data on the role of palliative care services in the LT-LVAD population. Direct extrapolation from the general heart failure literature is not possible as patients living with LT-LVAD therapy may follow several different disease trajectories and have a variable prognosis (6). The lack of data is even more stark given the high utilization of palliative care services by the LVAD population at MWHC and comparable institutions. The Center for Medicaid and Medicare Services (CMS) implemented guidelines for routine palliative care assessment for all patients being considered for LVAD in the pre-operative setting. The genesis of these guidelines was to assure that patients contemplating LVAD surgery would have an opportunity for advance care planning and to assure goal-concordant care in light of the risks and burdens of LT-LVAD therapy. This practice has led to research regarding the optimal timing, role, and impact of the palliative care pre-VAD phase (7,8). Most significantly, Nakagawa and colleagues found associations between patient's pre-VAD preferences and likelihood of receiving intensive care at the end-of-life (9). Patients living with long-term left ventricular assist device (LT-LVAD) face challenges related to medical crises, psychosocial stressors, and diminished quality of life. Patients experience a diminished quality of life due to worsening debility due to post-surgical deconditioning, loss of employment or financial independence with resulting strain, increased reliance on caregivers and stress surrounding the imposed burden on caregivers which can cause alterations family dynamics, anxiety related to managing the device including driveline exit site care and associated equipment, and fear of mortality. The time spent on LVAD support can also be punctuated by hospitalizations for acute LVAD related events, such as bleeding, stroke, infection, and pump thrombosis. Disparities in health outcomes have been noted in observational studies of women compared to men and patients who identify as a member of a racial or ethnic minority group compared to white patients (10-12). For instance, Black LVAD patients experience an increased burden of readmissions compared with White patients (12). Women with LVADs were shown to have a higher burden of stroke following LVAD surgery compared to men (11). These trends are superimposed on disparities in mortality from cardiovascular disease in Black populations compared to White, likely driven by social determinants of health (13). Prior studies on HRQoL in non-LVAD HF populations have demonstrated associations between poor HRQoL and race, sex, and socioeconomic status (14,15). There is a critical need for research into factors associated with quality of life in patients living with LT-LVAD and whether palliative care can mitigate these disparities. Additionally, there may be racial inequities in referral to palliative care and disparities in

Additionally, there may be racial inequities in referral to palliative care and disparities in acceptance of palliative care. In previous studies, Black patients reported that advance care planning, palliative care, and hospice can be beneficial to patients and their families but identified specific barriers to completion of advance directives and hospice enrollment, including lack of knowledge, fear that these measures may hasten death or cause providers to deliver inadequate care, and perceived conflict with patients' faith and religious beliefs (16).

Specific Aims

LT-LVAD patients currently intersect with palliative care prior to LVAD implantation. Though many patients may seemingly benefit from specialist palliative care in the post-LVAD setting, the factors contributing to the receipt of outpatient palliative care services in this population are unknown. To test the hypothesis that adverse medical outcomes, Black race, and high-risk SDoH profiles are associated with inpatient palliative care consultation, we aim to analyze data from the electronic health record, social work assessments, and an internal LVAD database. We hypothesize that patients who are White or have low-risk SDoH profiles are more likely to receive outpatient palliative care consultation, and potentially benefit from long-term improvements in HRQoL compared to patients who are seen by palliative care in the hospital. The long-term goal of this project is to devise a structured, prospective palliative care intervention with the goal of improving health-related quality of life of all patients living with LT-LVAD in Washington, DC. We seek to address this gap in knowledge by focusing on the following specific aims:

Aim 1: Compare patients with LT-LVAD who receive inpatient versus outpatient palliative care consultation by demographic characteristics, SDoH risk profiles, and medical outcomes.

We hypothesize that palliative care is infrequently consulted in stable patients with LT-LVAD who could benefit from symptom management, psychosocial support, and advance care planning (ACP), and instead palliative care is consulted late in a patient's disease course and more often within the context of an acute medical crisis. We additionally hypothesize that Black race, high-risk SDoH profiles, and poor medical outcomes are associated with inpatient palliative care consultation. Conversely, we hypothesize that White patients or patients with low-risk SDoH profiles are more likely to receive outpatient follow up with palliative care compared to Black patients or patients with high-risk SDoH profiles, independent of illness severity.

Aim 2a: Evaluate palliative care needs in patients living with LT-LVAD support, such as uncontrolled symptoms, need for advance care planning, and perceptions of barriers to palliative care, by using a mixed-methods approach with quantitative questionnaires and semi-structured interviews.

Aim 2b: Explore stakeholder perspectives on optimal integration of palliative care specialists in the care of patients with LT-LVAD through semi-structured interviews of experts in the Washington, DC region.

We hypothesize that many patients living with LT-LVAD therapy have unmet palliative care needs, such as pain, dyspnea, fatigue, anxiety, insomnia, or other symptoms. Additionally, we aim to understand barriers to pursuing evaluation and treatment of these symptoms through palliative care consultation. Some hypotheses for why patients may not receive palliative care include lack of time, lack of education about palliative care, a belief that the LVAD team will meet the entirety of the patient's care needs, and conflating palliative care and hospice care. Additionally, provider-level barriers to palliative care referral may exist. Advanced heart failure (AHF) providers from the DC region will be interviewed regarding the optimal timing of palliative care integration, optimal site of consultation (inpatient vs outpatient), and the expectations of the palliative care team.

Research Strategy: Significance

The prevalence of patients living with LT-LVAD technology is increasing. As the population of patients living with HF grows, a subset of those patients will develop advanced HF. With greater clinician and societal comfort, LVAD technology is becoming more widely available. Additionally, though LVADs were initially studied with bridge-to-transplantation treatment intent in mind, the majority of patients now receive LVAD with lifelong therapy (2). In this setting, a significant gap in knowledge becomes apparent: how do we best support patients and their families as they live with LT-LVAD therapy?

To our knowledge, the proposed project would be the first to examine the role of palliative care in patients living with LT-LVAD therapy. The Palliative Care and Advanced Heart Failure teams are closely intertwined at the MedStar Washington Hospital Center. The spectrum of collaboration includes the clinical care of patients prior to and following LVAD implantation. Given the role of the Palliative Care team as a consultative service for patients cared for by the Advanced Heart Failure team, there is variability in which patients receive palliative care consultation or longitudinal follow up based on the discretion of the treating clinician or patient/family preference. Given the growing evidence demonstrating the beneficial impact of palliative care on patients' quality of life, and the inconsistent involvement of palliative care in patients with LT-LVAD at the study institution, the proposed study aims to identify factors currently associated with palliative care and clinician- and patient-level barriers to palliative care.

Research Strategy: Innovation

The innovative aspects of this project include examination of a population of patients who have a high need for the kind of specialized care that palliative care provides. However, in the absence of data from our project, there are few, if any, guidelines that provide a blueprint for models of collaboration between Palliative Care and Advanced Heart Failure teams.

Patients living with LT-LVAD therapy experience a high burden of physical symptoms (fatigue, chronic pain, dyspnea, sexual dysfunction, nausea, and constipation) and psychological symptoms (anxiety, depression, and insomnia). Patients also experience spiritual and existential distress related to loss of previous functions and mismatch between expectations regarding quality of life and their new realities. As patients' health needs change over time, more emphasis on advance care planning can assure that patients receive goal concordant care towards the latter stages of life. Specialist palliative care has been shown to improve many of these domains. The outcomes of this project will help determine the optimal location, timing, and frequency of palliative care for patients with LT-LVAD. With the results from this project, we hope to design a prospective, randomized study of palliative care compared to usual care for patients with LT-LVAD. MedStar Health provides care to 1 in 5 individuals in the mid-Atlantic region, of whom >50% are urban-dwelling, self-described Black, Indigenous, and/or People of Color (BIPOC). While this population experiences increased prevalence and severity of advanced HF, they are underrepresented in HF research generally and palliative care research specifically. Around two thirds of the population of patients at MWHC living with LT-LVAD therapy identify as Black. Therefore, our project team is uniquely

situated to better understand the palliative care needs of this underrepresented population in research.

Research Strategy: Approach

The overall objective of this one-year project is to evaluate the utilization of specialist palliative care in patients with LT-LVAD therapy.

To assess Aim 1, we will conduct a retrospective EHR review of patients with LT-LVAD therapy (initial LVAD implantation between date range of 2018 to 2020, to allow for atleast two years of follow up). Data sources include 1) the EHR, which will be mined to extract demographic data 2) an internal LVAD outcomes database maintained by members of the advanced heart failure (AHF) team at MWHC and 3) palliative care patient-level metrics. Regarding data source 2, the LVAD database: this dataset contains patient demographics, pre-implantation risk factors (comorbidities), post-implantation complications, reasons for subsequent hospitalizations, and cause of death. Regarding data source 3, palliative care team members complete encounter forms after each clinical visit. These metrics track discrete data points specific to each patient (e.g., palliative carerelated diagnosis, symptom assessment, code status at initial consult, functional status, estimated prognosis at hospital discharge). This patient-level data will enable an accurate assessment of palliative care engagement for patients who receive palliative care. Lastly, pre-LVAD psychosocial assessments conducted by social workers specialized in this work will provide context regarding SDoH, including housing, income, food insecurity, caregiver support, and health literacy.

The primary outcome of interest is the location of palliative care consultation. The secondary outcomes include timing and frequency of palliative care consultation and patient-level outcomes such as mortality, number of hospitalizations, and number of days in hospital in the last year of life. Using logistic regression analysis, we will assess the associations between patient demographics, SDoH, medical outcomes and receipt of palliative care in this population of LT-LVAD patients in Washington, DC. Members of the study team have the knowledge and experience to access the above data sources to extract the salient data points in order to conduct statistical analysis. To assess Aim 2, we will conduct a mixed-methods approach with patients living with LT-LVAD. The quantitative questionnaires will include the Edmonton Symptom Assessment Scale, Kansas City Cardiomyopathy Questionnaire-12, and the EQ-5D visual analog scale. For the qualitative analysis, a semi-structured interview will be conducted with consenting patients regarding their perceptions of palliative care, knowledge of the role of palliative care, and barriers to engagement.

Advanced heart failure providers from regional LVAD programs will be interviewed regarding the optimal timing of palliative care integration, optimal site of consultation (inpatient vs outpatient), and common reasons for consulting the palliative care team. All transcribed documents will be analyzed using the following data analysis process: reviewing transcripts, identifying codes and themes or essential elements from the data, reflecting on and analyzing the aggregate data and interpreting for meaning. In addition, the transcripts will also be organized via the software program Dedoose and analyzed by two independent coders with expertise in qualitative analysis.

Research Design and Methods

We will conduct a mixed methods study that includes a retrospective review of the EHR with all patients living with LT-LVAD therapy (greater than 3 years of support with LVAD therapy) at MWHC and cross-sectional surveys and interviews. Data sources include internal palliative care team metrics, the electronic health record, and an internal LVAD database maintained by the AHF program. Patients who received LVAD implantation between 2018 and 2020 will be included in this study. Patients who are under 18 at the time of LVAD implantation will be excluded. The estimated size of the cohort is 150 patients. For the qualitative component (Aim 2), target enrollment will be 20 patients and 10 AHF providers. The specifics of the methodology are described above. Study Setting and Population: The study will take place at MedStar Washington Hospital Center (Washington, DC). The Advanced Heart Failure Program annually provides world-class inpatient care and outpatient clinical care to patients with Stage C or D HF. Last year, the Program successfully completed over 40 heart transplants and over 50 LVAD implantations. The MedStar Health Palliative Care Service is led by Dr. Groninger (MedStar Washington Hospital Center). Interdisciplinary palliative care teams include dedicated physicians, advance practice providers, social workers, chaplains, and clinical pharmacists. Palliative care consultation was provided for over 2,000 unique patients at the study institution in 2021.

Research Team:

This study will be overseen by a multidisciplinary team from MedStar Washington Hospital Center and Georgetown University. The PI, Anirudh Rao, MD, is an Assistant Professor of Medicine at Georgetown University and an Attending Physician in the Section of Palliative Care, Department of Medicine at MWHC. Co-PI Hunter Groninger, MD is a Professor of Medicine at Georgetown University and is the Scientific Director of Palliative Care for MedStar Health. Co-PI Kelley Anderson, PhD, RN, FNP is an Associate Professor at Georgetown University School of Nursing with expertise in health disparities research as pertaining to heart failure populations. Additional in-kind study consultants include: 1) Farooq Sheikh, MD, is the Medical Director of the Advanced Heart Failure Program at the MedStar Heart and Vascular Institute and an Associate Professor of Medicine at Georgetown University. Dr Sheikh has been intimately involved in LVAD research, including as co-investigator on the landmark MOMENTUM-3 trial and is a nationally renowned researcher in this space. 2) Richa Gupta, MD, MPH is an Assistant Professor of Medicine at Georgetown University and an Attending Physician at the MedStar Heart and Vascular Institute within the section of Advanced Heart Failure. Dr Gupta has a particular interest in sex and race disparities in health outcomes in patients living with LVAD support.

The research team has experience collaborating on research projects on patients with advanced heart failure that have resulted in publication in peer-reviewed journals. Statistics:

To understand the factors influencing receipt of palliative care, we will perform statistical tests of associations between clinical outcomes, demographics, and varying SDoH risk profiles with the frequency and location of palliative care consultation at the study institution.

IRB:

The study will be submitted for approval to the MedStar Health Research Institute-Georgetown University Institutional Review Board.

Study Timeline: Pre-study: IRB approval Months 1-5: Aim 1, with preliminary analysis. Months 6-9: Aim 2, Qualitative interviews and transcription. Months 10-12: Qualitative analysis and overall analysis. Challenges Aim 1: The main challenges expected are related to data acquisition. Over the past several years, the study team has gained experience in extracting data from MedConnect PowerChart, the LVAD database, and palliative care metrics and encounters data. We plan to apply our expertise in working with multiple sources of data to ensure that the study findings are valid and replicable. Aim 2: The main challenge expected is participant recruitment. Study participants will receive a gift card with a nominal incentive to encourage participation. Recruitment will be done by members of the study team through electronic advertising and direct recruitment. Future Plans The results of this study will be applied to inform a prospective, randomized intervention of longitudinal palliative care versus usual care for patients living with LT-LVAD. Several outcomes can be examined comparing patients with and without palliative care: scales of HRQoL such as the Kansas City Cardiomyopathy Questionnaire, scales examining depression and anxiety, rates of advance care planning documentation, and clinical outcomes. Budget Breakdown We are only seeking support from the Latham Fund for this study. Key Personnel In-kind Anirudh Rao, MD, Principal Investigator Hunter Groninger, MD, Co-Investigator In-kind Kelley Anderson, PhD, Co-Investigator In-kind Biostatistician (\$150/hr; 40 hours) \$6,000 Statistical analysis Bioinformatics (\$150/hr; 20 hours) \$3,000 Data extraction from various sources Stipend for interview participants (\$50/interview; 30 participants) \$1,500 Transcription of interviews \$500 Total amount requested \$11,000

Recommendation/Notes



Project Budget:

We are only seeking support from the Latham Fund for this study.

Key Personnel

Total amount requested	\$11,000
Transcription of interviews	\$500
Stipend for interview participants (\$50/interview; 30 participants)	\$1,500
Data extraction from various sources	
Bioinformatics (\$150/hr; 20 hours)	\$3,000
Statistical analysis	
Biostatistician (\$150/hr; 40 hours)	\$6,000
Kelley Anderson, PhD, Co-Investigator	In-kind
Hunter Groninger, MD, Co-Investigator	In-kind
Anirudh Rao, MD, Principal Investigator	In-kind

Budget Justification:

The major costs of this project are related to data acquisition and analysis. In discussion with co-PIs and consultants, the proposed project is expected to require 20 hours of bioinformatics effort. This effort will take place within the first 1-2 months of the project to extract data from various electronic sources. Once the data are extracted and cleaned, the database will be analyzed by a biostatistician with expertise in multivariate logistic regression analyses. This effort will take place from months 2-5. Following an initial meeting to establish the research questions and collaborate on the analyses required to test the hypotheses, biweekly 30-minute meetings will be held with the statistician until the analyses are concluded. The statistical analysis is expected to require 40 hours of effort.

For the qualitative analysis, the length of the semi-structured interview is expected to be 60 minutes. To remunerate the participants, a stipend of \$50 was expected to adequately compensate participants for their time.

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors. Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Anirudh Rao

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

POSITION TITLE: Assistant Professor of Medicine, Georgetown University School 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
Cornell University, Ithaca, NY	B.S	05/2009	Biology
Johns Hopkins University School of Medicine, Baltimore, MD	M.D	05/2013	Medicine
Johns Hopkins Hospital, Baltimore, MD		06/2017	Residency: Internal Medicine-Pediatrics
Johns Hopkins Hospital, Baltimore, MD		06/2018	Fellowship: Palliative Medicine

A. Personal Statement

I am passionate about improving quality of life for patients living with advanced heart failure. I have been successful in launching and completing projects in the niche of palliative care for patients with advanced heart failure. As a Palliative Care specialist with expertise in the clinical care of patients with advanced heart failure, I have been fortunate to improve quality of life for patients with advanced heart failure. My clinical expertise is in the management of symptoms related to advanced heart failure: pain, nausea, depression, anxiety, poor appetite, and fatigue.

This research proposal will contribute to the body of knowledge on symptom burden in patients with advanced heart failure living with long-term LVAD therapy, and develop strategies to optimize patient and family experience. I have the expertise, leadership, and training necessary to successfully lead the proposed research project as principal-investigator. I have strong collaborations with members of the study team including Drs. Groninger, Anderson, Sheikh, and Gupta. Our previous research on patients with LVADs has been published in peer-reviewed journals including *ASAIO* and *Journal of Pain and Symptom Management*. As recognition of my scholarly efforts, I was selected to receive salary support through the MedStar Health Research Scholars Program through a rigorous selection process. The current grant application builds logically on my prior work. My interests align well with the priorities of the Latham Fund to improve the health of the patients of Washington, DC.

- Abdullah B, Gupta R, Anderson KM, Balsara K, Sheikh FH, Groninger H, Rao A. A Review of the Role of Palliative Care for Patients with Left Ventricular Assist Devices. Annals of Palliative Medicine. Submitted.
- 2. **Rao A**, Violanti D, Elliott TI, Singh M, Kim B, VandenAssem K, Sheikh FH, Groninger H. Clinical Protocol for Left Ventricular Assist Device Deactivation at End of Life. J Palliat Med. 2023 May 22.

 Anderson KM, Yearwood E, Weintraub WS, Xia Y, Scally R, Groninger H, Rao A, Ahn J. Determinants of Health and Outcomes in Medicare Recipients With Heart Disease: A Population Study. J Pain Symptom Manage. 2023 Aug 6.

B. Positions, Scientific Appointments, and Honors

Positions and Employment

2018-Assistant Professor of Medicine, Georgetown University School of Medicine2018-Attending Physician, Section of Palliative Care, Department of Medicine, MedStarWashington Hospital Center

Other Experience and Professional Memberships

2017-	Member, American Academy of Hospice and Palliative Medicine
2019-	Faculty Member, Cura Personalis, Georgetown University School of Medicine

<u>Honors</u>

2023	MedStar Health Research Scholars Program
2022	Top Doctor, Northern Virginia Magazine
2017	Frank L. Coulson, Jr. Award for Clinical Excellence, Johns Hopkins Hospital
2015	Paul Lietman Global Health Fellowship, Johns Hopkins Hospital
2013	Johns Hopkins School of Medicine Graduation Speaker
2013	Helen & Harold Harrison Award for Outstanding Proficiency in Pediatrics, Johns Hopkins
Hospital	
2010	Sellards Award, Johns Hopkins University School of Medicine

C. Contributions to Science

Over the past several years as a faculty member and attending physician at Washington Hospital Center, I have developed clinical expertise in the niche of palliative care for patients with advanced heart failure. I have translated my clinical interests into a passion for research in improving the care and experiences for patients living with advanced heart failure. My interests include the natural history of advanced heart failure, the evolution of patients' symptoms, strategies for symptom management once disease-directed therapies prove ineffective, and care for patients who have Left Ventricular Assist Devices (LVAD) and continuous cardiac inotropes.

- 1. Outcomes and care of patients treated with continuous intravenous inotropic support (CIIS): I analyzed a large, retrospective data set from our institution along with several collaborators on the study team. We published our findings in the *Journal of Cardiac Failure*. We described health outcomes of patients on CIIS, with special focus on differences in outcomes based on treatment intent (palliative vs bridge to LVAD/transplant). In a subsequent analysis, we described health outcomes of patients on palliative inotropes, including number of hospitalizations or days admitted to the hospital in the last year of life to describe the burdens associated with this therapy. We also conducted a retrospective study of the HRQoL of patients on CIIS, which was recently accepted to the *American Journal of Cardiology*.
 - Rao A, Maini M, Seplowe M, Crowell NA, Pitcher C, Scally R, Weintraub WS, Najjar SS, Groninger H, Anderson KM. Health-Related Quality of Life in Patients with Advanced Heart Failure Receiving Continuous Intravenous Inotropic Support: A Multi-Center Survey. Am J Cardiol. 2023 Oct 15;205:231-233.

- b. Rao A, Maini M, Anderson KM, Crowell NA, Gholami SS, Foley Lgsw C, Violanti D, Singh M, Sheikh FH, Najjar SS, Groninger H. Benefits and Harms of Continuous Intravenous Inotropic Support as Palliative Therapy: A Single-Institution, Retrospective Analysis. Am J Hosp Palliat Care. 2023 Feb 22.
- c. **Rao A**, Singh M, Maini M, Anderson KM, Crowell NA, Henderson PR, Gholami SS, Sheikh FH, Najjar SS, Groninger H. Bridge to nowhere: A retrospective single-center study on patients using chronic intravenous inotropic support as bridge therapy who do not receive surgical therapy. Front Cardiovasc Med. 2022;9:918146.
- d. McPherson A, Nguyen C, Groninger H, Anderson KM, Henderson P, Rao A. Continuous Intravenous Inotropic Support for Advanced Heart Failure: Palliative Considerations. J Pain Palliat Care Pharmacother. 2022 Mar;36(1):59-67.
- e. **Rao A**, Anderson KM, Mohammed S, Hofmeyer M, Gholami SS, Sheikh FH, Rodrigo ME, Crowell NA, Javed H, Gupta S, Hajouli S, Stewart DE, Hamad A, Najjar SS, Groninger H. Chronic Intravenous Inotropic Support as Palliative Therapy and Bridge Therapy for Patients With Advanced Heart Failure: A Single-Center Experience. J Card Fail. 2021 Sep;27(9):974-980.
- 2. Care of patients living with Left Ventricular Assist Devices. Along with members of the study team, I analyzed the end-of-life experiences of a cohort of patients on LVAD support who died at the study institution. We described a high burden of in-hospital and ICU mortality, often due to acute health exacerbations. I led the creation of a clinical protocol to safely and effectively deactivate LVADs, which was published in the *Journal of Palliative Medicine*. Lastly, a comprehensive review of literature conducted with members of the study team (Drs Sheikh, Groninger, Gupta, and Anderson) on palliative *Care for patients living with LVAD support was just submitted for publication to the Annals of Palliative Medicine*.
 - a. **Rao A**, Violanti D, Elliott TI, Singh M, Kim B, VandenAssem K, Sheikh FH, Groninger H. Clinical Protocol for Left Ventricular Assist Device Deactivation at End of Life. J Palliat Med. 2023 May 22.
 - b. Abdullah B, Gupta R, Anderson KM, Balsara K, Sheikh FH, Groninger H, Rao A. A Review of the Role of Palliative Care for Patients with Left Ventricular Assist Devices. Annals of Palliative Medicine. Submitted.
 - c. **Rao A**, Violanti D, Elliott TI, Singh M, Kim B, VandenAssem K, Sheikh FH, Groninger H. Clinical Protocol for Left Ventricular Assist Device Deactivation at End of Life. J Palliat Med. 2023 May 22.
- 3. Health disparities in patients with serious illness. I conducted an analysis of data from our institution on disparities in health outcomes from COVID-19. We found that patients of Hispanic ethnicity were more likely to present to the hospital with serious illness and require intubation compared to non-Hispanic White patients. We hypothesized that this was due to social determinants, such as reduced trust in the healthcare system, increased likelihood of being employed as front-line personnel, and having barriers to accessing healthcare such as uninsurance/underinsurance. These results were published in the *Journal of Intensive Care Medicine*. We conducted another analysis on patients with heart failure to examine whether social determinants were associated with quality of life, and found that patients with high-risk social determinants of health profiles were more likely to report poor quality of life than patients with low-risk profiles. These projects have informed our work on health disparities with LVAD populations, which we hope to study further through the proposed project.
 - Anderson KM, Yearwood E, Weintraub WS, Xia Y, Scally R, Groninger H, Rao A, Ahn J. Determinants of Health and Outcomes in Medicare Recipients With Heart Disease: A Population Study. J Pain Symptom Manage. 2023 Aug 6.
 - b. Rao A, Alnababteh MH, Avila-Quintero VJ, Flores JM, Laing NE, Boyd DA, Yu J, Ahmed N, Groninger H, Zaaqoq AM. Association Between Patient Race and Ethnicity and Outcomes With COVID-19: A Retrospective Analysis From a Large Mid-Atlantic Health System. J Intensive Care Med. 2023 May;38(5):472-478.

Complete List of Published Work in MyBibliography:

https://www.ncbi.nlm.nih.gov/myncbi/anirudh.rao.2/bibliography/public/

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors. Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Groninger, James Hunter

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

POSITION TITLE: Director of Palliative Care

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
Princeton University, Princeton, NJ	BA	06/1997	Comparative Literature
University of Virginia School of Medicine, Charlottesville, VA	MD	06/2002	Medicine
University of Virginia Health Sciences Center, Charlottesville, VA	Internship	06/2003	Internal Medicine
University of Virginia Health Sciences Center, Charlottesville, VA	Residency	06/2005	Internal Medicine
Capital Hospice, Washington, DC	Fellowship	06/2006	Hospice and Palliative Medicine

A. Personal Statement

I serve as Director of Palliative Care at MedStar Washington Hospital Center, Scientific Director for Palliative Care at the MedStar Health Research Institute, Associate Chair for Research in the Department of Medicine at MedStar Washington Hospital Center, and Professor of Medicine at Georgetown University. I have laid the groundwork for the proposed research by establishing the most robustly integrated clinical palliative care service in the Washington DC region, providing care across inpatient, clinic, and home care settings to over 2500 patients each year and their caregivers. Early research from this palliative care program has shown favorable clinical outcomes on patients with advanced illness, has deepened successful institutional collaborative research efforts between our palliative care program, Georgetown University Schools of Medicine and Nursing, the MedStar Health Research Institute, and the MedStar Institute for Innovation. To date, this work has been favorably disseminated at national and international scientific meetings. This proposed project to evaluate palliative care consultation for patients with long term left ventricular assist device therapy will leverage my professional expertise and experience holistically assessing care needs for patients with serious illness.

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

National Cancer Institute 09/01/2022 – 08/31/2023 Greenberg (PI) Intervention for Chronic Insufficient Sleep in Young Adult Cancer Survivors

Deerbrook Trust Foundation

Groninger (PI) 9/1/2020-8/31/2023 MedStar Washington Hospital Center's PATCH (Palliative Telehealth Connecting to Home) Program: Providing Equal Access to Palliative Care for DC Residents MedStar Health Research Institute/Palliative Care Research Cooperative Groninger (PI) 7/1/2022-6/30/2023 Virtual reality for outpatient management of cancer pain: a dosing study NCT05442866

National Institutes of Aging 07/01/2022 – 06/30/2027 Fischer (PI) Decision trajectories of patients at the end of life: An epidemiological exploration of MAID and the impact on caregivers and clinicians

American Cancer Society Groninger (Co-PI) 9/1/2020-8/31/2022 Pilot study of virtual reality for pain management in hospitalized patients with cancer pain NCT04572074

B. Positions, Scientific Appointments, and Honors

Positions and Scientific Appointments

2023-present
2023-present
2021-present
2020-present
2020-present
2020-present
2017-2020
2015-present
2015-present
2011-2015
2016-2011
Associate Chair for Research, Department of Medicine, Georgetown University, Washington, DC
2015-present
2016-2011
Associate Professor, Department of Medicine, Georgetown University, Washington, DC
2015-present
2016-2011
Associate Professor, Department of Medicine, Georgetown University, Washington, DC
2015-present
2016-2011

2006-2011 Medical Director, Capital Hospice, Washington, DC

Other Experience and Professional Memberships

- 2022-present Member, Cancer Prevention and Control Scientific Committee, Georgetown University Lombardi Comprehensive Cancer Center
- 2020-2022 Chair, Palliative and End-of-Life Care Network Steering Committee, American College of Chest Physicians
- 2019- Member, Editorial Board, Annals of Palliative Medicine
- 2016-2019 Chair, Membership & Communities Strategic Coordinating Committee, American Academy of Hospice and Palliative Medicine (AAHPM)
- 2015- Member, Palliative Care Research Cooperative (PCRC)
- 2015-2018 Member, National Advisory Council for the Cancer Experience Registry: Gastric Cancer, Cancer Support Community
- 2015-2016 Scientific Committee, 12th Annual International Conference of Clinical Ethics Consultation
- 2013-2018 Editorial Board, Fast Facts and Concepts, End of Life/Palliative Education Resource Center
- 2012-2018 Associate Editor, PC-FACS (Fast Article Critical Summaries for Clinicians in Palliative Care), AAHPM Publications
- 2011-2015 Ad Hoc Reviewer, NIH Scientific Review Committees
- 2011- Member, AAHPM
- 2011- Ad Hoc Reviewer for 16 peer-reviewed scientific journals

Honors

2021-present	Top Doctor, Northern Virginia Magazine
2015-2017	Scholar, Georgetown/MedStar Teaching Scholars Program

- 2015 Fellow, American College of Physicians
- 2015 Top 40 Inspiring Leaders Under 40, AAHPM
- 2014 Fellow, AAHPM
- 2013 Clinical Center Director's Award, National Institutes of Health
- 2012-2013 Year-Long Mentoring Award, AAHPM

C. Contributions to Science

- 1. A significant portion of my research has focused on <u>supportive care needs and interventions in advanced illness, particularly heart failure</u>. Having led the development of our palliative care clinical service, I initiated collaborative research efforts with clinical advanced heart failure specialists to understand models of palliative care delivery in the setting of advanced heart failure therapies, such as left-ventricular assist devices, heart transplants, and continuous inotrope infusions. In particular, our research team's collaborations with members of the MedStar Heart and Vascular Institute to evaluate care for patients with advanced heart failure throughout the disease trajectory and across care settings align with this proposal.
 - Rao A, Maini M, Anderson KM, Crowell NA, Gholami SS, Foley Lgsw C, Violanti D, Singh M, Sheikh FH, Najjar SS, Groninger H. Benefits and Harms of Continuous Intravenous Inotropic Support as Palliative Therapy: A Single-Institution, Retrospective Analysis. Am J Hosp Palliat Care. 2023 Feb 22:10499091231160162.
 - b. Rao A, Singh M, Maini M, Anderson KM, Crowell NA, Henderson PR, Gholami SS, Sheikh FH, Najjar SS, Groninger H. Bridge to nowhere: A retrospective single-center study on patients using chronic intravenous inotropic support as bridge therapy who do not receive surgical therapy. Front Cardiovasc Med. 2022 Aug 30;9:918146. doi: 10.3389/fcvm.2022.918146. PMID: 36110411; PMCID: PMC9468486.
 - c. Singh M, Rao A, Ahmed S, Molina E, Sheikh FH, **Groninger H**. In-Hospital Left Ventricular Assist Devices Deactivation and Death Experience: A Single-Institution Retrospective Analysis. ASAIO J. 2022 Jan 19. doi: 10.1097/MAT.000000000001658. Epub ahead of print. PMID: 35943389.
 - d. Rao A, Anderson KM, Mohammed S, Hofmeyer M, Gholami SS, Sheikh FH, Rodrigo ME, Crowell NA, Javed H, Gupta S, Hajouli S, Stewart DE, Hamad A, Najjar SS, Groninger H. Chronic Intravenous Inotropic Support as Palliative Therapy and Bridge Therapy for Patients With Advanced Heart Failure: A Single-Center Experience. J Card Fail. 2021 Sep;27(9):974-980. doi: 10.1016/j.cardfail.2021.06.006. Epub 2021 Jun 19. PMID: 34153459.
- 2. A second portion of my research focuses on <u>symptom assessment and management in patients living with advanced illness</u>. As PI, I am concluding a clinical study evaluating specific "dosing" schedules of massage therapy interventions in hospitalized patients receiving palliative care consultation. Also as PI, I led a study evaluating virtual reality for pain management in advanced cardiac disease, and I am leading multiple clinical studies evaluating the role of technologies to improve symptom burden and quality of life in patients with advanced illness.
 - a. **Groninger H**, Nemati D, Cates C, Jordan K, Kelemen A, Shipp G, Munk N. Massage Therapy for Hospitalized Patients Receiving Palliative Care: A Randomized Clinical Trial. J Pain Symptom Manage. 2023 Jan 30:S0885-3924(23)00046-5.
 - b. Anderson KM, Murphy D, **Groninger H**, Kolm P, Wang H, Barton-Maxwel V. Perceived symptoms as the primary indicators for 30-day heart failure readmission. PLoS One. 2022 May 5;17(5):e0267820. doi: 10.1371/journal.pone.0267820. PMID: 35511916; PMCID: PMC9070923.
 - c. Groninger H, Stewart D, Fisher JM, Tefera E, Cowgill J, Mete M. Virtual reality for pain management in advanced heart failure: A randomized controlled study. Palliat Med. 2021 Dec;35(10):2008-2016. doi: 10.1177/02692163211041273. Epub 2021 Aug 25. PMID: 34431398.
 - d. Kelemen A, Anderson E, Jordan K, Cates LC, Shipp G, Groninger H. "I Didn't Know Massages Could Do That:" A qualitative analysis of the perception of hospitalized patients receiving massage therapy from specially trained massage therapists. Complement Ther Med. 2020 Aug;52:102509. doi: 10.1016/j.ctim.2020.102509. Epub 2020 Jul 16. PMID: 32951756.
- **3.** Another portion of my research continues to focus on <u>supportive care needs among patients living with</u> <u>advanced illness and their caregivers in the mid-Atlantic region</u>. The patient population served by

MedStar Health, predominately Black/African American, has traditionally been excluded from advanced illness research.

- Rao A, Alnababteh MH, Avila-Quintero VJ, Flores JM, Laing NE, Boyd DA, Yu J, Ahmed N, Groninger H, Zaaqoq AM. Association Between Patient Race and Ethnicity and Outcomes With COVID-19: A Retrospective Analysis From a Large Mid-Atlantic Health System. J Intensive Care Med. 2023 Jan 2:8850666221149956. doi: 10.1177/08850666221149956. Epub ahead of print. PMID: 36594202; PMCID: PMC9813659.
- Lupu DE, Aldous A, Anderson E, Schell JO, Groninger H, Sherman MJ, Aiello JR, Simmens SJ. Advance Care Planning Coaching in CKD Clinics: A Pragmatic Randomized Clinical Trial. Am J Kidney Dis. 2022 May;79(5):699-708.e1. doi: 10.1053/j.ajkd.2021.08.019. Epub 2021 Oct 12. PMID: 34648897.
- c. Kelemen A, Cagle J, Chung J, **Groninger H**. Assessing the Impact of Serious Illness on Patient Intimacy and Sexuality in Palliative Care. J Pain Symptom Manage. 2019 Aug;58(2):282-288. doi: 10.1016/j.jpainsymman.2019.04.015. Epub 2019 Apr 22. PMID: 31022442.
- d. Kelemen A, Cagle J, Groninger H. Screening for Intimacy Concerns in a Palliative Care Population: Findings from a Pilot Study. J Palliat Med. 2016 Oct;19(10):1102-1105. doi: 10.1089/jpm.2016.0092. Epub 2016 May 5. PMID: 27148898.

Complete List of Published Work in MyBibliography:

https://www.ncbi.nlm.nih.gov/myncbi/1FojgbSWk6Y5H/bibliography/public/

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors. Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Anderson, Kelley M.

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

POSITION TITLE: Associate Professor

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 <i>(if</i> applicable)	Completion Date MM/YYYY	FIELD OF STUDY
University of Virginia, Charlottesville, VA	BSN	05/1988	Nursing
University of Texas, Austin, TX	MSN	08/1991	Nursing
University of Florida, Gainesville, FL	FNP	12/1998	Nursing
The Catholic University of America, Washington, DC	PhD	01/2010	Nursing

A. Personal Statement

I am an Associate Professor and the PhD in Nursing Program Director in the School of Nursing, Georgetown University in Washington, DC. I have an extensive background in the care of individuals and families with cardiovascular conditions and expertise in the key research areas for this project. In this submission, I look forward to contributing to Dr. Anirudh Rao's Latham Foundation proposal entitled A mixed-methods study examining utilization of palliative care for patients living with long-term (LT) LVAD therapy. This project aligns with my clinical expertise of individuals with cardiovascular conditions combined with my scholarly work of advancing health equity, and experience in both qualitative and quantitative methods. My contributions across my research endeavors include the promotion of the bidirectional translation of clinical experiences to study components (study and conceptual design, recruitment, data collection, statistical analysis, and interpretation of finding) and then ensuring relevance to clinical practice and patients. I am a national HF nurse leader serving in many roles with the American Association of Heart Failure Nurses (AAHFN), an organization dedicated to advancing nursing education, clinical practice, and research to improve HF patient outcomes. I have served on and chaired several committees and task forces, including the advocacy, education, nominations (national elected), and editorial (chair) committees and prevention task force; I currently serve as the inaugural chair of the Scientific Statement Committee for AAHFN. The current project aligns with my scholarly work in the care and management of individuals with cardiovascular conditions, with a focus on quality of life and serious illness care of patients with advanced heart failure. I have current and ongoing collaborations with Dr. Rao (PI) and the members of the study team including Dr. Groninger. Our collaborations include retrospective and prospective quantitative studies and qualitative studies in patients with heart failure with advanced serious illness, including those who have left ventricular assist devices (LVADs).

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

RF00280-SUB00204 National Institutes of Health Artificial Intelligence/Machine Learning Consortium to Advance Health Equity and Researcher Diversity AIM-AHEAD Data Bridge Awardee: MedStar Health Research Institute (MHRI) Shara (PI); Role: Methodologist 05/16/23-02/2024

3UL1TR001409-06S2 Georgetown-Howard Universities Center for Clinical and Translational Science (GHUCCTS) Verbalis (PI); Role: Site PI 08/28/2015–03/31/2025 Maternal Morbidity and Mortality: Risk Factors, Early Detection, and Personalized Intervention

Relevant Papers:

- 1. Anderson KM, Yearwood E, Weintraub WS, Xia Y, Scally R, Groninger H, Rao A, Ahn J. Determinants of Health and Outcomes in Medicare Recipients With Heart Disease: A Population Study. Journal of Pain and Symptom Management. 2023 Aug 6.
- Rao A, Maini M, Seplowe M, Crowell NA, Pitcher C, Scally R, Weintraub WS, Najjar SS, Groninger H, Anderson KM. Health-Related Quality of Life in Patients with Advanced Heart Failure Receiving Continuous Intravenous Inotropic Support: A Multi-Center Survey. American Journal of Cardiology. 2023 Oct 15;205:231-3.https://doi.org/10.1016/j.amjcard.2023.07.158
- Rao A, Maini M, Anderson KM, Crowell NA, Gholami SS, Foley C, Violanti D, Singh M, Sheikh FH, Najjar SS, Groninger H. Benefits and Harms of Continuous Intravenous Inotropic Support as Palliative Therapy: A Single-Institution, Retrospective Analysis. Am J Hospice Palliat Care. 2023 Feb: 1.0499091231160162E16.
- Rao A, Singh M, Maini M, Anderson KM, Crowell NA, Henderson PR, Gholami SS, Sheikh FH, Najjar SS, Groninger H. Bridge to nowhere: A retrospective single-center study on patients using chronic intravenous inotropic support as bridge therapy who do not receive surgical therapy. Front Cardiovasc Med. 2022 Aug 30;9:918146. doi: 10.3389/fcvm.2022.918146. PMID: 36110411; PMCID: PMC9468486.

B. Positions, Scientific Appointments, and Honors

- 2019–present Associate Professor and Director PhD in Nursing Program, Tenure-Line, School of Nursing & Health Studies, Georgetown University, Washington, DC
- 2019–2020 Nurse Practitioner, Advanced Heart Failure Clinic, MedStar Washington Hospital Center, Washington, DC
- 2016–2019 Associate Professor, School of Nursing & Health Studies, Georgetown University, Washington, DC
- 2014–2015 Acting Chair (appointed during Chair's absence), Department of Nursing, School of Nursing & Health Studies, Georgetown University, Washington, DC
- 2013–2015 Campus Coordinator, Family Nurse Practitioner Program, School of Nursing & Health Studies, Georgetown University, Washington, DC
- 2011–2013 Assistant Director, Family Nurse Practitioner Program, School of Nursing & Health Studies, Georgetown University, Washington, DC
- 2010–2016 Assistant Professor, School of Nursing & Health Studies, Georgetown University, Washington, DC
- 2007–2010 Adjunct Instructor, Family Nurse Practitioner Program, School of Nursing & Health Studies, Georgetown University, Washington, DC
- 2004–2009 Nurse Practitioner, The Cardiovascular Group, Fairfax, VA
- 2002–2018 Nurse Practitioner, Division of Cardiology, MedStar Georgetown University Hospital, Washington, DC

Certifications

2016–present Certified Heart Failure Nurse, American Association of Heart Failure Nurses 1999–present Family Nurse Practitioner, American Academy of Nurse Practitioners

Honors

- 2020 The J. William Fulbright Foreign Scholarship Award (Location: Faculty of Health Studies, University of Pardubice, Czech Republic), Bureau of Educational and Cultural Affairs, United States Department of State
- 2018 Mentorship Award for Women in Health Studies, School of Nursing & Health Studies, Georgetown Women in Medicine

C. Contributions to Science

- 1. My research has focused on patients with advanced cardiovascular disease, these studies have impacted our field by contributing to the evidence of the care and management of cardiovascular conditions.
 - a. Anderson KM, Murphy D, Groninger H, Kolm P, Wang H, Barton-Maxwel V. Perceived symptoms as the primary indicators for 30-day heart failure readmission. PLoS One. 2022 May 5;17(5):e0267820. doi: 10.1371/journal.pone.0267820. PMID: 35511916; PMCID: PMC9070923.
 - Asano R, Kellogg A, Sulmasy D, Anderson KM, Nolan MT. Religious Involvement, Depressive Symptoms, and Burden in Caregivers of Terminally III Patients. J Hosp Palliat Nurs. 2021 Jun 1;23(3):271-276. doi: 10.1097/NJH.000000000000754. PMID: 33911059; PMCID: PMC8095715.
 - c. Anderson KM, Awoke MS, Barish R, Asano R, Yearwood EL. Patient perspectives of a heart failure action plan: A qualitative study. Nurs Forum. 2021 Jul;56(3):513–519. doi: 10.1111/nuf.12574. Epub 2021 Mar 26. PMID: 33772790.
 - d. Shaughnessy K, White KA, Murphy M, Crowell NA, Anderson KM. The effect of remote patient monitoring on discharge outcomes in post-coronary artery bypass graft surgery patients. J Am Assoc Nurse Pract. 2020 May 6;33(8):580–585. doi: 10.1097/JXX.000000000000413. PMID: 32384354.
- **2.** I have conducted prospective and retrospective research with patients with cardiovascular conditions who have advanced serious illness, with a focus on heart failure.
 - a. Rao A, Anderson KM, Mohammed S, Hofmeyer M, Gholami SS, Sheikh FH, Rodrigo ME, Crowell NA, Javed H, Gupta S, Hajouli S, Stewart DE, Hamad A, Najjar SS, Groninger H. Chronic Intravenous Inotropic Support as Palliative Therapy and Bridge Therapy for Patients with Advanced Heart Failure: A Single-Center Experience. J Card Fail. 2021 Sep;27(9):974-980. doi: 10.1016/j.cardfail.2021.06.006. Epub 2021 Jun 19. PMID: 34153459.
 - Anderson KM, Paterson M. Overview of secondary data analysis with a description of heart failure hospitalizations from the National Hospital Discharge Survey. Clinical Scholars Review. 2015;8(1):130–138. doi: 10.1891/1939-2095.8.1.139.
 - c. Anderson KM. Discharge clinical characteristics and 60-day readmission in patients hospitalized with heart failure. J Cardiovasc Nurs. 2014 May-Jun;29(3):232–41. doi: 10.1097/JCN.0b013e31828f0d25. PMID: 23612038.
- **3.** These manuscripts demonstrate collaborations detailing the state of the science in cardiovascular conditions:
 - e. Anderson KM, Ferranti EP, Alagha EC, Mykityshyn E, French CE, Reilly CM. The heart and gut relationship: a systematic review of the evaluation of the microbiome and trimethylamine-N-oxide (TMAO) in heart failure. Heart Fail Rev. 2022 Jun 21. doi: 10.1007/s10741-022-10254-6. Epub ahead of print. PMID: 35726110.
 - f. McPherson A, Nguyen C, Groninger H, Anderson KM, Henderson P, Rao A. Continuous Intravenous Inotropic Support for Advanced Heart Failure: Palliative Considerations. J Pain Palliat Care Pharmacother. 2022 Mar;36(1):59-67. doi: 10.1080/15360288.2022.2050456. Epub 2022 Mar 23. PMID: 35319327.
 - g. Asano R, Anderson KM, Koirala B, Abshire M, Himmelfarb CD, Davidson PM. The Edmonton Symptom Assessment Scale in Heart Failure: A Systematic Review. J Cardiovasc Nurs. 2021 Aug 16. doi: 10.1097/JCN.00000000000835. Epub ahead of print. PMID: 34406980.
 - h. Reilly CM, Anderson KM, Baas L, Johnson E, Lennie TA, Lewis CM, Prasun MA. American Association of Heart Failure Nurses Best Practices paper: Literature synthesis and guideline review

for dietary sodium restriction. Heart Lung. 2015 Jul-Aug;44(4):289–98. doi: 10.1016/j.hrtlng.2015.03.003. Epub 2015 Apr 16. PMID: 25891648.

- 4. These studies demonstrate research innovation including the integration of digital healthcare technologies and emerging research designs, artificial intelligence, and machine learning with patients with cardiovascular conditions.
 - a. Shara N, Bjarnadottir MV, Falah N, Chou J, Alqutri HS, Asch FM, Anderson KM, Bennett SS, Kuhn A, Montalvo B, Sanchez O, Loveland A, Mohammed SF. Voice activated remote monitoring technology for heart failure patients: Study design, feasibility and observations from a pilot randomized control trial. PLoS One. 2022 May 6;17(5):e0267794. doi: 10.1371/journal.pone.0267794. PMID: 35522660; PMCID: PMC9075666.
 - b. Shara N, Anderson KM, Falah N, Ahmad MF, Tavazoei D, Hughes JM, Talmadge B, Crovatt S, Dempers R. Early Identification of Maternal Cardiovascular Risk Through Sourcing and Preparing Electronic Health Record Data: Machine Learning Study. JMIR Med Inform. 2022 Feb 10;10(2):e34932. doi: 10.2196/34932. PMID: 35142637; PMCID: PMC8874927.
 - c. Apergi LA, Bjarnadottir MV, Baras JS, Golden BL, **Anderson KM**, Chou J, Shara N. Voice Interface Technology Adoption by Patients with Heart Failure: Pilot Comparison Study. JMIR Mhealth Uhealth. 2021 Apr 1;9(4):e24646. doi: 10.2196/24646. PMID: 33792556; PMCID: PMC8050751.
 - d. Shara N, Bjarnadottir MV, Falah N, Chou J, Alqutri HS, Asch FM, Anderson KM, Bennett SS, Kuhn A, Montalvo B, Sanchez O, Loveland A, Mohammed SF. Voice activated remote monitoring technology for heart failure patients: Study design, feasibility and observations from a pilot randomized control trial. PLoS One. 2022 May 6;17(5):e0267794. doi: 10.1371/journal.pone.0267794. PMID: 35522660; PMCID: PMC9075666.
- **5.** I have a broad range of expertise regarding cardiovascular conditions as demonstrated by book chapters and the interdisciplinary book that I edited entitled *The Advanced Practice Nurse Cardiovascular Clinician*, published by Springer Publishing Company.
 - a. Anderson KM, ed. The Advanced Practice Nurse Cardiovascular Clinician. New York, NY: Springer Publishing. 2014 Oct 20.
 - Murphy D, Anderson KM. Chapter 2: The cardiovascular patient interview and history. In: L'Ecuyer K, Young E, editors. Cardiac Vascular Nurse Certification Review. New York, NY: Springer Publishing; 2022 March 21.
 - c. Anderson KM, Murphy DL, Asano R, Vuckovic KM. Chapter 38: Heart failure: guideline directed medical and device therapy. In: Perpetua EM, Keegan P. Cardiac Nursing, 7th ed. Philadelphia, PA: Woltera Kluwer; 2020.
- **6.** As an academic, my research and scholarly work has focused on the science of education of inclusive teaching practices of universal design and mentoring.
 - Davis D, McLaughlin MK, Anderson KM. Universal Design for Learning: A Framework for Blended Learning in Nursing Education. Nurse Educ. 2022 May-Jun 01;47(3):133–138. doi: 10.1097/NNE.00000000001116. Epub 2021 Oct 11. PMID: 34657112.
 - Anderson KM, Davis D, McLaughlin MK. Implementing Universal Design Instruction in Doctor of Nursing Practice Education. Nurse Educ. 2019 Sep/Oct;44(5):245–249. doi: 10.1097/NNE.0000000000642. PMID: 30589666.
 - c. Anderson KM, McLaughlin MK, Crowell NA, Fall-Dickson JM, White KA, Heitzler ET, Kesten KS, Yearwood EL. Mentoring students engaging in scholarly projects and dissertations in doctoral nursing programs. Nurs Outlook. 2019 Nov-Dec;67(6):776–788. doi: 10.1016/j.outlook.2019.06.021. Epub 2019 Jul 5. PMID: 31421860.

White KA, Heitzler ET, **Anderson KM**, Yearwood EL, McLaughlin MK, Fall-Dickson JM. Essential knowledge, skills, & attitudes of mentors and mentees for successful DNP scholarly projects. Nurse Educ Today. 2018 Dec;71:107–110. doi: 10.1016/j.nedt.2018.09.015. Epub 2018 Sep 23. PMID: 30268072.

Complete List of Published Work in MyBibliography:

https://www.ncbi.nlm.nih.gov/myncbi/kelley.anderson.1/bibliography/public/



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