Duke University
This project will be conducted at Duke University, a private institution created in 1924 by James Buchanan Duke as a memorial to his father, Washington Duke. It consists of 10 schools, which have 6,542 undergraduate and 9,009 graduate and professional students enrolled as of Fall 2020. As of Fall 2020, there are 3,956 total faculty and 42,479 employees, the majority of whom work for the Schools of Medicine and Nursing and Duke Hospital. Duke is the largest employer in Durham County and the second-largest private employer in North Carolina. Duke's campus is located on over 1,000 acres in the city of Durham, NC, which itself is part of the Research Triangle area of North Carolina. Duke University is led by an executive team consisting of: President Vincent E. Price, Executive Vice President Daniel Ennis, Provost Sally Kornbluth, Chancellor for Health Affairs and President and CEO of the Duke University Health System Dr. A. Eugene Washington, and Senior Vice President and Secretary to the Board of Trustees Richard Riddell. The Dean of the School of Medicine and Vice Chancellor for Health Affairs is Dr. Mary Klotman. President Price reports to the Duke University Board of Trustees.

A major research university, Duke includes schools of nursing, medicine, engineering, environment, divinity, law, business, public policy, and arts and sciences. Because its schools are located on a single campus in Durham, NC, the availability of a wide range of research expertise is available to all faculty. Moreover, Duke’s institution-wide dedication to knowledge in the service to society has generated numerous opportunities to engage with communities in Durham and around the globe.

Duke Health
Duke Health conceptually integrates the Duke University School of Medicine, Duke-NUS Medical School, Duke University School of Nursing, Duke University Health System, Private Diagnostic Clinic (Duke physicians practice), and incorporates the health and health research programs within the Duke Global Health Institute as well as those in schools and centers across Duke University, including the Duke Robert J. Margolis Center for Health Policy.

As a world-class academic and health care system, Duke Health strives to transform medicine and health locally and globally through innovative scientific research, rapid translation of breakthrough discoveries, educating future clinical and scientific leaders, advocating and practicing evidence-based medicine to improve community health, and leading efforts to eliminate health inequalities.

Duke University School of Medicine
Established in 1930, Duke University School of Medicine is the youngest of the nation’s top medical schools. Ranked among the best in the nation, the School takes pride in being an inclusive community of outstanding learners, investigators, clinicians, and staff where traditional barriers are low, interdisciplinary collaboration is embraced, and great ideas accelerate translation of fundamental scientific discoveries to improve human health locally and around the globe.
Composed of more than 2,500 faculty physicians and researchers, the Duke University School of Medicine along with the Duke University School of Nursing and Duke University Health System create Duke Health. Duke Health is a world-class health care network. Founded in 1998 to provide efficient, responsive care, the health system offers a full network of health services and encompasses Duke University Hospital, Duke Regional Hospital, Duke Raleigh Hospital, Duke Primary Care, Private Diagnostic Clinic, Duke Home and Hospice, Duke Health and Wellness, and multiple affiliations.

**Research**
Duke University School of Medicine includes the research efforts of basic and clinical faculty members in 38 departments, centers, institutes and initiatives. Their combined efforts make Duke one of the largest biomedical research enterprises in the country.

**DCRI: World’s Largest Academic CRO**
The Duke Clinical Research Institute (DCRI) is the world’s largest academic clinical research organization. Its mission is to develop and share knowledge that improves the care of patients through innovative clinical research. The DCRI is a global leader in cardiovascular, infectious disease, pulmonary, neuroscience medicine, and pediatric clinical research and conducts studies across multiple other therapeutic areas. The institute unites the clinical and academic expertise of faculty within the School of Medicine with world-class operational staff to provide full-service clinical research organization capabilities in support of drug development and delivery, from Phase 1 studies to real-world outcomes and implementation science research.

**Duke Human Vaccine Institute**
For nearly three decades, the Duke Human Vaccine Institute (DHVI) has been at the forefront in the battle against AIDS and specifically in the quest for an HIV vaccine. Formed in 1990, the institute is home to interdisciplinary efforts across Duke to develop vaccines and therapeutics for HIV and other emerging infections, including COVID-19. In 2019, DHVI received a third, 7-year grant from the National Institute of Allergy and Infectious Diseases to fund the Duke Consortia for HIV/AIDS Vaccine Development. That same year, DHVI received a large Collaborative Influenza Vaccine Innovation Centers (CIVICs) federal contract from the National Institute of Allergy and Infectious Diseases to develop, manufacture and test in humans more durable, longer-lasting vaccines against influenza. Researchers in DHVI are using their expertise and resources previously targeted toward developing countermeasures and vaccines for HIV, influenza and other infectious diseases to development treatment and prevention strategies for COVID-19. In 2020, DHVI received an historic appropriation from the state of North Carolina to fund these efforts to stop the pandemic.

**Research Triangle Park Expansion**
The Duke University School of Medicine is expanding into a newly-leased research center in the Research Triangle Park (RTP), which is located between Durham and Raleigh, N.C. The 273,000 square foot facility is an expansion into RTP that was precipitated by a surge in new federal research grants to fund vaccine development.

**Duke-NUS**
Duke-NUS is Singapore’s first and only U.S.-style graduate medical school. A partnership between Duke University School of Medicine and the National University of Singapore (NUS), the program combines the unique medical education curriculum at Duke with the academic rigor and rich resources offered by NUS and offers students an enriching and innovative educational experience. Graduates of the Doctor of Medicine (MD) program are awarded a joint MD degree by Duke and NUS.
Duke Kunshan University
Duke Kunshan University, a Sino-American partnership of Duke University and Wuhan University in China, provides an international educational experience within a close-knit community of students and faculty from various fields. Duke Kunshan offers academic programs and research opportunities for medical students and researchers, in the Master of Science in Medical Physics Program, Master of Science in Global Health Program and Global Health Research Center.

Duke Global Health Institute (DGHI)
The Duke Global Health Institute’s (DGHI) education, research and capacity building initiatives are built on a strong network of partnerships with institutions around the world in priority locations. The institute provides opportunities for medical students to better understand the depth, breadth and interdisciplinary nature of global health challenges. DGHI provides programs specially tailored to the School of Medicine’s Third Year program that allows medical students to study and do research abroad and even pursue dual MD/Master of Science in Global Health degrees. DGHI also offers programs for medical residents and fellows.

Duke University Department of Medicine
The Department of Medicine is the largest of 23 departments in the Duke University School of Medicine. The Department drives world-class clinical and academic research at Duke and beyond. From G protein-coupled receptors to cancer care to kidney research to lung transplants and aging, our faculty are focused on finding new discoveries and improving patient care. And they don't do it alone, sequestered away. They work together, across boundaries and beyond silos. What truly sets Duke apart is our passion for the three-part mission of academic medicine, our dedication to excellence and our focus on creating partnerships – both within Duke University Medical Center and around the world.

Research success
The Department of Medicine is an important driver of the research enterprise at Duke University. Our faculty receive more funding, and publish more research articles, than other departments in the School of Medicine, while at the same time partnering with investigators across the institution.

Duke Health Technology Solutions
Duke Health Technology Solutions is a robust, specialized division of Duke University Health System dedicated to the development and management of enterprise IT systems. A 2018 Davies Award Recipient, Duke Health is nationally recognized for IT and information management as the first healthcare system to be awarded top honors by the Healthcare Information and Management Systems Society (HIMSS) for inpatient, ambulatory and analytics health information technology capabilities. As a ‘Most Wired’ health system, our employees are among the top-skilled IT experts in the Triangle and work with leading scholars and researchers across Duke University to develop innovative technologies that support our mission of delivering tomorrow's healthcare today.

Duke Health Technology Solutions (DHTS) provides the overarching information technology solutions for Duke Medicine. With over 900 employees, DHTS’s assets and services include the enterprise data center, enterprise service desk, and comprehensive network and hardware support. It serves over 11,000 administrative, clinical and financial customers. DHTS manages
over 25,000 computers for departments throughout Duke University Health System in a twenty-four hour/seven day support structure. In addition, the team also includes individuals that specialize in database development, network administration, workstation support, IT security, project and consultative services and web technologies. The DHTS Academic Device Support Team consists of 34 IT analysts; dedicated to hardware, software, and supporting infrastructure for end-user computers in a multi-platform environment, Windows, Mac and Linux. The base image is deployed to Duke purchased hardware and departmental sanctioned hardware, with Windows, Mac and Linux current operating system. Support is focused on School of Medicine research faculty and administrative support, in a departmental unit.

Duke Center for Community and Population Health Improvement
The Duke Center for Community and Population Health Improvement is a multidisciplinary center fostering academic, community, and health system partnerships that will conduct community and population research and implementation programs to improve health in the Southeastern US and to disseminate best practices nationally and internationally. DCCPHI leverages integrated health system and public data sources, as well as robust community engagement, to inform community and population health priorities and to serve as a platform for rigorous clinical studies and program implementation. It contributes to the fulfillment of Duke’s commitment to T3 (translation to practice) and T4 (translation to populations) research that will ultimately improve health care and health. The Center builds from a long-standing history of community engaged programs and partnerships at Duke to 1) Foster robust relationships and facilitate knowledge transfer among academic, community, and health system stakeholders 2) Inform local, regional, and national health policies 3) Identify targets for community and population health improvement at patient, family, community, and regional levels through clinical, social, geospatial, and other contextual analytic methods 4) Rigorously study interventions to improve community and population health 5) Develop novel analytic methods for community and population health research 6) Train leaders to sustain and extend community and population health improvements

Multi-sector Community Stakeholder Engagement Program: This program engages a range of key community stakeholders including those from Durham City and County Government, Public Health, Commerce, Justice, Safety and Social Services, and the Arts to advance shared missions around community and population health. Leaders meet quarterly to discuss ongoing local and regional initiatives, addressing common goals and establishing common agendas that can work synergistically to improve health. Through an annual Health Summit, groups from all sectors gather to establish annual priorities to partner and address health priorities.

Policy and Practice Action: This program leverages Duke leadership in population management programs sponsored by North Carolina Medicaid as well as Duke engagement in accountable care shared savings programs to identify opportunities to implement established interventions into policy supported initiatives. It also conducts funded (e.g., through foundations or government) demonstration projects to establish novel models of care for future adoption.

Population Health Improvement Initiative (PHII): The Population Health Improvement Initiative (PHII) aims to catalog the efforts of Duke University, DukeHealth, and its partner community organizations to improve population health in the Durham community and beyond. Information on various population health improvement efforts is displayed in this interactive website to be used by Duke, Durham community members, funding agencies, and other interested stakeholders. Stakeholders can engage with the website and filter the project by health factor, target population, and more.
Population Health Improvement Pragmatic Studies: This research program seeks to identify, measure, and address determinants of poor health and to establish the effectiveness and sustainability of pragmatic programs to improve and sustain community and population health and health equity. Though multiple externally funded projects, academic researchers with expertise in a broad range of methodologies, including clinical epidemiology, geospatial science, biomedical informatics, implementation science, social science, health policy, and precision medicine approaches work in concert to address high priority health needs, established through partnerships with the community. Community engagement undergirds the research program, which features

1. A standing network of established community leaders representing local non-profit organizations, local health sector leaders (including City and County Public Health agencies), local health systems, patients, and their families,
2. A standing community advisory board,
3. A program of ongoing colloquia to bring researchers together with community members to collaboratively engage in research, and
4. Duke-sponsored education and match-making programs to enhance researcher readiness to engaged with community members and to enhance community readiness for research.

Education and Training: The Center seeks to build a pipeline of academic and community leaders in community and population health research through an advanced seminar series featuring lectures from senior scholars at Duke focused on methods for conducting community engaged population studies, research works in progress, and invited speakers. Attendees include students, residents, clinical and research fellows, and faculty members conducting community engaged population studies.

Duke Department of Biostatistics and Bioinformatics
The Department of Biostatistics and Bioinformatics (B&B) engages in methodological and collaborative research, and directs four educational degree programs: the Clinical Research Training Program (CRTP), the Master of Biostatistics Program, the PhD Program in Biostatistics, and the Master of Management in Clinical Informatics (MMCi). Instructors in these programs, as well as other faculty members in the department, either teach courses or supervise student research in the areas of biostatistics, computational biology, statistical genetics, epidemiology, health economics, health services research and computational medicine.

The Department currently has over 50 faculty members who are individually affiliated with various research groups, centers, and institutes across the School of Medicine, including the Duke Clinical Research Institute, the Duke Cancer Institute, the Durham VA Medical Center, the Duke Molecular Physiology Institute, the Center for HIV/AIDS Vaccine Immunology, the Duke Center for Aging, the Duke Center for Genomic and Computational Biology, and the Duke Center for Applied Genomics & Precision Medicine. The discipline of biostatistics constitutes a primary focus of the Department, which serves as the academic home for faculty biostatisticians in the Medical Center. Outside the School of Medicine, statistics and biostatistics are represented at Duke by the Department of Statistical Science, one of the eight natural science departments in the School of Arts and Sciences. Some Department of Statistical Science faculty members have secondary
appointments in B&B, and vice-versa. Secondary appointments are also held by several faculty members whose primary appointments are in the Department of Medicine.

**Duke Department of Population Health Sciences**

Duke’s interest in population health has been both longstanding and widespread. To focus that interest and create a transdisciplinary setting for research and education, the University’s Board of Trustees approved the Department of Population Health Sciences in the School of Medicine in May 2017. The department’s creation brought together faculty and operational staff in behavioral science, epidemiology, health economics, health services research and policy, and implementation science.

The department includes 45 faculty members, 44 scholars with secondary appointments, and a staff of 64.

The department’s research and teaching draws on deep engagement with the Duke University Health System (Duke Health), which manages more than 90 percent of the healthcare encounters in Durham County, NC; and close collaboration with the Veterans Administration health care system and the North Carolina Department of Health and Human Services. The department also oversees many data sets of local, state and national sources.

**Duke Division of General Internal Medicine**

The research will be conducted in the Duke Division of General Internal Medicine which is a Division of the Department of Medicine in the Duke University School of Medicine. The division of General Internal Medicine provides exceptional patient care, research, and training of clinician leaders and scholars. With more than 160 faculty members contributing to our clinical, research and education programs, the division is among the largest divisions in the Duke Department of Medicine.

**Location:** The research division is located at 200 Morris Street, 3rd Floor, Durham, NC in close proximity to the Duke main campus and Duke University Medical Center and occupies 9,204 square feet of space with 22 offices, 37 cubicles and 10 additional rooms (conference rooms, storage, etc.).

**Computers/Servers:** The computing environment consists of Dell, Lenovo, and Apple desktops and laptops. All machines are running a minimum of Windows 7/OSX10.11 or higher. All machines are licensed to run Office and Crowdstrike Falcon Anti-Virus. Per Duke policy all laptops are to be encrypted with either Bitlocker on PC or Filevault. Mobile devices used to connect to the secure Duke Health wireless network or to access Duke Health resources are required to enroll in Duke Health Mobile Device Manager and must install AirWatch on their device.

**Duke General Internal Medicine Affiliated Research Resources, Centers and Institutes**

**Duke Primary Care Research Consortium**

Established in 1996, the PCRC is a primary care research network for academic, community, Veteran's Affairs (VA), and managed-care practices within the Duke Health System and surrounding communities. PCRC includes more than 70 practices in 9 counties in North Carolina, which represents close to 200 primary-care clinicians caring for more than 300,000
patients, with access to a total population of 1.2 million. For the past 20 years, the PCRC has conducted over 100 studies, enrolling more than 8000 patients. The PCRC is organizationally placed within the Clinical and Translational Science Institute (CTSI) in the Duke University School of Medicine. The current PCRC model consists of a group of dedicated clinical research coordinators and trials assistants trained by the network office. PCRC Project Management ensures that study milestones are completed according to timelines and coordinates contract and financial services for all network practices. Use of this model ensures quality data collection, enhances allocation of site personnel, and protects sites from fiscal responsibility for study staffing.

PCRC faculty ensure that protocols are pragmatic and feasible in busy clinical settings, assist with identifying participating practices, create short study summaries for practice presentations, and obtain feedback from the practices and providers during proposal development, study implementation, and dissemination of results.

The current PCRC Administrative Group (AG) is made up of a Director, Research Advisory Board Chair, a CTSI Senior Staff Director and a Research Project Lead. Rowena J. Dolor, MD, MHS has been the Director of the PCRC since its inception in 1997 and is an Assistant Professor in Head and Neck Surgery & Communication Sciences at Duke University Medical Center. Ranee Chatterjee, MD, MPH is Associate Director and Chair of the Research Advisory Board. Dr. Chatterjee is an Associate Professor in General Internal Medicine and a clinician at DPC South Durham, a Duke Primary Care practice. The PCRC AG is responsible for maintaining the interface with study sponsors for administrative issues, project timelines, and milestone definition. Contracts and finances are centrally managed for all the practices within the PCRC with support from CTSI Operations. The Duke University Medical Center Institutional Review Board (IRB) acts as the central IRB for PCRC studies. The PCRC AG develops grant proposals and oversees IRB submissions, modifications, annual renewals, and assists the study coordinator group with oversight of study implementation and operations. The PCRC staff are responsible for IRB submissions, protocol training, patient identification and recruitment, consent and enrollment, study visits, retention and follow-up, data collection and entry, regulatory compliance, as well as monitoring and audit preparation. All are cross-trained on all studies but, typically, one coordinator is designated the protocol “lead” for each study. Centralized study coordination ensures uniform training of the coordinators to improve the quality, completeness and accuracy of data collection. Communication with clinicians occurs via email, on-site practice meetings, or through meetings with the clinic leadership including the clinic medical directors, regional medical directors, and/or the chief medical officer.

Computer resources currently available to serve the extensive computing and information-sharing needs in the CTSI include over 1100 Pentium-class PC desktops linked by a fully-switched network to over 60 Microsoft Windows and Sun Solaris servers and, a central storage subsystem with over 8 TB of disk space and a capacity of 32 TB. Server and storage subsystem are located in a secure, environmentally controlled room with battery and generator power backup. A high-speed enterprise backup system is implemented with both on-site and off-site storage of backup tapes. Databases are maintained with capabilities for point-in-time recovery. A 1-Gbps backbone Ethernet network with 100-Mbps to the desktop provides quick response and efficient data transfer. A secure FTP file server is used for transfer of data to and from remote sites. Internet access is restricted with a computer firewall to the Duke Medical Center Common Services Network. The computing resources also include networked laser printers, scanners for black-and-white and color scanning, and FAX services for delivery of documents from the desktop. SAS for Windows is installed on the network. CTSI also maintains multiple 4-processor Sun Sunfire servers with 8-16 GB of memory running current versions of SAS, S-
PLUS, and Oracle software.

**Duke Outpatient Clinic:** The predecessor of the DOC was established shortly after Duke University Hospital (DUH) opened in 1930 as a medicine outpatient clinic to serve the public, regardless of ability to pay. Today the DOC continues that safety-net tradition, conducting over 22,000 provider visits for over 5,000 adult internal medicine patients per year. The patient population is majority-minority (63.7% African American), female, lower-income, including 10-15% uninsured and the largest concentration of “dual-eligible” patients at Duke. Clinic resources include social work, specialty care and intensive case management; the DOC is also collaborating with the Duke Population Health Management Office (PHMO) on shared care for needy patients.

**Duke Primary Care:** Duke Primary Care (DPC) physicians are part of a network of clinics and a continuum of care in the Duke University Health System. Established in 1995, Duke Primary Care is one of North Carolina’s largest primary care networks and plays a key role in Duke Health’s clinical care and research. Services include primary care, preventative medicine, chronic care management and urgent care for conditions usually seen in family medicine, internal medicine and pediatric practices. They are staffed by more than 200 providers and 500 clinical staff. Annually, Duke Primary Care providers see more than 614,000 patient encounters. DPC clinicians provide high quality and efficient patient care through a comprehensive primary care network. They strive to respond to our community's changing health care needs. These physicians have appointments as consulting associate faculty with Duke in the respective Departments of Community and Family Medicine, Medicine, and Pediatrics. DPC supports Duke University Health System's (DUHS) mission of education, research and patient care through the development and integration of a full-service primary care network. DUHS is the dominant health care provider for the Durham community as well as the largest employer in the area. DUHS is a wholly owned subsidiary corporation of Duke University, aligned with the Medical Center and partnering with local healthcare providers.

All DPC clinics use similar computerized systems (e.g. MaestoCare/EPIC) with the full capabilities of an electronic health record for medication prescribing, scheduling, billing, laboratory and radiology results and ordering, clinical notes, and disease management. Payor mix is 23% Medicare, 5% Medicaid, 55% Managed Care, 2% Self pay, and 15% Commercial and other insurers.

**Duke Center for Integrative Health Research**

The Duke Center for Integrative Health Research (DCIHR) is a multidisciplinary research center dedicated to the optimization of health and wellbeing using methodologies based in complementary and integrative medicine, nutrition, fitness, and health behavior change. The purpose of the center is to understand the biological, physiological, psychosocial and spiritual effects of existing and potential therapies, and disseminate key research findings into clinical practice. The DCIHR is driven by four core areas of research: (1) diet, nutrition, and supplements; (2) physical activities, manual therapies, and recovery; (3) environment; and (4) mind-body medicine. DCIHR is housed within Duke Integrative Medicine (Duke IM), an outpatient clinical space of 27,000 square foot, first-of-its-kind green facility designed with the principles of integrative medicine in mind. This $11.5 million "living laboratory" was opened in November 2006 and creates an ideal setting in which to implement integrative models of health care. An integrated café offers on-site highly nutritional options for patients and guests of Duke IM while they receive services or tour the facility. In addition to space within the integrative medicine-specific building, DCIHR has three offices dedicated solely to research personnel. DCIHR shares a 26-acre campus with the Duke Center for Living. This campus itself is
composed of multiple clinical and research programs aimed to improve patients' lifestyles through mind-body-spirit approaches to medical care, such as exercise training, nutrition interventions, psycho-social education, and meditation-based approaches to care. All facilities are JCAHO-approved and handicapped-accessible. The facilities are welcoming and offer convenient parking. The design of the facilities effectively separates areas used for administrative functions, clinical services, patient education, and laboratory functions.

**Duke Palliative Care Research**

The Duke Center for Palliative Care (DCPC) is committed to improving quality of life for those with serious illness and their loved ones, through outstanding clinical care, patient- and family-centered research, and innovative educational initiatives. Clinical services include an inpatient consult service, outpatient clinic, and hospice and community care programs. Research efforts focus on improving patient and family biomedical, psychosocial and spiritual needs through attention to areas of communication, decision-making, psychosocial interventions and healthcare disparities. The team has particular expertise in intervention development, testing and implementation. Educational initiatives are aimed at increasing the information needs of patients and families and equipping clinicians with primary palliative care skills. The Palliative Care Fellowship is an ACGME-approved 12-month program providing physician training for physicians leading to board certification in palliative medicine.

The Duke Center for Palliative Care (DCPC) is guided by a population-based approach to palliative care, which incorporate principles of education, outreach, analysis, and policy to improve palliative care in communities. In the same way that public health strategies have been used to improve the health of communities, DCPC is developing and evaluating innovative strategies of provider education, social marketing, community outreach, and scalable interventions to improve palliative care outcomes for communities. The Center’s overarching goal is to integrate palliative care resources into the fabric of health systems and communities in a way that is community-focused, payer-agnostic, and independent of demographic and socioeconomic characteristics.

DCPC faculty come from the Duke University School of Medicine and School of Nursing, and from schools and Institutes across the Duke campus. Faculty are funded by grants from the National Institutes of Health, the Department of Veterans Affairs, and a wide range of private foundations.