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NSF CENTER FOR HEALTH ORGANIZATION TRANSFORMATION

MISSION
The mission of the NSF Center for Health Organization Transformation (CHOT) is to advance the knowledge and practice of transformational strategies in evidence-based management and clinical practice.

CHOT conducts cooperative research among universities, health systems and other health-related industries. The Center relies on multi-disciplinary approaches to advance and link system design and organizational technologies in innovation research. The three main areas in which CHOT conducts research are:

- Developing research-informed strategy
- Validating innovations in healthcare delivery
- Implementing evidence-based innovation across settings

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Ustawi Biomedical Research Innovation and Industrial Centers of Africa (UBRICA)
Verizon

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Additional information on CHOT research projects from previous years are available to our members at chotnsf.org.

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Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.
As a National Science Foundation industry-university cooperative research center (I/UCRC), CHOT follows a model of an industry-academic partnership that has benefited industry-focused research across more than 50 disciplines. Of the 70 I/UCRCs within the United States, CHOT is the only one focused on innovations in healthcare delivery. CHOT researchers work alongside the Industry Advisory Board (IAB) to conduct research that supports the implementation of evidence-based transformational strategies within the healthcare sector. CHOT creates a safe, mutually beneficial, cooperative environment where leading healthcare industry members can come together to collaborate and to innovate.

Our research model relies on the knowledge and experience of healthcare leaders to guide academic research. This cooperative model ensures that the research is both meaningful and applicable to the healthcare industry and provides immediate decision support.

CHOT UNIVERSITY SITES:

INDUSTRY ADVISORY BOARD (IAB)

INDUSTRY MEMBERSHIP

= $50,000

Pooled Members

NSF Funds

CORE FUNDS

SUPPLEMENTAL FUNDS

= $500,000

Innovations in Healthcare Delivery

INVESTIGATE
Research-informed strategic decisions

VALIDATE
Innovations and prototypes

IMPLEMENT
Evidence-based innovation across settings

Value Created

INDUSTRY TESTIMONIALS

“Ability to conduct quality academic research of importance to our company and industry sector. Ability to collaborate with local University.”

Robert Bernstein
Carena Inc.

“Access to a broad knowledge based and academic experts as well as interactions with key industry members.”

Norma Padron, Ph.D.
Main Line Health

“Improvements in patient care management, information extraction and summarization, and quality improvement.”

Karan Uppal, Ph.D.
Emory

CHOT’s research model relies on the knowledge and experience of healthcare leaders to guide academic research to ensure that it is meaningful and applicable to the healthcare industry and provides immediate decision support.
CHOT INSIGHTS: A SYSTEMS APPROACH TO REDUCING CENTRAL LINE-ASSOCIATED BLOODSTREAM INFECTIONS

Administrators can reduce infection incidences to zero through a systems approach for reducing the incidence of central line-associated bloodstream infections (CLABSI).

Administrators should adopt the following measures to promote a collaborative and systems-style approach to reducing CLABSI rates in an organization:

A. Post signs next to trash to remind providers and clinical staff hand hygiene rules

B. Implement an electronic medical record (EMR) system alert to remind providers and clinical staff to change dressings

C. Implement a protocol to show which team is responsible for changing dressings AND the central line

D. Remind healthcare workers to only use sterilized tools

E. Update catheter maintenance protocol to include checking of Curo Caps

The implementation of the measures A–E at Grady Memorial Health reduced CLABSI rates by 18% and reduced CLABSI-related deaths by 33%.

CHOT INSIGHTS: ADOPTING ACTIVE BARRIER APPAREL IN A HEALTHCARE SETTING AS AN EFFECTIVE PATIENT SAFETY STRATEGY

Adopting new active barrier technologies can protect both healthcare workers and patients by reducing the potential for exposures to:

- Microorganisms
- Infectious materials found on healthcare workers’ uniforms
- Body fluids

Intensive care unit (ICU) settings saw a decreased prevalence of hospital-acquired surface bacteria on active barrier apparel, when compared to traditional non-protective scrubs.

Healthcare administrators should promote the use of active barrier apparel that utilizes latest advances in textile technology including attire made of fabric that is:

- Tightly woven
- Low tinting
- Stain resistant and durable
- Antimicrobial


CHOT INSIGHTS: COLLABORATIVE LEARNING CAN ENHANCE PERFORMANCE FOR TEAMS INVOLVED IN COMPLEX PEDIATRIC CARDIAC CARE

Through collaborative learning, where multidisciplinary teams share experiences and resources to enhance performance, clinical providers can leverage each other’s knowledge and skills to:

- Minimize variation
- Establish best clinical practice guidelines
- Improve quality of patient care

In order to achieve successful collaborative learning on a national level, administrators can develop a clinical practice guideline (CPG) that aims to reduce variations and enhance quality of care through the following actions:

- Assess the impact of practice on quality and patient care
- Develop standards of optimal safety, quality, and cost-effectiveness
- Enlist multidisciplinary teams made up of clinical leaders and systems engineers from multiple healthcare organizations
- Implement best practices of cardiac care found at leading healthcare facilities
- Observe activities and identify high-leverage practices for CPG development
- Visit participating sites to analyze resource availability, decision paths, and care coordination

CHOT INSIGHTS: IMPROVING SPECIALTY ACCESS TO MODERATE EMERGENCY DEPARTMENT OVERUSE

REDUCE OVERUSE OF THE EMERGENCY DEPARTMENT

- REDUCE PATIENT ANXIETY
- INCREASE ACCESS TO SPECIALTY CARE

Healthcare systems can increase access to their specialty care departments by improving team-based care between primary care physicians (PCPs) and specialists:

- Establish e-consults or virtual visits to specialty care patients with long access delays to help them better understand their health condition
- Enable walk-ins at specialty clinics
- Include nurse practitioners in primary care consults to help fast-track patients in need of urgent specialty care


CHOT INSIGHTS: A WEB-BASED PATIENT TOOL CAN HELP DETERMINE THE OPTIMAL EMERGENCY DEPARTMENT FACILITY FOR NON-AMBULANCE EMERGENCIES

By using a web-application designed from the perceived needs of the patient, hospitals can enhance:

1. Engagement of non-emergent ED patients
2. Ability of patients to make real-time informed decisions
3. Visibility of a hospital's Quality Index metrics
4. Utilization of hospital resources

In order to enhance the patient experience for non-ambulance ED patients, a web-application should contain:

- Approximate travel, wait, and composite times for nearby hospitals
- Input fields or automatic geo-location buttons to allow for the recognition of the user’s location
- Insurance acceptance details for nearby hospitals
- Interactive charts for each nearby hospital that provide visual summaries of CMS and insurance data
- Interactive maps that display nearby hospitals
- Ranking or quality indices for nearby hospitals


CHOT INSIGHTS: AVOIDABLE HOSPITAL READMISSIONS: TOP THREE INTERVENTIONS USED VERSUS TOP THREE MOST EFFECTIVE INTERVENTIONS

In 2016, approximately 75% of U.S. hospitals were penalized by the Center for Medicaid Services (CMS) under the Hospital Readmissions Reduction Program (HRRP) as a result of high readmission rates.1 Approximately 74% of hospitals in Pennsylvania were penalized under this program.2 Reducing readmission rates require the adoption of effective interventions. However, the literature on interventions aimed toward improved readmission rates has yielded mixed results. Below is a snapshot of the evidence, which is largely based on interventions on patients experiencing heart failure.

1. Education: 36.6% of studies report Successful Results
   Patient or family education delivered before and after care, or at discharge by diabetes educator, a pharmacy student, or a trained volunteer staff receiving dietary to increase patient or family’s knowledge and enhance their involvement in care. These interventions were most effective for racial minority, elderly and COPD or heart failure patients.

2. Telephone follow-up: 75% of studies report Successful Results
   Monitoring post-discharge care by via telephone, and educating patients and managing their symptoms by post-discharge telephone calls. These interventions were most effective for elderly and COPD and CHF patients.

3. Collaboration: 37% of studies report Successful Results
   Coordination between a multidisciplinary team of diverse professionals, including nurses, pharmacists, and physicians, and transition of care program to provide effective discharge processes for patients. These interventions were most effective for elderly and health failure patients.

4. Tele-homecare: 75% of studies report Successful Results
   Using remote patient technology to participate in Health Information Exchange (HIE), especially electronic documentation, to improve care coordination without clinical visits for patients. These interventions were most effective for elderly, and heart failure and AMI patients.

5. Guideline Implementation: 50% of studies report Successful Results
   Adherence to adopted guidelines and protocols about clinical treatment, and compliance with guidelines for staffing that include work hour restrictions. These interventions were most effective for White and elderly patients based on findings from a mixed pool of diagnoses.

6. Medication reconciliation: 75% of studies report Successful Results
   Patient education conducted by a pharmacist or nurse to improve the patient’s medication understanding or adherence before discharge. These interventions were most effective for elderly, Medicare, and pneumonia or COPD patients.


**CHOT INSIGHTS: A SYSTEMS THINKING APPROACH CAN ENHANCE THE IMPLEMENTATION OF INTERVENTIONS IN CHRONIC DISEASE MANAGEMENT**

A more patient-centered and coordinated approach to managing chronic diseases can be achieved through a systems thinking approach for the implementation of interventions. Interventions can be implemented more efficiently and successfully in three successive phases:

**Phase 1**

- Identify problems in system
- Understand the needs of all stakeholders—including patients—in the healthcare organization
- Identify potential interventions based on the needs of stakeholders

**Phase 2**

- Identify key variables in system
- Develop a causal loop to identify relationships between key variables
- Analyze key feedback loops between variables

**Phase 3**

- Prioritize interventions
- Present findings from Phase 2 to leadership
- Develop managerial strategies for successful implementation of the interventions in the system

**CHOT INSIGHTS: SYSTEMS APPROACH BASED INTERVENTIONS CAN REDUCE HOSPITAL READMISSION RATE**

Admission rates can be reduced based on a systematic review of the literature through the following systems-based strategies and interventions:

**1. Improve transitions of care**

- By enhancing assessment of:
  - Quality of care
  - Accurate medical reconciliation
  - Effective communication of clinical prognosis and of discharge
  - Post-discharge support
  - Proactive end-of-life care planning

**2. Redesign the discharge process**

- Through:
  - Patient centered approaches
  - Simple discharge process
  - Clear instructions on risks, symptoms, and complications
  - Usage of IT to communicate key discharge information

**3. Enhance follow-up care strategies**

- Through:
  - Increasing frequency of follow-up activities
  - Increasing primary care access
  - Usage of high-risk screening tools
  - Timely and accurate transfer of key patient information between providers
  - Healthcare worker visits and phone-based follow-ups after discharge


Hospitals can enhance patient-centered care and decrease health promotion costs by using data analysis to conduct customer-based market segmentation through the following steps:

**STEP 1:** Analyze patient data from electronic medical record (EMR) systems

**STEP 2:** Segment customer market based on similarities among patients

**STEP 3:** Identify homogenous clusters that are "at risk" or "at benefit"

**STEP 4:** Develop interventions that target unique patient segments

**STEP 4:** Improve value by providing high quality care at a reduced cost

Value-based reimbursement in healthcare has resulted in an increasing focus on patient engagement as a mechanism to improve post-acute care outcomes, particularly in reducing readmissions. Interventions to address patient engagement should account for health literacy and generational differences, since interventions that may work with a high literacy population may not be as effective among a population with low literacy. Similarly, interventions used with millennials may not be as effective among baby boomers. This project identifies best practices of health system strategies to address barriers related to health literacy and generational differences to increase patient engagement and ultimately reduce hospital readmissions.

**How this is different than related research:**
There has been relatively little research examining how health literacy and generational differences can influence patient engagement and readmission rates, as well as health system strategies to address barriers related to health literacy and generational differences. This study addresses research questions regarding health literacy and generational differences and their impact on patient engagement and hospital readmissions. The systematic literature review will also provide health system strategies to address barriers related to health literacy and generational differences.

**Description:**
Value-based reimbursement in healthcare has resulted in an increasing focus on patient engagement as a mechanism to improve post-acute care outcomes, particularly in reducing readmissions. Interventions to address patient engagement should account for health literacy and generational differences, since interventions that may work with a high literacy population may not be as effective among a population with low literacy. Similarly, interventions used with millennials may not be as effective among baby boomers. This project identifies best practices of health system strategies to address barriers related to health literacy and generational differences to increase patient engagement and ultimately reduce hospital readmissions.

**Value Proposition:**
- Examine health literacy and generational differences to increase patient engagement
- Identify strategies to address barriers related to health literacy and generational differences
- Utilize identified strategies to improve patient outcomes

**PROJECT 01-05171.UAB-FAU**

**Patient Engagement and Hospital Readmissions: The Role of Health Literacy**

**ACCESS TO CARE**

**Description:**
Direct-to-consumer (DTC) telemedicine refers to patient-initiated, on-demand primary, and urgent care services provided by licensed healthcare providers. It addresses common, non-emergent conditions, such as respiratory infections and urinary tract infections, using real-time, interactive technologies (e.g., video and phone). DTC telemedicine has great potential to extend access to care and contain costs, especially with ongoing research indicating rapid growth of DTC telemedicine offerings nationwide. However, there is concern that unnecessary service duplication and growth in total costs will result from access to an increase in DTC telemedicine. Using a retrospective study design, the average treatment effects for healthcare utilization and the cost by care site for common DTC telemedicine conditions will be estimated. This project provides healthcare decision makers key insights regarding DTC telemedicine’s impact on healthcare utilization and cost using rigorous research methods that consider multiple stakeholder perspectives.

**How this is different than related research:**
There is a scarcity of empirical work related to DTC telemedicine in general, but particularly around downstream impacts. The small body of existing research, most notably generated from the RAND Corporation, is limited largely to the utilization and spending for acute respiratory illness and is specific to a geographically-isolated and commercially-insured patient population. This project addresses important gaps in DTC telemedicine research, such as the differing utilization patterns and associated costs based on medical condition, insurance coverage, and other factors. This study will also look at payer and patient cost perspectives, an examination that has not yet been conducted.

**Value Proposition:**
- Compile and interpret insights regarding direct-to-consumer telemedicine’s impact on healthcare utilization and cost to current and prospective adopters
- Recommend rigorous strategies to evaluate return on investment for direct-to-consumer telemedicine
- Identify opportunities for direct-to-consumer telemedicine to support population health and value-based care

**PROJECT 02-05171.TAM**

**Impact of Direct-to-Consumer Telemedicine on Downstream Healthcare Utilization and Costs**

**ACCESS TO CARE**
Telehealth and Remote Patient Monitoring Systems to Improve Access & Promote Active Patient Engagement in Rural Communities

**Value Proposition:**
- Utilize the goals of cost efficiency to improve quality of care
- Identify drivers and barriers of patient engagement to reduce hospital admissions
- Summarize most effective telehealth/telemedicine interventions to improve patient outcomes

**Description:**
Timely access to quality healthcare service is a real challenge—as outlined in the 2015 IOM report—and misalignment of resources and demands results in long delay for care. Telehealth can offer alternative and timely care to rural area patients who lack sufficient healthcare options. Telehealth can also help to improve health conditions and to promote active patient engagement, which is particularly important for chronic disease management. This project identifies drivers and barriers of patient engagement by population groups (i.e., aged, generational differences) and chronic conditions (i.e., diabetes, obesity, COPD) and provides recommendations for implementing appropriate telehealth/telemedicine interventions given governmental policies, reimbursement payments (i.e., FFS, bundle payments), and delivery of care models (i.e., ACOs).

**How this is different than related research:**
The adoption of telemedicine and level of patient engagement and services provided across healthcare facilities remains uneven and far from optimal. There has been relatively little research examining various patient populations' engagement in the successful use of telehealth/telemedicine options. By exploring successful applications in rural care settings, this study will define the terms telehealth and telemedicine.

ACCESS TO CARE
Development of a Middleware Framework for Medical Device Integration for Telemedicine

**Value Proposition:**
- Design a working prototype based on IEEE 11073 protocol for various device integration
- Develop a hardware/software co-designed system used for interfacing biosensors for system prototyping
- Evaluate and expand the existing capabilities of the IEEE 11073 protocol to enable remote patient monitoring

**Description:**
Studies have found that the quality of patient-care declines as patient-to-doctor/nurse ratios increase. The ability of healthcare providers to effectively and efficiently monitor the current health status of patients can save lives and dramatically improve mortality rates. An integration of mobile, wireless, and sensor technologies has the potential to greatly advance the ability to enable automated data collection for monitoring patient health status in real time and provide a rapid response to a critical healthcare need. The goal of this project is to develop a middle-ware layer with a standardized communication framework for patient monitoring devices by expanding the capability of the IEEE 11073 protocol, such that a wide range of health monitoring devices could quickly and easily be interfaced and integrated. The goal is to include the capability of remotely collecting and transmitting data using the standard healthcare protocol (Health Language 7), and then storing the data at a remote location for further data collection and visualization.

**How this is different than related research:**
The networking capability of currently available health status monitoring devices is limited in functionality and primarily relies on proprietary communication protocols offered by a multitude of different vendors, and current systems are missing critical elements of a truly robust system. The development of a middle-ware layer framework in this project will be able to use the recorded data to continuously mine it in real-time to detect data inconsistencies due to network issues. Then, the intelligent system engine (knowledge base) could automatically detect potential health-related issues in patients and alert the caregivers.
Healthcare providers must be empowered with effective analytical methods and tools that enable and assist them in handling rich datasets, extracting useful and meaningful information at different granularities and across heterogeneous healthcare systems. Insights gained with these effective analytical methods and tools can be used in delivering personalized and effective healthcare services. This project initially focuses on patients with diabetes, cancer, and cardiovascular diseases. The goal is to ensure optimal dosages, cost effectiveness, and minimal adverse effects, and advance innovation in disease tracking with lab diagnostics.

How this is different than related research:
This project analyzes heterogeneous types of data including imaging, personal collected data (e.g., daily glucose results for diabetics), and utilization data across multiple clinic sites and platforms using large-scale data and predictive analytics. The study involves personal patient-specific data to advance innovative disease tracking with lab diagnostics, design evidence-based personalized treatment for individual patients, and optimize utilization for most efficient delivery. It will contribute to the development of state-of-the-art system data analytics and real-time decision technologies with broad applicability.

Description:
Fueled by rapid digital media advances, healthcare systems are investing more in advanced sensors and robotics, communication technologies, and sophisticated data centers. This facilitates information and knowledge visibility and delivery standardization and performance efficiency through big-data analytics. Diabetes, hypertension, cardiovascular disease, stroke, and cancer are the initial focus of this study. Ten years of clinical data on 2.7 million patients to perform machine learning and data mining are used to identify evidence and characteristics of best practice, uncover risk factors of different patient groups, develop effective clinical practice guidelines and disease management strategies, and optimize the service delivery to meet the demand.

How this is different than related research:
The data captures a diverse population across the United States with varying demographics, clinical practices, and outcome measures. This project is the first study of this kind that includes a massive amount of data across heterogeneous hospital and provider sites.
Consumers access healthcare in a multitude of settings, ranging from acute care to home-and community-based services (HCBS). With a variety of access points, care coordination programs are essential to facilitate care from one system to another, which emphasizes the isolated nature of the US healthcare system. In an effort to bring about broader systemic changes, this project aims to develop a care coordination program that focuses on the utilization of a bio-psycho-social model and leveraging community resources to facilitate care coordination outcomes. The project also develops cost, quality, and access metrics, as well as a tool used to assess care coordination best practices. The end goal is to disseminate a toolkit for providers to evaluate practice and identify gaps in care coordination.

How this is different than related research:
Related research focuses on a piecemeal approach to improving care coordination, often focusing on single visits and procedures, rather than the whole continuum of care. This project takes a more holistic approach by defining the continuum of care and developing models of collaborative best practices in care coordination that take into account the full system of care.

Value Proposition:
- Identify best practices for improving care coordination across systems and populations
- Develop a toolkit for providers to evaluate practice and identify gaps in care coordination

Description:
Transitions in patient care include home/community to acute care to post-acute care back to home/community. During these transitions, gaps in care may occur, which can negatively impact quality as well as increase healthcare costs. Two examples are: 1. hospital acquired infections (HAI) for admitted patients and medication adherence and 2. reconciliation for discharged and/or transferred patients. The quality and cost issues affect how future transitions of patient care will be coordinated. Although Centers for Medicare & Medicaid Services (CMS) has initiated penalty programs to reduce care complications, such as HAIs and readmissions, both remain high nationwide, meaning providers have an opportunity to improve the quality of care they offer during care transitions. This project summarizes best practices for HAIs and identify peer-reviewed evaluations of programs for medication management interventions and best practices for medication adherence to reduce readmissions after a transition in care.

How this is different than related research:
The literature contains various and numerous case studies of HAIs and medication nonadherence, but is limited in nature. Hospital acquired infections have been studied, but there is limited literature on the hospital acquired clostridium difficile infection. The literature on programs designed to improve medication adherence and reconciliation for discharged patients has yet to be considered a cohesive body. A systematic review of published evaluations of readmission reduction programs will allow researchers to identify best practices common to the most effective programs and will identify contextual elements important to the programs’ success along with intervention characteristics that tend to be less effective.

Value Proposition:
- Demonstrate practices to reduce certain hospital-acquired conditions and prevent readmissions related to medication adherence
- Identify best practices to increase quality of care while reducing avoidable costs
The United States of America faces a growing population of older adults and people with disabilities who require a coordinated service environment to meet the growing demand for home- and community-based services. Care coordination programs and care transition programs often center on the intersection of acute care and chronic care (such as the transition from nursing home to hospital), but in reality people access healthcare in a multitude of settings. This project aims to develop a care coordination program that focuses on measuring care coordination program impact, utilizing the bio-psycho-social and spiritual model, and creating a model that continually improves collaboration among providers.

How this is different than related research:
Traditional research in care coordination is related to coordination between acute and/or chronic clinical care providers. But delivery of care to older adults and people with disabilities extends beyond traditional institutional-based clinical care to include home-based care, as well as services which are social, financial, legal, and spiritual in nature. This project significantly broadens the perspective of care coordination by developing a system that also includes non-traditional participants, such as social service and public health agencies, religious organizations, and end-of-life services, in addition to traditional participants such as hospitals, skilled nursing homes, and rehabilitation providers.

A Mobile Based Care Coordination System for Critical Care
PROJECT 10-05171.FAU

Value Proposition:
- Design a HIPAA-compliant messaging platform to ensure a timely delivery of messages to a care team with a critical patient information attached with each message
- Facilitate tight communication, collaboration, and coordination among care team members

Description:
Currently, the healthcare industry is going through rapid transformations including readmission penalties, payment bundling, and wellness and patient compliance related medical coding, to refocus efforts on keeping patients healthy and driving the revenue stream from patients’ wellness. Such changes have given rise to different models of healthcare, such as Accountable Care Organizations (ACO) and Managed Care Organizations (MCO). These organizations are directly incentivized to reduce the cost of healthcare, as well as improve quality in order to stay profitable. This project aims to develop a mobile-based care coordination system for critical care patients. The created system will provide a secured, asynchronous messaging system, which will ensure an instant communication with the entire care team for a patient.

How this is different than related research:
While communication or lack of it is the main reason for missed diagnosis, hospital admission, readmission and duplication of care, it has not yet been successfully addressed in any electronic health record (EHR) system. Though several new mobile healthcare messaging applications have been implemented, they are basically HIPAA-compliant text messaging among doctors (i.e. HIPAA compliant WhatsApp) and effectively create more silos. This project proposes to build a mobile EHR agnostic application connecting the patient with their outpatient and inpatient doctors, staff, and others related to care for intelligent communication, which has potential to improve healthcare and provide opportunities.
Frequently, the factors that influence medical readmissions exist outside the borders of a healthcare setting and include patient-level decisions and societal interactions. The objective of this project is to leverage the size and availability of population health data to model and predict readmission risk factors. Data will be acquired on a large scale by mining publicly-available websites. The collected data will then be used to segment, model, and identify patients at risk of medical readmissions. For patient segments at a high risk of readmission, digital assistants (e.g., IBM Watson) will provide interactive feedback in an attempt to mitigate the risks.

How this is different than related research:
Typically, medical readmission research focuses on investigating clinical-level factors (such as age and medical condition) that have the potential of increasing medical readmission. Yet, when patients leave the hospital, a wide range of factors may influence their risk profiles, such as their support system and social norms. This project includes population health data that provides a more holistic understanding of what happens to patients once they are discharged from the hospital and utilizes a digital assistant that can provide real-time decision support to patients who have been predicted to be at a higher risk of readmission.

Value Proposition:
- Evaluate the value of publicly-available social media data in modeling patient-specific outcomes
- Measure the impact of digital assistants in serving as ubiquitous decision support systems

Description:
The rate of chronic conditions, including diabetes and asthma, continue to rise despite the advances in medical technologies and public awareness programs. For example, in the United States, more than 29 million individuals have been diagnosed with diabetes, with a new diagnosis occurring every 23 seconds. The objective of this project is to evaluate the efficacy of chronic condition treatment programs for chronic diseases, such as diabetes and asthma. Specifically, this project evaluates the clinical effectiveness and economic impact of different approaches to managing diabetes and asthma by exploring secondary data analysis of program operations data and biometric data on participants. Researchers also explore the impact that gamification methods have in chronic disease management and in changing the behavior of patients toward better healthcare outcomes.

How this is different than related research:
Existing research has focused on predicting factors that influence chronic diseases, but a knowledge gap exists between research on chronic disease management and translating the recommended practices for disease management. This project aims to identify specific practices that best translate into practice, as well as explore the influence of gamification in chronic disease management to determine whether successful implementations in other settings (e.g., education and rehabilitation) can be adapted for management of chronic disease.

Value Proposition:
- Summarize sets of basic research that may contribute to better management of chronic conditions
- Explore the role of gamification in changing behavior toward positive health outcomes
Value Proposition:
- Create a healthcare app that can be deployed to capture patient-specific data
- Develop a data mining tool that can extract valuable information from patient-centered data and inform delivery of patient-centered healthcare

Description:
Most patients spend a majority of their time away from healthcare facilities, where there is little to no ability to monitor health improvements or outcomes. A recent study by the Center for Disease Control (CDC) reported that of the 33+ million injuries that occurred between 2004 and 2007, 54% of women and 42% of men were injured inside/outside the home. With the emergence of ubiquitous sensing systems, such as mobile phones and wearable sensors, acquisition of population health-related data can occur quickly. This project explores methods used to effectively manage the health of those who typically spend a majority of their time outside the walls of a healthcare facility to improve employee and patient health outcomes. The goal is to design and develop a mobile app that has the ability to capture patient-specific data that can then be aggregated to answer population-level questions.

How this is different than related research:
Existing research related to population health is limited by data acquisition tools (e.g. mobile app) currently available. Rather than utilize existing data acquisition tools, this project will design and create a data acquisition tool that is based on patient and employee feedback. Such feedback will guide tool development to ensure it is highly customizable, user-friendly, patient-access friendly, and valued by the healthcare decision makers and patients.

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