

CHOT

Center for Health Organization Transformation

Center Compendium 2013



The mission of CHOT is to advance knowledge and practice of transformational strategies in evidence-based management, information technology, clinical practice, and organizational learning through cooperative research among universities, health systems, and other health-related industries. CHOT conducts research in innovation and transformation within and across the healthcare industry. It relies on multi-disciplinary approaches to advance and link systems design and organizational technologies—information, management, clinical, and social—in innovation research.

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The National Science Foundation I/UCRC Model

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. CHOT creates a safe, mutually beneficial, cooperative environment where innovative, leading healthcare industry members can come together in collaboration to:

1. Support important transformation initiatives addressing health organization management and services
2. Examine the implementation of transformational strategies
3. Partner with healthcare management researchers to improve such initiatives and strategies
4. Participate in research in a cost-effective manner
5. Play a critical role in shaping the education of future healthcare leaders as managers, engineers, and health professionals



Participating Universities



Participating Industry Members

American Society of Anesthesiologists

Children's Healthcare of Atlanta

East Texas Medical Center Regional Healthcare System

Grady Health System

Highmark

MD Anderson Cancer Center

Meadows Regional Medical Center

Morehouse School of Medicine

Northside Anesthesiology Consultants, LLC

Partners HealthCare

Seattle Children's Hospital

Siemens

St. Luke's Episcopal Health System

Studer Group

Texas Children's Hospital

Verizon



Center Funding Mechanism

- Industry members sign a 3-year contract that can be cancelled after one year if not satisfied
- Each industry member contributes \$50k per year to its respective University Partner
 - *Ninety percent of industry member funding goes directly to research activities*
- NSF contributes \$55k to each University Partner to cover administrative costs



Treatment Design for Managing Multiple Chronic Conditions



Description: 68% of Medicare spending goes to people with five or more chronic diseases. Reports found that between 44% - 57% of older patients take more than one unnecessary drug. The management of multiple diseases is complicated and offers daunting challenges to healthcare providers. More drugs are prescribed for treatment, which causes reduced adherence by patients to drug therapy, higher possibility of drug-drug interactions, more side effects observed on patients, less effective treatment, and more frequent changes in drug therapies. This results in more hospital visits, heavier burden on the use of health resources and higher medical expenses. The objective of this study is to optimize the medical interventions, treatment plan, and drug therapy decisions such that the risks of adverse/side effects are reduced, efficacy of the treatment is increased, risk of mortality is minimized, and quality of life is improved.

How ours is different than related research:

The project focuses on co-existing multiple conditions, rather than a single disease. Thus, it is more challenging, interesting, and clinically relevant. So far, there is no mathematical model developed for the long-term, dynamic, and all-around treatment of multiple diseases. A quantitative model based on desirable clinical outcomes will reduce the negative effect of individual provider's subjectivity on the decision making process for managing treatments and drug therapy. The project helps to identify guidelines for multiple disease treatment.

Reducing Hospital Acquired Conditions



Description: A Hospital Acquired Condition (HAC) is a medical condition or complication that a patient develops during a hospital stay, which was not present at admission. Hospital acquired infection (HAI) is one of the ten leading causes of death in the United States. In particular, surgical site infection (SSI), central line-associated bloodstream infections (CLABSI), catheter-associated urinary tract Infection (CAUTI), and ventilator-acquired pneumonia (VAP) account for 75% of all HAI, with estimated 12-25% of mortality. HAC prolongs hospital stays, lowers quality of care and treatment outcome, adds to the burden on patients and healthcare providers, and results in tremendous resource wastes.

The challenges here are multiple fold, including suboptimal adherence to current prevention recommendations; limitations in surveillance strategies; lack of efficient mechanism for reporting adverse events; inconsistent metrics of measurement; and at times, lack of system-wide research. Most studies are site-specific, e.g., ICU-focused, antibiotics-focused, etc. The interdependencies and multi-faceted potential personnel and process contribution to HACs make it difficult to pinpoint sources for early detection and intervention.

How ours is different than related research:

This is a large-scale system-wide study that involves multiple hospital units and services (OR, ICU, NICU, MRSA, ED, and environmental services) and multiple stakeholders (care givers and providers, patients, and facility workers). Our study is designed to analyze the entire hospital stay to uncover susceptible areas/processes/procedures where HACs are acquired with the objective to cultivate awareness of infection-prone situations and establish a proactive surveillance system. The team will completely immerse in the day-to-day processes and will map out the multi-faceted inter-dependencies across processes and systems.

Evaluating the Impact of Bedside Shift Reports



Description: The traditional nurse change-of-shift report occurs outside of patient's room between the nurses, without the presence of patient or family members. This can result in faulty communication between caregivers and significantly affect patient safety. In response to Joint Commission's National Patient Safety Goals for hospitals to improve the effectiveness of communication among caregivers and, more generally, to promote patient safety and ensure nursing excellence, some hospital are adopting "Bedside Shift Reports" (BSRs), which bring the change-of shift communication between the caregivers into patient's room. BSRs promote greater joint accountability among nurses for the care of the patient and also promote the communication between nurses, patients and caregivers for the care they receive. This project will assess the impact of bedside shift reports on quality, safety, and patient satisfaction as well as human factors issues in implementation that may affect the effectiveness of implementation of bedside shift reports.

How ours is different than related research: Limited research has focused on the nurse's perception and attitude toward the bedside shift report. No research has combined such research on nurse perceptions with quality, safety, and patient satisfaction indicators.

Reduction of Surgical Site Infections



Description: In this study, we propose to develop surgical care guidelines to reduce / prevent surgical site infections for colorectal, GYN, and joint operations. In particular, we focus on 3 areas: pre-operation, intra-operation, and post-operation processes (e.g. cleaning guidelines, use of timeouts, briefings, prophylactic antibiotics, appropriate hair removal, glucose control, reduction of surgical interruption, etc) where checklists for compliances can be established. We desire to foster a culture of safety in the workplace where caregivers follow best-practices and gold-standards. Further, we will design educational templates to educate patients on pre-op preparation and post-op wound care to minimize infection. Our previous success on coronary artery bypass graft SSI reduction (from 23% to 0%) has generated buy-in and high morale from the entire team of healthcare providers.

How ours is different than related research: SSI is an important area of study and is an on-going research area for many hospital and clinical investigators. Our work focuses on a systems approach where processes (pre-op, intra-op, post-op), stakeholders (patients, caregivers, health providers); and settings (outpatient, inpatient) are integrated within our analysis. The study offers an objective benchmark against national standards and best practices, and important actionable recommendations for actual implementation. One goal is to develop a sustainable environment and system process that will be beneficial to all type of surgical procedures.

Reducing Readmission Incidents



Description: Previously, we have analyzed and accurately predicted ED 72-hour readmission for both the pediatric and the adult population. In this study the decision support system developed will be tested in the clinical setting for validity, refinement, and continued improvement for practical usage. Next, we will focus on general 30-day readmissions across various units in the hospitals. Readmissions affect quality of care, tie up unnecessary hospital resources, impede operational efficiency and resource utilization, drive up healthcare costs, and impose burden on both the patients and the providers. One objective in this study is to reduce readmissions by 25% across the hospital units.

How ours is different than related research:

Leveraging the success in our ED readmission study, this will be the first comprehensive study that includes acuity, finance, disease-type, demographics, and other factors simultaneously for identifying major readmission characteristics. No past studies have been done in combination with hospital resource utilization in predicting patient readmissions. This study is also the first which seeks to understand and correlate readmission patterns across different units. Our decision support tools will aim to provide automatic prediction, and trigger actionable recommendations without human monitoring. Healthcare leaders can then devote their time carefully reviewing and deciding on recommendations.

Proliferating ED Throughput



Description: Emergency department (ED) overcrowding has been recognized as a serious concern in the hospital nationwide. In an effort to combat the issues that arise with crowding, insurance providers have turned to target-based financial incentives for hospitals to improve their operational efficiency and the Joint Commission will be introducing a measure for hospitals to be held to account on ED crowding. In response, many hospitals have implemented various improvement initiatives including physical plant expansion, point-of-care testing, or triage protocols with limited success. More advanced sites have found greater success by with a multi-discipline approach using engineering, information technology, manufacturing experience (demand-capacity match, lean, six-sigma) and process mapping. The first aim of this research is to characterize the profiles of hospitals that have already made a series of these and other improvements over time. The goal is to construct a macrolevel model of the forces that contribute to speed of the adoption of operational improvements. The second aim is to identify advanced models of practice across the country, correlated to volume. The third aim of this research is to explore the opportunity for using incentives to spur knowledge-sharing of best practices among hospitals.

How ours is different than related research: Individual successes in individual departments have been reported in the literature. There is no standard regarding sustainability of capacity flow models. There is no evidence that correlates various individual flow models to emergency department volumes. This study would provide a framework of ED crowding solutions correlated to sustainability by ED volume to lay the groundwork for faster proliferation of best practices via lay literature, business partners, in addition to peer review literature.

Rerouting Non-Emergency Patients in an ED



Description: A health system recently instituted a medical screening program to refer non-emergent patients age 6 to 64 that arrive at rural ED's to a nearby affiliated health clinic to receive care; all patients arriving at the ED are screened by a registered nurse in accord with an approved protocol for triage. Based on preliminary success in two sites, the number of facilities participating in the health clinic referral program is planned to increase. This study will address the following questions to complement internal analyses by the health system:

1. What are the demographic and payer patterns for medically screened out patients referred to the rural health clinic compared to other health clinic and ED patients in these facilities?
2. Has the implementation of the medical screening exam increased overall revenue?
3. Has the volume of patients and patient characteristics changed for the ED and health clinic since the program was implemented?

How ours is different than related research:

This is a novel program that was designed to improve care coordination and continuity of care for nonemergent patients that might otherwise use ED's for routine care services. Our preliminary research has focused on qualitative methods to understand the rationale for the program and its implementation in two locations. This study expands the methods and data sources to allow quantitative and/or mixed-methods analysis.

Engineering Better ED Observation Units



Description: Emergency department (ED) observation units (OUs) provide inpatient capacity by creating a suitable alternative for short-stay admissions at a lower cost and without negatively impacting access or quality of care. These units are ideal for non-critical patients who do not meet inpatient criteria but are not ready to be sent home. Although more frequent use of observation has been shown to increase patient safety and satisfaction while reducing costs, there has not been much investigation on how to effectively run these units, specifically how to select the appropriate patients, how to staff an OU, and how to operate efficiently. We are proposing pilot work in this area and defining a larger research agenda. This could potentially include using frontier estimation methods such as data envelopment analysis (DEA), selecting appropriate patients for an OU, staffing scheduling models, and patient flow and adaptive bed demand models.

How ours is different than related research: There has been some research on ED OUs, but it has primarily focused on chest pain patients only. If OUs are not managed well for all patients, including good patient selection criteria, they can lose their cost effectiveness.

Appointment Access and Engineering Control



Description: Appointment access is a common problem in many health systems. Typical approaches to poor access include deterministic staffing calculations, process improvement efforts to simplify processes and reduce backlogs, matching supply to demand in different time periods, or queuing methods based on mean performance levels. We propose to apply engineering control methods to several healthcare contexts, populations, and cost structures. We will develop a basic theoretical simulation model and approach to test the concept, followed by pilot testing to identify opportunities, barriers, and research needs. Later work would follow to refine the most promising methods and test in multiple contexts, then develop end-user tools and disseminate for broader application.

How ours is different than related research: Unlike most usual approaches that statically set the mean number of patients or time waiting, our work will dynamically control access by adjusting staff levels or working hours based on current access delays. In particular, almost all queuing or simulation based methods seek acceptable average performance levels even with significant variability (right hand figure). This project instead investigates the value of feedback control to dynamically adjust staff levels to achieve any stated acceptable access limit. Pilot results suggest this can have significant value in improving access at reasonable costs.

Evidence-Based Leadership Approach to Health System Change



Description: This project focuses on if, why, how well, and how long a leading managerial innovation works. More specifically the purposes are: (1) to specify the science of the Studer Group approach, or Evidence-Based Leadership (EBL) hereafter, (2) to compare year 2011 results of qualitative interviews of leader results and quantitative survey results of medical-surgical nurses with results from the same in Spring 2013, (3) analyze trends in the aforementioned results in comparison with changes in patient satisfaction and employee engagement at units between 2008-2013, and (4) identify important factors contributing to sustainability and optimization of EBL across facilities and units within the health system.

How ours is different than related research:

The published research on EBL has focused on results, but like much health management research, relies on cross-sectional study design which only accounts for a single ‘snapshot’ in time. This work will utilize a longitudinal design using baseline data captured by a previous CHOT project. This project develops and applies a complex adaptive systems (CAS) derived framework that examined the impact of EBL tools on outcomes in a fashion that attends to factors and relationships among them across multiple levels and units within the system. It addresses, too, variation in time of use and impacts of the use of such EBL tools on intervening variables and ultimately on outcomes patient satisfaction and employee engagement. The sum of all of these elements and interrelationships will inform conclusions about EBL sustainability and optimization.

The Spread of Improvements Across Healthcare Networks



Description: This proposal is in response to a IAB request at the fall 2012 meeting for proposals to better understand the spread of improvement across healthcare systems. Related, although there is a growing interest in quality improvement networks (QIN) as a way to accelerate the spread of improvement, there is a need to better understand and assess what helps a good idea to spread across a network. Specifically we are proposing two related studies to (1) understand and map the structure of improvement spread networks and (2) understand how improvements flow across these informal systems. Results will help inform optimization of improvement spread and diffusion. Methodologically, for the former we will use a combination of social network mapping tools and direct interviews. For the latter we will use agent-based simulation to such the spread of information across different network structures and as network evolve over time, similar to epidemiological approaches such as the Susceptible-Infected-Recovered (S-I-R) model.

How ours is different than related research: A good deal of awareness exists about the cultural elements of innovation spread and adoption (e.g., Kotter, Rogers, etc). However analysis of the networks across which innovations spread and how to accelerate this has not been studied in any model-based detail.

Game Theory, Economic Incentives, and Accountable Care



Description: Misaligned incentives and competitive games abound in healthcare, governing decisions at operational, clinical, and policy levels. The prisoner's dilemma, volunteer's dilemma, fair division, and free rider problems are a few examples of economic and game models that describe behaviors under a set of rules and incentives. These models can be used to study inefficient resource allocation, care coordination failures, rehospitalizations, equilibrium among regional healthcare systems and/or competitors. Two examples of particular interest are care coordination across multiple systems and market segmentation. Mechanism design and market design can offer solution approaches to such issues.

How ours is different than related research:

Game theory is well known, but the application to describe current healthcare policy trends has not been studied and its use as a decision-making tool is not always immediately clear. In this project we plan to explore how to use mechanism design and other application methods to take the conclusions of the game theory model and convert it to actionable results.

Financial Incentives for Decreasing HAIs



Description: Healthcare-associated infections (HAI) affect approximately 1 out of every 20 hospitalized patients. The estimated medical costs of HAI to U.S. hospitals range \$30-45 billion. Since approximately 70 percent of HAIs are preventable, there has been substantial attention to the benefits and approaches for prevention. The CDC's National Healthcare Safety Network (NHSN) is the nation's most widely used healthcare-associated infection tracking system; the data collected is used to facilitate local improvement efforts. In addition, in the evolution of managed care, pay-for-performance (P4P) is increasingly used to incentivize improvement. As insurance companies move towards more deployment of the model, issues such as evaluating the incentives for hospitals to participate, particularly whether participation is driving quality and shortening the cycle times for improvement, tend to potentially impede a system-wide implementation. However, the link between how participation in these programs help reduce the costs of operation of hospitals in the longer run still needs to be better addressed. In this project, we aim to evaluate how participation in a P4P program can impact the existing levels of hospital quality. In particular, we focus on analyzing data for hospital acquired infections (HAI) to determine whether patterns emerge between the level of the incentive and the rate at which HAIs decline.

How ours is different than related research: Existing research on P4P models have focused on improving hospital quality and patient care, but have fallen short on tackling the ultimate benefit of cost reduction to the participating hospital. Our research aims at addressing how the impact of the financial incentives for participation can evolve into further reduction in hospital costs and serve a motivator for system-wide implementation. We expect to establish how perturbations in the reimbursement structure impact quality outcomes.

Design of Regional Healthcare Networks & ACOs



Description: Many healthcare systems are engaged in macro-level planning of their overall network topology, care location, market expansion, and merger strategies. A common problem for many healthcare systems involves the design of their overall delivery system across a region, including questions as to what services to provide where, in what capacity, and how to best use telehealth and remote technologies, so as to maximize coverage, access, and care and relative to potentially competitive healthcare systems. This type of problem also extends to the current trends to form systems of systems, such as via so-called accountable care networks and medical homes. This project will develop decision support tools to help healthcare systems and partnerships to determine how much care to various types and to best provide these across geographic regions. These tools will be developed in partnership with multiple healthcare systems and evaluated for the value. Preliminary experience suggests that familiar network design tools can inform these decision making processes to help create cost-efficient, patient-centered, and easy to access care systems.

How ours is different than related research:

While a great deal of work has been conducted on classic location-allocation problems, these methods typically are not used much in practice in healthcare settings. Moreover, current medical home and merger trends introduce opportunities to revisit how to best design care networks geographically. Additionally, while most analysis of this type assumes constant and predictable demand patterns, our work also will incorporate the stochastic and estimated demand. Finally particular focus will be placed on measuring the actual value of these models to decision making and the subsequent benefits of results in actual practice.

Optimizing Hospital-Integrated Primary Care Provider Networks



Description: An internal orientation on “what we do best” is gaining importance in the highly competitive market of today’s healthcare. Evaluating specific aspects and features of an integrated PCP network model as potential sources of competitive advantage can inform future strategic direction and decision making about competitive positioning and market differentiation. This project is designed in three phases to address two aims: 1. Identification of specific aspects and programmatic capabilities of the PCP network, and 2. Evaluate competitive relevancy of PCP network model aspects identified in phase 1. The first aim requires in-depth interviews and focus groups with key informants in order to capture all aspects of the PCP network model. The second aim includes a survey of PCP physicians and staff in both employed and not employed models. PCP network model aspects to be studied (identified by key informants) might include: compensation model, financial relationship with hospital, EMR, direct scheduling with specialist, and diagnostic order abilities.

How ours is different than related research: PCP integration models have been studied in terms of design, efficiencies and improvements in quality and volume, and compensation but not as potential sources of competitive advantage within the hospital and health system sector.

Inter-Department Variation of Physician Engagement



Description: Hospital leaders often limit innovation implementation efforts to their non-physician staff in order to avoid conflict with physicians [1, 2]. Non-physician managers often have neither a carrot nor a stick to convince physicians to adopt and endorse innovation [2]. Meanwhile, physicians are often skeptical of innovation for a number of potential reasons including: its potential threat to their autonomy, an unclear decision-making hierarchy, personal ambivalence, skepticism, fundamental disagreement with the approach, or insufficient training [3]. Combined, this tension creates a daunting task of engaging physicians in the continuous churn of hospital-led change initiatives.

How ours is different than related research: Previous research has identified strong managerial leadership, commitment from the board, and physician involvement in hospital governance as critical factors in improving physician engagement [2, 3]. However, this research has analyzed physician engagement as either a broad, hospital-level measurement or as a narrow, single unit measurement. No previous study has explored inter-department variation of physician engagement in a system-level culture change initiative. Furthermore, most previous work has focused on physician engagement as it relates to niche change initiatives such as the use of a new tool, decreasing racial disparities, or generic quality improvement efforts. This study aims to identify and explore the variation of physician engagement across multiple departments as it relates to a system-level culture change initiative.

Collaborative mHealth Tools for Diabetes Management



Description: Mobile health (mHealth) tools making use of cellular networks and telephony may enable new, more effective forms of patient-provider communication, remote monitoring, and realtime feedback to patients who have or are at risk for diabetes. Diabetes and its complications are leading causes of hospitalizations and deaths in the United States, but small changes to daily habits can drastically help diabetics control their condition. Most mHealth research and commercial mobile health applications for diabetes management take the perspective that patient care is a dyad between provider and patient; we instead take the perspective that patient care is often a collaborative effort involving more parties than just the patient and the provider. For instance, spouses, children, friends, or lay health educators may be important facilitators of self-management, yet these stakeholders are largely ignored in the design of mHealth tools for diabetes. We know little about the needs of these stakeholders, such as when they should receive information, what sorts of information, and so on. Our project addresses this issue by bringing together experts in healthcare collaboration, mobile health, and technology adoption by American families to identify requirements for the design of collaborative mHealth tools that meet the needs not only of patients but also other stakeholders involved with healthcare delivery for diabetics.

How ours is different than related research: Our work is unique in that it takes the perspective that patient care is more nuanced than a simple dyad between provider and patient. We address a large gap in the development of mHealth tools: inclusion and involvement of people who are outside of this dyad, such as family and lay health educators. By designing for the needs of these additional groups, we may improve the effectiveness and user acceptance of mHealth tools for diabetes management.

Data Visualization (DV) in Obesity Counseling



Description: The United States Preventive Services Task Force (USPSTF) recommends that physicians screen all adults for obesity and offer intensive counseling and behavioral interventions for weight loss for obese adults. Using outpatient primary care physician (PCP) visit data from the National Ambulatory Medical Care Survey (NAMCS), Kraschnewski et al. (2012a) demonstrated rates of weight counseling have significantly declined despite increased rates of overweight and obesity in the United States. Physicians report numerous barriers to providing recommended preventive services like weight counseling, including a lack of time during the office visit, limited training, and the perception that patients lack interest in losing weight. In this respect, this study will focus on the potential benefits of data visualization on the provision of preventive care by assisting physicians in caring for their overweight/obese patients. Our vision is to then represent outcomes on weight and related counseling across a primary care practice. This may incentivize physician performance and lead to faster adoption of weight counseling practices.

How ours is different than related research:

A few studies have discussed the broad applicability of data visualization to medicine but little research has explored how to effectively present clinical data visually in primary care. With respect to obesity counseling in particular, a recent study showed that only 9% of PCPs performed more than half of the obesity counseling, and the vast majority perform little to no counseling (Kraschnewski et al., 2012b). Nevertheless, no disseminated tool exists to improve primary care physician medical decision making on agenda-setting for clinic visits for overweight/obese patients. Our framework will offer an integrated roadmap for leveraging existing health care data and visualization tools to achieve this aim.

Predicting Parkinson's Disease From The Comfort Of Your Home



Description: The challenge in today's dynamic digital age is not the lack of large scale data, but rather, the ability to extract knowledge from this data in meaningful ways that support real world decision making efforts. Particularly, the Healthcare industry is experiencing a tremendous paradigm shift as patient records move to the digital space. In addition, the digitalization of clinical information also plays a major role in providing rich, quantifiable data for clinical research pertaining to disease prediction/modeling. The objective of this proposal is to develop a dynamic, data-driven approach to neurological disease diagnosis that brings together patients, healthcare providers, data service providers and insurance companies. This will be achieved through a seamless, integrated system that evaluates patients in the comfort of their homes (using multimodal sensors), sends data back to healthcare servers, generates predictive models relating to neurological disease progression, with the resulting predictive models serving as decision support systems to healthcare providers, device makers and insurance companies.

How ours is different than related research: Currently, diagnosis of neurological diseases is typically performed by an expert physician, which may require multiple visits across physicians due to the variations in assessment techniques. Furthermore, each of these visits requires the patient visiting the healthcare facility which adds facility capacity challenges. The proposed research differs from the existing techniques by being able to diagnose and predict the emergence of neurological diseases while a patient is in the comfort of their home. Patient privacy is hereby increased, while concurrently decreasing both diagnosis time and cost.



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

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