

Undergraduate Thesis Prospectus

Creation of Infectious Diseases Data Analysis Program (IDDAP)

(technical research project in Biomedical Engineering)

Rising Pressure on the Doctor-Patient Relationship in the United States

(STS research project)

by

Jessica E. Mahoney

December 8, 2019

technical project collaborators:

Michael Hughes

Elnaz Ghajar-Rahimi

On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

signed: _____ date: _____

approved: _____ date: _____
Peter Norton, Department of Engineering and Society

approved: _____ date: _____
Dr. Jason Papin, Department of Biomedical Engineering

General Research Problem

How can healthcare in the United States be improved? Although the United States is a world leader in medical technology, large studies of healthcare delivery reveal that “only about half (55%) of US citizens receive necessary care and fewer than half of physician practices incorporate recommended processes of care” (Doebbeling & Flanagan, 2011). The healthcare system faces challenges such as “major gaps between evidence and practice, suboptimal quality, inequitable patterns of utilization, poor safety, and unsustainable cost increases” (NAE, 2005). Healthcare reform groups aim to address these challenges. The Institute of Medicine (US) Committee on Quality of Health Care in America outlined performance expectations for the 21st century healthcare system, suggesting there are at least 10 straightforward ways in which the healthcare system in the United States can improve (IOM, 2001).

Creation of Infectious Diseases Data Analysis Program (IDDAP)

How can medical professionals more easily use patient data to better inform their decisions? My capstone advisors will be Dr. Jason Papin of the Biomedical Engineering Department and Dr. Joshua Eby, an Infectious Disease and International Health clinician at the UVA Medical Center. I am collaborating with two other BME undergraduate students: Elnaz Ghajar-Rahimi and Michael Hughes.

Electronic Health Record (EHR) software accounts for approximately 98% of patient medical records nationwide (“Adoption of...,” n.d.). Electronic Privacy Information Center (EPIC) is a leading EHR system used by medical professionals to access, store, and organize electronic medical records for nearly 64 % of patients in the nation (Epic; Epic Systems). With every minute spent directly interacting with a patient, physicians spend 1.12 minutes manipulating the EHR (Davis, 2018). There are several critical gaps in the application of EHR

platforms in data-mining. Dr. Joshua Eby in the Infectious Diseases department at UVA explains that patient files are either individually accessed in EPIC or compiled into an excel file by quality assurance professionals. The limited filtering options in EPIC and the slow turn-around time of the quality assurance group creates a significant challenge for Dr. Eby and his colleagues when trying to evaluate patient readmissions and inappropriate antibiotic prescriptions. EPIC currently only allows for a single step of sorting using a keyword search and is unable to filter the factors crucial to infectious disease research—microbial resistance, length of antimicrobial treatment, and duration of central line placement in inpatient care.

The proposed project aims to provide the UVA Department of Infectious disease with a novel computational medical diagnostic tool that will eliminate the gap between data stored in EPIC or excel sheets and the analysis either desired or required by the physician. The Infectious Diseases Data Analysis Program (IDDAP) aims to filter patient data based on constraints given by the user in order to reduce data processing time and allow clinicians to better manipulate data to find key variables. Identified variables can better guide their research problems and quality improvement plans.

R Shiny in the R studio and the MATLAB App Designer will be used to develop IDDAP, resulting in an application that is easy to access across all computers. We will be using de-identified patient data sheets provided by Dr. Eby in order to test IDDAP. We will then work with UVA clinicians to ensure that the final computational medical diagnostic tool is applicable to the work they do for the UVA Health System. Constraints include possible restrictions on our access to patient information, such as EPIC or IRB approval.

Results from this study will be significant not only in advancing the development of data-mining software, but also in providing a proof-of-concept that second party applications are beneficial in handling patient data. The reduced time spent manually sorting data will allow for

the caretaker to spend more face to face time with the patient. An opportunity for more frequent patient-doctor interactions has been proven to increase patients' perceived quality of care (Dugdale et al., 1999). With success, IDDAP will provide an easier way for clinicians to interpret large amounts of data. These interpretations are important in bringing clinicians like Dr. Eby closer to achieving their goals of reducing patient readmissions, preventing improper antimicrobial prescriptions, and improving the overall quality of patient care.

Rising Pressure on the Doctor-Patient Relationship in the United States

How are medical professionals seeking to protect and improve the doctor-patient relationship (DPR) in the United States? The DPR is threatened by rising skepticism toward the motives of healthcare providers. This skepticism grows primarily as a result of the increasing influence government legislation and the pharmaceutical industry have on healthcare in the United States. Keller et al. (2016) found that about 80% of physicians have a relationship with industry, and even though “61% of physicians reported that financial incentive did not influence their own practice, only 16% believed that the same was true for their colleagues.” If medical professionals have such skepticism for the motives of their own colleagues, patient distrust in any the healthcare system can be rationalized. The pharmaceutical industry views collaboration with physicians as essential to research, but many doctors are considering cutting ties with drug to protect their professional integrity. According to D’Arcy & Moynihan (2009), “both the pharmaceutical industry and health care professionals must focus on the goal of improving health”.

Chipidza et al. (2015) found that better DPRs were associated with better patient outcomes. Alternatively, impaired DPRs, qualified by patient reports of feeling unheard or

disrespected, were associated with poorer outcomes. Shrivastava et al. (2014) concluded that a poor DPR is associated with low patient compliance; such patients also change their doctor more often. Kerse et al. (2004) assessed the relationship between four aspects of the DPR and medication compliance. They found that consultations with greater levels of “patient-reported physician-patient concordance were associated with one-third greater medication compliance.”

Five physician organizations, the American Academy of Family Physicians (AAFP), the American College of Physicians (ACP), the American College of Obstetricians and Gynecologists (ACOG), the American Academy of Pediatrics (AAP), and the American College of Surgeons (ACS), have together criticized four types of laws that have degraded the DPR and called for putting patients’ interests first (Weinberger et al., 2012). The physicians in these organizations view the DPR as vital and threatened. The National Patient Advocate Foundation (NPAF) and its affiliate, the Patient Advocate Foundation (PAF), aim to represent the patient and “work at the local, regional, and national level to promote access to affordable, quality healthcare for people with chronic, debilitating or life threatening illnesses” (NPAF, 1994 ; PAF, 1994) . America’s Health Insurance Plans (AHIP), an insurance industry trade group, issued a statement on improving the prior-authorization process, one of their many efforts to mitigate the pressure of insurance companies on the DPR (Robeznieks, 2018). The Healthcare Administrators Association (HCAA) claims it helps healthcare administrators stay at the “forefront of industry and business issues while enjoying an open exchange of ideas” and considers the DPR a large factor in the success of healthcare centers (HCAA, 1980).

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