Electronic Medical Records, Provider Behavior and Health Outcomes among the Elderly

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Our project uses innovative, granular Electronic Medical Record (EMR) data from the UCSF medical system to study health care and health outcomes for the elderly. These data cover more than 3,000 clinicians across 2 hospitals and 175 ambulatory practices that houses records of more than 650,000 patients. We have obtained access to these data from 2012-present. The scale of these data have required extensive work to develop into a working data set, a goal we have now achieved and are turning to developing the empirical analysis for a specific set of conditions.

The digitization of health records and the metadata captured by these systems create a novel and exciting opportunity to rapidly advance both our understanding of biases and heuristics in clinical decision-making, and our understanding of how to design clinical decision support tools to overcome them. Specifically, the ability to truly understand how frontline clinicians interact with clinical information when making decisions, and how these interactions impact clinical care and health outcomes, requires analysis of a largely-unused, highly-granular level of electronic health record (EHR) data (referred to as "clickstream" or "audit log" data) that are captured primarily for administrative compliance purposes today.

A central theme of our research is to assess the role of teams of decision makers in assessing patients and selecting treatments. At the heart of such a decision is the ability to gather and synthesize appropriate data. This process is of particular importance to the care of aging populations. Older patients typically have more detailed clinical histories, higher rates of health conditions overall as well as more comorbid conditions at any given point. Thus, the role of complexity in treatment decisions plays a central role in how and why particular treatments decisions are made and whether or not those decisions generate health improvements. Despite the importance of uncertainty, heuristics and informational complexity in clinical decisions, there are few studies focused on health care in aging populations that assess *why* patients receive different treatments. A large body of literature instead documents variation in treatment among Medicare enrollees and argues that this implies inefficiency (e.g. the Dartmouth Atlas of Health Care). Without a richer understanding of how treatment decisions are made it is difficult to assess the positive or normative implications of treatment variation or prescribe effective policy tools for Medicare to improve efficiency.

We will develop our study in a set of specific clinical areas that are critical to aging populations. Our first study domain is the inpatient cardiology service where we are focusing on diagnosis and treatment of Congestive Heart Failure (CHF) patients. By focusing on a specific common in aging populations we limit ourselves to a defined production function, facilitating analysis. We plan to expand to the emergency department (ED). The ED is a setting with a large set of plausible conditions but the clinical objective is limited to be diagnosis and triage/assignment to downstream care. This setting generates valuable insight into beliefs about diagnoses and the evolution of those beliefs. For example, we can use the diagnostic test orders used to recover the plausible set of hypothesized conditions at a given point in time.

We hope to understand (i) how and why physicians rely on free text notes rather than more structured measures of clinical information (e.g. check boxes for specific situations), (ii) the time associated with note writing and how that affects the speed of care and the quality of subsequent diagnoses and treatment (iii) the role of notes in information transmission and its impact on productivity when teams handoff care over time.