

Empirical Investigations into the Operational Factors Impacting on Hospital Performance

Health care has become one of the world's largest and fastest-growing industries, consuming nearly 10% of world and over 17% of US GDP. However, the industry faces a formidable challenge: populations are aging and becoming increasingly comorbid, leading to considerable cost growth; at the same time, there are relatively fewer people of working age to cover these costs. To continue its success, the industry thus has to solve a fundamental productivity problem: how to improve health outcomes further while reducing costs. It is this challenge that I engage with as an operations academic. Achieving better care at lower cost will require a radical transformation of the systems and processes of health care delivery. This presents unique opportunities for gaining insights into the mechanisms that affect productivity and quality for complex services such as health care. These study opportunities are compounded by the increasing availability of highly granular operational and financial health care data, which has exposed significant unexplained variation in costs and outcomes across providers. In my research, I attempt to explain this variation with operational factors by leveraging state-of-the-art econometric methods.

Referral behavior

Two of my thesis chapters address the problem of coordinating patient flow through health care systems – specifically, ensuring that patients are referred to the appropriate provider. Getting referral decisions right is critical for the quality and productivity of health care services. Aggressive referral behavior leads to overtreatment, as patients may receive more specialized care than they require. On the other hand, a patient's condition may deteriorate if a necessary referral is missed, leading to increased costs and poorer outcomes in the future. The first chapter studies how midwives at a large maternity hospital change their referral behavior in response to variation in workload. We find that midwives increase referrals at both high- and low-workload, albeit for different types of patient. The second chapter studies how emergency department (ED) physicians make routing decisions when faced with diagnostic uncertainty. This chapter shows that physicians' preference for "safety-first" leads to high levels of avoidable hospital admission. We find that this tendency is amplified when service times in the ED are compressed, which creates a bullwhip-style effect whereby increased ED demand leads to even greater hospital demand pressures. The findings in these chapters show that health care access varies not only by patient need, as one might expect, but also as a result of day-to-day changes in the busyness of the service provider.

Hospital business models

The third chapter of my thesis, my job market paper, considers whether the prevailing operational model of a general hospital is still suitable for delivering high-value care. While in nearly every other industry there has been a trend towards greater specialization, the prevalent mixed operational model of the general hospital is still based on the provision of care across a full spectrum of patient types and conditions. As a consequence, tremendous variability and uncertainty often exists in patients' service needs, to the extent that Clayton Christensen has described hospitals in a recent book as "some of the most managerially intractable institutions in the annals of capitalism". We examine the implications of this business model, finding there to be significant negative spillovers between different hospital services and patient types which render their co-production inefficient. These findings suggest that taking routine care out of existing hospitals and delivering it instead in large, regional, specialty-specific "focused factories" – an approach backed by Christensen – could improve the productivity of both the removed and the remaining activity. Such findings challenge the prevailing business model of the general hospital and take a first step towards answering the question of *which* services should be delivered *where*.

In summary, my research seeks to identify those operational and behavioral factors that interfere with the delivery of high-value, high-quality health care outcomes by drawing causal inferences from observational data and quasi-experimental designs. Through my research, I aspire to provide a prescriptive path as to how hospitals and other health providers can evolve their business models in order to meet the dual challenge of improving clinical outcomes while controlling costs.