Benjamin Grant

Research Statement

Research Interests and Philosophy:

I am broadly interested in the field of Operations Management with a focus on health care. I am particularly interested in the intersection of research and practice from theoretical, data-driven, and empirical perspectives to help inform better decisions with practical impact. With the increasing amount of health care data being collected, the opportunity for analyzing these complex systems has never been greater. I believe that there is still an enormous amount of research to be done in the field of health care operations and am excited about participating actively in the development and expansion of this branch of knowledge. A crucial aspect to success is building collaborative relationships with health care practitioners so that the tools from operations research and operations management merge with the expertise of medical professionals. Engaging physicians and promoting active research participation not only adds to research validity, but further creates conduits for direct implementation of research findings. At a high level, I plan to research health care areas by designing, modifying, and evaluating systems to improve patient outcomes and experiences, while at the same time reducing cost and waste.

Job Market Paper, Optimal Dynamic Appointment Scheduling of Base and Surge Capacity, Second Round Review at M&SOM:

We study dynamic stochastic appointment scheduling when delaying appointments increases the risk of incurring costly failures, such as readmissions in health care or engine failures in preventative maintenance. When near-term base appointment capacity is full, the scheduler faces a trade-off between delaying an appointment at the risk of costly failures versus the additional cost of scheduling the appointment sooner using surge capacity. Most appointment scheduling literature in operations focuses on the trade-off between waiting times versus utilization. In contrast, we analyze preventative appointment scheduling and its impact on the broader service supply network when the firm is responsible for service and failure costs. We adopt a stochastic dynamic programming (DP) formulation to characterize the optimal scheduling policy and evaluate heuristics. We present sufficient conditions for the optimality of simple policies. When analytical solutions are intractable, we solve the DP numerically and present optimality gaps for several practical policies in a health care setting. Intuitive appointment policies used in practice are robust under moderate capacity utilization, but their optimality gap can quadruple under high load.

Current Research and Future Direction:

My current research and future research direction are focused on how patients flow through the health care network and associated outcomes and costs. At the macro level, I am interested in the facilities and sequencing of patients’ paths to different nodes (i.e. ED, Inpatient, Outpatient, Nursing Homes, etc.) over time. For example: Does a patient who is admitted to the hospital, is discharged, fills their prescription at the pharmacy, then goes home have a different health outcome than a patient who is admitted to the hospital, is discharged, then goes home, but never fills their prescription? While the answer to this basic question is most likely “yes”, can we identify and predict patients’ outcomes based on the pathway they take through the healthcare system? If we can predict outcomes based on a patients’ past, can we then design interventions that aim to prevent poor predicted outcomes? Can we
stratify patients and identify precision care based on patient characteristics vs. a one-size-fits-all model? What are the important factors determining patient strata (i.e. socio-economic, age, genetics, medical history, etc.)? What features are associated with, or can predict, facilities with better or worse outcomes for a given patient strata? Can we identify specific facilities along patient pathways that consistently outperform others given the complexity of the health care network?

To begin to answer these questions (and others) I spent two years with co-authors securing a Data Use Agreement (DUA) with the Centers for Medicare & Medicaid Services to access all claims data associated with Medicare Congestive Heart Failure (CHF) patients that were admitted to Northwestern Memorial Health Care (NMHC). I am excited about the data set we now have access to for two main reasons. First, it contains claims information for every expense associated with CHF patients; this means inside and outside of the NMHC network. We will be able to see a near-complete view of the health care network for CHF patients that visit NMHC and therefore we can see how complex the network truly is and how much “slippage” there is to outside network providers. To our knowledge, there are no statistics available on true “network-wide” readmission rates associated with a specific facility’s initial admissions, as most studies include only “in-network” data or aggregate data. A patient discharged from a CHF episode from NMHC may readmit to another hospital outside of NMHC (i.e. University of Chicago) and without full network data this may appear as a reduction in readmissions for NMHC, but the patient’s outcome was not improved. Second, we were able to secure the DUA to include patient identifiable data which allows us to merge the broad, yet shallow, CMS claims data with the deep granular data collected internally at NMHC. To our knowledge this data set is unique in its availability to researchers and is extremely rich in part because NMHC has been on the forefront of medical data collection with historic data continuously collected from the late 1980s.

At the micro level, I am interested in how a patient flows through a node in the health care system. Take the Emergency Department (ED) as an example. Many ED’s in urban areas are crowded with long wait times. Can we use tools from queuing theory, predictive analytics, and optimization to identify patient’s probability of being admitted and then design a system to better serve patients by alleviating congestion? Further can we do this while simultaneously maintaining or increasing good health outcomes and maintaining or reducing the cost of service? How can we use the vast data being collected to help medical professionals make better informed decisions and increase the value of healthcare to the individual and society?

Concluding Remarks:

I am excited about continuing my research career as an Assistant Professor at a research university. In addition to my passion for research, I truly enjoy the teaching component of a faculty position. I find the classroom to be an energetic space where transferring knowledge and ideas to students is as rewarding as engaging in meaningful discussions and navigating interesting questions. I have had the honor of being trained in research and teaching by some of the best in the field at Kellogg School of Management where the environment has been collaborative and inclusive. I hope to join a group and institution that fosters and promotes similar ideals. I plan to excel in both research and post-secondary education with a commitment to quality and integrity across my current and future body of work.