ROI from AI: Unlocking Scarce Capacity in Health Systems

Introduction:

In the current economic climate, the United States healthcare system is facing unprecedented financial and operational challenges. Hospital leaders are under a tremendous amount of pressure to continue serving a growing number of patients in their communities with constrained resources. According to the American Hospital Association (AHA) AHA Hospital Statistics 2022, total spend for US hospitals in 2020 was a staggering $1.2 trillion dollars. Although the COVID-19 pandemic contributed to unforeseen costs in healthcare, it also thrust fundamental financial and operational issues to the forefront and thus highlighted opportunities for long-term innovation and solutions within healthcare organizations.

Healthcare financial leaders in the C-suite have a fiduciary responsibility to drive budgetary objectives while implementing financially solvent and strategic plans. As a result, capital asset expenditures and their return on investment are a major area of focus, particularly during the fiscal year budget process. Despite significant costs, justification for deferring or moving forward on expensive capital expenditures is often based on anecdotal or inaccurate information. For example – is there really a need to build additional operating rooms, increase the number of inpatient beds, or purchase an additional robot? Often, capital asset expenditures are made in an attempt to solve problems that are actually related to capacity management, and not when the health system is fully utilizing its existing resources and truly needs to build or buy more to grow.

AI-based Analytics Are a Requirement, Not a Luxury

While healthcare's ability to maximize patient access in a safe and cost effective way is critical, the industry continues to lag far behind others in regards to optimizing capacity and asset management via data analytics and the technologies that enable them. Simply scheduling an operating room or clinic appointment or assigning a bed to a patient, even with comprehensive EHR data on patient history and current capacity levels, account for the many stochastic factors involved in that patient's needs, which may change rapidly, along with the intersecting use of the resources and the scheduling of the resources themselves.

AI-based analytics, which are powered by advanced math, are necessary to solve fundamental operational equations. Analytics solutions generally range from those that admire problems to those that prescribe actions to create value. EHRs generally fall to the left of this analytics spectrum, while health systems must move to the right to manage capacity successfully. Health systems and their frontline personnel need predictive, prescriptive guidance to make decisions each day based on a nuanced understanding of the ever changing dynamics of the supply-demand balance. Enabling the frontline to make immediate decisions based on prescriptive recommendations requires building predictive analytics, probability theory, constraint-based optimization, discrete event simulation, machine learning, and AI algorithms at scale in order to fully leverage the data that exists in the EHR. Adding this intelligent, prescriptive, and predictive layer on top of the EHR effectively leverages the large investment health systems have already made in the platform and prescriptive analytics, which are crucial to offering intelligent recommendations and guidance to drive a hospital's capacity management.

ROI from AI: Unlocking Scarce Capacity

Right now, as health system leaders have been charged with "doing more with less" due to increasing financial pressures, innovative AI technology that leverages the EHR has become the key to recouping millions of dollars in value. Increasingly, health systems across the country are adopting machine learning, AI, and predictive and prescriptive analytics to unlock scarce capacity.

For example, applying AI in operations has been attributed to generating $40 million in contribution margin for a health system, which translated into a 10x+ ROI. AI has also reduced infusion patient wait times at one system by 30%, and delivered an average increase of $20,000/infusion chair per year in cancer centers. In another system's inpatient bed setting, AI technology has helped them achieve an 8% decrease in opportunity days, the equivalent to $8 million in ROI.

Increased Asset Utilization and Major CapEx Deferral: Robotic Operating Room Asset Case Study

Prior to a partnership with LeanTaaS, a healthcare analytics company, Baptist Medical Center Jacksonville struggled with optimizing OR time. Leaders lacked access to actionable data from its Downtown Main OR to solve robot utilization challenges. Despite the existing robotic equipment showing low utilization, surgeons struggled to schedule frequent robotic time and made capital purchase requests for more robots. Leveraging predictive and prescriptive analytics through LeanTaaS' iQueue for OR product, the Baptist leadership team gained insight into robotic historical booking patterns and were able to develop a successful robotic block allocation plan to better assign existing robots and delay these unnecessary and expensive capital purchases. The Robot Visualizer in LeanTaaS' iQueue for OR product became a powerful "single source of truth" capacity management tool for Baptist Health stakeholders to produce notable results, including 10% improvement in robot utilization in April 2021 from 2019, an 18% increase month-over-month in May, and 24% improvement year-over-year.

Results: Significant Increase in Robotic Minutes

April 2021

- 10% increase in robotic minutes compared to April 2019
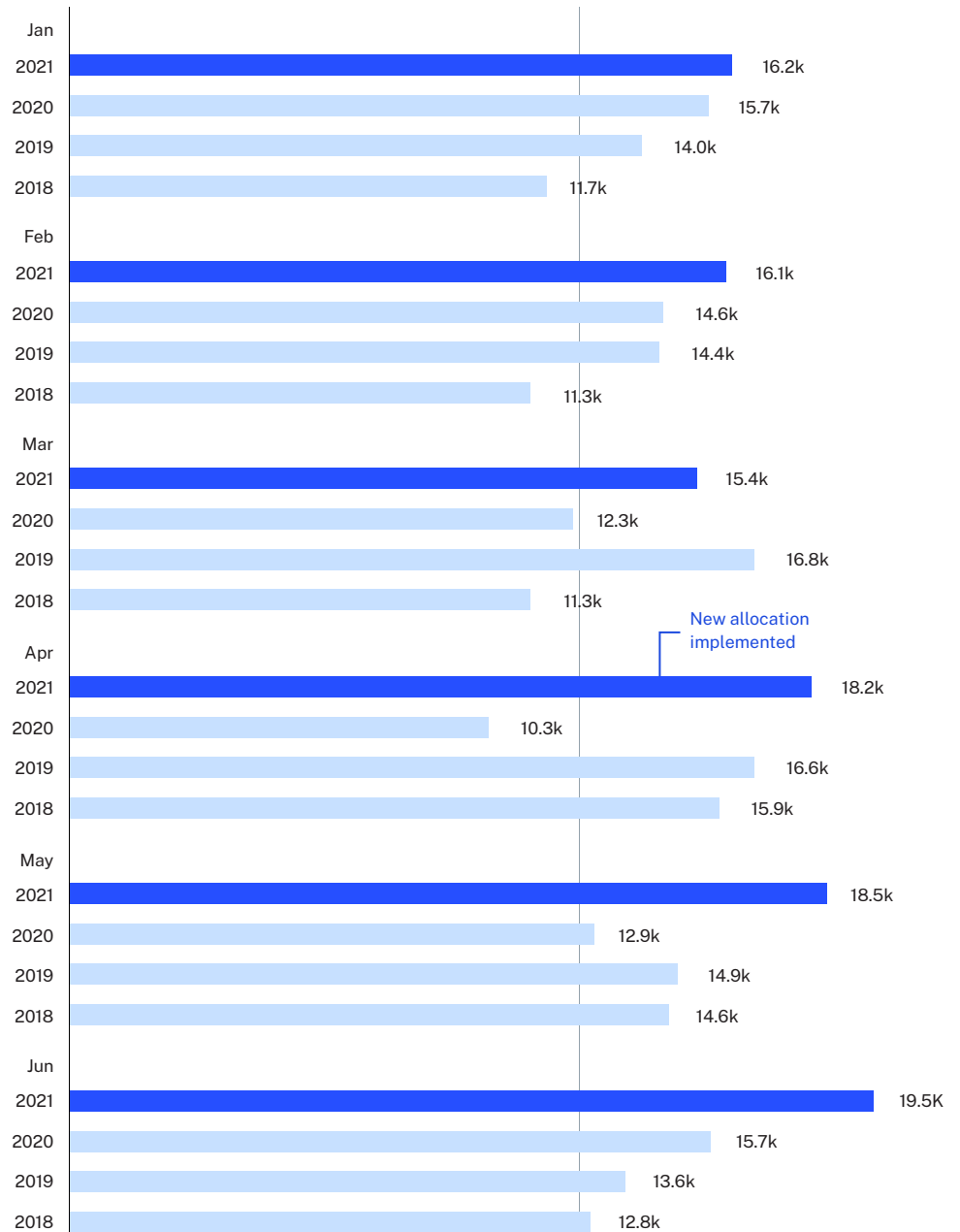- 18% increase compared to March 2021

May 2021

- 24% increase in robotic minutes compared to May 2019
- 20% increase compared to March 2021

June 2021

- 45% increase in robotic minutes compared to April 2019
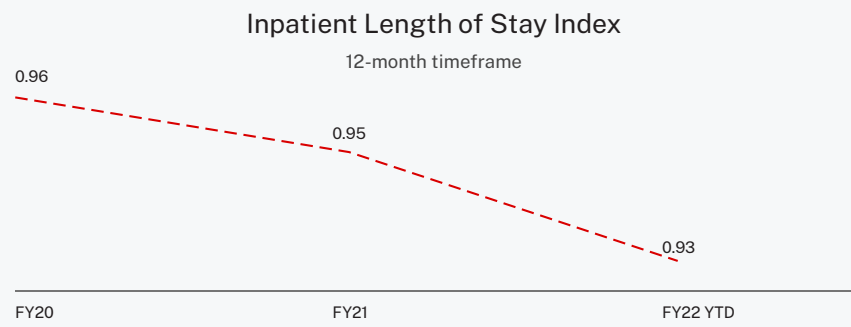- 28% increase compared to March 2021

Downtown Main OR Robotic Case Minutes by Month

(Excluding Ortho)

Month	Year	Value
Jan	2021	16.2k
	2020	15.7k
	2019	14.0k
	2018	11.7k
Feb	2021	16.1k
	2020	14.6k
	2019	14.4k
	2018	11.3k
Mar	2021	15.4k
	2020	12.3k
	2019	16.8k
	2018	11.3k
Apr	2021	18.2k
	2020	10.3k
	2019	16.6k
	2018	15.9k
May	2021	18.5k
	2020	12.9k
	2019	14.9k
	2018	14.6k
Jun	2021	19.5K
	2020	15.7k
	2019	13.6k
	2018	12.8k

New allocation implemented

Decrease in Opportunity Days and Time-to-Admit: Inpatient Beds Case Study

Historically, UCHealth relied on analytic tools created by internal teams to manage inpatient throughput. While these offered information that supplemented staff expertise, they required labor-intensive manual preparation on a daily basis and could not provide timely and accurate decision-making data, resulting in chaotic patient flow processes throughout the system. LeanTaaS' iQueue for Inpatient Beds product provided real-time data plus predictive and prescriptive analytics that enabled operational teams to shift from reactive capacity planning and towards proactive problem-solving. The software solution now provides UCHealth's leadership team and stakeholders with a single source of truth for capacity management and enables information sharing in real-time across the entire system. Since implementing iQueue for Inpatient Beds, UCHealth has noted a steady decrease in their overall Vizient length of stay index, most recently placing them in the top 25% of the Academic Medical Center cohort. Additionally, UCHealth saw an 8% decrease in opportunity days (differences between medical/surgical length of stay and CMS length of stay) for an approximate $8 million value, along with a 10% decreased time-to-admit from the emergency department and a 16% overall decreased time-to-admit (despite an 18% increase in COVID-19 census).

12 Month Inpatient Length of Stay Index

Performance

| 0.6 | 0.65 | 0.7 | 0.75 | 0.8 | 0.85 | 0.9 | 0.95 | 1 | 1.05 | 1.1 | 1.15 | 1.2 |

0.93

Top 10%: less than	Top 25%: less than	Top 50%: less than	Bottom 50%: greater than
0.89	0.94	0.98	0.98

Comparison Cohort: AMC

Inpatient Length of Stay Index

12-month timeframe

0.96

0.95

0.93

| FY20 | FY21 | FY22 YTD |
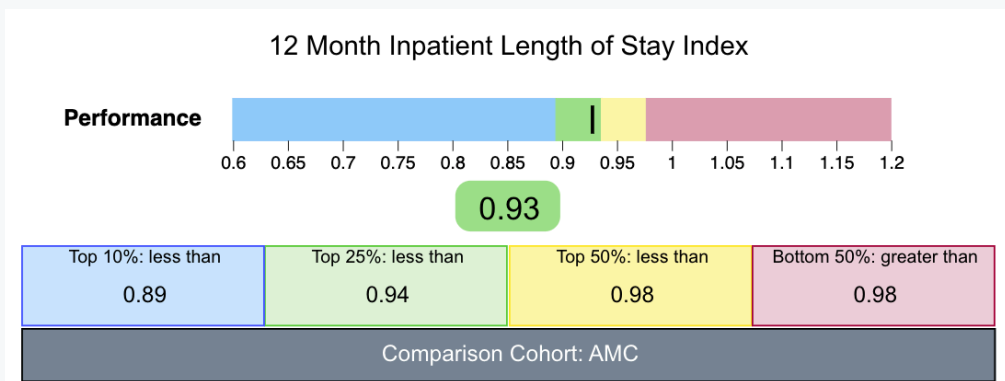
Achieve Better Healthcare Through Math

For decades, these high-level analytics have delivered massive improvements in operational performance in industries such as transportation, airlines, and package delivery, whose safety, logistics, and service challenges closely align with healthcare challenges. These methods have the potential to unlock enormous value for health systems. In addition to improving the patient experience, sophisticated capacity management can reduce staff burnout while adding tens of millions of dollars in annual improvement to the bottom line.

The ultimate vision is a world where every asset within the health system is optimized, from ORs, infusion centers, and inpatient units to emergency departments, pharmacies, labs, imaging, and more. In this scenario, every leader in every care setting has the tools they need to address complex problems and thus increase the capacity – and value – of all assets across the entire system.

Now is the time for leaders to embrace a fundamental shift in capacity management as critical to the success of their healthcare organizations, to achieve better healthcare across the spectrum.

Learn why one of LeanTaaS's products received one of the highest overall customer satisfaction scores (96.5 out of 100) by KLAS Research in 2022. Contact us today and receive a complimentary copy of Better Healthcare Through Math.

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