



Improving Operating Room Occupancy through Lean and Data Science: implementation in an oncology hospital

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Abstract. The optimization of operating room occupancy in healthcare facilities, particularly within hospitals specialized in cancer treatment, constitutes a pivotal determinant influencing surgery waiting times, operational expenditures, patient satisfaction, and overall healthcare outcomes [1]. Managing surgical flow entails a multifaceted endeavor encompassing service capacity, organization of procedures based on available teams and resources, procurement management, and notably, the patient's clinical condition [2]. In Brazil, over 1 million patients are awaiting surgery within the public healthcare system [3], while hospitals utilize merely 38% of their operating room capacity [4]. Each year, the imperative to refine hospital processes intensifies, underscored by the urgent necessity to enhance efficiency, elevate care standards, and reconcile demand with constrained resources. Thus, the central challenge resides in aligning surgical demand with the limited availability of operating room resources, enhancing operating room availability, and ameliorating inefficient scheduling protocols and practices. An approach adopted to enhance operational management in hospital settings is the implementation of Lean Healthcare. This strategy focuses on minimizing or eradicating non-value-adding processes and enhancing planning competencies, thereby bolstering efficiency, elevating care quality, and diminishing expenses [5]. This study addresses these challenges comprehensively, implementing a technical approach based on Lean methodologies and advanced data science techniques to optimize operating room occupancy rates, thereby reducing waiting lists and improving operational efficiency. This improvement project underwent two significant phases: the implementation phase and the operational phase. The implementation phase, which spanned three months, entailed the development of an analytics tool tailored to the pertinent processes, the training of a team composed of members from various departments to spearhead improvement initiatives, and the dissemination of the program policies to be rigorously adhered to throughout the endeavor. The primary objective of this initial stage was to establish the fundamental groundwork for the successful initiation of an operational improvement initiative. With the foundation laid, the operational phase commenced, encompassing data collection, analysis aimed at identifying inefficiencies and operational planning deficiencies, collaborative identification of improvement opportunities, and subsequent implementation of planned activities. These operational phases are recurrent on a monthly basis, fostering a culture of continuous improvement within the organization through consistent opportunity identification and a regular cycle of enhancement. The outcomes stemming from the adoption of these technical strategies were notably impactful, with the majority of identified bottlenecks attributed to process-related factors, necessitating minimal or negligible financial investment for enhancements to materialize. Initial findings suggest an 11% augmentation in the volume of surgeries conducted, concomitant with a decrease in preparation time (reduced from 111 to 87 minutes) and turnover intervals between procedures. These enhancements culminated in a more effective utilization of operating room facilities, thereby mitigating waiting lists and enhancing patient contentment. Furthermore, the optimizations provided considerable savings, highlighting the economic benefits of process improvements in healthcare environments. The study demonstrates the effectiveness of combining Lean methodologies with advanced data science to tackle complex operational challenges in healthcare. By focusing on continuous improvement and data-driven decision-making, hospitals can significantly increase their operational efficiency and service quality. The success of this initiative suggests that a similar

technical approach could be scalable and applicable to other healthcare settings facing similar challenges. Moreover, the collaborative aspect of the project, involving employees at all organizational levels, highlights the importance of organizational culture in sustaining improvements. This case study exemplifies how the integration of Lean methodologies and advanced data science can lead to substantial improvements in operating room occupancy rates, with positive impacts on patient care, operational efficiency, and financial performance. It offers a scalable model for healthcare institutions seeking to optimize their resources and improve service delivery. Future research will focus on the long-term sustainability of these improvements and their applicability to other areas of healthcare operations, including expanding these techniques to areas such as bed management, staff planning, and patient flow optimization in emergency departments.

Keywords: Operational efficiency, Operating room, Lean methodologies.

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