Cleveland Clinic Innovations

PRODUCT
Predictive models for surgical case duration

INDICATION
Ambulatory and inpatient surgeries

VALUE PROPOSITION
Optimized planning to include OR time and cleanup time

Reduce unplanned, idle resource time and rescheduled surgeries

DEVELOPMENT STAGE
Model validation

PUBLICATION
2022 JSM Meeting "A Machine Learning Solution to Predict Surgical Case Duration in a Multi-Hospital Health System"

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Operating Room Time Models

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PROBLEM/OPPORTUNITY

Hospitals encounter challenges in efficient scheduling and resource management to ensure high quality healthcare is provided to current and future patients. Operating room (OR) scheduling is one of the most complex issues. To estimate surgical case duration, most hospitals rely on historical averages based on a specific surgeon or a specific procedure type. Information is obtained from electronic medical record (EMR) scheduling systems referred to as "intuition models." However, the low predictive accuracy with EMR data leads to poor scheduling causing delays in surgeries, rescheduling of surgeries, and cancellation of surgeries.

SOLUTION/PRODUCT

Cleveland Clinic has developed a visualization dashboard powered by two gradient-boosted machine learning models to predict wheel-in/wheel-out time and room turnover time for ambulatory (OP) and inpatient (IP) surgeries. This information is used to optimize planning and generate surgery schedules.

Using Cleveland Clinic data, the IP and OP models are 23% and 21% more accurate in model prediction as compared to actual length of OR time than the industry standard benchmark Intuition model. It was calculated that one minute of Ambulatory OR time was worth about $118.31 and one minute of Inpatient time was worth $257.01 in 2022. Use of the IP and OP models Based on predicted improved efficiencies, in the year 2022 an additional $41.7 M revenue in Ambulatory & $13.4 M revenue in Inpatient would have been generated. The models have improved planning of OR resources at CCF resulting in more accurate OR time allocation, improved family experience, and improved access for additional surgeries.