MSK Perioperative Visualization Tools to Drive Operational Decision Making

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Introduction

Operations in the perioperative domain of a specialized cancer hospital are complex. Matching increasing demand for surgical resources (blocks, staff, equipment) with the available capacity of those resources becomes particularly difficult. Although the data for every surgery is captured on a timely basis within the Electronic Health Records (EHR), accessing it to conduct insightful analytics is slow, difficult and labor intensive. Timely, smart metrics pushed automatically to surgeons and administrators raise awareness and facilitate decision making. At Memorial Sloan Kettering (MSK), we have developed a suite of Perioperative Dashboards, robust analytic visualization tools that provided surgical leadership with the insights they needed to address operational challenges and make data-driven decisions and interventions.

Methods

MSK Perioperative Dashboards were developed using Human-Centered Design principles, in an iterative manner by working closely with stakeholders and collecting feedback at each development step.

The Dashboards were designed in Tableau using the method of Guided Analytics. The Dashboards provide visualization and drill down capabilities out of the box, allowing end-users to find answers to a wide spectrum of analytic questions and provide a mechanism for in-depth analysis when needed. Each dashboard view is designed to answer questions based on specific end-user role or function and provides the appropriate level-of-detail, from executive snapshots to drill-down into individual records.

The data and metrics reported were predefined and linked together in the Perioperative Datamart built as a star schema, a high-performance relational data model. Building of the Datamart was preceded by data discovery and profiling, and development of imputation and transformation techniques. For each use case, we developed fit-for-use data quality measures and checks, and built reports for monitoring of key data quality measures.

The process used in the development, deployment, and maintenance of the Perioperative Analytic Tools adhered to best data governance practices. A business owner was assigned to each domain of metrics; consensus of all stakeholders was reached on metric definitions; continuous data integrity was ensured by respective data stewards; and metric definitions were published on the Dashboards and MSK Datapedia.

Results

Since 2016, we have developed Perioperative Dashboards covering Case and Procedure Volume, First Case Delays, Scheduling Accuracy, Space and Block Utilization, Rooms Running and PACU Hold.

The MSK Surgical Block Committee uses the tools in decision making for granting additional blocks to surgeons and services. The First Case Nursing Workforce monitors first case delays and identifies delay reasons to develop and assess effectiveness of interventions. Operational Engineers assess the rising demand and need to expand Operating Room capacity. MSK Strategy and Finance use Case Volume trends to forecast volume budgets.

The Datamart became a single source of truth and business intelligence for perioperative data throughout MSK. Data profiling resulted in changes to some Standard Operating Procedures that improved quality of collected data. The new dashboards replaced the need for manually curating fifteen reports, freeing valuable resources.

Conclusion

Perioperative visualization tools equipped MSK operational and strategic teams with actionable data. Future work will include establishing metrics that evaluate and quantify the effectiveness of these visualization tools.