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Radiology Services in a Value-based Industry: **why yesterday's strategy no longer works**

Interventional Radiology Assessment Enables Lahey Hospital Medical Center to Identify Key Opportunities to Optimize Staffing and Operations for Complex Minimally Invasive Patient Care.

Case in Point: Lahey's IR Services Challenge

The Interventional Radiology (IR) Program at Lahey Hospital Medical Center has evolved over time, broadening its scope of care, e.g. in the minimally invasive oncology space and with increasing complexity hepato-biliary interventions. Lahey Health considers minimally invasive image guided interventions as a key driver of appropriate care, critical to managing multi-morbid patients in a tertiary care center that provides advanced care options to the overall patient population in its integrated care delivery network.

The hospital has seen a steady increase in patient volume and complexity in recent years. As a result, the IR service is now caring for more high acuity patients and performing more complex procedures than ever before. As a result of this growth and shift in its patient demographics, Lahey leaders recognized that in order to properly resource its IR department, the manner in which it allocated and organized resources and delivered its service needed to be adjusted. At the outset, Lahey radiology leadership and administration wanted to assess the state of its current delivery system in IR, identify issues and devise better ways to ensure that this section of the department was staffed appropriately to handle complex patients.

Action strategy

Lahey chose Philips as a strategic partner to conduct a comprehensive assessment of the IR service line. The assessment was the first step in creating a baseline of the current performance of the IR section, as well as gaps and opportunities for improvement. The purpose of the assessment included, but was not limited to:

- **Describe the current state of the IR service line and the resources required to meet patient needs now and in the future;**
- **Deepen understanding of the activities, workflows, hand-offs and inter-dependencies within IR;**
- **Examine the hypothesis of the IR department's leaders that it was being short staffed relative to the increase in procedure complexity that had occurred over time;**
- **Analyze the acuity of in-patients by bringing the case mix index metric to the IR department level**
- **Understand the potential impact and influence of other Lahey services on IR (e.g. patient transportation, nursing); and,**
- **Analyze the economy, efficiency and effectiveness of IR through this holistic review.**

Data analytics of Departmental level Case Mix Index

A key metric to understand patient acuity of inpatients is the hospital Case Mix Index (CMI) metric. CMI also has a significant impact on hospital reimbursement for an inpatient stay. Even small changes in CMI can have large financial implications to hospitals. CMI not only drives reimbursement, but we hypothesized that it may also be used in resource allocation

algorithms to adjust staffing needed to deliver care. A key issue is that the average hospital CMI is based on the entire inpatient population. As such, it may not be adequate to determine specific interventional radiology (IR) department-level resource utilization. The IR department has unique challenges in determining the number of technologists and nurses needed as case length and staffing intensity increases with patient acuity levels and comorbidity statistics.

As a first step in this assessment, Philips developed an analytics algorithm to deduct the CMI at a department section level and compare it to the hospital level CMI. It was hypothesized that if the interventional radiology patients' CMI was very different to the average CMI of their hospital environment, then the radiology department may be tasked to deliver care with inappropriate resource levels, if staffing was determined merely by using the overall institutional CMI.

Assessment Process and Deliverables

With this hypothesis, the assessment was executed in three phases that included: a document and data review with stakeholder interviews, analysis and report development, and an outcome and action report to stakeholders. In the first phase, Philips worked with Lahey staff to understand the context in which its IR department operates by observing and interviewing operational and medical staff internal to IR for stakeholder input. Working with the radiology department, the Philips team extracted data for a six-month period using routine operational reports produced by the enterprise electronic medical record system. The assessment included IR section-specific CMIs to quantify the complexity of inpatients that were being treated in this department, as well as to understand if department section-specific CMI was higher than the overall hospital observed and reported CMI.

In the second phase, the Philips team conducted a data review and analysis of key areas including: department-level case mix index, cost-per-case and technologist time-per-study. It also performed a trend analysis of key patient concerns such as patient profiles, volumes and utilization patterns (e.g. number of cases/day; cases/week; and number of add-ons) as well as reviewed more operational areas such as expenditures, revenues, and staff scheduling. In the third and final phase, the Philips team developed a report inclusive of a summary of findings and an assessment of the economy, efficiency and effectiveness of Lahey's IR service. The report was revised in accordance to feedback provided by project sponsors and presented to other Lahey stakeholders.



Key Findings

With this data-driven process, the Philips team analysis revealed that Lahey's IR department CMI was consistently higher than the overall hospital CMI on a month-over-month basis. The results suggested that there are specific sections within Lahey's Radiology service line, namely Interventional Neuroradiology and Interventional Radiology, which are caring for an inpatient population that is even sicker than the general Lahey inpatient population, potentially requiring significantly more resources for daily operations of the section. While this finding was not entirely unexpected, it was the first time the Lahey radiology leadership had a department-level patient complexity metric to demonstrate and quantify a resource request to hospital management. Essentially, the assessment helped validate the initial hypothesis that the increase in Lahey's patient complexity was one reason why the staff in these areas had a sense of being short staffed. Workflows and slot times were not keeping pace with service needs.

The assessment also provided Lahey IR a closer look into its actual patient care workflow in IR, and provided visibility to data-driven improvement opportunities in its IR service. One specific recommendation revolved around technologist scheduling which needed to be adapted to a weekly pattern matching the observed volume of add-on patient cases. The other recommendation concerned lab and technologist FTE utilization which was found to be near full capacity. Occasional staff absences and variability in exam time were impacting the quality of service both in terms of patient wait times and staff morale.

Assessment Recommendations and Outcomes

Based on these findings, Philips was able to create awareness of the current state especially on quantifying the CMI at a departmental level. The analysis by Philips in collaboration with Radiology leadership developed a unique application of the CMI metric. Based on this insight, Lahey management realized that calculating a more granular service-level and section-level CMI can provide valuable insights to determining optimal distribution of operating resources. By providing a more precise definition of department level CMI, Philips helped Lahey create a more realistic representation of the challenges faced by its IR service line to enable appropriate resource (nurse and technologist staff) allocation to accommodate the higher case complexity.

Lahey's Director of Interventional Radiology, Dr. Sebastian Flacke commented, "It is so helpful to have a set of fresh eyes evaluate our setting and help us improve."

Learn more:

Philips assessment service can help healthcare organizations identify and address similar challenges in their imaging service line so that they can use data to better inform and direct the management of system resources to initiate improvements and realize greater value.

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