Calculation and Utilization of a Risk-Adjusted Test Utilization Index for Process Improvement

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Description of problem or gap

Studies as early as the 1970s have recognized how the misuse of inpatient laboratory testing causes increased costs, iatrogenic anemias, and negative patient experiences via pain, sleep disruption, and unnecessary phlebotomy.[1] Recent studies have estimated the annual cost of inpatient laboratory testing by Medicare alone to be approximately 7 billion dollars.[2]

It is evident that interventions are warranted to reduce testing unless clinically necessary. Provider resistance to these resource-reduction efforts may be more than simply the perception of "necessity", but may also demonstrate habitual practice patterns and lack of awareness as to the risk of harm to the patient or cost to the health system. Many strategies have been attempted, including on-screen prompts, broad-spectrum provider education, price displays within ordering activities, and unbundling of order sets. These have met with limited success.

Methods

With the goals of improved patient experience and decreased inappropriate use of resources, our hospital established a Lab Utilization Task Force. Initial assessment included evaluation of current-state utilization practices and comparison to national data from similar Academic Medical Centers.

Based on the frequency of ordering as well as recurrent (daily) ordering practices, four inpatient laboratory tests were tracked over a three-month period: basic metabolic panel, comprehensive metabolic panel, complete blood count, and complete blood count with differential. Utilization of these "in-scope" tests were assessed from EHR reports by Current Procedural Terminology (CPT) codes (90048, 800053, 81001, 81003, 82746, 85025, 85027, 85610, 85730, and 87040). Tests were deemed "out-of-scope" if completed in an outpatient context, if other inpatient tests, or if ordered in the Emergency Department.

The EHR query for test utilization included hospital-wide values from 5/1/2019-7/31/2019, and broke down the data by service-line. These data points were: total number of discharges, mean length of stay, frequency of ordering for each in-scope test, and total tests of each type ordered. Vizient data was utilized to calculate the case mix index (CMI) for the same groups of discharges.

Calculations included percent utilization of in-scope tests hospital-wide and by service line individually, Test Use Days (# days with ≥ 1 in-scope laboratory test performed), and the Aggregate Test Utilization (# of tests per patient per day). In order to assess "appropriateness" of the testing patterns that were revealed by these calculations, the Aggregate score was adjusted, employing CMI as a proxy for the complexity and acuity of the patient treated. The risk-adjusted Test Utilization Score (TUS) was tabulated for each service line. The hospital-wide TUS was calculated using mean CMI. Comparing service-line performance to hospital-wide scores applied

these values as a Test Utilization Index (TUI). The overall hospital TUS = 1 in the index. A service-line-specific index >1 is indicative of "over-use" of in-scope lab testing.

Results:
Within the 3-month time period queried for all service lines, a total of 6,441 patients were discharged. The overall rate of in-scope of test utilization was 92.1%, placing the hospital at the 68 percentile within the Vizient database of similar facilities. With a mean CMI of 1.9651, mean LOS of 5.74 days, and mean Aggregate Test Utilization of 2.2, the risk-adjusted TUS for the hospital was 1.1195. This represented TUI score of 1.

TUI by service-line revealed that high CMI did not always correlate with higher usage of inpatient laboratory tests. The converse was also demonstrated. The service line with the highest CMI (6.31) had a TUS of 2.7 and corresponding TUI of 0.38, while the service with the highest TUS at 3.2 had a CMI of 1.58, resulting in a TUI of 1.8. The six (27.3% of 22 total) highest TUI service lines accounted for 51.1% of all in-scope testing ordered.

Discussion of results:
Health Care systems can utilize the EHR for documentation, decision support, and all the various administrative and revenue-capturing functions within the hospital. A developing field of interest is the utilization of the EHR in reporting and analytics, applying these tools to evidence-based medicine, enhancing the quality of care, monitoring revenue cycles, and permitting health systems to acquire and process real-time data that can then be employed in Process Improvement endeavors.

Through this pilot project that was focused on laboratory test utilization, were we able to acquire detailed data from an EHR query that allowed a clinically-significant evaluation of practice patterns amongst our service lines. The risk-adjusted TUI creates a clear and reproducible standard by which to identify the over-utilizers of resources. Accordingly, Process Improvement efforts may now be focused on the service lines with an index > 1, with target efforts to educate and motivate change in ordering practices. The index also provides a mechanism to monitor the effectiveness of these interventions in real time.

Conclusions:
Traditional Clinical Laboratory ordering habits may not be aligned with evidence-based best practices. In an effort to minimize laboratory testing without clinical necessity, we created a Test Utilization Index. This analytic tool provided a standardized and objective means to assess resource utilization and focus our Process Improvement efforts. The concept of this index is simple and reproducible, and may be applicable to other types of testing and procedures.

Attendee's take-away tool
The Risk-Adjusted Test Utilization Index is a standardized calculation that provides an objective and real-time assessment of the ordering practices of physicians and provides a value that permits targeted efforts for altering in-scope test ordering.

References

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[2]HHS, Office of Inspector General, Data Brief Medicare Payments for Clinical Diagnostic Laboratory Tests in 2017: Year 4 of Baseline Data, OEI-09-18-00410 (Washington, D.C.: September 2018).