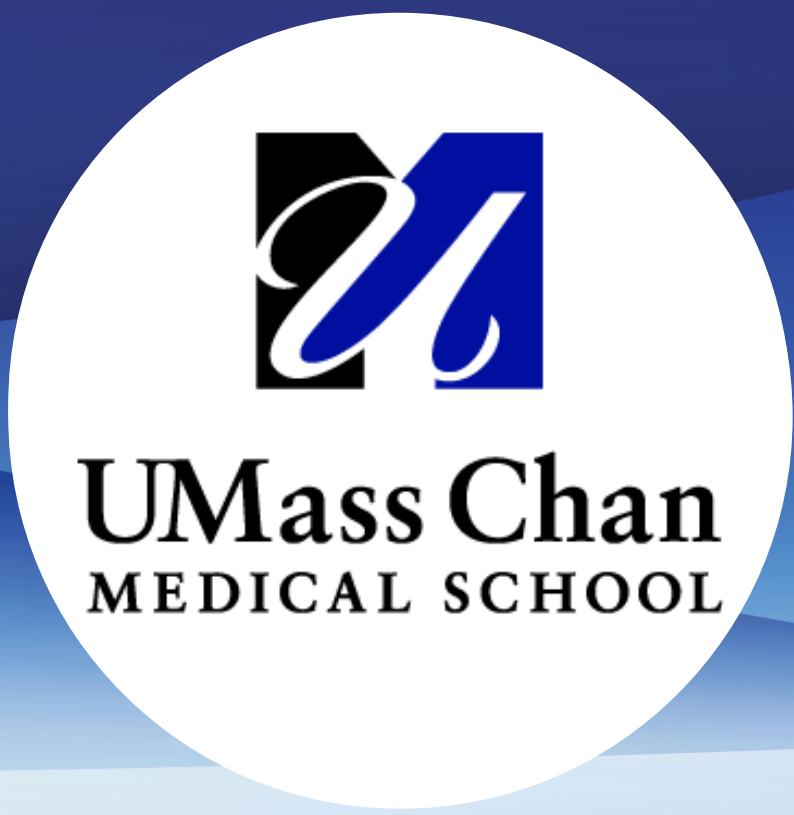


Efficiency Quality Index in Vertical Sleeve Gastrectomy - a Quality and Reliability Assessment Tool

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Objective

- This study aims to develop an Efficiency Quality Index (EQI) to promote high reliability in the performance of Vertical Sleeve Gastrectomy (VSG)
- Evaluate department performance against the national standard by effectively summarizing metrics that are meaningful to the surgeons
- A novel quality metric that improves monitoring efficiency through objective internal measurement and predicts future SAR performance degradation.

Methods

Developing the EQI

- Indicator selection was adapted from the UMass Lobectomy EQI for Thoracic surgery and informed by a literature review of quality metrics for VSG
- A maximum point value (MP) was assigned to each indicator, totaling 100 points for the index, to represent its relative weight in the final quality score.
- A benchmark was selected for each indicator: the national standard (set by SAR or a large cohort study), the internal median, or goal performance
- The fifteen selected indicators, point distributions, and benchmarks were verified by the bariatric surgeons at UMass

Implementing the EQI

- The EQI entailed acquiring each indicator and calculating the percentage of MP earned based on the performance relative to the benchmark (Table 1)

Point Allocation: Departmental Indicator Performance vs. Benchmark					
Department Score in Relation to Benchmark	>50% Above	>25% - ≤50% Above	>5% - ≤25% Above	Within ±5%	>5% Below
% of Indicator's Maximum Points Earned	20%	40%	60%	80%	100%
Example: Benchmark = 6.2% Indicator Max Points = 6	Score Range: >9.3% Point Earned: 1.2	Score Range: (7.75% - 9.3%] Point Earned: 2.4	Score Range: (6.51% - 7.75%] Point Earned: 3.6	Score Range: [5.89 - 6.51] Point Earned: 4.8	Score Range: <5.89% Point Earned: 6
Performance Level	Marked Underperforming	Moderate Underperforming	Mild Underperforming	Meets National Standard	Exceeds National Standard
	Suboptimal Performance			Optimal Performance	

Table 1. Five-tier EQI scoring system illustrating the relationship between indicator performance, benchmark deviation, and corresponding proportion of MP assigned.

- Performance relative to the benchmark was stratified into 25% increments, with each range assigned a proportional percentage of MP (Table 1)
- The EQI was retrospectively applied to all VSG cases from January 2020 to December 2023. Scores were calculated quarterly, by individual indicator and overall. Data was sourced from EPIC via the MBSAQIP database.
- A total score of 80 equaled performance at the national standard

Results

- The lowest score was 58.0 (Q4-2022) and the highest 97.2 (Q1-2022) (Figure 1)
- The longest period of score stability, within three points, was two quarters (Figure 1 and 2)
- Eight indicators demonstrated unstable performance, with quarterly scoring sustained for only three quarters, most alternating between 100% of MP and <50% of MP (Figure 1)
- Hemorrhage demonstrated the greatest instability, alternating between MP and <50% of MP for ten quarters, leading to the largest cumulative point loss, 45.2 (Figure 1)
- The EQI's lowest scoring indicators per year aligned with corresponding SAR reports
- The EQI identified decreased hemorrhage performance five years before SAR recognition and predicted multiple SAR flags (Serious Event, All Cause Intervention, Related Intervention); annual mean scores anticipated Morbidity quartile fluctuations (Figure 1).

Indicator Name	Benchmark	Max Points	2020 Q1	2020 Q2	2020 Q3	2020 Q4	2021 Q1	2021 Q2	2021 Q3	2021 Q4	2022 Q1	2022 Q2	2022 Q3	2022 Q4	2023 Q1	2023 Q2	2023 Q3	2023 Q4
OR Time Incision to Close (min)	78	8	6.4	4.8	6.4	4.8	8.0	6.4	4.8	6.4	6.4	6.4	6.4	6.4	8.0	8.0	8.0	8.0
Observed vs Expected Discharge	0.5	6	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
Rate of Discharge After 24 Hours	47.00%	10	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Readmissions	1.46%	6	1.2	1.2	6.0	6.0	1.2	1.2	6.0	6.0	6.0	1.2	1.2	3.6	3.6	1.2	3.6	6.0
Surgical Site Infections	0.43%	6	6.0	6.0	6.0	6.0	1.2	1.2	6.0	6.0	6.0	6.0	1.2	1.2	6.0	6.0	6.0	1.2
30-Day Mortality	1.77%	16	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0
OR + Post-Op Transfusions	1.00%	6	6.0	6.0	4.8	6.0	1.2	4.8	6.0	2.4	6.0	1.2	6.0	1.2	6.0	1.2	6.0	1.2
Emergency Department Visits	6.20%	6	3.6	6.0	1.2	6.0	6.0	6.0	4.8	3.6	6.0	2.4	3.6	1.2	3.6	2.4	1.2	2.4
Hemorrhage	0.56%	6	6.0	6.0	1.2	6.0	1.2	1.2	6.0	1.2	6.0	1.2	2.4	1.2	6.0	1.2	2.4	1.2
Unanticipated Post-Op Procedure or Return to OR	0.36%	4	4.0	4.0	4.0	4.0	0.8	0.8	0.8	4.0	4.0	0.8	0.8	0.8	4.0	4.0	4.0	0.8
Major Complication	1.39%	10	10.0	10.0	4.0	10.0	2.0	2.0	10.0	2.0	10.0	2.0	2.0	2.0	10.0	2.0	6.0	2.0
DVT	0.20%	4	4.0	4.0	4.0	4.0	4.0	0.8	4.0	4.0	4.0	4.0	0.8	0.8	4.0	4.0	4.0	4.0
Leak	0.13%	4	4.0	4.0	4.0	4.0	4.0	0.8	4.0	4.0	4.0	4.0	0.8	0.8	4.0	4.0	4.0	4.0
Post-Op Oral Intolerance	2.43%	4	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.2	3.2	4.0
Post-Op Dysphagia Requiring Dilatation	0.60%	4	4.0	4.0	0.8	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.6	4.0	4.0	1.6	4.0	4.0
Score		100	90.0	90.8	77.2	95.6	68.4	64.0	91.2	78.4	97.2	68.0	61.6	58.0	94.0	69.6	83.2	69.6

Figure 1. EQI for VGS from January 2020 to December 2023. Quarterly EQI score, total and per indicator. Color based on points earned in relation to MP: green represents 100% of MP, yellow ≥50%, and red <50%.

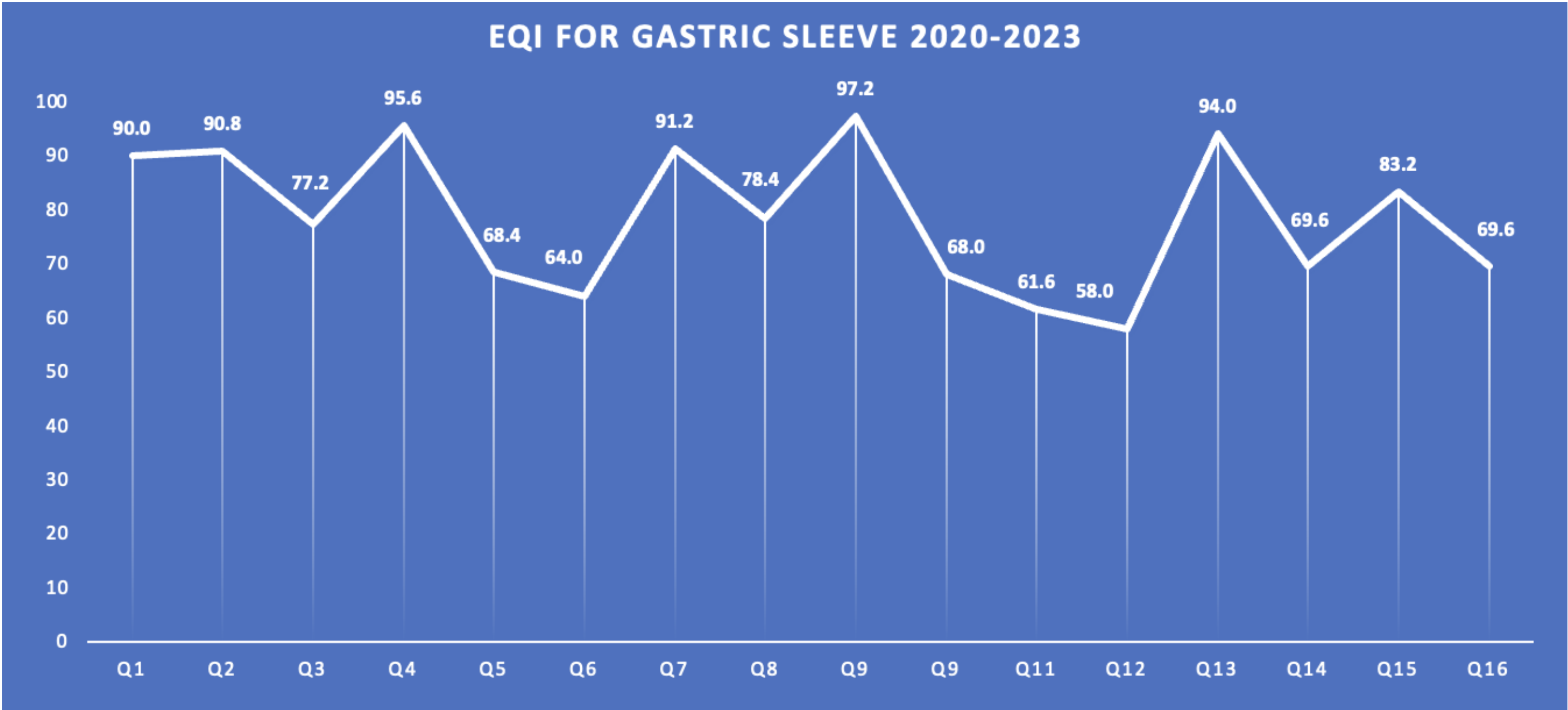


Figure 2. Efficiency Quality Index (EQI) for Vertical Gastric Sleeves from January 2020 to December 2023. Quarterly EQI score ranging from 58.0 to 97.2.

Conclusions

- The EQI enabled timely monitoring and streamlined assessment of surgical performance using surgeon identified quality measures
- It provided a comprehensive evaluation of departmental performance in VSG compared to the national standard
- The design effectively evaluated performance consistency and recognized underperformance facilitating implementation of targeted quality initiatives
- The EQI accurately identified areas of poor performance on the corresponding SAR reports, enabling reliable detection well in advance of conventional reporting metrics
- The EQI served as a predictive indicator of future SAR performance, enabling the opportunity to improve quality ratings through early intervention

Future Work

- Complete automation of the EQI to further streamline performance assessment
- The development of a longitudinal EQI to track long term outcomes of VGS to outcome prediction
- Use this EQI as a template for adaptation to other surgical procedures

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