Statewide Clinic Registries: The Michigan Surgical Quality Collaborative

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Clin Colon Rectal Surg 2019;32:16–24.

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Abstract

Keywords

- Regional Collaborative Effort
- Michigan Surgical Quality Collaborative
- quality improvement
- surgical outcomes
- process measures
- colorectal surgery

Regional clinical registries provide a unique opportunity for shared learning and population-based analyses of the quality of surgical care. Through the “Michigan Model” of pay for participation in strategic Value Partnerships, exemplified by the Michigan Surgical Quality Collaborative (MSQC), the state’s dominant private insurer, Blue Cross Blue Shield of Michigan, has sponsored 20 statewide clinical quality improvement collaboratives. MSQC represents a partnership among 73 Michigan hospitals with a robust data infrastructure and flexible platform for the promulgation of best practices in surgical quality improvement. This article will describe the organizational structure of the MSQC, the contributions the registry has made to quality improvement in colorectal surgery, and how future work will align to improve the reliability of improvement-relevant registry data.

The advent of public reporting, value-based purchasing, and public accountability for surgical performance have increasingly highlighted the wide variability in hospital surgical outcomes.¹ Meanwhile, increasing awareness of the costs of surgical complications to payers, providers,^{2–4} and patients⁵ has supported a strong economic case for improving surgical performance. Recognizing that the global effects of public reporting, pay for performance, and regionalization on surgical outcomes have been relatively limited, there is increasing interest in novel strategies for broad-scale improvement in surgery. Recently, several regional collaborations have emerged, allowing a collection of geographically related hospitals and surgeons to work together to disseminate best practices and shared learning. In this article, we will discuss our experience with statewide collaborative quality improvement (CQI) in Michigan, focusing on the Michigan Surgical Quality Collaborative (MSQC) and, in particular, its work in colorectal surgery.

The Michigan Surgical Quality Collaborative

The MSQC was established in 2004 and was funded by the Blue Cross and Blue Shield of Michigan/Blue Care Network (BCBSM), the state’s dominant private insurer—covering nearly 50% of

the 10 million residents of the state. Currently, this statewide consortium includes 73 community and academic hospitals, whose participation is funded by the BCBSM Participating Hospital Agreement Incentive Program⁶ (→ Fig. 1). By funding the costs associated with collaboration and incentivizing participation, the BCBSM has provided an opportunity for hospitals and providers to meet and discuss how to improve quality of care, decrease complications, manage costs, eliminate errors, and improve health outcomes.

To accomplish these goals, BCBSM has established Value Partnerships utilizing CQI principles to address common, costly surgical and medical conditions. These clinical quality improvement (CQI) registries enable benchmarking between hospitals, identification and modeling of best performers, and analysis of the links between processes, outcomes, and cost. Currently, 20 Collaborative Quality Initiatives are funded by BCBSM with participation from nearly 90% of all Michigan hospitals. These partnerships cover multiple areas of care and include not only the MSQC but also other partnerships such as the Michigan Bariatric Surgery Consortium (MBSC), the Michigan Value Collaborative, Michigan Oncology Quality Consortium, and others (→ Table 1).

It is important to recognize that BCBSM does not coordinate the activities of the individual registries, and that the insurer

Fig. 1 Hospital members of the Michigan Surgical Quality Collaborative.

cannot identify individual hospital or physician data. Rather, each collaborative improvement program relies on a coordinating center staffed by one of the participating hospitals and BCBSM only views aggregated data. In the case of the MSQC, this responsibility has been assigned to the University of Michigan. The collected data are used to identify QI opportunities for participating hospitals and physicians.

Rather than instituting an outcomes-based, pay-for-performance approach, BCBSM initially set out to compensate

hospitals for participating in QI.⁶ Compensation was based on the total payments they receive from BCBSM, with certain institutions receiving more than \$1 million because of their extensive participation and high volume of cases. These funds were able to address nearly 80% of the total data abstraction cost of each initiative. To participate, hospitals agree to submit data and respond to the coordinating center in a timely manner, cooperate with data audits, participate in CQI efforts, actively use MSQC performance reports in QI

Table 1 Collaborative quality initiative projects

Collaborative quality initiative project	Description/Goals
Anesthesiology Performance Improvement and Reporting Exchange (ASPIRE)	Improves the quality of anesthesiology care by using real-world data and the collective experience of its members
Blue Cross and Blue Shield of Michigan Cardiovascular Consortium—Percutaneous Coronary Intervention (BMC2-PCI)	A prospective multicenter statewide registry of consecutive percutaneous coronary interventions
Blue Cross and Blue Shield of Michigan Cardiovascular Consortium—Vascular Interventions Collaborative (BMC2-VIC)	A prospective, longitudinal, multicenter, statewide registry of consecutive vascular surgical interventions
Genetic Testing Resource and Quality Consortium (GTRQC)	Improves the quality of care for patients needing molecular diagnostic testing
Lean Clinical Redesign	Assists health care organizations and clinic teams learn how to build internal capabilities for continuous improvement
Michigan Arthroplasty Registry Collaborative Quality Initiative (MARCQI)	Shares “best practices” for hospitals providing care to hip and knee replacement patients
Michigan Anti-Coagulation Quality Improvement Initiative (MAQI2)	Registry of anticoagulation care seeking to improve the safety, quality of care, and outcomes of patients requiring anticoagulation
Michigan Bariatric Surgery Collaborative (MBSC)	Seeks to improve the quality of care for patients undergoing bariatric surgery
Michigan Breast Oncology Quality Initiative (MiBOQI)	Statewide effort to examine practice patterns in surgical, radiation, and medical oncology
Michigan Care Management Resource Center (MCMRC)	Assists and supports Michigan primary care practices as they continue to build upon their current Patient-Centered Medical Home capabilities
Michigan Emergency Department Improvement Collaborative (MEDIC)	Dedicated to measuring, evaluating, and enhancing the experience and outcomes of patients seeking care in emergency departments
Michigan Hospital Medicine Safety Consortium (HMS)	Supports Michigan hospitals in improving the safety and quality of care for hospitalized medical patients
Michigan Oncology Clinical Treatment Pathways (Pathways)	Program provides recommended treatment pathways for cancer patients who are receiving chemotherapy
Michigan Oncology Quality Consortium (MOQC)	Seeks to improve care of cancer patients by using data gathered as part of the national Quality Oncology Practice Initiative program
Michigan Pharmacists Transforming Care and Quality (MPTCQ)	Focuses on the integration of care models into provider practices to help improve patient care through pharmacist/physician collaboration
Michigan Radiation Oncology Quality Collaborative (MROQC)	Identifies best practices in radiation therapy that minimize the side effects that patients may experience from radiation treatment
Michigan Spine Surgery Improvement Collaborative (MSSIC)	Seeks to enhance patient-reported outcomes following spine surgery by reducing surgical complications, reoperations, and cost
Michigan Surgical Quality Collaborative (MSQC)	Improves overall surgical quality through better patient care and lower costs
Michigan Society of Thoracic and Cardiovascular Surgeons Quality Collaborative (MSTCVS)	Promotes and shares optimal processes of care and cardiac surgery outcomes
Michigan Trauma Quality Improvement Program (MTQIP)	Measures and improves the quality of care administered to trauma patients
Michigan Urological Surgery Improvement Collaborative (MUSIC)	Improves the quality and cost-efficiency of prostate cancer care in the state of Michigan
Michigan Value Collaborative (MVC)	Profiles ~20 common inpatient conditions and procedures to help design and evaluate improvement interventions

efforts, share best practices with one another, and provide reports on how QI efforts have impacted their institution.⁷ To further ensure collaboration and cooperative interactions, hospitals are not permitted to use any comparative outcomes data for public promotion, advertising, or outreach.

Over time, other compensation programs within the Value Partnerships have emerged, incorporating pay-for-performance rewards for QI and efficiency into the MSQC and other CQJs. Hospitals are assigned pay-for-performance scores based on program participation and engagement, quality and clinical process improvement, and outcomes. As a program becomes more established at an institution, increasing weight is given to performance measures relative to participation measures.

Through the guidance of collaborative project directors and committees composed of surgeons, nurses, and data analysts, the MSQC's registry has developed validated, precise definitions for patient comorbidities, operative characteristics, and postoperative surgical complications. Validated risk and reliability adjustment methods allow for center-specific comparisons to be performed and disseminated among participating hospitals.⁸ Hospitals are provided information about how they compare with others, with no identifying information exchanged. ► **Fig. 2** shows a sample hospital comparison for sepsis complications following general surgical operations. Hospitals are provided de-identified reports which allow them to compare their complication rates with those of other institutions in the consortium. By comparing the risk-adjusted 95% confidence intervals to the overall complication rate of the MSQC, one can identify

either high or low outliers related to that complication and target QI initiatives to decrease variability between sites.

When evaluating the measurement platform used, the MSQC has many similarities to national efforts such as the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP). However, unlike ACS-NSQIP, which predominantly represents high-volume academic institutions,⁹ the MSQC provides a more diverse group of community and academic institutions a mechanism by which to evaluate findings and share experiences. This is done by designating clinical champions and coordinators who participate in quarterly meetings with other site representatives. These meetings allow sites across the consortium to identify areas where variation exists and understand what processes are implemented at different institutions. Furthermore, although ACS-NSQIP institutions receive reports, they are not necessarily expected to initiate QI initiatives to address areas where they are not performing well. The pay-for-participation approach established by the MSQC provides an environment that allows for institutions to be more transparent about their problem areas and, thus, more willing to share ideas about how to improve. In doing so, information may be distributed to inform others about opportunities for QI.

It is this active collaboration that sets the results of MSQC apart from other outcomes assessment registry efforts. Two studies examining the effect of ACS-NSQIP found that participating hospitals did not experience any greater improvement in outcomes or cost of surgery for Medicare patients than nonparticipating hospitals.^{10,11} In contrast, MSQC and MBSC participation has been associated with significantly

Fig. 2 An example of one of the many reports provided to Michigan Surgical Quality Collaborative (MSQC) participants. In this example, all sepsis complications for each participating hospital are quantified. Risk-adjusted 95% confidence intervals (CIs) are shown. The horizontal line along the Y-axis identifies the MSQC average for all institutions. Hospitals with CIs that do not cross the MSQC average are considered outliers and are highlighted in dark shading. Those toward the left of the x-axis are considered low outliers, those to the right are considered high outliers.

greater reduction in perioperative morbidity among Michigan hospitals than among comparison hospitals in other states.^{6,12} Evaluating more than 300 thousand patients over two specific time periods, Campbell et al¹² showed that morbidity following general and vascular procedures was significantly reduced at MSQC sites, whereas non-MSQC sites did not show any improvement in morbidity. These findings, coupled with high levels of participant satisfaction and engagement, support the continued use and expansion of regional collaborative efforts.

MSQC Research in Colorectal Surgery

Colorectal Surgery Initiatives

As the MSQC has evolved, collaborators have identified opportunities for more specific initiatives. To address colorectal-specific QI concerns, a group of colectomy procedures was identified by using Current Procedural Terminology (CPT) codes. Four codes (44140, 44160, 44204, and 44205) designed to capture commonly performed open and laparoscopic colon operations were included in a colectomy special project. Since that time, a more comprehensive set of 22

colorectal CPT codes have been included in a parallel Colectomy Procedure Group—capturing more complex operations including pelvic operations such as restorative proctectomy for rectal cancer and inflammatory bowel disease and operations with temporary or permanent stomas. Over 50 unique elements related to patient factors, perioperative processes of care, and postoperative outcomes of specific clinical interest to colorectal surgery have been introduced. Since 2008, these colectomy-specific initiatives have increased to include 69 hospitals which have contributed more than 17,000 cases for the Colectomy Special Project and 29,000 cases for the Colectomy Procedure Group. ►Fig. 3 illustrates an example of the user interface surgeons operating at MSQC facilities access to make hospital- and surgeon-level comparisons related to colorectal surgery outcomes.

Recently, a special project measuring the quality of care for rectal cancer has been added to the colorectal surgery component of MSQC.¹³ Piloted in 24 volunteer hospitals, this program adds to the MSQC core metrics a set of key process and outcome quality measures essential to the evaluation of the quality of colorectal cancer surgery. Information related to lymph node procurement, margin positivity, mesorectal

Fig. 3 An example of one of the reports generated by using the Colectomy Special Project initiative. Adjusted and unadjusted rates of complications may be compared across the consortium. In addition, individual at specific institutions may identify complication rates at their respective institution.

excision grading, the use of neoadjuvant chemoradiotherapy, ostomy nurse care, and cancer recurrence are some examples of the detailed data that will be collected through this program. For example, these data have been used to identify variation in sphincter preservation surgery for patients with rectal cancer.¹⁴ Given the lack of rectal cancer-specific variables in national databases, the information gathered from this program will provide meaningful feedback to colorectal surgeons and promote specialty-specific QI.

In nearly a decade of work, the MSQC colectomy initiative has allowed for robust evaluation of various topics of interest. Through time, QI has not only been implemented based on the findings related to these studies, but improvements have been introduced to the database to capture more granular information and improve the quality of research performed by collaborators. We will highlight some of the milestones related to colorectal surgery and the MSQC.

Infectious Complications following Colectomy

Infectious complications after colectomy have been a common focus of research and QI initiatives in MSQC. In the preoperative setting, the role of bowel preparation has long been debated. Especially in an era with intravenous prophylactic antibiotics, some have questioned its utility. Meta-analyses of randomized clinical trials have failed to identify benefits related to mechanical bowel preparation following colorectal resections,¹⁵ but these studies were often limited by dichotomizing bowel preparation and not considering the role of oral antibiotics. To address these questions, multiple studies were performed to further evaluate individual components of bowel preparations. In one study, Englesbe et al¹⁶ compared mechanical preparation with and without antibiotics and found that patients who received oral antibiotics were less likely to develop surgical site infections (SSI; 4.5 vs. 11.8%, $p = 0.0001$) and organ space infections (1.8 vs. 4.2%, $p = 0.044$). In a second study, Kim et al¹⁷ further evaluated the use of oral nonabsorbable antibiotics in full bowel preparations. Patients receiving preparations with oral antibiotics were less likely to develop SSIs (5.0 vs. 9.7%; $p = 0.0001$) and organ space infections (1.6 vs. 3.1%; $p = 0.024$) than patients with no bowel preparation at all.

Given the heightened attention to guidelines for perioperative intravenous antibiotic administration in the Surgical Care Improvement Program (SCIP) and elsewhere, several MSQC studies have evaluated guideline compliance and its association with SSI rates. For instance, specific prophylactic antibiotic choices (cefazolin/metronidazole, ciprofloxacin/metronidazole, and ertapenem) were shown to be independently associated with lower SSI rates.¹⁸ Prompted by these findings, studies were conducted to evaluate how intraoperative antibiotic administration practices adhered to SCIP antibiotic guidelines.^{19,20} Analysis of MSQC colectomy registry revealed that nearly all cases (99.5%) had antibiotics administered during the operative period. Unfortunately, significant deficiencies related to guideline compliance (81.4%), time of administration (90.8%), weight-adjusted dosing (56.8%), and redosing schedules (6.0%) were identified. These findings highlighted the fact that many surgeons and anesthesiologists understood the importance of prophylactic antibiotics, yet may not have had

the systematic support necessary to effectively execute their role. These deficiencies have since led to QI in antibiotic administration strategies via simplified guidelines, provider education, real-time automated paging systems, and computerized reminder systems.

Although the results for oral and intravenous antibiotic use are compelling, they have raised concerns for unintended consequences. Specifically, some feel that the additive effect of oral and intravenous antibiotics may alter the normal bowel flora and increase the risk for *Clostridium difficile* infection (CDI). Within MSQC, Krapohl et al²¹ evaluated 4,936 colorectal resections in 23 hospitals and found that postoperative CDI was significantly more common among patients with higher illness severities and comorbid conditions (i.e., renal disease, low albumin, and emergency surgery). However, there was no increased risk of CDI associated with the use of either oral antibiotics with bowel preparation or SCIP-compliant prophylactic perioperative intravenous antibiotics.²²

Using the registry, the relationship of a variety of other individual care measures with infectious complications has been evaluated. Studies comparing skin preparations containing chlorhexidine versus iodine povacrylex as well as alcohol versus non-alcohol-based skin preparations have shown no significant association between SSI, wound complication, or readmission rates and the different formulations.²³ Others have focused on postoperative factors, such as blood glucose levels and shown that serum hyperglycemia (blood glucose > 180 mg/dL) in nondiabetic patients is associated with superficial SSI (4.7 vs. 8.1%, $p < 0.01$), sepsis (5.2 vs. 11.6%, $p < 0.01$), and death (1.6 vs. 7.1%, $p < 0.01$).²⁴ These cautionary results are especially timely in the era of enhanced recovery and carbohydrate loading.

These studies highlight the granularity of the data available for analysis and have led others to evaluate whether individual care measures may be grouped together to have an additive effect. By incorporating multiple protective processes of care, Waits et al²⁵ proposed the Colectomy Bundle Score and showed that it was tightly associated with the risk of postoperative SSI after colectomy in MSQC. Six measures comprise the Colectomy Bundle Score: oral antibiotics with bowel preparation, SCIP-compliant intravenous antibiotics, minimally invasive surgery, short operative duration, postoperative normothermia, and perioperative glycemic control. In patients with all bundle elements satisfied, SSI incidence was only 2.0%, whereas SSI rates increased monotonically with decreasing scores, reaching 17.5% for patients with only one element received (►Fig. 4). Given these findings, many institutions within the consortium have instituted a bundle of best practices for both colorectal and noncolorectal operations.

Anastomotic Leak

As one of the most serious complication following colectomy, multiple groups within the collaborative have attempted to better understand why anastomotic leaks (ALs) occur. In a study of 4,340 patients undergoing colorectal resections with anastomosis, Leichtle et al²⁶ identified intraoperative fecal contamination and estimated blood loss greater than 100 mL

Fig. 4 Surgical site infection (SSI) rates as a function of the number of colectomy bundle measures followed. Patients with lower colectomy bundle scores had significantly higher rates of SSI. Data presented as risk-standardized SSI rate + SD.

as factors predictive of increased risk of AL. In a subsequent analysis, we found that elevated platelet count, perioperative immunosuppression, tobacco use, obesity, as well as technical factors related to prolonged operative duration and emergency procedures are predictive of an increased risk for AL. Furthermore, we found that there was significant variation in hospitals' risk-adjusted rates of AL following colorectal resection, suggesting that there may be influential processes of care to ameliorate the risk of leak in some patients.²⁷

Analyses of at-risk patient populations have been conducted to better understand what happens to patients following complications. Although diabetic patients within our registry were found to have comparable AL rates compared with non-diabetic patients, the consequences differed substantially. Among patients with AL, diabetes was associated with more than four times greater risk of mortality (26.3 vs. 6.0%, $p < 0.05$).²⁸ These findings, in addition to the association between hyperglycemia and SSI after colectomy, have led to increased screening in the perioperative period to identify high-risk patients (e.g., occult or poorly managed diabetes) who may benefit from preoperative glucose control. The implications and cost of a single AL likely outweigh the cost of routine preoperative testing of hemoglobin A1c, and this practice has been adopted by several enhanced recovery programs.

Enhanced Recovery after Surgery

Enhanced recovery after surgery (ERAS) protocols are designed to optimize perioperative care pathways. Various care elements which have been shown to influence postoperative complication rates and postoperative hospital length of stay (pLOS) have been evaluated using the MSQC registry. Preoperative interventions such as the use of alvimopan has been supported by findings from clinical trials in which strict conformation to protocols has resulted decreased postoperative ileus and pLOS.²⁹ Subsequent studies evaluating the use of

the drug were limited by small sample sizes or close affiliations with the drug manufacturer.^{30–32} By using the MSQC registry, Harbaugh et al conducted an independent investigation of alvimopan in the real-world clinical setting.³³ In their study, patients who received alvimopan were noted to have lower incidences of prolonged ileus (2.3 vs. 7.9%, $p < 0.001$) as well as shorter pLOS (4.8 vs. 6.4 days, $p < 0.001$), further supporting its use to improve postoperative recovery and outcomes.

Intraoperative factors have also been assessed to develop institution-level evidence regarding optimal fluid management strategies.³⁴ Over 8,000 cases involving intestinal resections were evaluated. After accounting for patient morphometrics, resuscitative fluids, urine output, blood loss, and operative approach, hospitals were stratified based on average fluid balance. The study revealed a wide degree of variation between hospitals. Patients who were managed at high-fluid balance hospitals were noted to have a 12 to 14% longer pLOS when compared with patients managed with more conservative fluid resuscitation strategies.

Multiple trials have demonstrated that minimally invasive techniques in colorectal surgery are both safe and effective.^{35–37} As a central component of ERAS protocols, minimally invasive surgery facilitates postoperative recovery. These benefits must be weighed against the potential for conversion to an open operation which has been linked to worse outcomes related to ileus, infectious complications, and oncologic resection.³⁸ Cases with unplanned conversions were evaluated to more clearly identify factors that predict conversion.³⁹ Conversion rates ranged from 7.7% for robotic to 18.2% for laparoscopic operations. Adhesions and the presence of cancer were noted to be common factors associated with conversion for both laparoscopic and robotic approaches. Other preoperative variables were identified and differed based on approach. Moving forward, information from studies such as this may allow for scoring algorithms to be developed which will allow for optimization of operative approach and available intraoperative technologies.

Pain management for the colorectal patient population has also been a focus in multiple studies. We recently evaluated hospital variation in analgesia practices and patient-reported pain.⁴⁰ Fifty-two hospitals were evaluated and stratified based on patient pain scores to identify hospital characteristics, pain management practices, and clinical outcomes associated with higher case-mix-adjusted pain scores. We saw that hospitals with lowest pain scores were larger (503 vs. 452 beds; $p < 0.001$), higher volume (196 vs. 112; $p = 0.005$), and performed more laparoscopy (37.7 vs. 27.2%; $p < 0.001$) than those with highest scores. In addition, patients at these hospitals were more likely to receive multimodal pain control regimens utilizing local anesthesia (31.1 vs. 12.9%; $p < 0.001$), nonsteroidal anti-inflammatory drugs (NSAIDs; 33.5 vs. 14.4%; $p < 0.001$), and patient-controlled analgesia (56.5 vs. 22.8%; $p < 0.001$). Importantly, hospitals with lower pain scores were noted to have less complications (20.3 vs. 26.4%; $p < 0.001$), emergency department visits (8.2 vs. 15.8%; $p < 0.001$), and readmissions (11.3 vs. 16.2%; $p = 0.01$).

These findings are tempered by limited studies suggesting that NSAID use in the postoperative period may be an

independent risk factor for AL.⁴¹ As such, collaborators have studied whether the use of NSAIDs in the immediate postoperative period impacts complication rates. Within MSQC, patients who received NSAIDs on postoperative day 1 did not experience any significant increased risk of AL, SSI, or mortality compared with those that did not receive NSAIDs.⁴²

Postoperative Readmissions

With a focus on value-based purchasing on readmissions, the disproportionately high rate of readmission after colectomy inspired interest in evaluating hospital readmission rates following colectomy in MSQC.⁴³ It is recognized that a variety of factors, including delayed complications, coordination of care, and discharge planning, contribute to readmissions.^{44,45} Among MSQC hospitals, outlier hospitals with highest rates of readmission after colectomy were identified, and compared with best performers, with a focus on differences in complications and process compliance.⁴³ Readmission rates for the best and worst performing hospitals were found to be 5.1 and 10.3%, respectively. Although the variation between these hospitals was significant, complications did not explain this difference, as hospitals with similar readmission rates differed significantly with regard to complications. As such, future work will likely require additional care processes to be measured to make valid conclusions about variation in readmissions.

Reliability of Findings

Hospital Risk-Adjusted Rates and Composite Measures

One of the primary challenges of outcome measurement is to establish reliability in the face of small sample size and low-incidence events. Recognizing these limitations, many have cautioned against the use of risk-adjusted morbidity to compare hospital performance in these settings.⁴⁶ At the hospital level, novel composite measures may thus be more effective approaches for measuring hospitals' quality of care. This approach combines multiple quality indicators for a single operation to reduce statistical noise and improve reliability.⁴⁷ In addition, composite measures allow for increased statistical power and thus better predictions of future hospital performance. With the effectiveness of composite measures inversely proportional to the degree of capture within a registry, this method of reliability adjustment has proven to be very useful in settings when all cases are not captured and will likely be implemented by the MSQC in future initiatives.

Surgeon Reliability Adjustment

Public reporting is increasingly used by public and private payers as a tool to measure performance, inform the public, and improve autonomy for patients. Although these programs are initiated with good intentions, unintended consequences must be recognized. The problems just described with hospital-adjusted rates are only magnified at the level of the individual surgeon. Conventional performance measures are at high risk of reporting unreliable data. Shih et al

evaluated over 300 surgeons in the MSQC registry to determine how reliable risk adjustment was at the surgeon level.⁴⁸ Using hierarchical regression modeling techniques, surgeon-specific risk-adjusted complication rates were calculated and subsequently adjusted for reliability. On initial evaluation, risk-adjusted complication rates revealed a considerable degree of variation (0–55%). Following reliability adjustment, the range in variation decreased to 21.4 to 25.6%. Of the nearly 350 surgeons evaluated, only 1 had enough cases included in the registry to achieve high reliability, as more than 50 cases per year were required to reach a reliability index greater than 70%. Given these findings, further work must be done to ensure that individual surgeon performance is evaluated appropriately.

Summary

In conclusion, the MSQC has been able to show that regionalized collaborative efforts can accelerate QI and save costs. Although the Michigan experience is unique in having a dominant third-party payer which can simplify some of the organization and financial challenges associated with multicenter collaboratives, the concepts that have been established within the MSQC provide a blueprint by which others can achieve a safer health care system.

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