# Michigan Spine Surgery Improvement Collaborative

https://mssic.org/

The Michigan Spine Surgery Improvement Collaborative (MSSIC) is a statewide quality improvement collaborative involving orthopedic surgeons and neurosurgeons with the aim of improving the quality of care of spine surgery. The objective of this collaborative is to heighten patient care outcomes while consequently increasing the efficiency of treatment.

The Michigan Spine Surgery Improvement Collaborative (MSSIC) is a prospective, longitudinal, multicenter, quality-improvement collaborative.

Michigan Spine Surgery Improvement Collaborative (MSSIC) prospectively collects data on all patients undergoing operations for degenerative and/or deformity indications.

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In 2013, Blue Cross Blue Shield of Michigan (BCBSM) and Blue Care Network (BCN) established the Michigan Spine Surgery Improvement Collaborative (MSSIC) as a Collaborative Quality Initiative (CQI). MSSIC is one of the newest of 21 other CQIs that have significantly improved and continue to improve the quality of patient care throughout the state of Michigan. METHODS MSSIC focuses on lumbar and cervical spine surgery, specifically indications such as stenosis, disk herniation, and degenerative disease. Surgery for tumors, traumatic fractures, deformity, scoliosis, and acute spinal cord injury are currently not within the scope of MSSIC. Starting in 2014, MSSIC consisted of 7 hospitals and in 2015 included another 15 hospitals, for a total of 22 hospitals statewide. A standardized data set is obtained by data abstractors, who are funded by BCBSM/BCN. Variables of interest include indications for surgery, baseline patient-reported outcome measures, and medical history. These are obtained within 30 days of surgery. Outcome instruments used include the EQ-5D general health state score (0 being worst and 100 being the best health one can imagine) and EQ-5D-3 L. For patients undergoing lumbar surgery, a 0 to 10 numeric rating scale for leg and back pain and the Oswestry Disability Index for back pain are collected. For patients undergoing cervical surgery, a 0 to 10 numeric rating scale for arm and neck pain, Neck Disability Index, and the modified Japanese Orthopaedic Association score are collected. Surgical details, postoperative hospital course, and patient-reported outcome measures are collected at 90-day, 1-year, and 2-year intervals. RESULTS As of July 1, 2015, a total of 6397 cases have been entered into the registry. This number reflects 4824 eligible cases with confirmed surgery dates. Of these 4824 eligible cases, 3338 cases went beyond the 120-day window and were considered eligible for the extraction of surgical details, 90-day outcomes, and adverse events. Among these 3338 patients, there are a total of 2469 lumbar cases, 862 cervical cases, and 7 combined procedures that were entered into the registry.

In addition to functioning as a registry, MSSIC is also meant to be a platform for quality improvement with the potential for future initiatives and best practices to be implemented statewide in order to improve quality and lower costs. With its current rate of recruitment and expansion, MSSIC will provide a robust platform as a regional prospective registry. Its unique funding model, which is supported by BCBSM/BCN, will help ensure its longevity and viability, as has been observed in other CQIs that have been active for several years [1].

Macki et al. aimed to identify which factors are significantly associated with return-to-work after lumbar surgery at long-term follow-up.

Summary of background data: Prior publications have created a clinically relevant predictive model for return-to-work, wherein education, gender, race, comorbidities, and preoperative symptoms increased the likelihood of return-to-work at 3 months after lumbar surgery. They sought to determine if these trends 1) persisted at 1 year and 2 years postoperatively, or 2) differed among preoperatively employed versus unemployed patients.

MSSIC was queried for all patients undergoing lumbar operations (2014-2019). All patients intended to return to work postoperatively. Patients were followed for up to 2 years postoperatively. Measures of association were calculated with multivariable generalized estimating equations (GEE).

Return-to-work increased from 63% (3542/5591) at 90 days postoperatively to 75% (3143/4147) at 1 year and 74% (2133/2866) at 2 years postoperatively. Following GEE, neither clinical nor surgical variables predicted return-to-work at all three-time intervals: 90 days, 1 year, and 2 years postoperatively. Only socioeconomic factors reached statistical significance at all follow-up points. Preoperative employment followed by insurance status had the greatest associations with return-to-work. In a sub-analysis of patients who were preoperatively employed, insurance was the only factor with significant associations with return-to-work at all three follow-up intervals. The return-to-work rates among unemployed patients at baseline increased from 29% (455/1100) at 90 days, 44% (495/608) at 1 year, and 46% (366/426) at 2 years postoperatively. The only two significant factors associated with return-to-work at all three follow-up intervals were Medicaid, as compared to private insurance, and male gender.

In patients inquiring about long-term return-to-work after lumbar surgery, health insurance status represents the important determinant of employment status.Level of Evidence: 2 [2].

While a complex myriad of socio-economic factors interplay between race and surgical success, they identified modifiable risk factors, specifically depression, that may improve patient-reported outcomes (PROs) among African American patients after elective lumbar spine surgery [3].

Correction of sagittal balance is associated with greater odds of discharge to home. These findings, coupled with the recognized implications of admission to a rehabilitation facility, will emphasize the importance of spine surgeons accounting for the sagittal vertical axis (SVA) in their surgical planning of MIS lumbar interbody fusions [4]

Using MSSIC, Zakaria et al. sought to identify the relationship between a positive Patient Health Questionnaire-2 (PHQ-2) screening, which is predictive of depression, and patient satisfaction, return to work, and achieving Oswestry Disability Index (ODI) minimal clinically important difference (MCID) scores up to 2 years after lumbar fusion.

Data from a total of 8585 lumbar fusion patients were analyzed. Patient satisfaction was measured by the North American Spine Society patient satisfaction index. A positive PHQ-2 score is one that is ≥ 3, which has an 82.9% sensitivity and 90.0% specificity in detecting major depressive disorder. Generalized estimating equation models were constructed; variables tested include age, sex, race, past medical history, severity of surgery, and preoperative opioid usage.

Multivariate analysis was performed. Patients with a positive PHQ-2 score (i.e., ≥ 3) were less likely to be satisfied after lumbar fusion at 90 days (relative risk [RR] 0.93, $p < 0.001$), 1 year (RR 0.92, $p = 0.001$), and 2 years (RR 0.92, $p = 0.028$). A positive PHQ-2 score was also associated with decreased likelihood of returning to work at 90 days (RR 0.76, $p < 0.001$), 1 year (RR 0.85, $p = 0.001$), and 2 years (RR 0.82, $p = 0.031$). A positive PHQ-2 score was predictive of failure to achieve an ODI MCID at 90 days (RR 1.07, $p = 0.005$) but not at 1 year or 2 years after lumbar fusion.

A multivariate analysis based on information from a large, multicenter, prospective database on lumbar fusion patients was performed. The authors found that a positive score (≥ 3) on the PHQ-2, which is a simple and accurate screening tool for depression, predicts an inability to return to work and worse satisfaction up to 2 years after lumbar fusion. Depression is a treatable condition, and so in the same way that patients are medically optimized before surgery to decrease postoperative morbidity, perhaps patients should have preoperative psychiatric optimization to improve postoperative functional outcomes [5].

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Ninety-day readmission occurred in 9.0% of patients, mainly for pain, wound infection, and radicular symptoms. Increased focus on postoperative pain may decrease readmissions. Among factors impacting the likelihood of 90-d readmission, early postoperative ambulation may be most easily modifiable. Optimization of preexisting medical conditions could also potentially decrease readmission risk [6].

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Multivariate analysis identified the common adverse events after cervical spine surgery, along with their associated risk factors. They found that early mobilization after cervical spine surgery has the potential to significantly decrease adverse events [7].

1)

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