

# Using NSQIP and TSQC to Sustain Improved Surgical Outcomes

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*Tennessee Surgical Quality Collaborative and the Tennessee Hospital Association*

## BACKGROUND

The Tennessee Chapter of the American College of Surgeons led the formation of a 10-hospital collaborative between the Tennessee Chapter of the ACS, the Tennessee Hospital Association and the BlueCross Blue Shield of Tennessee Health Foundation for the purpose of sharing surgical process and outcome data using the National Surgical Quality Improvement Program (NSQIP) system. Using this approach we have shown that surgical outcomes have improved [1]. The TSQC is newly expanded by 11 hospitals as shown in the map below to 21 hospitals across the state of Tennessee.

## MATERIALS AND METHODS

The Tennessee Surgical Quality Collaborative employed an interrupted time-series study to examine the trends in surgical outcomes among the ten-hospital group during two phases: January 2009 through December 2009 (period 1), January 2010 through December 2010 (period 2) and January 2011 through September 2011 (period 3). We utilized several outcome measurements. The primary outcome was post-operative complications. A secondary outcome was 30-day mortality. Since our first analysis the vendor for datasets from NSQIP has changed and new fields have been added. The new fields include a field indicating whether the postoperative occurrence was present at the time of surgery (PATOS). In this new analysis this PATOS correction was incorporated for all postoperative occurrences.

At the time of data collection the Tennessee Surgical Quality Collaborative consisted of 10 member hospitals: Erlanger Hospital (Chattanooga, TN), Vanderbilt University Hospital (Nashville, TN), Saint Francis Hospital (Memphis, TN), Baptist Memorial Hospital (Memphis, TN), Cookeville Regional Medical Center (Cookeville, TN), Jackson Madison County General Hospital (Jackson, TN), Johnson City Medical Center (Johnson City, TN), Methodist University Hospital (Memphis, TN), Parkwest Medical Center (Knoxville, TN), and the University of Tennessee Medical Center (Knoxville, TN). These ten institutions perform approximately 25% of the entire general and vascular surgical interventions performed annually within the state.[2] Utilizing the infrastructure of the ACS NSQIP and data use agreements among the participating parties, the Tennessee Hospital Association serves as the coordinator for the collaborative and has confidential access to the TSQC performance data. Although the collaborative was chartered in 2007, the initial 18-month period was utilized to finalize grant funding, identify the ten participating hospitals and establish the appropriate personnel (RN abstractor, surgeon champion, CEO) within each system. Appropriate data collection amongst the entire collaborative began, in earnest, in January of 2009.

The primary outcome of post-operative complication is defined as the 17 post-operative occurrences by the NSQIP: acute renal failure, cardiac arrest requiring cardiopulmonary resuscitation (CPR), deep incisional skin and soft tissue infection (SSI), deep venous thrombosis (DVT)/thrombophlebitis, myocardial infarction, post-operative ventilatory support greater than 48 hours, pneumonia, pulmonary embolism, progressive renal insufficiency, stroke/cerebrovascular accident(CVA), superficial incisional skin and soft tissue infection (SSI), sepsis, unplanned intubation, urinary tract incision (UTI), wound disruption, organ/deep space SSI and septic shock. 30-day mortality was considered as a secondary outcome. All completed cases were included in the analysis. Collaborative-wide aggregate postoperative rate improvement significance was identified using the Z-test.

## RESULTS

Significant improvements occurred in: 1) acute renal failure, 2) on ventilator > 48 hours, 3) superficial incisional surgical site infections and 4) wound disruptions (see table; improvements shown in **blue** and worsening shown in **red**) in 2010 over 2009. Significant improvements occurred in: 1) deep incisional surgical site infections, 2) on ventilator > 48 hours, 3) superficial incisional surgical site infections, 4) wound disruption, 5) total postoperative occurrences and 6) mortality in 2011 over 2009 (table 1). Improvement was sustained over the 2010-2011 period in: 1) on ventilator > 48 hours, 2) superficial incisional surgical site infections and 3) wound disruption (table 1).

Table. Postoperative Occurrences per 10,000 Procedures

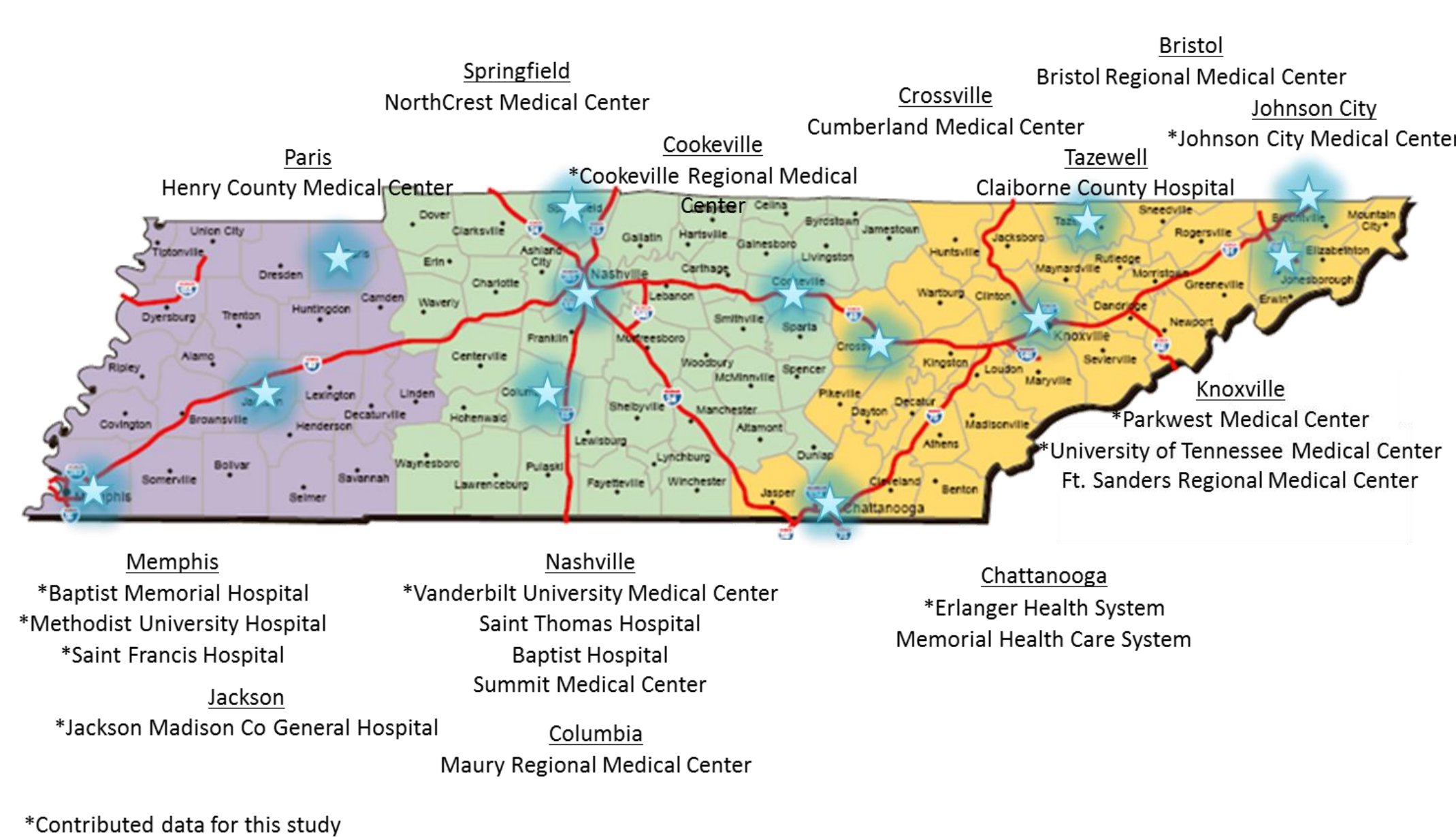
Postoperative Occurrence	2009	2010	2009 to 2010 Percent Change	Pr (Z<z)	Through 3rd Quarter 2011	2011 to 2009 Percent Change	Pr (Z<z)
ACUTE RENAL FAILURE	79.9	56.3	-29.6%	0.0074	64.2	-19.7%	NS
DEEP INCISIONAL SSI	79.2	75.0	-5.3%	NS	50.2	-36.6%	0.0015
DVT/THROMBOPHLEBITIS	69.6	89.1	28.0%	0.0326	96.0	37.9%	0.0083
ON VENTILATOR > 48 HOURS	290.2	241.7	-16.7%	0.0055	195.6	-32.6%	0.0000
ORGAN/SPACE SSI	145.1	170.8	17.7%	0.0129	127.0	-12.5%	NS
PNEUMONIA	224.3	264.5	17.9%	0.0143	215.6	-3.9%	NS
SUPERFICIAL INCISIONAL SSI	340.5	275.9	-19.0%	0.0008	270.2	-20.6%	0.0004
URINARY TRACT INFECTION	159.1	193.5	21.6%	0.0141	146.9	-7.7%	NS
WOUND DISRUPTION	77.0	59.6	-22.6%	0.0373	42.1	-45.3%	0.0001
Total Postoperative Occurrences	2190.2	2142.2	-2.2%	NS	1872.9	-14.5%	0.0000
Mortality	256.1	237.1	-7.4%	NS	211.1	-17.6%	0.0072

CARDIAC ARREST REQUIRING CPR, MYOCARDIAL INFARCTION, PROGRESSIVE RENAL INSUFFICIENCY, PULMONARY EMBOLISM, SEPSIS, SEPTIC SHOCK, STROKE/CVA and UNPLANNED INTUBATION showed no significant change across the three time periods.

## CONCLUSIONS

- 1) The approach we chose led to improvement in outcomes.
- 2) Three of the four improvements occurring in 2010 compared to 2009 have continued through the first three quarters of 2011.
- 3) Other improvements have been made in 2011 compared to 2009 in addition to those made in 2010 compared to 2009, including improvements in deep incisional surgical site infections, total postoperative occurrences and mortality.

## TSQC Member Hospitals



## PURPOSE AND HYPOTHESIS

We hypothesize that our initial approach described above will continue to sustain and improve surgical outcomes.



## BIBLIOGRAPHY

[1] Oscar D. Guillamondegui, Oliver L. Gunter, Leonard Hines, Barbara J. Martin, William Gibson, P. Chris Clarke, William T. Cecil, Joseph B. Cofer. Using the National Surgical Quality Improvement Program and the Tennessee Surgical Quality Collaborative to Improve Surgical Outcomes. Journal of the American College of Surgeons - April 2012 (Vol. 214, Issue 4, Pages 709-714, DOI: 10.1016/j.jamcollsurg.2011.12.012).

[2] Tennessee Hospital Association Health Information Network 2010.