Reducing Surgical Site Infection by Hospital-Specific Feedback to Improve Practice in the Multicenter Vascular Quality Initiative

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Vascular Quality Initiative:
VQI is a national quality improvement network of 320 centers in 46 states organized as a Patient Safety Organization. Data are recorded for major vascular procedures using national registries.

18 Regional Quality Groups across the U.S.
Regional Groups hold semi-annual meetings of physicians, nurses, researchers, and administration to discuss regional variations in patient selection, procedure selection, and outcomes, in order to develop regional quality improvement projects.

Improvement Opportunity:
Surgical site infection (SSI) after lower extremity bypass operations are a major cause of morbidity following these limb-sparing procedures. We found substantial variation in SSI rate (0% to 32%) after 7,908 operations performed in 101 VQI centers from 2003 to 2012.

Objectives:
To identify factors associated with surgical site infection and communicate specific opportunities to VQI centers that could change practice and reduce surgical site infection rates.

Methods:
Multivariable logistic regression was used to identify modifiable processes of care associated with SSI. A Center Opportunity Profile for Improvement (COPI) report was sent to each center in December, 2012 indicating specific opportunities to reduce SSI based on identified risk factors. SSI rate was compared in 2012 vs. 2013 among 41 centers with at least 10 procedures per year.

Results:
Independent modifiable SSI predictors were:
Operative Transfusion >2 units PRBC (OR 3.3)
Procedure Time >220 minutes (OR 2.1)
Chlorhexidine Skin Prep (OR 0.53, Protective)

Center Opportunity Profile for Improvement Report
Each center was sent a COPI report in Dec, 2012 showing their SSI rate and their profile of these modifiable risk factors, highlighting opportunity for improvement. The example below shows a center with higher than expected SSI rate, and highlights the opportunity to increase chlorhexidine skin prep and reduce operative transfusions.

Practice Change Based on COPI Reports
In 2013, after the COPI reports, operative transfusion rates and procedure time did not change across VQI centers. However, chlorhexidine skin prep, which is more easily modified, increased from 61% to 81% among 5,342 procedures performed in 101 centers.

Improved Outcomes in Centers that Changed Practice
After COPI reports were received, 12 of 16 centers with low chlorhexidine usage substantially increased chlorhexidine use from 2012 to 2013 (from 24% to 95% of procedures). Among these centers, SSI rate decreased significantly, while it did not change in other centers, as shown below:

Conclusion
The Vascular Quality Initiative generated new knowledge that operative skin prep could reduce surgical site infection. When distributed to sites in an actionable COPI report, this stimulated rapid practice change in 75% of centers with low chlorhexidine usage, which resulted in reduced surgical site infection rates in these centers. COPI reports appear to be an effective method to translate registry data into practice change within a national quality initiative.
The Society for Vascular Surgery Vascular Quality Initiative: Regional Groups Organized to Improve Vascular Health Care

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Background:
VQI was launched by the Society for Vascular Surgery in 2001 to improve the quality, safety, effectiveness and cost of vascular health care, by collecting and exchanging information in a national registry. The intent was to create a distributed network of regional groups patterned after the New England group (VSGNE) that had met semi-annually since 2003. This group had developed a successful registry and used regional variation in processes of care and outcomes as the basis for quality improvement projects.

Methods:
The SVS Patient Safety Organization was formed to house this GI project. A web-based system was developed for data entry and reporting, including one-year follow-up for carotid, aortic, and peripheral vascular procedures. Claims-based data auditing was initiated to insure consecutive procedure entry. The program was presented to hospitals by vascular surgeon leaders. A federation structure was developed with representation from each regional group. The benefits of regional ownership of GI projects was championed. Anonymous comparison data about processes of care and outcome were reported to centers and physicians. Multivariable analyses were done to identify processes of care leading to better outcomes, and specific improvement opportunity reports were prepared for each center.

Results:
The number of participating centers in VQI has increased to 291 sites over the past 4 years as the value of the program became apparent.

704 VQI Centers in 45 states and Ontario

18 Regional Quality Groups across the U.S.
Each holds semi-annual meeting of physicians, nurses, researchers, and administration to discuss regional variation in patient selection, procedure selection, and outcomes, in order to develop regional quality improvement projects.

Hospital and Physician Participant Types
Membership is evenly representative of academic medical centers, teaching affiliates and community hospitals. While vascular surgeons predominate, all specialties caring for vascular disease participate.

Case Study: Reducing Re-Operation for Bleeding after Carotid Endarterectomy
A Quality Improvement Project of the Vascular Study Group of New England (VSGNE)

Background:
Carotid endarterectomy (CEA) is the most frequent vascular operation done to prevent stroke. During the procedure, heparin anticoagulation is used to prevent clotting. There was debate among surgeons about whether to reverse the anticoagulation with protamine at the end of the procedure. Proponents wished to avoid bleeding after surgery while opponents feared thrombotic complications such as stroke or heart attack.

Analysis:
VSGNE analyzed 4587 carotid endarterectomy procedures and found that protamine use varied by surgeon, not patient, with 46% of CEAs during 2003-2010 receiving protamine. Reoperation for bleeding after CEA were presented at the regional group meeting, sent to centers and published. Protamine usage rates and re-operation rates were then monitored over time.

Results: that protamine reduced re-operation for bleeding after CEA were presented at the regional group meeting, sent to centers and published.

Outcome: Increased Protamine Usage
Protamine use increased from 43% to 52% in 2008 when many new centers joined VSGNE. It then increased to 62% coincident with the presentation of the results to VSGNE centers, as shown below (P<.01).

Action Taken:
Results that protamine reduced re-operation for bleeding after CEA were presented at the regional group meeting, sent to centers and published.

Outcome: Reduced re-operation for Bleeding
Coincident with increased regional use of protamine, re-operation for bleeding decreased from 1.2% to 0.7% as show below (P<.01).

Root Cause Analysis:
Investigation at the surgeon level revealed that increased protamine use across the region was related to practice change by 14 surgeons who increase their protamine use from rare to routine. They indicated that they changed practice because of confidence in the quality of the regional registry in which they felt ownership.

Conclusion:
The Vascular Quality Initiative has successfully combined a national registry to leverage the power of a large uniform registry with a distributed network of regional quality improvement groups that create local ownership of the improvement projects. This process is organized as an AHRQ-listed Patient Safety Organization and is funded by fees from participating centers. It has provided multiple opportunities for regional and national quality improvement. Importantly, it has demonstrated the ability to change practice patterns and improve outcomes much more rapidly than the traditional dissemination of published results.

Center Opportunity Profile for Improvement
Multivariable analyses identify patient, process and outcome variables that are associated with desired outcomes, such as reduced length of stay after carotid endarterectomy. Each site then receives a COPR report to identify their specific improvement opportunities and how they compare to others.

VQI Participation Improves Outcome
VQI data has shown that prescribing anti-platelet and statin medication after major vascular procedures improves patient survival by 24%. VQI centers receive feedback and are more likely to prescribe these medications with longer participation.

Patients on Antiplatelet and Statin Pre-op and Discharge

The Vascular Quality Initiative has successfully combined a national registry to leverage the power of a large uniform registry with a distributed network of regional quality improvement groups that create local ownership of the improvement projects. This process is organized as an AHRQ-listed Patient Safety Organization and is funded by fees from participating centers. It has provided multiple opportunities for regional and national quality improvement. Importantly, it has demonstrated the ability to change practice patterns and improve outcomes much more rapidly than the traditional dissemination of published results.