the NMSC lesions developing in patients exposed to Agent Orange do not regress any differently than the lesions developing in patients who were not exposed.

Naveed Nosrati, MD
Jane Han, BS
Roberto Flores, MD
Rajiv Sood, MD
Sunil S. Tholpady, MD, PhD

Author Affiliations: Division of Plastic Surgery, Department of Surgery, Indiana University, Indianapolis (Nosrati, Han, Flores, Sood, Tholpady); Richard L. Roudebush VA Medical Center, Indianapolis, Indiana (Tholpady).

Corresponding Author: Sunil S. Tholpady, MD, PhD, Division of Plastic Surgery, Department of Surgery, Indiana University, and Richard L. Roudebush VA Medical Center, 705 Riley Hospital Dr, RI 2514, Indianapolis, IN 46202 (stholpad@iupui.edu).


Author Contributions: Drs Nosrati and Tholpady had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. Dr Nosrati and Ms Han contributed equally and would like to be considered as co-first authors.

Study concept and design: All authors.

Acquisition, analysis, or interpretation of data: Nosrati, Han, Tholpady.

Drafting of the manuscript: Nosrati, Han, Tholpady.

Critical revision of the manuscript for important intellectual content: All authors.

Statistical analysis: Nosrati, Tholpady.

Administrative, technical, or material support: Nosrati, Flores.

Study supervision: Nosrati, Flores, Sood, Tholpady.

Conflict of Interest Disclosures: None reported.

Previous Presentation: This paper was presented at the Annual Meeting of the Association of VA Surgeons; April 7, 2014; New Haven, Connecticut.


ASSOCIATION OF VA SURGEONS

Using a Composite Readmission Measure to Assess Surgical Quality in the Veterans Health Administration: How Well Does It Correlate With Established Surgical Measures?

Preventing readmissions is a top priority in the current health care landscape. Although medical conditions have been the focus of these efforts, the Centers for Medicare and Medicaid Services recently added 30-day all-cause readmissions after total hip/knee replacement to their 2014 public reporting and pay-for-performance programs. Compared with medical conditions, readmissions after surgery have been poorly studied. Furthermore, whether they truly reflect hospital surgical quality is not clear. To address this gap, we developed a hospital-level readmission composite measure that included 7 major surgical procedures frequently performed in Veterans Affairs (VA) hospitals and assessed how well it correlated with other well-established surgical quality metrics.

Methods | We used 2009 administrative data to identify index surgical procedures for total hip/knee replacement, colectomy, lung resection, ventral hernia repair, radical prostatectomy, and thyroidectomy and associated unplanned 30-day readmissions using the Centers for Medicare and Medicaid Services hospital-wide, all-condition 30-day readmission algorithm. We followed a recently published method to calculate surgical volume (sum of procedure-specific volumes) and a risk-adjusted composite readmission rate (average of procedure-specific risk-adjusted readmission rates weighted by procedure-specific volume) for VA hospitals that performed at least 5 index surgical procedures in 2009. For each of the 67 VA hospitals with advance surgical programs, we examined the correlation between the composite readmission rate and the VA Surgical Quality Improvement Program (VASQIP) mortality and morbidity observed to expected ratios and the Surgical Care Improvement Program compliance scores from the 2010 VA Facility Quality and Safety Report generated based on data collected in 2009 (first as continuous variables and then by grouping each measure into quartiles).

Results | Of the 13 282 index surgical procedures assessed, 982 (7.4%) were associated with a 30-day readmission. Readmission rates varied by type of surgery, ranging from 5.1% for thyroidectomy to 12.8% for colectomy. The mean (SD) hospital-level composite readmission rate was 7.3% (4.0%) (Table 1). Hospitals’ readmission rates were significantly, albeit weakly, correlated with hospitals’ VASQIP morbidity observed to expected ratios ($r = 0.31, P = .01$); they were not significantly associated with any of the other measures (Table 2).

Discussion | Use of readmission measures to assess surgical quality may capture other quality problems missed by other commonly used surgical metrics. Our findings that hospital-level readmission rates were not strongly correlated with standard surgical quality metrics are consistent with a recent study demonstrating that half of all surgical readmissions were not associated with a complication currently assessed by the VASQIP (eg, readmissions due to ileus or dehydration after colectomy). Although the units of analysis differed (hospital vs patient), both studies suggest that readmissions may represent an additional dimension of surgical quality compared with other measures, such as care related to preoperative preparation, discharge planning, management of medical comorbidities, or access to care. Given that hospitals may soon be penalized based on excess rates of surgical readmissions, health care professionals should think beyond the traditional surgical quality metrics (eg, by expanding the definition of postoperative complications to include procedure-specific events and by improving processes of care in discharge planning to reduce readmissions after surgery).

From a quality-measurement perspective, our findings suggest that the quality of surgical care at a hospital can be...
measured differently by various metrics. The lack of correlation between measures may result in confusion as to what the hospital’s true quality really is. To address this concern, Feinstein\(^6\) suggested combining uncorrelated dimensions into a composite measure. Future studies should explore the development of a single composite score that encompasses multiple dimensions of surgical quality in order to provide patients, health care professionals, and policy makers with actionable information on hospital performance.

Qi Chen, MD, PhD
Thomas C. Tsai, MD, MPH
Hillary J. Mull, PhD, MPP
Amy K. Rosen, PhD
Kamal M. F. Itani, MD

Author Affiliations: Center for Healthcare Organization and Implementation Research, VA Boston Healthcare System, Boston, Massachusetts (Chen, Mull, Rosen); Department of Health Policy and Management, Harvard School of Public Health, Boston, Massachusetts (Tsai); Department of Surgery, Brigham and Women’s Hospital, Boston, Massachusetts (Tsai); Department of Surgery, Boston University School of Medicine, Boston, Massachusetts (Mull, Rosen, Itani); Department of Surgery, VA Boston Healthcare System, Boston, Massachusetts (Itani); Harvard Medical School, Boston, Massachusetts (Itani).

Corresponding Author: Qi Chen, MD, PhD, Center for Healthcare Organization and Implementation Research, VA Boston Healthcare System, 150 S Huntington Ave, Boston, MA 02130 (qi.chen2@va.gov).


Author Contributions: Dr Chen had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. Study concept and design: Chen, Mull, Rosen, Itani. Acquisition, analysis, or interpretation of data: Chen, Tsai, Mull. Drafting of the manuscript: Chen, Rosen, Itani. Critical revision of the manuscript for important intellectual content: All authors. Statistical analysis: Chen, Tsai. Obtained funding: Rosen. Administrative, technical, or material support: Chen, Mull. Study supervision: Rosen, Itani.

Conflict of Interest Disclosures: None reported.

Funding/Support: This research was funded by the VA Health Services Research and Development Service grant IIR 09-369-1 (Dr Rosen, principal investigator).

Role of the Funder/Sponsor: The VA Health Services Research and Development Service had no role in the design and conduct of the study; collection, management, analysis, or interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

Previous Presentation: The paper was presented at the 38th Annual Surgical Symposium of the Association of VA Surgeons; April 6, 2014; New Haven, Connecticut.


Table 1. VA Fiscal Year 2009 National and Hospital-Level Procedure-Specific and Composite Readmission Rates*  

<table>
<thead>
<tr>
<th>Measure</th>
<th>Colecotomy</th>
<th>Ventral Hernia Repair</th>
<th>Total Hip Replacement</th>
<th>Total Knee Replacement</th>
<th>Radical Prostatectomy</th>
<th>Lung Resection</th>
<th>Thyroid Surgery</th>
<th>Composite Readmission Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of VA hospitals that performed ≥5 index surgical procedures</td>
<td>97</td>
<td>78</td>
<td>85</td>
<td>92</td>
<td>61</td>
<td>55</td>
<td>52</td>
<td>104</td>
</tr>
<tr>
<td>VA nationwide No. of index surgical procedures</td>
<td>1962</td>
<td>1127</td>
<td>1906</td>
<td>6094</td>
<td>958</td>
<td>603</td>
<td>632</td>
<td>13 282</td>
</tr>
<tr>
<td>VA nationwide No. of readmissions</td>
<td>247</td>
<td>115</td>
<td>118</td>
<td>349</td>
<td>50</td>
<td>71</td>
<td>32</td>
<td>982</td>
</tr>
<tr>
<td>VA national observed readmission rate, %</td>
<td>12.6</td>
<td>10.2</td>
<td>6.2</td>
<td>5.7</td>
<td>5.2</td>
<td>11.8</td>
<td>5.1</td>
<td>7.4</td>
</tr>
<tr>
<td>Hospital risk-adjusted readmission rate, %</td>
<td>Mean (SD)</td>
<td>11.9 (8.3)</td>
<td>10.4 (9.4)</td>
<td>5.8 (7.4)</td>
<td>5.8 (3.9)</td>
<td>4.7 (6.0)</td>
<td>10.4 (10.3)</td>
<td>6.3 (8.5)</td>
</tr>
<tr>
<td>Median (range)</td>
<td>12.4 (0.0-39.0)</td>
<td>90 (0.0-36.6)</td>
<td>4.6 (0.0-40.5)</td>
<td>5.3 (0.0-16.1)</td>
<td>3.5 (0.0-25.6)</td>
<td>10.2 (0.0-29.2)</td>
<td>0.0 (0.0-23.0)</td>
<td>6.9 (0.0-23.0)</td>
</tr>
</tbody>
</table>

Abbreviation: VA, Veterans Affairs.

* The International Classification of Diseases, Ninth Revision, Clinical Modification codes for the index surgical procedures are as follows: 1731-36, 1739, 4503, 4526, 4572-76, and 4581-83 for colectomy; 5351, 5359, 5361-63, and 5369 for ventral hernia repair; 8151 for total hip replacement; 8154 for total knee replacement; 603, 604, 605, and 6062 for radical prostatectomy; 3241, 3249, 3230, and 3239 for lung resection; and O62, O64, and O650-52 for thyroid surgery.

Table 2. Correlations Between Hospitals’ Risk-Adjusted Composite Readmission Rates and 67 Other Established Hospital-Level Surgical Quality Measures  

<table>
<thead>
<tr>
<th>Surgical Quality Measure</th>
<th>Pearson r Value</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>As continuous variable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surgical volume</td>
<td>−0.062</td>
<td>.62</td>
</tr>
<tr>
<td>SCIP compliance score</td>
<td>0.015</td>
<td>.91</td>
</tr>
<tr>
<td>VASQIP observed to expected ratio</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mortality</td>
<td>0.2</td>
<td>.11</td>
</tr>
<tr>
<td>Morbidity</td>
<td>0.31</td>
<td>.01</td>
</tr>
<tr>
<td>Grouped in quartiles</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surgical volume</td>
<td>−0.058</td>
<td>.64</td>
</tr>
<tr>
<td>SCIP compliance score</td>
<td>0.035</td>
<td>.78</td>
</tr>
<tr>
<td>VASQIP observed to expected ratio</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mortality</td>
<td>0.22</td>
<td>.08</td>
</tr>
<tr>
<td>Morbidity</td>
<td>0.28</td>
<td>.02</td>
</tr>
</tbody>
</table>

Abbreviations: SCIP, Surgical Care Improvement Program; VASQIP, Veterans Affairs Surgical Quality Improvement Program.