EVALUATING PATIENT SAFETY INDICATORS IN ORTHOPEDIC SURGERY BETWEEN ITALY AND USA

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Taormina, October 30th, 2015
Outline

- Quality Measurement
- Methods
- Results
- Limitations
- Conclusions
- Implications
Quality Measurement

• Essential element of a public health system is quality assurance and close monitoring of patient outcomes
  ◦ Mortality
  ◦ Complications
  ◦ Readmissions
  ◦ Satisfaction

• Adverse event is an unwanted outcome caused by medical care
  ◦ The risk of many adverse events can be reduced by altered steps, but not necessarily eliminate
Adverse Events on Patient Outcomes

Using Patient Safety Indicators to Estimate the Impact of Potential Adverse Events on Outcomes
Peter E. Rivard, Stephen L. Luther, Cindy L. Christiansen, Shibeii Zhao, Susan Loveland, Anne Elixhauser, Patrick S. Romano and Amy K. Rosen

The Impact of Medical Errors on Ninety-Day Costs and Outcomes: An Examination of Surgical Patients
William E. Encinosa and Fred J. Hellinger
Outcomes Evaluation in Italy

- National Agency for Regional Healthcare Services (AGENAS)
  
  *National Outcomes Project (PNE)*
  
  → Annual results for a wide range of outcomes indicators by hospital/Local Health Authority/province
  
  → Directly available to policy makers and health professionals

- Scuola Superiore Sant'Anna, Management and Healthcare Lab (MeS Lab)

  *Evaluation of Regional Healthcare Systems (Network of Regions)*
  
  → Performance evaluation system of Tuscany
  
  → Performance evaluation system of Network of 12 Regions and 2 Autonomous Provinces
AHRQ Patient Safety Indicators (PSIs)

- Set of indicators to identify potential complications or adverse events
  - Each indicator corresponds to specific & common adverse events
- One of AHRQ’s Quality Indicators
  - Developed by Stanford University, UC San Francisco, UC Davis
- Administrative inpatient data
  - ICD-9-CM and DRG
- Each PSI has specific inclusion and exclusion criteria
- SAS programs
Patient Safety Indicators (PSIs)

- PSI 02 Death in Low-mortality DRG
- PSI 03 Pressure Ulcer
- PSI 04 Failure to Rescue
- PSI 05 Foreign Body Left Procedure
- PSI 06 Iatrogenic Pneumothorax
- PSI 07 Central Venous Catheter-related Bloodstream Infections
- PSI 08 Postoperative Hip Fracture
- PSI 09 Postoperative Hemorrhage or Hematoma
- PSI 10 Postoperative Physiologic and Metabolic Derangement
- PSI 11 Postoperative Respiratory Failure
- PSI 12 Postoperative Pulmonary Embolism or Deep Vein Thrombosis
- PSI 13 Postoperative Sepsis
- PSI 14 Postoperative Wound Dehiscence
- PSI 15 Accidental Puncture or Laceration
- PSI 16 Transfusion Reaction
- PSI 17 Birth Trauma-Injury to Neonate
- PSI 18 Obstetric Trauma-Vaginal Delivery with Instrument
- PSI 19 Obstetric Trauma-Vaginal Delivery without Instrument
Risk management at Rizzoli Orthopedic Institute

- Program active since 2007
- Integration to the Quality system
- Systemic approach to safety
- Application of proactive and reactive methods and tools IR, RCA, SEA, FMEA
OUR STUDY

Evaluating Patient Safety Indicators in orthopedic surgery between Italy and the United States.

Dario Tedesco, Tina Hernandez-Boussard, Elisa Carretta, Paola Rucci, Maurizia Rolli, Patrizio Di Denia, Kathryn McDonald, Maria Pia Fantini
Methods

Study Population and data sources
Patients ≥18 years who underwent one of 17 major orthopedic procedures, with an average length of stay ≥1 day, from 2011-2013. One Italian orthopedic hospital and 26 hospitals in Florida with ≥1,000 major orthopedic procedures per year.

US: ARHQ’s HCUP Database, State Inpatient Database (SID), Florida
Italy: IOR’s Hospital Discharge Records database

Statistical Analyses
- Chi-Square test for categorical variables and Wilcoxon rank sum test for continuous variables to compare patient characteristics between countries.
- Wilcoxon rank sum test to compare the length of stay and number of secondary diagnoses between US and Italian patients at risk for each PSI.
- AHRQ’s PSI crude rates used as dependent variables of a set of multivariable logistic models. Independent covariates: demographic characteristics (gender and age), comorbidities (Elixhauser Index), length of stay and mean number of secondary diagnoses.
Methods: Procedures

List of the most frequent orthopedic procedures selected for the study (ICD-9-CM codes)

<table>
<thead>
<tr>
<th>Code</th>
<th>Procedure Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>77.49</td>
<td>Biopsy of bone except facial bones</td>
</tr>
<tr>
<td>77.88</td>
<td>Other partial ostectomy of tarsal and metatarsal bones</td>
</tr>
<tr>
<td>78.65</td>
<td>Removal of implanted devices from femur</td>
</tr>
<tr>
<td>78.67</td>
<td>Removal of implanted devices from tibia and fibula</td>
</tr>
<tr>
<td>79.15</td>
<td>Closed reduction of fracture with internal fixation of femur</td>
</tr>
<tr>
<td>79.31</td>
<td>Open reduction of fracture with internal fixation of humerus</td>
</tr>
<tr>
<td>79.35</td>
<td>Open reduction of fracture with internal fixation of femur</td>
</tr>
<tr>
<td>79.36</td>
<td>Open reduction of fracture with internal fixation of tibia and fibula</td>
</tr>
<tr>
<td>81.05</td>
<td>Dorsal and dorso-lumbar fusion, posterior technique</td>
</tr>
<tr>
<td>81.08</td>
<td>Lumbar and lumbosacral fusion, posterior technique</td>
</tr>
<tr>
<td>81.47</td>
<td>Other repair of knee</td>
</tr>
<tr>
<td>81.51</td>
<td>Total hip replacement</td>
</tr>
<tr>
<td>81.52</td>
<td>Partial hip replacement</td>
</tr>
<tr>
<td>81.54</td>
<td>Total knee replacement</td>
</tr>
<tr>
<td>83.39</td>
<td>Excision of lesion of other soft tissue</td>
</tr>
<tr>
<td>83.63</td>
<td>Rotator cuff repair</td>
</tr>
<tr>
<td>86.22</td>
<td>Excisional debridement of wound, infection, or burn</td>
</tr>
</tbody>
</table>
### Results: Characteristics of the study population, stratified by country from 2011-2013

<table>
<thead>
<tr>
<th>Patient characteristics</th>
<th>Italy</th>
<th>United States</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Discharges</td>
<td>14,393</td>
<td>131,371</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>59.76 ± 18.31</td>
<td>65.45 ± 14.54</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Males</td>
<td>6,420 (44.61%)</td>
<td>54,665 (41.61%)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Mean number of comorbidities</td>
<td>0.43 ± 0.77</td>
<td>2.09 ± 1.61</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Mean number of Secondary diagnoses</td>
<td>1.26 ± 1.64</td>
<td>7.72 ± 5.51</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Mean Length of Stay</td>
<td>7.33 ± 5.99</td>
<td>4.68 ± 6.25</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>
Results

PSI 03 Pressure ulcer rate
PSI 09 Perioperative hemorrhage or hematoma rate
PSI 10 Postoperative physiologic and metabolic derangement rate
PSI 11 Postoperative respiratory failure rate
PSI 12 Perioperative pulmonary embolism or deep vein thrombosis
PSI 13 Postoperative sepsis rate
PSI 15 Accidental puncture or laceration rate.

Odds Ratios and 95% Confidence Intervals from logistic models
Limitations

Performance Measures

How Often are Potential Patient Safety Events Present on Admission?

Robert L. Houchens, Ph.D.
Anne Elshauser, Ph.D.
Patrick S. Romano, M.D., M.P.H.
Limitations

Differences in PSIs ↔ Differences among hospitals?
• Italian data from an orthopedic high-specialized center, and teaching hospital
• US data come from a heterogeneous group of hospitals.

Hospital effect was included in the model as a random intercept and results were unchanged

International comparisons of hospital performance affected by coding bias?

In Italy information on Present-on-admission (POA) diagnoses is not available... This may have resulted in an overestimation of the PSIs.

We excluded POA information also from the US data
Conclusions

- Lower risk of Perioperative Pulmonary Embolism/DVT in Italy
- Lower risk of Pressure Ulcers, Perioperative Hemorrhage/Hematoma, and Postoperative Derangements in the US.
- Lower risk of Postoperative sepsis in Italy, *but not statistically significant*.

- These findings can be related to policies adopted in the two countries focused on Patient Safety.

- Further steps: Other studies aimed at considering better the different case-mix and coding practices, extending analyses to other regions in Italy and the US, and considering other clinical and organizational factors that may influence patient safety outcomes.
Implications

- Safety evaluation and assessment
- Safety improvement
- Provider benchmarking
- International comparison
"That wisdom tooth on the right side was giving me a tough time, so I had to get at it from a different angle."

Thank you!

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