Improving Population Health through Interprofessional Leadership: The Case for a Professional Practice Model
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Learner Objectives and Disclosures

• The learner will be able to describe:
  – How a professional practice model supports an interprofessional and role based leadership approach to improving outcomes.
  – How population health data can help explain variation in nurse sensitive indicators.

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PPM Premise:

A professional practice model (PPM) provides the structure, content, and process for the development of a results-oriented clinical enterprise

The PPM links

1. Interprofessional collaboration and leadership to sustainable improvements in patient outcomes.
2. Model elements, individually and collectively, to organizational effectiveness.
3. Patient care improvements to decision making actions of clinicians and managers.
**Professional Practice Model**

**Mission**
To improve the health and well-being of those we serve

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* CARES: Integrity, Caring, Accountability, Respect, Excellence, Stewardship.
Population Health

Actions:

1. DRG and Co-morbidity Profiles and impact on outcomes
Population Health

• Linked to improving the quality of care (Stoto, 2013).
• Key PPM element that focuses on a broadened view of the patient in context of the community.
• Population health management is an underpinning for organizational effectiveness from a patient-centric perspective.
• Healthcare analytics is critical aspect of defining and refining the population served.
• Key driver for understanding the link among
  — Diagnostic related groups (DRGs) and comorbidities,
  — Clinical practice and competency,
  — Outcomes, specifically, nurse sensitive indicators.
Questions

• Is there a link between the patient profile using APR-DRGs and the occurrence of nurse sensitive indicators (CAUTI, CLABSI, PU, or Fall)?

• Is there a link between a nurse sensitive indicator and comorbidities (ICD-9 codes)?

• Does a more refined use of healthcare analytics contribute to more precise patient profiles from which to make better organizational and patient care decisions?
Method Development

• Link between the patient profile using APR-DRGs and comorbidities (ICD-9 codes) and the occurrence of nurse sensitive indicators.

• Hypothesizes that poor outcomes on nurse-sensitive indicators are due, in part, to a lack of familiarity with the patient’s DRG on the unit.
Setting

- Three-hospital tertiary health care system (879 total beds).
- Initial work of building the template for analysis was conducted at largest of the system facilities with 421 beds.
Method: Familiarity Index

- Data were then sorted according to how frequently DRG’s were seen in each hospital unit.

- An index of “familiarity” was calculated by dividing the number of times each DRG was seen on each unit by the total number of patients seen on that unit during the 12 months under investigation.

- As an example, if 100 patients with DRG 299 (Peripheral Vascular Disorders w/ MCC MS) were seen on Unit A, and a total of 1000 patient were seen on Unit A during that year, DRG 299 would be assigned a Familiarity Index of 10% for Unit A.
Method: Familiarity Index

• The Familiarity Index (FI) is a continuum, ranging from <1% to 100%

• For purposes of simplification in this presentation, the FI was bifurcated

• DRG’s were ranked according to FI within unit
  – The upper 70% of patients were classified into one group (DRG’s with which the unit was familiar—seen frequently)
  – The lower 30% were classified into another group (DRG’s with which the unit was not familiar—seen infrequently)
Assumption

• Level of nurse competency is assumed to be high with a higher Familiarity Index due to the predictability of characteristics of patients admitted to the units.
Method: Data Collection

- DRG and comorbidity data were collected and examined through an interprofessional collaboration with the clinical analytics team members.
- Administrative and quality outcomes data retrieved from McKesson Horizon Performance Manager and the Midas Plus Care Management system.
- Data included 100% of discharged patients for 30 medical-surgical units at three hospitals during a 12-month period.
• APR-DRG and comorbidity data were summarized for each hospital unit (30).

• The variety of APR-DRGs and comorbidities within the unit was telling and revealed important implications for patient safety, nurse staffing, and patient education.
• Development of a case profile completed at the unit level
• Development of a case profile at the hospital level
• Mixed model predictive analysis of nurse-sensitive indicators (clustered by unit)
  – Predictor variables: Familiarity Index, length of stay, age and number of comorbidities
## Results

### Demographics (n = 31,268)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Metric</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cases with Nurse Sensitive Indicator</td>
<td>1 to 4</td>
<td>520</td>
<td>1.7</td>
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<tr>
<td>Comorbidities</td>
<td>≥ 9</td>
<td>16,876</td>
<td>54.6</td>
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<tr>
<td>DRGs on Med Surg Units</td>
<td>DRG seen &gt;2.2% in Location</td>
<td>21,854</td>
<td>69.9</td>
</tr>
<tr>
<td></td>
<td>DRG seen &lt;2.2% in Location</td>
<td>9,414</td>
<td>30.1</td>
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</tbody>
</table>
• Medical/surgical units included (30 units)
  – Shea: 421 beds, 11 units
  – Osborn: 340 beds, 12 units
  – Thompson Peak: 92 beds, 7 units
• Comorbidities – up to 10 coded
Mixed Model Predictive Analysis of Nurse-Sensitive Indicators: All Hospitals

All Hospitals (n = 31,268)

• Dependent variable: Occurrence of nurse-sensitive indicator
• Patients with DRG’s with which nurses were more familiar (upper 30%) experienced 85% (1/0.54) fewer nurse-sensitive indicators than patients with “novel” DRG’s
• For each one-day increase in Length of Stay, there is a 310% increase in the likelihood of having a nursing sensitive indicator. (3.1 times more likely)
• For each one-year increase in age, the likelihood of a nurse-sensitive indicator increased 1%
• Patients with 9 or more comorbidities (54%) were 2.95 times as likely to experience a nurse-sensitive indicator as those with fewer than 9 comorbidities

<table>
<thead>
<tr>
<th>Variable</th>
<th>Beta</th>
<th>SE</th>
<th>OR</th>
<th>Lower</th>
<th>Upper</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRG (70/30)</td>
<td>-0.61</td>
<td>0.13</td>
<td>0.54</td>
<td>0.42</td>
<td>0.70</td>
<td>&lt;.001</td>
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<tr>
<td>LOS (Days)</td>
<td>1.15</td>
<td>0.10</td>
<td>3.14</td>
<td>2.57</td>
<td>3.85</td>
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<tr>
<td>Age (Years)</td>
<td>0.01</td>
<td>0.01</td>
<td>1.01</td>
<td>1.01</td>
<td>1.02</td>
<td>&lt;.001</td>
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<tr>
<td>Comorbidities (&lt;9, 9+)</td>
<td>1.08</td>
<td>0.13</td>
<td>2.95</td>
<td>2.30</td>
<td>3.79</td>
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</table>
Mixed Model Predictive Analysis of Nurse-Sensitive Indicators: Shea

Shea (n = 13,507)

<table>
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<th>Variable</th>
<th>Beta</th>
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<th>OR</th>
<th>Lower</th>
<th>Upper</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRG (70/30)</td>
<td>-0.49</td>
<td>0.18</td>
<td>0.61</td>
<td>0.43</td>
<td>0.87</td>
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<td>LOS (Days)</td>
<td>1.17</td>
<td>0.16</td>
<td>3.20</td>
<td>2.33</td>
<td>4.41</td>
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<tr>
<td>Age (Years)</td>
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<td>0.01</td>
<td>1.01</td>
<td>1.00</td>
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<tr>
<td>Comorbidities (&lt;9, 9+)</td>
<td>0.99</td>
<td>0.21</td>
<td>2.69</td>
<td>1.80</td>
<td>4.02</td>
<td>&lt;.001</td>
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There is a 3.6 fold increase in the likelihood of having a Nurse-Sensitive Indicator.
### Mixed Model Predictive Analysis of Nurse-Sensitive Indicators: Thompson Peak

**Thompson Peak (n = 5,298)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Beta</th>
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<th>OR</th>
<th>Lower</th>
<th>Upper</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRG (70/30)</td>
<td>-0.86</td>
<td>0.36</td>
<td>0.42</td>
<td>0.21</td>
<td>0.85</td>
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<td>LOS (Days)</td>
<td>0.72</td>
<td>0.26</td>
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<td>1.24</td>
<td>3.42</td>
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<tr>
<td>Age (Years)</td>
<td>0.01</td>
<td>0.01</td>
<td>1.01</td>
<td>0.99</td>
<td>1.03</td>
<td>0.312</td>
</tr>
<tr>
<td>Comorbidities (&lt;9, 9+)</td>
<td>0.72</td>
<td>0.30</td>
<td>2.06</td>
<td>1.14</td>
<td>3.71</td>
<td>0.017</td>
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</table>
Percent of Nurse-Sensitive Indicator by Number of Comorbidities
1) **Link between the patient profile using APR-DRG’s and NSI occurrence?**

_There is a clear relationship between the patient profile frequency of APR-DRG occurrence and a NSI._

2) **Link between a NSI and frequency of occurrence of number of comorbidities?**

_Cases with nine or more comorbidities were significantly linked to higher likelihood of a NSI._

3) **Refined use of healthcare analytics contribute to more precise patient profiles to make better organizational and patient care decisions?**

_The results appear promising. A profile comprising Familiarity index, age, LOS and comorbidities appears to be predictive._
Significance

• This unique approach to population health and the organization of data generated a more refined patient profile

• Approach serves to inform us more precisely about how to improve
  – quality of care
  – clinical and management decision-making
  – educational resource allocation decision making
  – staffing
  – patient placement
  – RN competency
  – interprofessional collaboration
Future Directions

- Development of a case profile completed at the unit level
- Development of a case profile at the hospital level
References


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