Using Evidence To Impact Practice and Policy

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Medical Errors Leading Cause of Death and Injury

- In 1999, IOM estimated that up to 98,000 people died annually in the US as a result of hospital medical error.

- New study published in May 2016 in BMJ, updates the IOM estimate to 251,454 deaths in 2013 making medical errors the 3rd largest cause of death in US.

- Medical errors remain a problem despite 15 years and $ billions spent.

- Is the national approach to making care safe missing an important needed perspective?
Nurses’ Assessments: Hospital Safety Remains a Problem

RN4CAST-US 2015-16
27,319 nurses in 1,146 hospitals

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<table>
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<tbody>
<tr>
<td>Nurses giving their hospital overall safety grade of C, D, or F</td>
<td>30%</td>
</tr>
<tr>
<td>Nurses giving their hospital overall grade of prevention of infections C, D, or F</td>
<td>29%</td>
</tr>
<tr>
<td>Would not always recommend their hospital to family and friends</td>
<td>55%</td>
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The hospital you choose really matters

Death rates are much higher in some than in others.

Compared to the average death rates for high-rated hospitals, death rates for heart attack, heart failure, pneumonia, and surgery patients are significantly higher in low-rated hospitals.

Compared the average death rates for high-rated and low-rated hospitals, for patients admitted with heart attack, heart failure, or pneumonia, and for surgery patients with serious, treatable complications. Data come from the Centers for Medicare & Medicaid Services for patients 65 and older.

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Nurses’ Assessments: Hospital Work Environments Remain Unsafe  
RN4CAST-US 2015-16

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Percentage</th>
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<tr>
<td>Rate hospital work environment fair/poor</td>
<td>34%</td>
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<tr>
<td>Report not enough nurses to provide quality care</td>
<td>50%</td>
</tr>
<tr>
<td>Lack confidence in management to resolve problems nurses identify in patient care</td>
<td>54%</td>
</tr>
<tr>
<td>Nurses scoring in high burnout range, Maslach Burnout Inventory</td>
<td>34%</td>
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Patient Safety Culture is Inadequate: Nurses’ Reports

<table>
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<tr>
<th>Issue</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Staff feel like their mistakes are held against them</td>
<td>75%</td>
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<tr>
<td>Staff do not feel free to question authority</td>
<td>53%</td>
</tr>
<tr>
<td>Actions of management do not show that patient safety is a top priority</td>
<td>36%</td>
</tr>
<tr>
<td>Frequently interrupted by missing supplies, broken equipment, missing medications</td>
<td>34%</td>
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RN4CAST-US, 2015-16
The Quality Health Outcomes Model

Effect of Nurse Education on Surgical Patient Mortality

(independent of nurse staffing)

Each 10% increase in proportion of nurses with BSNs is associated with 5-7% decline in mortality

Aiken et al, Medical Care, 2011; Lancet,
Increase in BSNs per Hospital Causally Linked to Lower Mortality
Kutney Lee, Sloane, Aiken, Health Affairs, 2013

• Study of changes in BSN employment in all Pennsylvania hospitals between 1999 and 2006
• 10 point increase in % BSN per hospital was associated with reduction of 2.12 deaths per 1000, and 7.47 deaths per 1000 patients with complications, for a total of 500 potentially preventable deaths
• If all hospitals in PA had increased to 80% BSNs, 2100 lives might have been saved in one state over the 7 year period
Business Case for Achieving IOM Recommendation of 80% BSNs

Yakusheva, Medical Care 2014

– Looks at dose of BSN care for individual patients

– Finds even larger impact of BSN proportion on reducing mortality: each 10% increase in BSN care reduces mortality by 11 percent

– Finds at 80% BSN dose that readmissions and length of stay are also significantly reduced

– Even for a hospital paying salary premium for BSNs, the cost of transitioning to 80% BSN staffing is more than offset by savings produced by better patient outcomes
Moving Toward 80% BSNs
Hospital Workforce

Source: Center for Health Outcomes and Policy Research, University of Pennsylvania
Patient/Nurse Workloads, By Hospital

Mean: 5.3 patients per nurse - Range: 3 - 12
Patient to Nurse Ratios in California Hospitals Compared to Nurse Staffing in Other States, 2006

<table>
<thead>
<tr>
<th></th>
<th>CA</th>
<th>FL</th>
<th>NJ</th>
<th>PA</th>
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<tbody>
<tr>
<td>MedSurg</td>
<td>4.8</td>
<td>6.0</td>
<td>6.8</td>
<td>6.5</td>
</tr>
<tr>
<td>Pediatric</td>
<td>3.6</td>
<td>4.2</td>
<td>4.6</td>
<td>4.4</td>
</tr>
<tr>
<td>All ICUs</td>
<td>2.1</td>
<td>2.3</td>
<td>2.5</td>
<td>2.3</td>
</tr>
<tr>
<td>Telemetry</td>
<td>4.5</td>
<td>5.6</td>
<td>5.9</td>
<td>5.7</td>
</tr>
<tr>
<td>Oncology</td>
<td>4.6</td>
<td>5.5</td>
<td>6.3</td>
<td>5.7</td>
</tr>
<tr>
<td>Psych</td>
<td>5.7</td>
<td>8.9</td>
<td>7.0</td>
<td>7.9</td>
</tr>
<tr>
<td>Labor/Delivery</td>
<td>2.4</td>
<td>2.8</td>
<td>2.6</td>
<td>2.8</td>
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Aiken et al., Health Services Research 2010
If PA & NJ hospitals staffed at California levels, the odds of death after general surgery would be reduced by 13%.

Source: Aiken et al., Health Services Research, August 2010
% Hospitals with Various Levels of Medical/Surgical Nurse Staffing (Pts. per Nurse) in CA vs. Three Other States, 2016
Each 1 patient increase in nurses’ workloads is associated with 7% increase in mortality

Aiken et al., Medical Care 2011, Lancet 2014
Effect of Improved Nurse Staffing on Mortality Depends Upon Quality of Work Environment

Aiken et al. Medical Care, 2011.

The difference in the odds on dying in hospitals with 8:1 and 4:1 patient/nurse ratios is -
0 percent in hospitals with poor environments;
16 percent in hospitals with mixed environments;
46 percent in hospitals with good environments.
Deskilling Hospital Nurse Workforce Is Associated With Poor Outcomes

Aiken et al. BMJQS Nov 2016

- Deskilling occurs by adding assistants without adding more nurses or reducing nurses
- Each 10% decrease in proportion of nurses is associated with 12% increased risk of death
- Adding one assistant per 25 patients instead of adding a nurse is associated with a 21% increased odds of dying
Magnet Hospitals Have Substantially Lower Risk Adjusted Mortality Than Matched Hospitals

• Aiken et al., Medical Care 1994 and 2012

• Intervention: Hospitals in PA that got Magnet between 1999 and 2006 compared to those that did not, experienced greater reduction in mortality accounting for other factors, Kutney Lee et al., Medical Care 2015
Magnet hospitals have better very low birthweight mortality

- *JAMA* 2012 by Lake et al. shows lower risk adjusted 7 day mortality in Magnet hospitals for inborn very low birthweight infants
- Also lower nosocomial infections, severe intraventricular hemorrhage in Magnet hospitals after taking into account other possible explanations
Magnet Patient Satisfaction Advantage
Stimpfel, McHugh, Aiken *HSR* 2015

- Hospital patient satisfaction (and nurse satisfaction) is significantly higher in Magnet hospitals than in matched non-Magnet hospitals
- Patient satisfaction scores (HCAHPS) are important to determining distribution of $1 billion hospital performance incentives
- Patient reports are a good barometer for safety and quality and nurse retention
Magnet Hospitals Return Better Value

• Matched Medicare patients of all severity levels undergoing general surgery have lower mortality in Magnet hospitals
• Magnet hospitals achieve better outcomes at same or lower costs for patients at every level of risk thus providing greater value
• Magnet hospitals achieve lower cost in part by lower use of ICU care for patients of equal severity of illness and their outcomes are better
Better Patient and Nurse Outcomes for Magnet Hospitals Suggest Pathway to Improved Safety for All Hospitals

• Lower general surgical mortality in Magnets is due both to better nursing and to the Magnet Journey; there is a Magnet Advantage after considering better nursing (Aiken et al., Medical Care 1994 and 2012)

• Hospitals that attained Magnet between 1999 and 2006 compared to those that did not, experienced greater reduction in mortality (Kutney Lee, Aiken et al., Medical Care 2015)
Nursing Innovation: Business Case for Magnet
Jayawardhana, Welton, Medical Care, 2014

• Costs of becoming Magnet are more than offset by increased inpatient revenues after attaining Magnet
• Increased revenues are due to higher quality
• Payback from becoming Magnet occurs between 2\textsuperscript{nd} and 3\textsuperscript{rd} years
• Thereafter, Magnets receive higher revenues per discharge than comparable non-Magnets
Missed Needed Nursing Care is Common:
% Nurses Reporting Missed Care on Last Shift by Workload

RN4CAST-US 2015-16
Nurse Staffing, Work Environment, and Readmissions

McHugh et al., Medical Care 2013
Ma, McHugh, Aiken, Medical Care 2015
Tubbs-Cooley, Aiken et al, 2013 BMJ Quality and Safety
Lasater, McHugh, Int J Quality Healthcare, 2016

• Strengthening inpatient nursing resources is a cost effective strategy for reducing excess hospital admissions

• Each 1 patient increase in patient to nurse workloads increases readmissions by
  – Between 6-9% for heart failure, pneumonia, AMI and 3% for general surgery, 8% hip & knee replacements
  – 11% for children

• Better work environments vs poor reduces readmissions by between 6-10% for HF, PN, AMI; 3% for general surgery; 12% hip & knee replacements
Outcomes of In-hospital Resuscitation: Nurses Rescue Patients
McHugh Aiken, Medical Care, 2016

- Almost all hospitals have rapid response teams and there is still variation in outcomes
- Nursing factors largely explain variation in survival rates from in-hospital resuscitation
- Could define any resuscitation outside ICU as an error
- **Nurse staffing:** Each additional patient added to nurses’ workloads is associated with 4% lower survival to discharge
- **Work environment:** Patients experiencing in-hospital resuscitation cared for in hospitals with poor work environments have 22% lower survival than patients in hospitals with good environments (independent of nurse staffing)
Substantial Variation in Nurse-Physician Teamwork Scores Across Hospitals

668 hospitals

Mean 2.90; Range 2.27-3.6; Higher is better
Better Nurse Physician Teamwork Associated with Lower Mortality

Kang, CHOPR, 2016

• In hospitals in which nurses report effective teamwork between doctors and nurses, mortality and “Failure to Rescue” following general surgery is significantly lower

• Positive effect of teamwork on improved outcomes is contingent upon
  – Good nurse staffing
  – Greater proportion of BSN nurses
Operationalizing Nurse Engagement in Shared Governance
Forthcoming paper in JONA 2016

• Individual items from Practice Environment Scale of Nursing Work Index (NDNQI option)
  – **Least**: Little opportunity to participate
  – **Some**: Can serve on hospital committees
  – **More**: Involved in hospital governance
  – **Best**: Participate in hospital policy decisions

• **Data**: Penn Nursing Care and Patient Safety Study of 28,144 staff nurses in 617 hospitals
Distribution of Engagement Scores by Hospital

By hospital*

- Least 7%
- Some 21
- More 34
- Best 38

N=617 hospitals

*Assigned category by median scores of nurses employed in each hospital
Nurse Quality of Care Ratings and Engagement

• % Nurses rating quality of care on their unit as poor or fair by engagement level

  – Least engagement 33%
  – Some engagement 24%
  – More engagement 15%
  – Highest engagement 8%
Nurses’ Lack of Confidence in Management’s Resolution of Problems in Care is Highly Associated With Nurse Engagement

% Nurses not at all confident in management’s resolution of care problems

- Least: 32%
- Some: 26%
- Moderate: 20%
- Highest: 14%
High nurse engagement hospitals are more than twice as likely to be in highest quartile of high patient ratings (HCAHPS) compared to low nurse engagement hospitals.

High patient rating = 9 or 10 HCAHPS global rating scale
Nurse Engagement and Nurse Outcomes

- **Job Dissatisfaction**
  - Highest Nurse Engagement: 13%
  - Lowest Nurse Engagement: 42%

- **High Burnout**
  - Highest Nurse Engagement: 23%
  - Lowest Nurse Engagement: 52%

- **Intention to Leave**
  - Highest Nurse Engagement: 8%
  - Lowest Nurse Engagement: 25%
Patient Safety Requires Improvements in Foundations of Care Not Just “Magic Bullets”

- IOM’s most important contribution to improving patient safety was recognition that safety is a property of health care organizations
- Over past 15 years, interventions to improve safety have not been accompanied by substantial improvements in care environments
- Nurses are often in short supply in clinical settings and work in chaotic, poorly resourced environments causing dangerous interruptions in care
- Further safety improvements require fundamental organizational reform and commitment, especially in nursing resources, because nursing is the early warning and first response system for patient safety threats
Recommendations

• A high priority on improving hospital work environments, including improved MD-RN team functioning and greater engagement in shared governance to improve patient outcomes and nurse retention, and achieve higher value in resource investments

• **Magnet** certification is an evidence-based blueprint to improving work environments, and is a relatively low cost lever for improving quality of care

• Standardizing nurses’ qualifications at bachelor’s level and above is associated with better care outcomes

• Significant variation in nurse staffing suggests more attention is needed to implement evidence-based decision-making about patient to nurse workloads; Magnet blueprint results in better nurse staffing.