New Evidence on the Impact of Safe Nurse Staffing Interventions

Linda H. Aiken
Matthew D. McHugh

www.nursing.upenn.edu/chopr

Acknowledgments: QUT AU; University College Cork, IE; Universidad de los Andes, CL
Research: Lower hospital patient to nurse ratios are associated with

- Lower mortality
- Fewer readmissions
- Shorter length of stay
- Fewer ICU Admissions
- Fewer healthcare associated infections
- Fewer falls with injuries and pressure ulcers
- Greater patient satisfaction
- Greater nurse job satisfaction, less burnout, greater intent to stay
Evidence-Based Safe Nurse Staffing

• Concludes there is strong and actionable evidence of association of nurse staffing and patient outcomes
• Encourages nurses and their national associations to support implementation of safe nurse staffing systems
• What do we know about outcomes of hospital patient to nurse ratio policy interventions?

Passed 2018
Nurse Staffing Policy Interventions Are Becoming More Common

- Victoria, AU in 2000
- California, US in 2004
- Last 5 years:
  - Wales, UK
  - Scotland, UK
  - Ireland
  - Queensland, AU
- Other jurisdictions considering: More US states, Korea, Chile
Nurse staffing changes in California compared to other states, 1997-2016
Nurse staffing mandates in California benefited patients

- Penn research found no unintended adverse outcomes of staffing mandates and estimated...

440 Surgical patient deaths avoided in California in first 3 years following ratio implementation
Implications of California ratios for other states in USA

Aiken, McHugh et al. Health Services Research, 2010

• Nurses in Pennsylvania and New Jersey on average care for between 1-2 more patients each than nurses under staffing mandates in CA

• If Pennsylvania and New Jersey staffed at California mandated ratios, odds of death after general surgery estimated to be reduced by 10 to 13 % annually saving thousands of lives

• But lack of baseline measures in CA have resulted in contentious stakeholder debate on whether ratios work
Ireland Framework for Safe Nurse Staffing and Skill-Mix

- Systematic, evidence-based approach to determine RN/Health Care Assistant (HCA) staffing based on patient acuity and dependency levels
- Skill mix requirement 80% RN 20% HCA
- Ward leader role is 100% supervisory
- Pilot tested by independent research before national rollout
Ireland: Care Left Undone Events Before and After Pilot

Shifts with at least one item undone (%)

Source: J Drennan, Cork
Ireland: Nurse Job Satisfaction Increased from 53% Before to 70%

Source: Professor Jonathan Drennan, University College Cork, Ireland
Queensland AU: Exemplary Policy Process

• July 2016, Queensland Health implemented nurse-to-patient ratios in 27 public hospitals
• Ratios specify an average of 1:4 on morning/afternoon and 1:7 on night shifts in acute adult medical-surgical wards
• Prospective external evaluation with data collection and linked patient outcomes before and after implementation
Before ratios significant variation in public hospitals in patient to nurse ratios

Adult medical-surgical patients per nurse by facility

Data Source: RN4CAST-Australia survey data
**Before: consequences of staffing variation for nurses and patients**

- Each additional patient per nurse was associated with:

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>12%</td>
<td>Higher odds of death</td>
</tr>
<tr>
<td>2%</td>
<td>Longer length of stay</td>
</tr>
<tr>
<td>19%</td>
<td>Higher odds of nurse burnout</td>
</tr>
<tr>
<td>32%</td>
<td>Higher odds of poor care quality</td>
</tr>
</tbody>
</table>

*Data Source: RN4CAST-Australia survey data and patient data*
Ratio legislation lead to improved nurse staffing

The average medical-surgical nurse saw a workload reduction of:

- 1-2 patients during the day; and
- 1-3 patients on the night shift

Data Source: RN4CAST-Australia survey data
Better patient and nurse outcomes were associated with staffing improvements

Reductions of 1 patient per nurse were associated with:

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>9%</td>
<td>Lower odds of dying in the hospital</td>
</tr>
<tr>
<td>6%</td>
<td>Lower odds of readmission within 7-days</td>
</tr>
<tr>
<td>3%</td>
<td>Reduction in length of stay</td>
</tr>
<tr>
<td>7%</td>
<td>Reduction in nurse burnout</td>
</tr>
</tbody>
</table>

Data Source: RN4CAST-Australia survey data
Public benefits of nurse staffing improvements in Queensland first 2 years

145
Deaths avoided

255
Readmissions avoided
Estimated cost savings would be ~ $2.2 million (USD)

29,222
Hospital days avoided
Estimated cost savings would be ~ $20 million (USD)

Data Source: Queensland Health patient outcomes data
Chile: Example of Research Motivating Nurse Staffing Policy

Investigator-Initiated Study Findings Translated for Policy Makers
Chile: Large variation in hospital nurse staffing associated with mortality

![Adjusted Mortality Rate, by Staffing图表](chart.png)
Chile: Estimated Annual Avoided Hospital Deaths Under Different Patient to Nurse Ratios

- Patient to Nurse Ratio: 8
  - Avoided Hospital Deaths: 2,762
- Patient to Nurse Ratio: 10
  - Avoided Hospital Deaths: 2,046
- Patient to Nurse Ratio: 12
  - Avoided Hospital Deaths: 667
- Patient to Nurse Ratio: 14
  - Avoided Hospital Deaths: 393
Estimated Annual Avoided Readmissions by Different Nurse Staffing Ratios, Chile

- 8: 4184
- 10: 2863
- 12: 2121
- 14: 180
<table>
<thead>
<tr>
<th>Ratio Patient-to-Nurse</th>
<th>Est. Additional Staff Costs (in millions USD)</th>
<th>Savings from Readmissions Avoided (in millions USD)</th>
<th>Net Cost* (in millions USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>$11.0</td>
<td>$6.0</td>
<td>$5.0</td>
</tr>
<tr>
<td>12</td>
<td>$19.7</td>
<td>$10.0</td>
<td>$9.7</td>
</tr>
<tr>
<td>10</td>
<td>$34.3</td>
<td>$15.5</td>
<td>$18.8</td>
</tr>
<tr>
<td>8</td>
<td>$58.9</td>
<td>$21.6</td>
<td>$37.3</td>
</tr>
</tbody>
</table>
Conclusions

• Evidence suggests policies establishing safe nurse staffing standards improve patient and nurse workforce outcomes

• Savings from avoided readmissions, shorter length of stay, fewer complications help finance improved nurse staffing

• Gold standard of evidence-based policy: Inclusion of funded prospective pre and post intervention research

• Prospective research evaluating outcomes of staffing policies will also contribute further evidence about causal links between nursing and patient outcomes
Come to Policy Café Today 1300-14:30
Level 5, Policy Café A, Next to Registration

• Experts from jurisdictions with nurse staffing standards to answer questions
• Linda Aiken, Univ Penn, USA, Moderator
• Shelley Nowlan, Chief Nurse, Queensland, AU
• Diane Murray, Deputy Chief Nurse, Scotland
• Gillian Knight, Deputy Chief Nurse, Wales
• Matthew McHugh, Univ Penn, USA
• Consuelo Cerón Mackay, Univ los Andes, Chile