Evidence-based Nurse Staffing Saves Lives and Money

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2020 International Year of Nurse & Midwife

• 200\textsuperscript{th} birthday of Florence Nightingale who acted on basis of research to improve patient safety

• Much evidence that evidence-based nurse staffing saves lives and money
Evidence-Based Safe Nurse Staffing

• ICN concludes there is strong and actionable evidence of association of nurse staffing and patient outcomes

• Encourages nurses and their national associations to take leadership in supporting implementation of safe nurse staffing systems

Aiken, International Nursing Review, 2018
Nursing Outcomes Research in 30 Countries

- North America (2)
- South America-Chile
- Europe (15)
- Australia
- New Zealand
- United Arab Emirates
- Asia (4)
- South Africa
- Russia
- Armenia
Common Research Protocol

• Survey nurses in hospitals and other settings
• From surveys we get information on patient to nurse workloads, nursing skill mix, nurses’ education and qualifications, quality of the work environment, nurses’ assessments of quality and safety, reports about culture of patient safety, missed nursing care
• Survey patients about their satisfaction or use national patient satisfaction results by hospital
• Obtain patient outcomes for each organization from government sources
• Link survey data to actual patient outcomes
Evidence: Lower hospital patient to nurse ratios are associated with

• Lower risk adjusted mortality
• Fewer readmissions
• Shorter length of stay
• Fewer ICU Admissions
• Fewer healthcare associated infections
• Fewer falls and pressure ulcers
• Greater patient satisfaction
• Greater nurse job satisfaction, less burnout, greater intent to stay

14 European Countries

561 representative hospitals
Expected Deaths per 1000 Discharges at Different Staffing Levels

Aiken et al., Lancet, 2014
Deaths are significantly lower in European hospitals with better nurse staffing and more bachelor’s educated nurses

Aiken et al. The Lancet, 2014

- Every 1 patient increase in average hospital nurse’s workload is associated with 7% higher mortality
- Every 10% increase in bachelor’s educated RNs is associated with 7% lower risk adjusted mortality
- If all hospitals in the 9 European countries in this analysis had at least 60% bachelor’s nurses and nurse workloads of no more than 6 patients each, more than **3500 deaths a year** might be prevented
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

• If Pennsylvania and New Jersey had staffed at CA mandated ratios, odds of death after general surgery estimated to be reduced by 10 to 13% annually Aiken et al. Health Services Research, 2010

• Greatest improvement in CA staffing was in historically understaffed hospitals including safety net hospitals McHugh et al., Milbank Quarterly, 2012

• “Mixed” findings not accurate as nothing bad happened in CA; some studies had null findings which can mean they had weak designs. Also no experimental prospective studies
Adult Medical Surgical Patient-to-RN Ratios, By Pennsylvania Hospital, 2015-16

Mean: 5.6
Min: 3.3
Max: 11.0

Hospitals Arrayed from Best to Worst Staffing
Staffing Variation in PA Hospitals Associated with Excess Deaths

• In 2015-16 in PA, half of hospitals are higher than 5 patients per nurse

• Patients outside metropolitan areas of Philadelphia and Pittsburg have limited access to hospitals staffing at 5:1 or better

• Each 1 patient increase in patients per nurse is associated with a 5-8% increase in mortality
Staffing Variation in PA Hospitals Associated with Excess Deaths

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Nurse Practitioner Hospital Staffing Study, US

- Data from multiple sources for representative sample of 579 acute general hospitals in 4 large states with 100+ beds
  - 2015 RN4CAST-US survey data from over 18,000 RNs
  - State patient discharge data from 1.4 million surgical patients
  - Government data on Medicare Spending Per Beneficiary by hospital
  - 2015 HCAHPS experience surveys from 660,000 patients
- RN surveys provided information to estimate the number of NPs working in each hospital, which we grouped as follows –
  - <1 NP/100 beds (N=132 hospitals),
  - 1-2.99 NPs/100 beds (N=279 hospitals), and
  - 3+ NPs/100 beds (N=168 hospitals)
Nurse Practitioner Summary Results

In hospitals with 3+ NPs/100 beds vs. <1 NP/100 beds

1. Patients have 22% lower risk adjusted 30-day mortality
2. Patients have 9% lower risk of being readmitted
3. Nurses are twice as likely to provide favorable reports of care quality and patient safety
4. RNs have 17% lower odds on high burnout
5. RNs have 46% higher odds on job satisfaction and 36% higher odds on intent to stay in their current job
6. Length of stay and readmissions are lower increasing productivity of hospital thus reducing waiting times for surgery
7. Overall expenditures per patient is lower
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
Queensland AU before ratios: Significant variation in hospital patient to nurse ratios

Adult medical-surgical patients per nurse by facility

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

- 145 Deaths avoided
- 255 Readmissions avoided
- Estimated cost savings $2.2 million (USD)
- 29,222 Hospital days avoided
- Estimated cost savings $20 million (USD)

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

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

![Adjusted Mortality Rate, by Staffing](image)

- Workloads (Patients per Nurse):
  - 6: 3.2%
  - 8: 3.4%
  - 10: 3.5%
  - 12: 3.6%
  - 14: 3.8%
  - 16: 3.9%
  - 18: 4.0%
  - 20: 4.2%
  - 22: 4.4%

- Mortality Rate:
  - 0.0% to 4.5%
Chile: Estimated **Annual** Avoided Hospital Deaths Under Different Patient to Nurse Ratios

- 8: 2,762
- 10: 2,046
- 12: 667
- 14: 393
Number of New Nurses and Estimated Salary Cost Needed to Implement Nurse Staffing Standard by Different Ratios

- 12:1 would require addition of 700 nurses at cost of $20 million USD
- 10:1 would require 1000 nurses at cost of $34 million USD annually
- Chile graduated 5,314 nurses in 2016 so the supply is adequate under all scenarios
Estimated Annual Avoided Readmissions by Different Nurse Staffing Ratios, Chile

- 8: 4184
- 10: 2863
- 12: 2121
- 14: 180
### Annual Costs of Patient-to-Nurse Ratio Improvements Less Projected Savings from Avoided Readmissions, Chile

<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>
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<tr>
<td>8</td>
<td>$58.9</td>
<td>$21.6</td>
<td>$37.3</td>
</tr>
</tbody>
</table>
## Predicted Length of Stay by Nurse Staffing Ratios, Surgery, Chile

<table>
<thead>
<tr>
<th>PT/RN Ratios</th>
<th>Mean LOS</th>
<th>Total Days Avoided Annually - All Public Hospitals</th>
<th>Estimated Savings in Millions (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>9.97</td>
<td>3,165</td>
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<tr>
<td>14</td>
<td>9.83</td>
<td>14,272</td>
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<td>13</td>
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<td>12</td>
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<td>10</td>
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<td>82,761</td>
<td>53</td>
</tr>
<tr>
<td>9</td>
<td>8.76</td>
<td>104,271</td>
<td>67</td>
</tr>
</tbody>
</table>
Conclusion: Safe Nurse Staffing Interventions Save Lives and Money

• Evidence suggests safe nurse staffing standards improve patient & nurse outcomes
• Savings from avoided readmissions and shorter length of stay from fewer complications finance improved nurse staffing
• Plus productivity is improved resulting in need for fewer hospital beds
• Through scientific evaluations of staffing interventions we establish causal links between nurse staffing and patient outcomes
Onerous Nurse Workloads and Chaotic Clinical Environments Common
Hospital Safety Remains a Problem
Studied 535 hospitals in 4 large states at two points, 2005 and 2016
Reports from 805,881 patients and 53,699 nurses

In 2015-16 ...

<table>
<thead>
<tr>
<th>Description</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients rating their hospitals less than excellent</td>
<td>32%</td>
</tr>
<tr>
<td>Patients would not definitely recommend their hospital</td>
<td>30%</td>
</tr>
<tr>
<td>Nurses giving their hospital unfavorable safety grade of C, D, or F</td>
<td>30%</td>
</tr>
<tr>
<td>Nurses experiencing high burnout</td>
<td></td>
</tr>
<tr>
<td>Nurses rating their hospital clinical work environments less than excellent</td>
<td>31%</td>
</tr>
<tr>
<td></td>
<td>81%</td>
</tr>
</tbody>
</table>
Percent Hospitals Whose Clinical Work Environments Changed, 2005-2016

- Worsened: 7%
- Remained the same: 71%
- Improved: 21%
Safety advances in hospitals by changes in work environments

Improved
• Patients rating their hospitals excellent + 11%
• Patients definitely recommend hospital + 8%
• Nurses ranking patient safety favorably +15%

Worsened
• Favorable hospital patient safety grade -19%

Little change
• Changes in favorable patient safety grade 0 %
MAGNET4EUROPE: IMPROVING MENTAL HEALTH AND WELLBEING IN THE HEALTH CARE WORKPLACE

• Funded by EU Horizon 2020
• Co-led by KU Leuven & Penn
• Randomized trial 60+ hospitals
• Five European countries
• Redesign nurse work environments
• Based on Magnet principles
• Twinning with Magnet hospitals
• Learning collaborative
• Implementing at scale to promote sustainability and policy support
If we wait one day, one month, one year to act on the evidence we have, we are going backwards!

Florence Nightingale