Safe staffing: Understanding the “size and shape” of the nursing workforce

Health economics, decision making under uncertainty and workforce epidemiology...

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• The views expressed are those of the author(s) and not necessarily those of the NICE, the Department of Health and Social Care, arm’s length bodies or other government departments.
Evidence for the association between nurse staffing levels and patient outcomes

“...compelling...”
• (UK Royal College of Nursing, 2010)

“...overwhelming...”
• (US Joint Commission, 2005)
Summary conclusions from NICE evidence review:

- **Nurse staffing**: Higher nurse staffing levels associated with lower mortality, fewer falls, less reports of missed care, shorter stay. Mixed evidence on pressure ulcers and drug errors.

- **Skill mix**: A skill mix that is richer in RNs is associated with improved outcomes, including mortality.

- **Assistant staffing (e.g. HCA)**: Higher assistant staffing levels associated with higher rates of falls, pressure ulcers, readmission rates, medication errors, use of physical restraints and lower patient satisfaction.
“There is a lack of high-quality studies exploring and quantifying the relationship between registered nurse and healthcare assistant staffing levels and skill mix and any outcomes”

(NICE Safe staffing guideline (SG1) 2014)
NICE evidence review 2014

From 1993 *hundreds* of studies and several reviews looking at nurse staffing, skill mix and outcomes...

Many *very large* studies

Most had *significant limitations*

All studies *observational*, most *cross-sectional*

Average staffing over a period of time

Outcomes over that period

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Nurse staffing, missed vital signs and mortality

One NHS Trust

Three years

32 general (med / surg) wards

33,000 ward X days of staffing

138,000 patients

3,367,000 sets of vital signs observations

Griffiths et al BMJ Quality and Safety DOI: 10.1136/bmjqs-2018-008043
Griffiths et al Health Services & Delivery Research Journal 2018 6, (38)
Effects of variation in staffing levels on mortality

% change in hazard of death

-3 -2.5 -2 -1.5 -1 -0.5 0 0.5 1 1.5 2 2.5 3

-5% -3% -1% 1% 3% 5% 7% 9%

RN

HCA

Care hours per patient relative to ward mean

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+1 RN Hour Per Patient Day

+£10 million staffing costs

219 fewer deaths per year

+2% £219 per patient

£47,376 per life saved

10,636 bed days saved
Change staffing / skill mix to reflect establishment

+£1.3 million staffing costs

50 fewer deaths per year

<0.25% £28 per patient

£-486 per life saved

4464 bed days saved

Net saving £24000
Correlation: 99%

Divorce rate in Maine per 1,000 people

Per capita consumption of margarine (lbs)

Source: US Census, USDA, tylervigen.com
Causal Mechanism?

- Missed vital signs mediates the relationship between low RN staffing and mortality
- NOT the relationship between low HCA staffing and mortality nor RN hours and mortality
<table>
<thead>
<tr>
<th>Strength (effect size)</th>
<th>• Many of the observed effects are quite small</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consistency &amp; reproducibility</td>
<td>• Findings replicated in a range of different settings and populations &amp; overall evidence is quite consistent</td>
</tr>
<tr>
<td>Specificity</td>
<td>• The strongest evidence is on an outcome (mortality) that is NOT specific.</td>
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<tr>
<td>Temporality</td>
<td>• Increasing longitudinal evidence - cause precedes effect</td>
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<tr>
<td>Biological gradient</td>
<td>• Some evidence of plausible dose response relationship</td>
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<tr>
<td>Plausibility</td>
<td>• Plausible mechanisms have been hypothesised &amp; demonstrated</td>
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<tr>
<td>Coherence &amp; analogy</td>
<td>• Evidence that omissions in care associated with adverse outcomes</td>
</tr>
<tr>
<td>Experimental evidence</td>
<td>• Limited</td>
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“To my knowledge, it has not been proven that cigarette smoking causes cancer...there is, you know, in scientific terms, there are hurdles related to causation, and at this time there is no evidence that - they have not been able to reproduce cancer in animals from cigarette smoking” (William Campbell, then President and CEO of Phillip Morris quoted in the NYT December 6, 1993.)
What next and what more?

- More generalizable economic evidence
- Allied health professionals
- Outside acute general hospitals
- Staffing tools and methodologies
- Sensitive & specific quality indicators
- New roles & better understanding of risks

<table>
<thead>
<tr>
<th>HCA HPPD</th>
<th>High RN HPPD</th>
<th>Target RN HPPD</th>
<th>Low RN HPPD</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Overall capacity high. Supervisory capacity balanced with demand (skill mix) but high demand for delegation</td>
<td>Overall capacity high. Supervisory capacity not balanced with demand (low skill mix) AND high demand for delegation</td>
<td>Overall capacity medium or low. Supervisory capacity not balanced with demand (low skill mix) AND high demand for delegation</td>
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<tr>
<td>Target</td>
<td>Overall capacity high. Supervisory capacity exceeds demand (skill mix) expected demand for delegation</td>
<td>Overall capacity medium. Supervisory capacity balanced with demand (skill mix), expected demand for delegation</td>
<td>Overall capacity low. Supervisory capacity not balanced with demand (skill mix) AND high demand for delegation</td>
</tr>
<tr>
<td>Low</td>
<td>Overall capacity medium. Supervisory capacity exceeds demand (skill mix) low demand for delegation</td>
<td>Overall capacity low. Supervisory capacity exceeds demand (skill mix) low demand for delegation</td>
<td>Overall capacity very low. Supervisory capacity balanced with demand (skill mix), expected demand for</td>
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