Nurse staffing: Key to good patient, nurse, and financial outcomes

Lynn Unruh, PhD, RN, LHRM
Department of Health Management & Informatics
University of Central Florida
lunruh@mail.ucf.edu

136 Annual APHA Meeting, San Diego, CA
October 26-29, 2008
Current healthcare climate

- Nursing shortage
- Tight reimbursements to providers
- Focus on capital & technology improvements:
  - may be more costly than improving staffing
  - may not improve quality and safety as intended
Presentation topics

- Conceptual framework
- Discuss the evidence on the importance of nurse staffing for:
  - Patient quality and safety
  - Staff satisfaction and health
  - Financial performance
- Recommendations
Definition of nurse staffing

- Number of nurses or nursing hrs/
  - the number of patients
  - or patient days
- Skill mix of nurses
- Little scientific evidence of exact nurse-to-patient-ratios needed
- Staffing adequacy is related to workload
Definition of workload

- The amount and intensity of work a nurse encounters in a given period of time.

- Affected by all of the following:
  - # of patients
  - patient acuity
  - patient throughput
  - unit design
  - technologies
  - human resources
  - amount of administrative tasks
  - skills and education of nurses
Pathways of inadequate nurse staffing

Inadequate Staffing, Excessive workload

Org. climate & other work environment issues

Patient characteristics

Patient outcomes:
- Dissatisfaction
- Adverse event
- Mortality
- Failure to rescue
- Education deficits
- Readmission

Difficult working conditions

Poor nursing performance

Nurse skills and characteristics

Nursing outcomes:
- Dissatisfaction
- Burnout, stress
- Injury/Illness
- Absenteeism
- Turnover
- Vacancy

Financial Outcomes:
- Unproductive workforce expenditures:
  - Lower productivity
  - Turnover costs
  - Agency costs
  - Absenteeism costs
  - Worker’s comp claims
- Unnecessary patient care costs:
  - Longer LOS
  - Higher tx cost
  - Malpractice claims
- Lower patient care revenue:
  - Bed closures
  - ER backup/bypass
  - Loss of market share
Hypothesized impacts of understaffing

- Negative patient outcomes
  - patient dissatisfaction
  - adverse events
  - failure to rescue (FTR)
  - Mortality

- Negative nursing outcomes
  - dissatisfaction
  - burnout
  - injury or ill-health
  - turnover

- Higher costs and lost revenues due to:
  - lower productivity
  - higher turnover
  - use of agency nurses
  - more workers’ compensation claims
  - longer patient lengths of stay
  - higher treatment costs
Evidence base for impact on outcomes

- Comprehensive literature review
- Several article databases 1980 - 2006:
  - Multiple search terms
  - Articles selected if they were original empirical literature
- Existing reviews discussed when evaluating the evidence
RN staffing impact on patients, 2002-2006
(20 studies, 112 findings)

<table>
<thead>
<tr>
<th></th>
<th>Blood stream infections</th>
<th>Cardiac arrest/shock</th>
<th>Complications</th>
<th>Falls</th>
<th>Failure to rescue</th>
</tr>
</thead>
<tbody>
<tr>
<td>RN, LN / pt, pt day, apd</td>
<td>1 = NS</td>
<td></td>
<td>2 = (-)</td>
<td>3 = (-)</td>
<td>3 = (-)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 = NS</td>
<td>2 = NS</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 = (+)</td>
</tr>
<tr>
<td>RN, LN skill mix</td>
<td>1 = NS</td>
<td></td>
<td>1 = (-)</td>
<td>1 = (-)</td>
<td>1 = (-)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 = NS</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RN ed level</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 = (-)</td>
</tr>
</tbody>
</table>
### RN staffing impact on patients, 2002-2006 (20 studies, 112 findings)

<table>
<thead>
<tr>
<th></th>
<th>Med errors</th>
<th>Mortality</th>
<th>Pneumonia</th>
<th>Post-op infections</th>
<th>Pt satisfaction</th>
<th>Pulmonary compromise</th>
</tr>
</thead>
<tbody>
<tr>
<td>RN, LN / pt, pt day, apd</td>
<td>1 = (-)</td>
<td>5 = (-)</td>
<td>2 = (-)</td>
<td>2 = NS</td>
<td>1 = NS</td>
<td>1 = (-)</td>
</tr>
<tr>
<td></td>
<td>1 = NS</td>
<td>3 = NS</td>
<td>1 = NS</td>
<td>1 = (+)</td>
<td>1 = (+)</td>
<td>1 = NS</td>
</tr>
<tr>
<td>RN, LN skill mix</td>
<td>1 = (-)</td>
<td>2 = (-)</td>
<td>2 = (-)</td>
<td>1 = (-)</td>
<td>1 = (+)</td>
<td>1 = NS</td>
</tr>
<tr>
<td></td>
<td>1 = NS</td>
<td>2 = NS</td>
<td>2 = NS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RN ed level</td>
<td></td>
<td></td>
<td></td>
<td>2 = (-)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nurse/ pt</td>
<td></td>
<td>1 = (-)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### RN staffing impact on patients, 2002-2006 (20 studies, 112 findings)

<table>
<thead>
<tr>
<th></th>
<th>Restraint use</th>
<th>Skin breakdown</th>
<th>Thrombosis</th>
<th>Urinary tract infections</th>
</tr>
</thead>
<tbody>
<tr>
<td>RN, LN / pt, pt day, apd</td>
<td>1 =(- )</td>
<td>1 =(- )</td>
<td>1 = NS</td>
<td>1 = ( - ) 4 = NS</td>
</tr>
<tr>
<td>RN, LN skill mix</td>
<td></td>
<td>1 = (- )</td>
<td>1 = NS</td>
<td>3 = NS</td>
</tr>
</tbody>
</table>
Impact on patients: reviews

- Lang et al., 2004, review 43 studies 1981–2003:
  - positive effect of nurse staffing with FTR and mortality
- Haberfelde et al., 2005:
  - evidence is mixed
- Lankshear et al., 2005:
  - accumulating evidence of a relationship between nurse staffing & patient outcomes.
- Lake & Cheung, 2006:
  - studies of falls and pressure sores 1998-2005
  - methodologies vary and the evidence is inconclusive.
- AHRQ, 2007 (Kane, et al., 2007):
  - large meta-analysis of studies 1990-2006
  - higher nurse staffing is r/t lower pt mortality, FTR
Impact on patients: summary

- Most studies find at least one positive relationship between staffing and patient outcomes and one insignificant or counter-intuitive relationship.

- Counting the number of statistically significant relationships, the following outcomes stand out as being related to nurse staffing:
  - Falls
  - FTR
  - Mortality
  - Pneumonia
### RN staffing & workload impact on nurses
(22 studies, 36 findings)

<table>
<thead>
<tr>
<th></th>
<th>Burn-out</th>
<th>Disengagement &amp; intent to quit</th>
<th>Exhaus-tion</th>
<th>Health status</th>
<th>Job dissatisfaction</th>
<th>Job satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understaffing</td>
<td>1 = (+)</td>
<td></td>
<td>1 = (+)</td>
<td></td>
<td>4 = (+)</td>
<td>1 = (-)</td>
</tr>
<tr>
<td>High workload</td>
<td></td>
<td>1 = (+)</td>
<td>2 = (+)</td>
<td></td>
<td>2 = (+)</td>
<td>2 = (-)</td>
</tr>
<tr>
<td>High job demands, stress</td>
<td>1 = (+)</td>
<td>1 = NS</td>
<td>1 = (+)</td>
<td>1 (-)</td>
<td>2 = (+)</td>
<td>1 = (-)</td>
</tr>
</tbody>
</table>
# RN staffing & workload impact on nurses (22 studies, 36 findings)

<table>
<thead>
<tr>
<th></th>
<th>Life satisfaction &amp; quality</th>
<th>Injury: assault</th>
<th>Injury: musculoskeletal</th>
<th>Injury: needle stick</th>
<th>Stress</th>
<th>Turnover</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under-staffing</td>
<td></td>
<td></td>
<td></td>
<td>1 = (+)</td>
<td></td>
<td>1 = (+)</td>
</tr>
<tr>
<td>High workload</td>
<td>1 = (-)</td>
<td>1 = (+)</td>
<td></td>
<td>1 = (+)</td>
<td>1 = (+)</td>
<td></td>
</tr>
<tr>
<td>High job demands, stress</td>
<td>2 = (-)</td>
<td>1 = (+)</td>
<td></td>
<td></td>
<td></td>
<td>1 = (+)</td>
</tr>
</tbody>
</table>
## Impact on nurses: emotional

- *Emotional exhaustion, &/or burnout &/or job dissatisfaction* are r/t:
  - insufficient nurse staffing
  - high work or job demands/pressure
  - high patient acuity
  - lack of time to do the job
  - too many things happening at once
  - exhaustion at the end of a shift
  - a sense of poor quality
  - fear of making or actually making a mistake
Impact on nurses: physical

- Understaffing/high workloads/physical work demands/work pressure r/t
  - Higher probability of needle-stick injury (Clark, et al. 2002a,b)
  - Neck, shoulder, back injuries (Trinkoff, et al., 2003)
  - Poor health status of nurses (Landeweerd & Boumans, 1994)
Impact on nurses: retention

- **Indirect impact:**
  - Staffing and workload are linked to
    - job dissatisfaction
    - work related exhaustion
    - lower quality of care
  - Job dissatisfaction, work related exhaustion, lower quality of care are linked to
    - intent to quit
    - quitting

- **Direct impact:**
  - higher work tempo is r/t intent to quit (Gardulf, et al., 2005)
  - poor staffing, poor work environment, work stress is why nurses left job (Strachota, et al., 2003)
Impact on nurses: summary

- Nearly all studies find that lower staffing or higher workload are related to:
  - negative emotional and physical health
  - lower retention (directly or indirectly)
- More studies of physical impacts need to be conducted
Impact on hospital finances

- Small number of studies
- Difficulty in making the linkage because benefits of better staffing are difficult to monetize
- Four approaches
  1) Efficiencies r/t impact on personnel and operating costs
  2) Cost savings r/t impact on patient LOS
  3) Cost savings r/t impact on patient adverse events
  4) Costs savings of reduced nurse turnover (thought to be affected by staffing)
Impact on finances: costs

- Older studies of the impact of RN skill mix on personnel & operating costs have mixed results.
- A newer study of both personnel and operating costs finds that:
  - Greater RN skill mix is cost-neutral for both types of costs
  - Greater use of temp RNs leads to higher operating costs
- (Bloom, Alexander, & Nuchols, 1997)
Impact on finances: patient LOS

- Lower LOS r/t
  - greater RN hours
    (Brown, et al., 2002; Shamian, et al., 1994)
  - higher nurse/patient ratios
    (Provonost, et al., 1999)
  - lower nurse workload
    (Behner, et al., 1990)
Impact on finances: patient adverse events

- An increase in RN hours or proportion is r/t
  - a decrease in the odds of pneumonia
  - significantly lower lengths of stay
  - decreased medical cost (Cho, et al., 2003)

- An increase in RN hours
  - significantly *increases* operating *expenses* but has *no significant effect* on *profits* (McCue et al., 2003)

- An increase in RN skill mix
  - *increases* operating *expenses* and *lowers profits* (McCue et al., 2003)
Impact on finances: patient adverse events

- Decreasing patients/nurse
  - lowers mortality and decreases costs but cost savings never completely offset the labor costs.
  - the cost effectiveness declines as the pt/nurse ratio declines
  - *is more cost effective than other patient safety interventions* (Rothberg et al., 2005)

- Raising the proportion of RNs without changing licensed hrs
  - is the least costly of several staffing improvement strategies
  - would result in a small average net benefit (negative net cost) (Needleman, et al., 2006)
Impact on finances: nurse turnover

- For each nurse replaced, turnover costs include:
  - lower productivity of nurse leaving
  - termination costs
  - training costs
  - lower productivity of nurse hiring on
  - other common expenses
Impact on finances: nurse turnover

- Turnover is estimated in 2002 dollars to cost around
  - $62,100 for a medical surgical nurse
  - $67,100 for a specialized nurse (Jones, 2005)
  - This is 119-128% of the average 2002 RN salary
Recommendations

- ensure good staffing levels
- maintain reasonable workload
- make improvements in work environment
- consider the opportunity costs of choices
- be careful with innovations
- evaluate interventions
- promote staffing research
- promote adequate supply of nurses
Selected References


Selected References


Selected References


Selected References


