Nursing Services Research: Examples from Nurse Staffing & Discharge Studies

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What is Nursing Services Research?

(www.insprenet.ca)

• Approach to study health care delivery and systems
• Examination of the structures, processes, and outcomes of nursing care
• Evaluation of nursing practice innovations and improvements in care delivery

Donabedian Structure-Process-Outcomes Model (Donabedian, 1980)
The 2 Driving Forces in Healthcare

- **Quality**
  - Focal concerns in healthcare reform
    - Improve hospital discharge
    - Reduce ED use and readmission

- **Cost**
  - Patients and their payers
  - Providers/hospitals

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21st Century Health Care

Improving quality by promoting a culture of safety through Value-Driven Health Care

- Information-rich, patient-focused enterprises
- Evidence is continually refined as a by-product of care delivery
- Information and evidence transform interactions from reactive to proactive (benefits & harms)
- Actionable information available – to clinicians AND patients – “just in time”

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Black Box of Nursing

In science and engineering, a black box is a device, system or object which can (and sometimes can only) be viewed solely in terms of its input, output and transfer characteristics without any knowledge of its internal workings.

Input  Blackbox  Output
Nurse Staffing & Quality Care

- Looks at how nurse work hours & nurse-to-patient ratios are associated with specific patient outcomes in acute care hospitals.
- Notes factors that influence nurse staffing policies & nurse staffing strategies that improve patient outcomes.
- Found that increased nurse staffing levels are associated with lower hospital-related mortality, failure to rescue & other patient outcomes.

Average Number of Hospital Staff per Acute Care Hospital Bed, 2006


Relationship Between Work Environment & Outcomes

Sources of Design Failure in Complex Systems

Design flaws are expected because (for example):
- Actual operations are more complex than our design models
- System elements interact in unexpected ways
- Procedures, tools, & materials are used in ways not anticipated
- Multiple designers with potentially different goals & assumptions
- Safety features, defenses become degraded over time
- Environmental conditions, expectations, & demands change over time

Healthcare “Systems”
Range from the Simple to Complex
- Syringe, catheter bag & its tubing
- \( \text{O}_2 \) cylinder, ECG machine, IV pump
- Code cart, anesthesia work station
- Hospital computer system
- MRI control room and suite
- ICU, ED, OR

Schedules are One Influence on Worker Performance & Clinical Outcomes
Which Ratio is Right?

Total RN hours/Day: 119.50 RN Hours
12-hour Shifts: + 12
RN Shifts: 9.96 RN Shifts in 24 hrs (2 shifts)
Each Shift: 4.97 RN's each Day/Night Shift
Ratio: 25.9 Patients ÷ 4.97 RNs/shift = 1 RN: 5.2 Patients

Budget

Aug Census: 25.9 Patients
Caregiver RN's/Shift: ÷ 4 RN's/shift
RN to Patient Ratio: 1 RN to 6.47 Patients

Patient Safety Indicators / Nurse Sensitive Indicators

- Death among surgical inpatients with treatable serious complications (failure to rescue)
- Prevalence of hospital-acquired pressure ulcer
- Restraint prevalence
- Patient falls
- Falls with injury
- Catheter-associated urinary tract infections (UTIs) for intensive care patients (ICUs)
- Central line catheter-associated blood stream infections for ICU and Neonatal Intensive Care Unit (NICU) patients
- Ventilator-associated pneumonia for ICU & NICU patients
Types of Errors (“Root Causes”)

Structural Errors:
- Malfunctioning equipment
- Inadequate #, skills of staff
- No “No-lift” policy
- Overtime
- No “error-protecting” barriers
- Reliance on clinician memory
- Poorly designed workspace

Process Errors:
- Not evidence-based
- Failure to abide by policy/procedure
- Task-oriented care
- Not using SBAR
- Interruptions

Decrease Nurse Staff = Increase Mortality Rates

- Assessed abt. 200,000 admissions, 177,000 nursing shifts in 43 patient units.
- When nurse staffing levels fell below target levels, more patients died.
  - Understaffed = patient mortality increased by 2%
  - Understaffed + high patient turnover = patient mortality increased by 4%

Source: Needleman et al., 2011. NEJM.
Strategies for System Improvement

- Institute & foster a culture of safety.
- Institute continual quality improvement processes.
- Decision makers must insist on high-quality evidence in making decisions.
- Systematically identify & prioritize knowledge gaps.
- Examine current processes.
- Gather and use all available data.

Surveys: Advantages & Pitfalls

- Advantages
  - Relatively cheap & easy
  - Broad range of items
  - Large samples possible
  - Standardized items

- Pitfalls
  - Too many surveys
  - Too long surveys
  - May not be representative of population (nonresponse bias)
  - Subjective response – may answer based on what they think the questioner wants (response bias)
Secondary Databases

- Where are they?
  - Federal government
  - National programs
  - State-wide programs
  - Insurers
  - State government
  - Hospitals

- Why use them?
  - Already exist.
  - Low cost.
  - Circumvent data collection problems.
  - Can detect statistically significant differences absent in smaller samples.
  - Diverse & broad.
  - Multiple purposes.
  - They’re fun - sometimes.

Understanding Data Contents

- How variables were operationally defined.
- Conceptual match.
- Sampling methodology.
- Reliability & validity of data.
- Historico-socio-political context behind data collection.
- Completeness, Accuracy, Missing data

Unit Level Safety Culture

Scenario: Due to wide variations in hospital acquired infections, unit level assessments of safety culture were planned. Objective was to provide caregivers and managers with feedback on dimensions of safety culture for their own unit compared to benchmarks.

- Question: Does the perceived safety culture vary across inpatient units? If yes, on what dimensions?

- Approach:
  - Use established tool “Hospital Survey of Patient Safety” (AHRQ.gov)
  - Carefully consider sampling and ways to increase response rate
  - Protect confidentiality (anonymity vs. confidentiality)
  - Pretest
Research Designs

No intervention
- Descriptive (describe variables)
- Correlational (examine relationships)

Intervention
- Quasi-experimental (no random assignment)
- Experimental (random assignment and control)

Quality & Cost Analysis of Nurse Staffing, Discharge Preparation, & Post-Discharge Utilization

Conceptual Model
Our study results

<table>
<thead>
<tr>
<th>Staffing</th>
<th>Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>↑ Quality of Discharge Teaching</td>
<td>Process</td>
</tr>
<tr>
<td>↑ Readiness for Hospital Discharge</td>
<td>Outcome</td>
</tr>
<tr>
<td>↓ Readmissions &amp; ↓ ED visits</td>
<td>Outcome</td>
</tr>
</tbody>
</table>

THE BOTTOM LINE
Cost Analysis: Unplanned/related readmissions & ED

- **Hospital ‘Costs’** per hospitalized patient:
  - RN staffing: .75 HPPD = $145.74
  - Loss of revenue from readmission: $52.18

- **Payer Savings** per hospitalized patient:
  - ↓ Readmission: $607.51

THE BOTTOM LINE
Net savings

- **Hospital ‘Costs’**
  - ↑ RN staffing
  - Loss of revenue from readmission

- **Payer Savings**
  - $11.6M (for 16 m s units) ↓ Readmission

Reinvestment
Current projects

- Nurse staffing and outcomes
- Discharge transition measures and outcomes.
- Non-failure to rescue
- Magnet sustainability study
- Outcomes of elderly post-surgical patients
- Consultation on discharge process improvement

Summary

- Field of NSR is fairly young.
- Involves interdisciplinary research.
- Should involve cost analysis.
- New methodological techniques are being developed.
- Goal is to provide safe, effective, efficient care at all points in patient experience.
Clinicians, leaders, educators, and researchers who transform health care

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