The Ecology of the Nursing Unit:
Design, Communication, Stress and Performance

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SELECTED Cornell RESEARCH PROJECTS

Franklin Becker & Ronojoy Dutta

Influence of Nursing Unit Layout on Staff Communication and Interaction Patterns
(2007)

Franklin Becker & Anton Villacorte

An Exploratory Case Study of Decentralized Nursing Units
(2007)

Franklin Becker, Rosie Adams, & Sarah Hammer

The Role of Physical Design and Informal Communication and Learning in Reducing Stress and Gaining Competency Among New Nurse Graduates
(2008)
New ICCU

Old ICCU

Intensive Cardiac Care Unit (ICCU) at Cayuga Medical Center
How does the change from a more centralized to more decentralized nursing unit design affect communication patterns, teamwork and collaboration, and job stress and job satisfaction?

**Hypothesis 1:**
The frequency of communication among nurses and other clinical staff will decrease in a more decentralized unit design.

**Hypothesis 2:**
Nurses will continue to walk constantly among pods and other work areas in a more decentralized unit design.

**Hypothesis 3:**
Teamwork and collaboration will decline in a more decentralized unit design.

**Hypothesis 4:**
Staff members' job satisfaction will decrease and job stress will increase in a more decentralized unit design.
Systematic observations of communication frequencies and behaviors within the ICCU both before and after its relocation to a new space.

Data collected
- Professional Role
- Gender
- Duration of interaction
- Location of interaction

Sample Data Recording Sheet

<table>
<thead>
<tr>
<th>Staff</th>
<th>Region</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>RN m</td>
<td>RN m</td>
<td>m</td>
<td>m</td>
<td>m</td>
<td>m</td>
<td>other RN m  RN m  RN m</td>
</tr>
<tr>
<td>CN m</td>
<td>CN n</td>
<td>m</td>
<td>RN m</td>
<td>m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FN m</td>
<td>MD m</td>
<td>m</td>
<td>M D m</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MD m</td>
<td>MD m</td>
<td>m</td>
<td>M D m</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NS m</td>
<td>RT m</td>
<td>m</td>
<td>RT m</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AT m</td>
<td>AT m</td>
<td>m</td>
<td>AT m</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NA n</td>
<td>NS n</td>
<td>m</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WC m</td>
<td>CM m</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NS m</td>
<td>HK m</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D m</td>
<td>PF m</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

length of conv | S | M | L | XL

location | P1m | P2 | corridor

Sample Time Table

Total Observations

<table>
<thead>
<tr>
<th></th>
<th>Pre-Move</th>
<th>Post-move</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hrs</td>
<td>23</td>
<td>50</td>
</tr>
<tr>
<td>Obs.</td>
<td>1058</td>
<td>899</td>
</tr>
</tbody>
</table>
Results

Pre-Post Comparative Analysis by Location

Locations | Pre-Move Data | Post-Move Data
----------|---------------|-----------------|
Nursing Pods | 36 | 13.5 (62.8%) |
Corridor Areas | 7 | 4.48 (35.6%) |

Total Hours of Observation: 23, 50

Average Interactions per Hour

(% decrease from pre-move data value)
Results

Pre-Post Comparative Analysis by Duration

<table>
<thead>
<tr>
<th>Duration of Interaction</th>
<th>Pre-Move Data</th>
<th>Post-Move Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short (&lt; 1 min)</td>
<td>34.74</td>
<td>15.94 (54.1%)</td>
</tr>
<tr>
<td>Medium (&gt;1 min &lt; 5 min)</td>
<td>7.61</td>
<td>1.86 (75.6%)</td>
</tr>
<tr>
<td>Long (&gt; 5 min &lt; 10 min)</td>
<td>0.74</td>
<td>0.18 (75.6%)</td>
</tr>
<tr>
<td>Extra Long (&gt; 10 min)</td>
<td>0.13</td>
<td>0</td>
</tr>
</tbody>
</table>

Total Hours of Observation: 23, 50

Number of Interactions per Hour: 40, 30, 20, 10, 0, 10, 20, 30, 40

(% decrease from pre-move data value)
The Ecology of the Nursing Unit

Results

Pre-Post Comparative Analysis by Number of Persons Interacting

<table>
<thead>
<tr>
<th>Number of Persons Interacting</th>
<th>Pre-Move Data</th>
<th>Post-Move Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>37.61</td>
<td>16 (57.5%)</td>
</tr>
<tr>
<td>3</td>
<td>4.65</td>
<td>1.84 (60.4%)</td>
</tr>
<tr>
<td>4</td>
<td>0.74</td>
<td>0.14 (81.1%)</td>
</tr>
<tr>
<td>5</td>
<td>0.22</td>
<td>0</td>
</tr>
</tbody>
</table>

Total Hours of Observation: 23 for Pre-Move Data, 50 for Post-Move Data.
Results

Pre-Post Comparative Analysis by Role Pairs

<table>
<thead>
<tr>
<th>Staff Roles</th>
<th>Pre-Move Data</th>
<th>Post-Move Data</th>
<th>(% decrease from pre-move data value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RN - RT</td>
<td>2.00</td>
<td>0.6</td>
<td>70.0%</td>
</tr>
<tr>
<td>RN - OTH</td>
<td>1.04</td>
<td>1.12</td>
<td>-7.3%</td>
</tr>
<tr>
<td>RN - MD</td>
<td>2.83</td>
<td>1.46</td>
<td>48.3%</td>
</tr>
<tr>
<td>RN - AT</td>
<td>6.04</td>
<td>2.42</td>
<td>60.0%</td>
</tr>
<tr>
<td>RN - WC</td>
<td>5.87</td>
<td>2.9</td>
<td>50.6%</td>
</tr>
<tr>
<td>RN - RN</td>
<td>12.30</td>
<td>4</td>
<td>67.5%</td>
</tr>
</tbody>
</table>

Total Hours of Observation: 23 (Pre-Move) vs 50 (Post-Move)

Number of Interactions per Hour:
- MD: Doctor
- OTH: Others
- WC: Ward Clerk
- AT: Nursing Aide
- RN: Registered Nurse
- RT: Respiratory Therapist
The Ecology of the Nursing Unit

Non-Interactive Individual Events
- 67% Work
- 31% Patient Rooms
- 2% Non-Work

Number of Individual vs Interactive Events (N = 1822)

- 43% Individual
- 57% Interactions
Summary of Nurse Travel
50 Observations
Average = 22 locations/hour
Range = 7 - 49 locations per hour
Over 8 hour shift, approximately
• 22 x 8 = 176 locations
Over 12 hour shift, approximately
• 22 x 12 = 264 locations
Q4: The nursing personnel on my unit are more likely to pitch in and help one another when things are in a rush than they were prior to the move

Staff comments to question:

“The isolation makes it difficult to know what is happening in other areas”

“Less likely because “pods”, walls are all barriers to unity. less ability to learn from each other, teach, know less about each others patients”

“It is difficult to help others because the unit is more spread out”

Q5: Since relocating the ICU, physicians and staff work better together than they did prior to the move

Staff comments to question:

“Less likely because “pods”, walls are all barriers to unity. less ability to learn from each other, teach, know less about each others patients”

“This is 100% related to a change in MD’s and change in companies” (strongly disagreed to question)
Q10: I would be more likely to recommend this unit as a good place to work than I would have been prior to the move

Staff comments to question:

"Its cleaner, brighter – the physical"

Q17: Since relocating the ICU, I am more satisfied with my job than prior to the move

Staff comments to question:

"Slightly"

“I love my job, I love my job”

“MD related” (Disagree)
The Ecology of the Nursing Unit

Teamwork

Job Stress

Job Satisfaction

Valued
Organizational Ecology
The Ecology of the Nursing Unit

It's a System: Design, Culture, Work Processes, Technology

- Physical Design
- Information Technology
- Work Processes
- Culture
Research Purpose

• To **explore** the role that the physical design of a nursing unit plays during the new nurse “orienting” period in creating more or fewer opportunities for informal, on-the-job communication and learning that can help reduce stress and build competency.
How does the design of the nursing unit affect communication patterns, opportunities for informal learning, competency, and job stress among new nurse graduates (NNG)?

**Hypothesis 1:**
The frequency of communication among NNGs and other clinical staff will decrease in a more decentralized unit design.

**Hypothesis 2:**
NNG who communicate less will experience higher stress levels and slower decline in stress levels over the orienting period (12 wks).

**Hypothesis 3:**
NNG who communicate less will achieve lower competency ratings than NNG who communicate more over course of orienting period.
Data Collection

- Track NNG’s patterns of work and communication
- Measure time/task

- Measure NNG perceived stress, and learning opportunities
- Understand culture of nursing unit

- Measure level of competency weekly
- Utilize pre-existing rating system

- Understand how design influences communication and learning
- Further understand complexity of unit

- Physiological measure of stress
- Analyze change over time