The Impact of Window Views on ICU Patients and Staff
Introduction

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http://www.northside-cottage.co.uk/side%20view%20from%20bed%20window.jpg
This research project addresses the impact of windows and window views on patient outcomes and staff behavior in an intensive care unit.
Purpose

Evidence suggests that:

1) **windows** in ICUs can reduce patient delirium (Wilson, 1972; Keep, et al., 1980),

2) **views of nature** can reduce LOS, negative comments, and requests for analgesics (Ulrich, 1984),

3) **sunlight** can reduce perception of pain and requests for medication (Walch, et al., 2005).
1. New unit was compared to the old unit, which was limited in views.
2. Patient information gathered from medical records: length of stay, and pain perception.
3. Staff data gathered from personnel and hospital records including attrition and sick leave and medical errors.
Two categories of studies were relevant to this project:

• independent variables associated with the physical environment (windows, views, sunlight) and

• dependent variables of human response (health outcomes, attrition, etc.).
Impact of Windows

- Traditionally, window design was linked to daylight and ventilation requirements.
- With changes in technology, stricter environmental requirements, and reduced building depth, these requirements diminished (Markus, 1967).
Literature Review - The Environment

• Keighley (1973) found that satisfaction regarding windows was influenced by area and proportion and the number and width of mullions.

• The most preferred were horizontal apertures occupying 25-30% of the exterior wall.
Roessler (1980) examined the relationship between windows (width, views, illuminance) and psychological factors. Unpleasant feelings of enclosure were minimal with a width of 1.5m; ideal was 2 lateral windows with a width of 3-4m in a 6m wide room. Windows improved satisfaction and retention in offices (Farley & Veitch, 2001).
• Kaplan (1993) notes that **views** are also **important**; **built forms** are not negative, if landscaping is provided. Windows allow for the redirection of attention, which provides rest.

• Tennessen & Cimprich (1995) found **students in dormitory rooms with good views of nature** had a better capacity to direct attention.
Windows in Healthcare Settings

• Wilson (1972) found twice as many windowless patients with delirium.

• Staff reported negative impacts on both patients and staff in a windowless ICU (Keep, 1977)

• Patients had poorer recollections and were less oriented. Hallucinations twice as frequent (Keep, et.al., 1980).
• Ulrich (1984) noted that gall bladder surgery patients, who had nature views had a shorter length of stay, took less pain medication and made fewer negative comments than those who had views of a building.
• Verderber (1986) used photoquestionnaires, interviews and observations in the inpatient, office and therapeutic spaces of a rehab hospital.
• Windows with high sills, distant from viewer or obscured by walls and furnishing ranked as poorly as having no windows at all.
Verderber & Reuman (1987) compared inpatient and staff experience. Patients more negatively impacted than staff by rooms with limited fenestration. Being located more than 10’ from a window significantly impacted patients who were immobile, visually impaired or non-Caucasian.
Sunlight and Natural Light

- Ne’eman (1974) found 91% of patients and 31% of staff found sunlight to be pleasurable.
- 93% of people in housing, 42% of in schools and 73% in offices considered it pleasurable.
- In hospitals, 50% preferred good views without indoor sunshine and 31% preferred unpleasant views with indoor sunshine.
• Walch et al. (2005) compared use of pain medications in patients who were on the bright and dim side of a hospital.
• Those on the bright side were exposed to 46% higher sun intensity and perceived less stress and less pain, and took fewer analgesics.
Patients

- ICU patients are vulnerable to stress; the trauma of the ICU extends long after discharge.
- Research on patient experience in ICUs is limited, as they are often unconscious or disoriented.
- Researchers, however, have useful data regarding patient memories of the ICU (Rattray, et al., 2004; Swaiss & Badran, 2004).
Medical Staff

- Nurses experience high stress in ICUs. Goodfellow, et al. found 27% of ICU physicians experience psychiatric difficulties.

- Negative environmental factors: poor access to equipment, inadequate storage space, (Gibbons, et al. 1998), inadequate work space, noise, inappropriate lighting, too many people, (Bailey, 1980).
Methodology

Site
The previous Concord Hospital ICU was a 16-bed facility and the new facility has 20 beds. Staffing was proportionally consistent in both facilities.
Methodology – Site - Old ICU
Methodology – Site – New ICU
Methodology – Site – New ICU

Roof garden views

Office view
Subjects
• Subjects included all medical staff assigned to the unit on a regular basis September 2006 to September 2007, and March 2008 to March 2009.
• Patients randomly selected from total pool during same periods.
**Methodology**

**IRB**

- Reviewed by the Institutional Review Board of Concord Hospital.
- Anonymity of all subjects was maintained throughout the study.
1. **Window attributes.** Per Verderber (1987):
   a. proximity of head of bed to window,
   b. window to total wall area ratio (percentage), and
   c. sill height above floor.

2. **Views** (% of nature of total view) as seen from head of bed.
3. Sunlight intensity. Per Walch (2005), light intensity (lux) measured twice daily at 9:30 and 3:30 pm within 5 days of solstice/equinox. Door was closed, lights off, blinds opened. Measurements taken 5 times and averaged; multiplied by morning and afternoon hours; summed for total sunlight in lux-hours. Direct, reflective, and ambient.
Methodology – Independent Variables

a. **Direct light** measured intensity of the sunlight at the location where it first entered the room.
b. **Reflective light** measured sunlight reflected off patient’s bed by focusing meter at patient’s eye level.
c. **Ambient** measure recorded light reflected from interior surfaces. Meter placed at head of bed and pointed toward window.
Preliminary Results – % Window of Wall

- North: 28% (Old Unit), 18% (New Unit)
- East: 25% (Old Unit), 15% (New Unit)
- South: 20% (Old Unit), 10% (New Unit)
- West: 30% (Old Unit), 20% (New Unit)
Preliminary Results - Views of Nature

- North
- East
- South
- West

Old Unit
New Unit
Preliminary Results – Light Levels Old Unit

North

East

South

West

December 21, 2007

March 20, 2008

June 20, 2008

September 22, 2008

North

East

South

West
Preliminary Results – Light Levels New Unit

North
East
South
West
December 21, 2007
March 20, 2008
June 20, 2008
September 22, 2008

-5000.0
5000.0
15000.0
25000.0
35000.0
45000.0
55000.0

December 21, 2007
March 20, 2008
June 20, 2008
September 22, 2008

North
East
South
West

-5000.0
5000.0
15000.0
25000.0
35000.0
45000.0
55000.0

North
East
South
West
Preliminary Results – Light Levels Compared
Methods – Dependent Variables

Data was gathered pre- and post-construction by Concord hospital staff including:
1. Staff vacancy
2. Staff absenteeism
3. Medical errors
4. Patient length of stay
6. Perceived pain
7. Family and staff satisfaction (Press Ganey)
Preliminary Results – Perceived Pain

Average Perceived Pain – Old Unit
18 sequential observations on a scale of 1 to 10
Preliminary Results – Nurse Vacancy

Vacancy Rate (%)

Old Unit

New Unit
Preliminary Results – Medical Errors

Process Improvement Data Sheet filings – Old Unit
POE Study
Next Steps

- Process patient data from new unit
- Inferential statistical analysis
- Peer reviewed publication
- Examining data from other projects