

The Impact of Window Views on ICU Patients and Staff

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Introduction

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1. Purpose
2. Literature Review
3. Methods
4. Preliminary Results



<http://www.northside-cottage.co.uk/side%20view%20from%20bed%20window.jpg>

Purpose

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This research project addresses the impact of windows and window views on patient outcomes and staff behavior in an intensive care unit.



Purpose

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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).



Purpose

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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.



Literature Review

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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.).



Literature Review - The Environment

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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

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- 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.



Literature Review - The Environment

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- 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).



Literature Review - The Environment

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- 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.**



Literature Review - The Environment

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Windows in Healthcare Settings

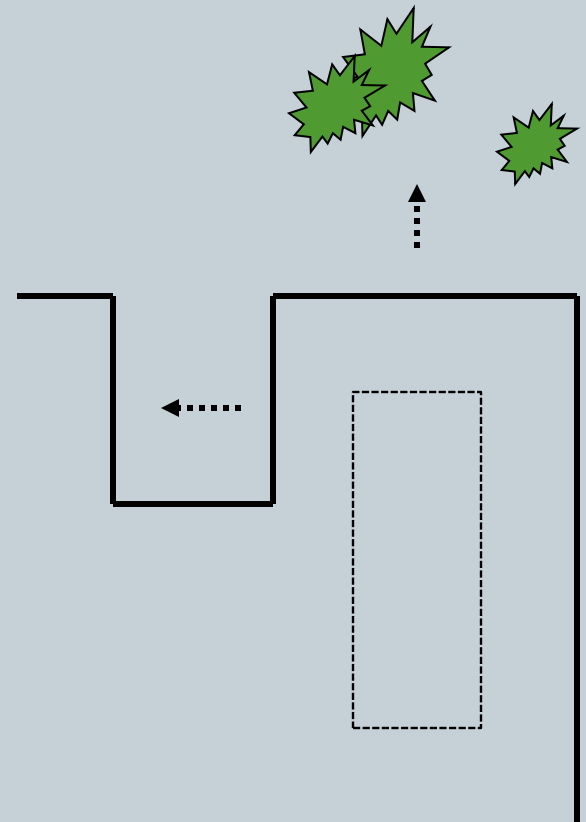
- Wilson (1972) found **twice as many windowless patients with delirium.**
- Staff reported **negative impacts on both patients and staff** in a windowless ICU (Keep, 1977)
- Patients had poorer recollections and were less oriented.
Hallucinations twice as frequent (Keep, et.al., 1980).



Literature Review - The Environment

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- 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.**



Literature Review - The Environment

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- 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.



Literature Review - The Environment

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- 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.

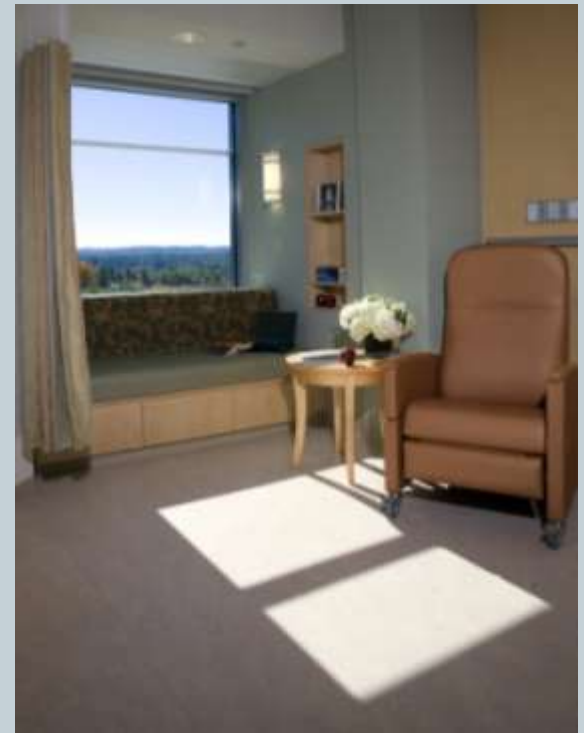


Literature Review - The Environment

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Sunlight and Natural Light

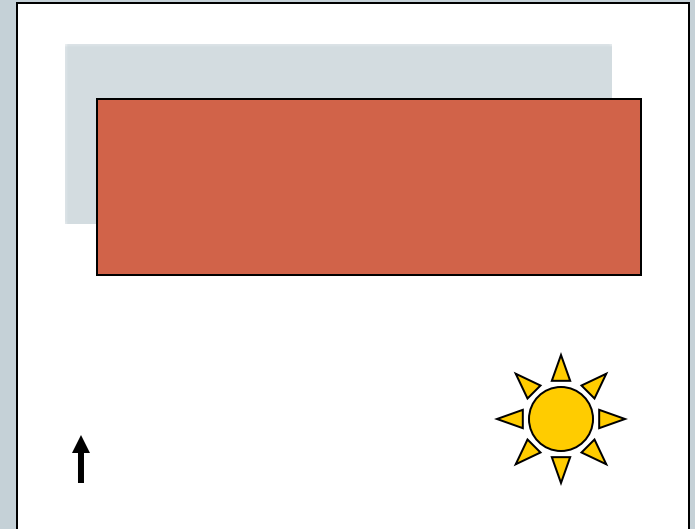
- Ne'eman (1974) found **91% of patients and 31% of staff** found sunlight to be pleasurable.
- 93% of people in housing, 42% of in schools and 73% in offices considered it pleasurable.
- In hospitals, **50% preferred good views without indoor sunshine and 31% preferred unpleasant views with indoor sunshine.**



Literature Review - The Environment

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- 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.**



Literature Review - The People

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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).



Literature Review - The People

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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

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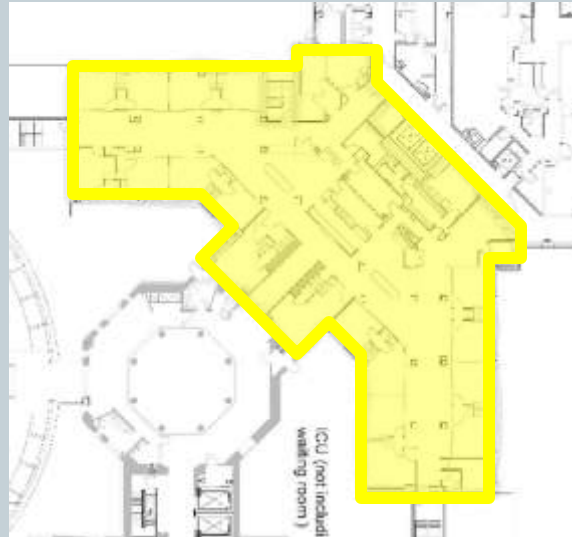
Site

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

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Methodology – Site – New ICU

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Methodology – Site – New ICU

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Roof garden views



Office view

Methodology

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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

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IRB

- Reviewed by the Institutional Review Board of Concord Hospital.
- Anonymity of all subjects was maintained throughout the study.



Methodology – Independent Variables

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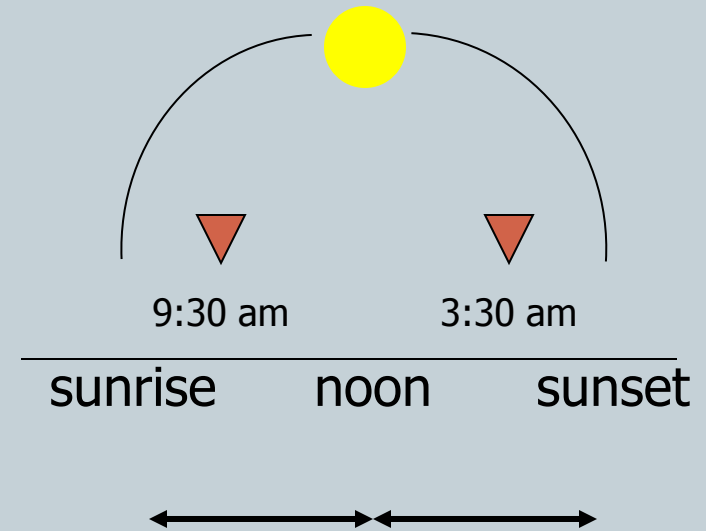
1. **Window attributes.** Per Verderber (1987):
 - a. proximity of head of bed to window,
 - b. window to total wall area ratio (percentage), and
 - c. sill height above floor.
2. **Views** (% of nature of total view) as seen from head of bed.



Methodology – Independent Variables

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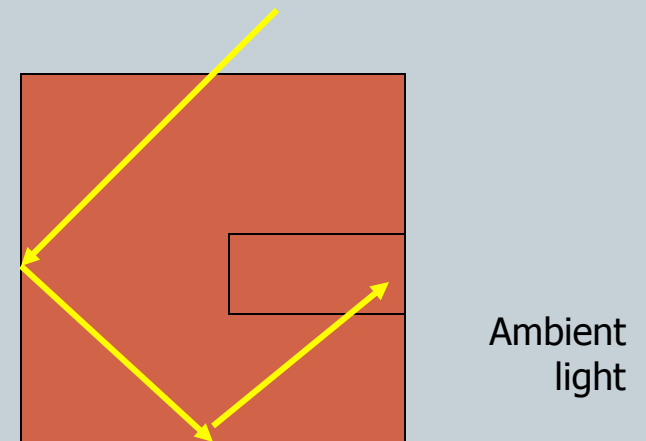
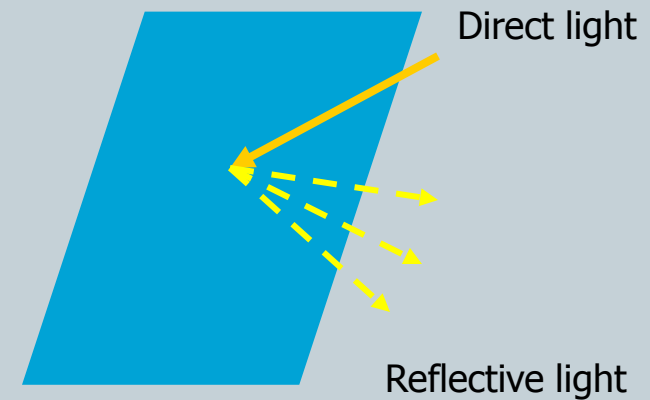
3. **Sunlight intensity.** Per Walch (2005), light intensity (lux) measured twice daily at 9:30 and 3:30 pm within 5 days of solstice/equinox. Door was closed, lights off, blinds opened. Measurements taken 5 times and averaged; multiplied by morning and afternoon hours; summed for total sunlight in lux-hours. Direct, reflective, and ambient.



Methodology – Independent Variables

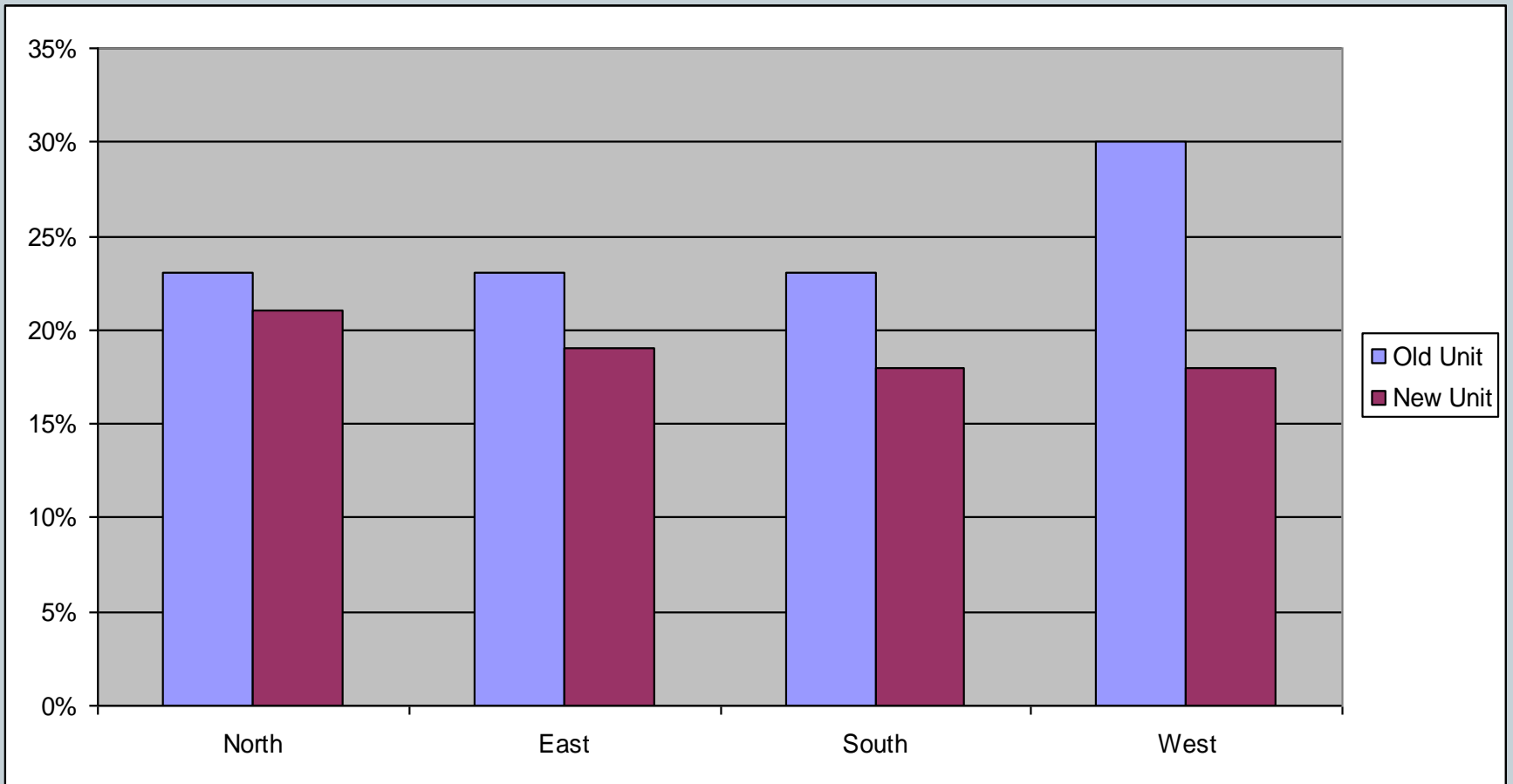
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- a. **Direct light** measured intensity of the sunlight at the location where it first entered the room.
- b. **Reflective light** measured sunlight reflected off patient's bed by focusing meter at patient's eye level.
- c. **Ambient** measure recorded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



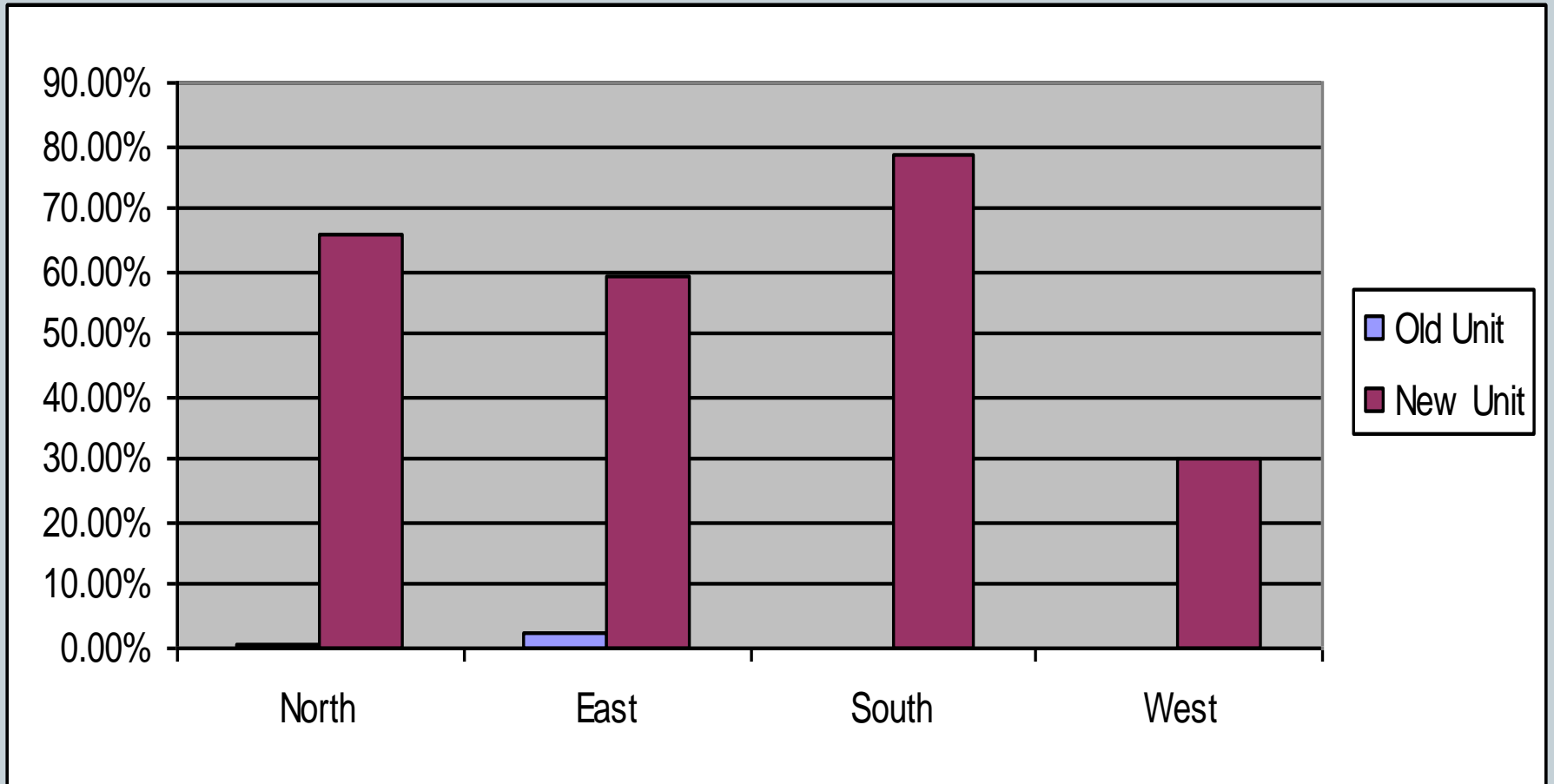
Preliminary Results – % Window of Wall

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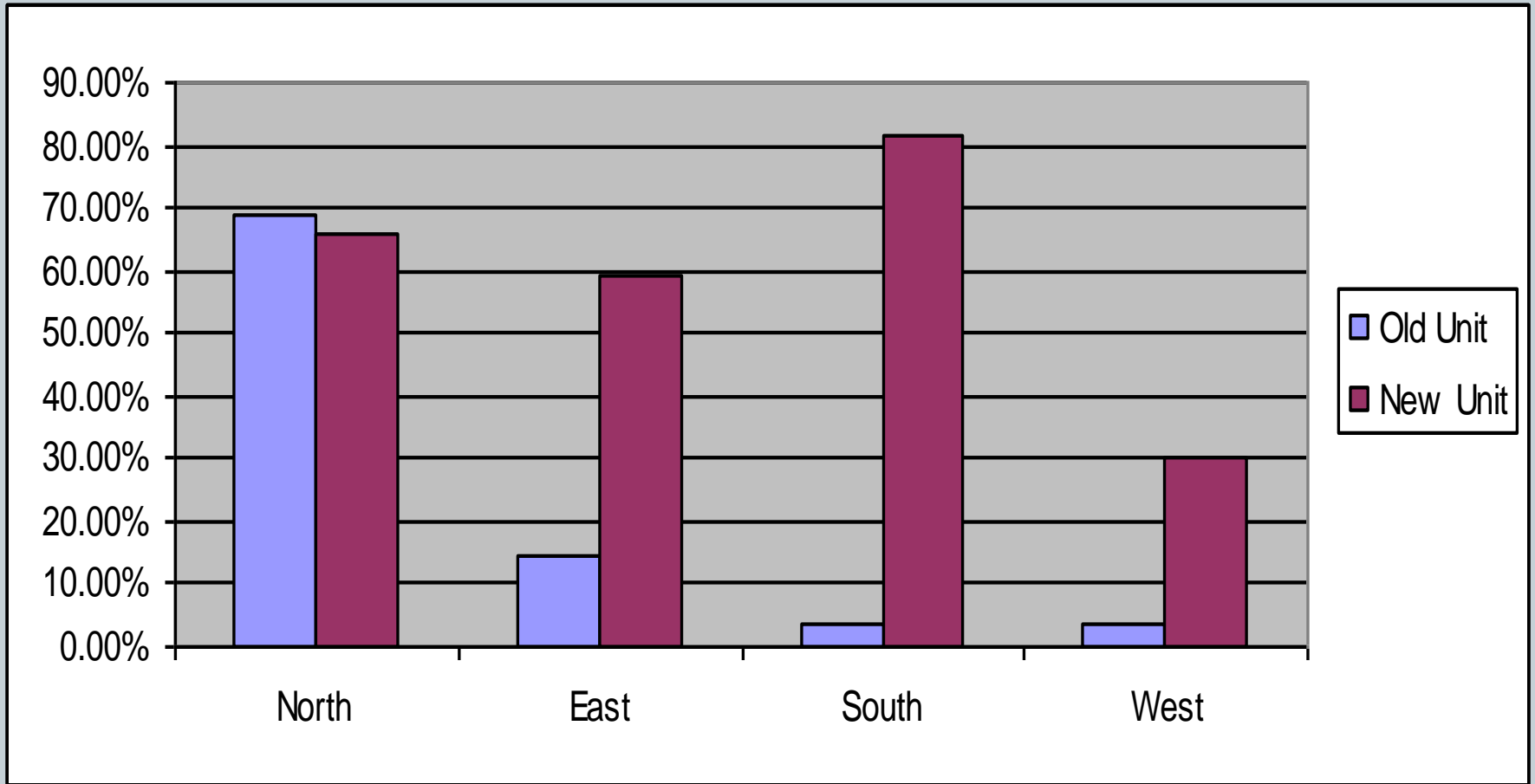
Preliminary Results - Views of Nature

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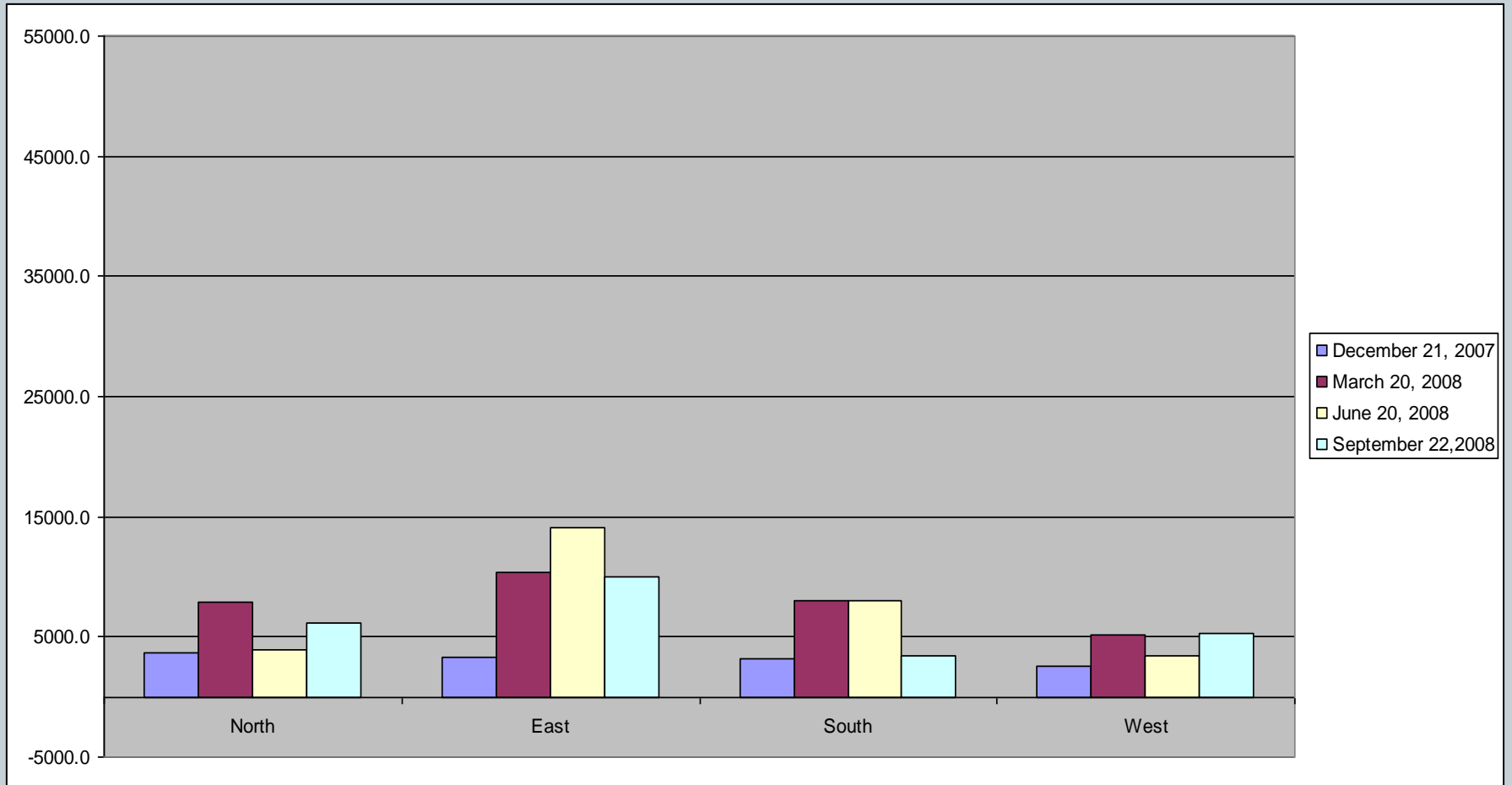
Preliminary Results – Views of Nature & Sky

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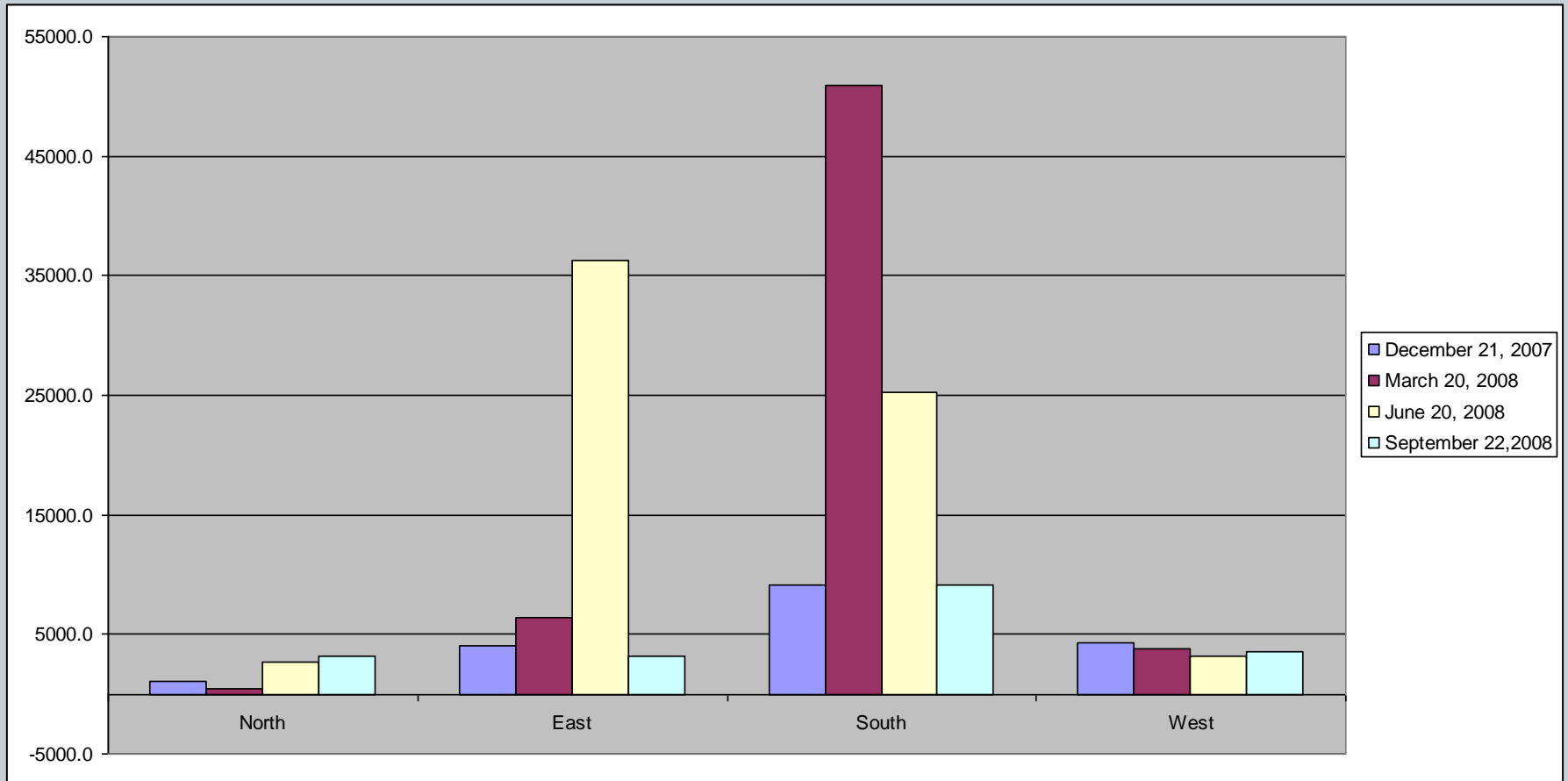
Preliminary Results – Light Levels Old Unit

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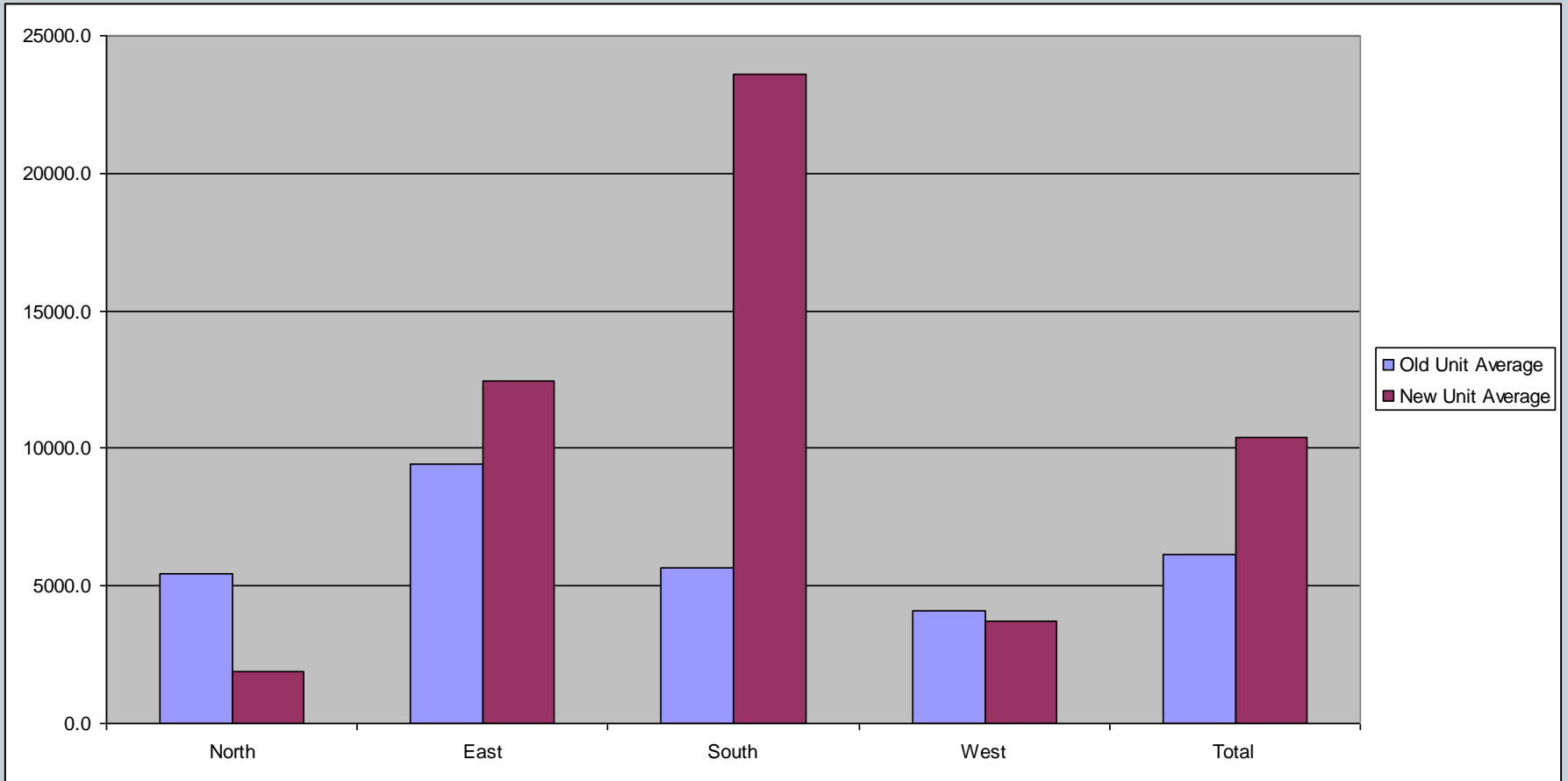


Preliminary Results – Light Levels New Unit

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Preliminary Results – Light Levels Compared



Methods – Dependent Variables

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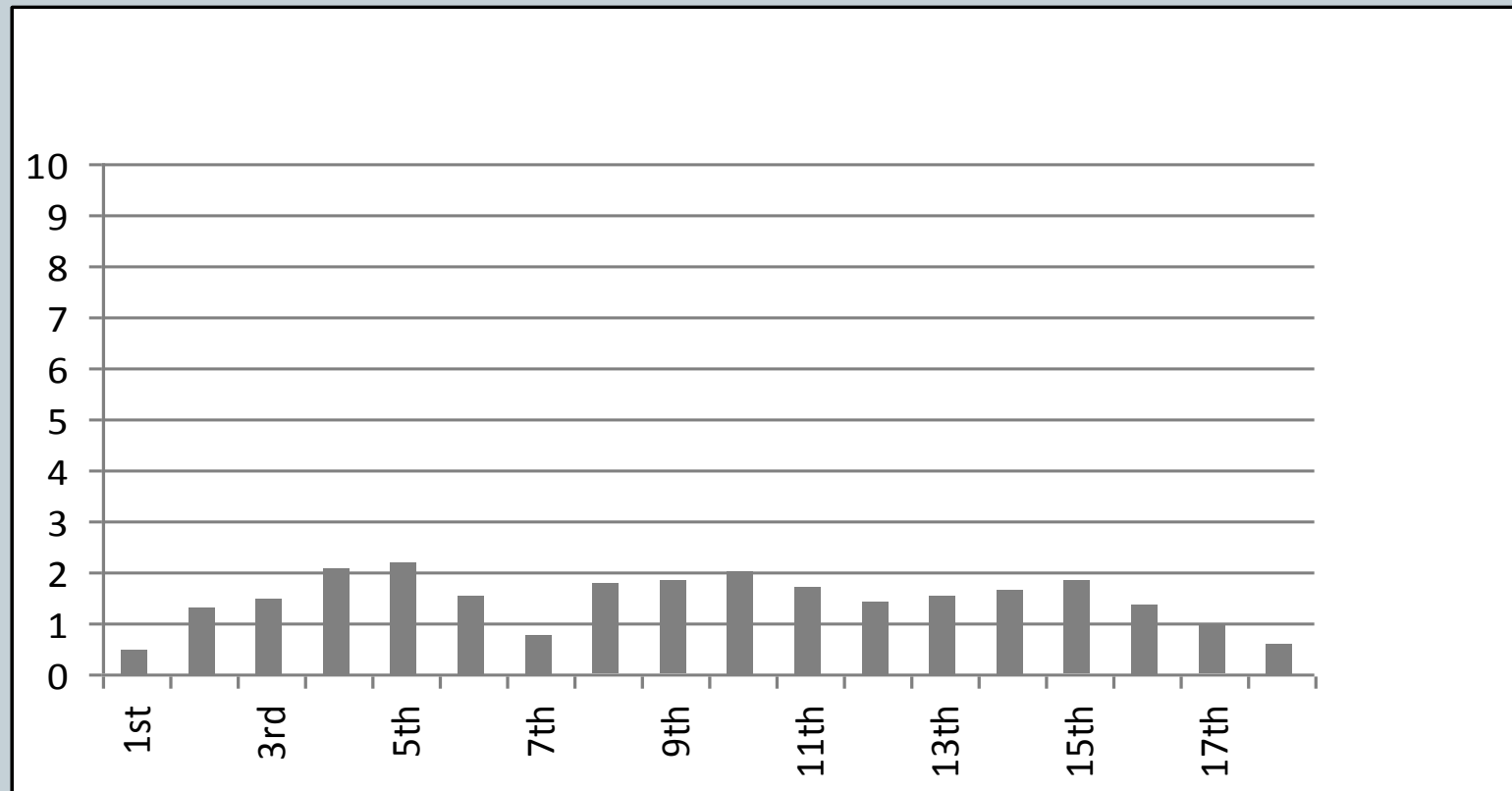
Data was gathered pre- and post-construction by Concord hospital staff including:

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

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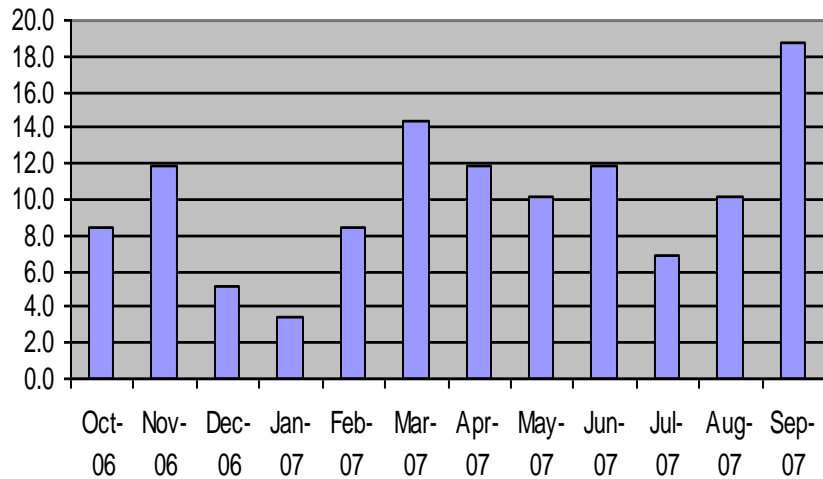


Average Perceived Pain – Old Unit
18 sequential observations on a scale of 1 to 10

Preliminary Results – Nurse Vacancy

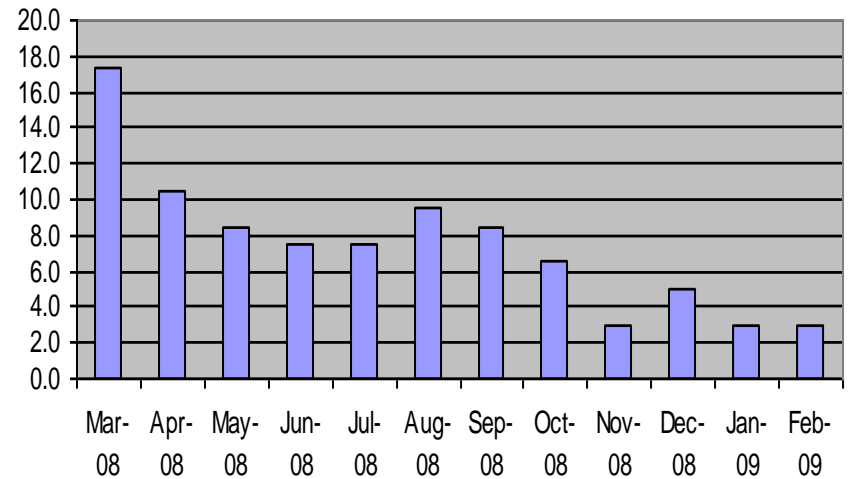
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Vacancy Rate (%)



Old Unit

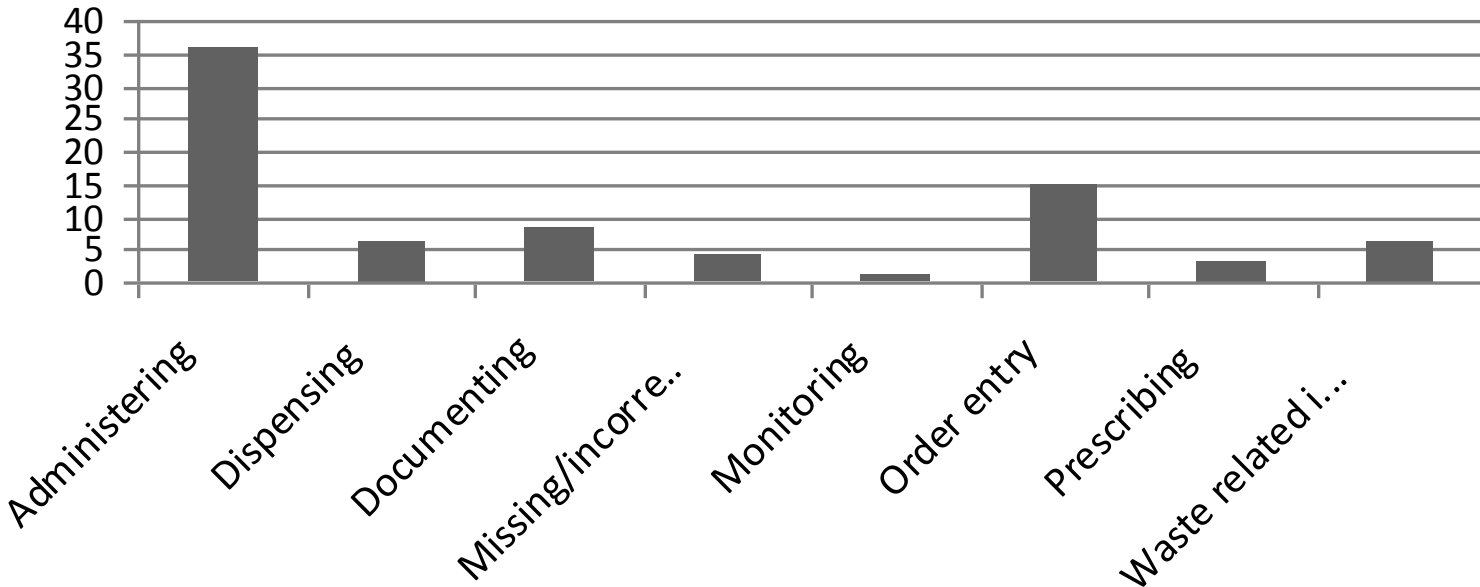
Vacancy Rate (%)



New Unit

Preliminary Results – Medical Errors

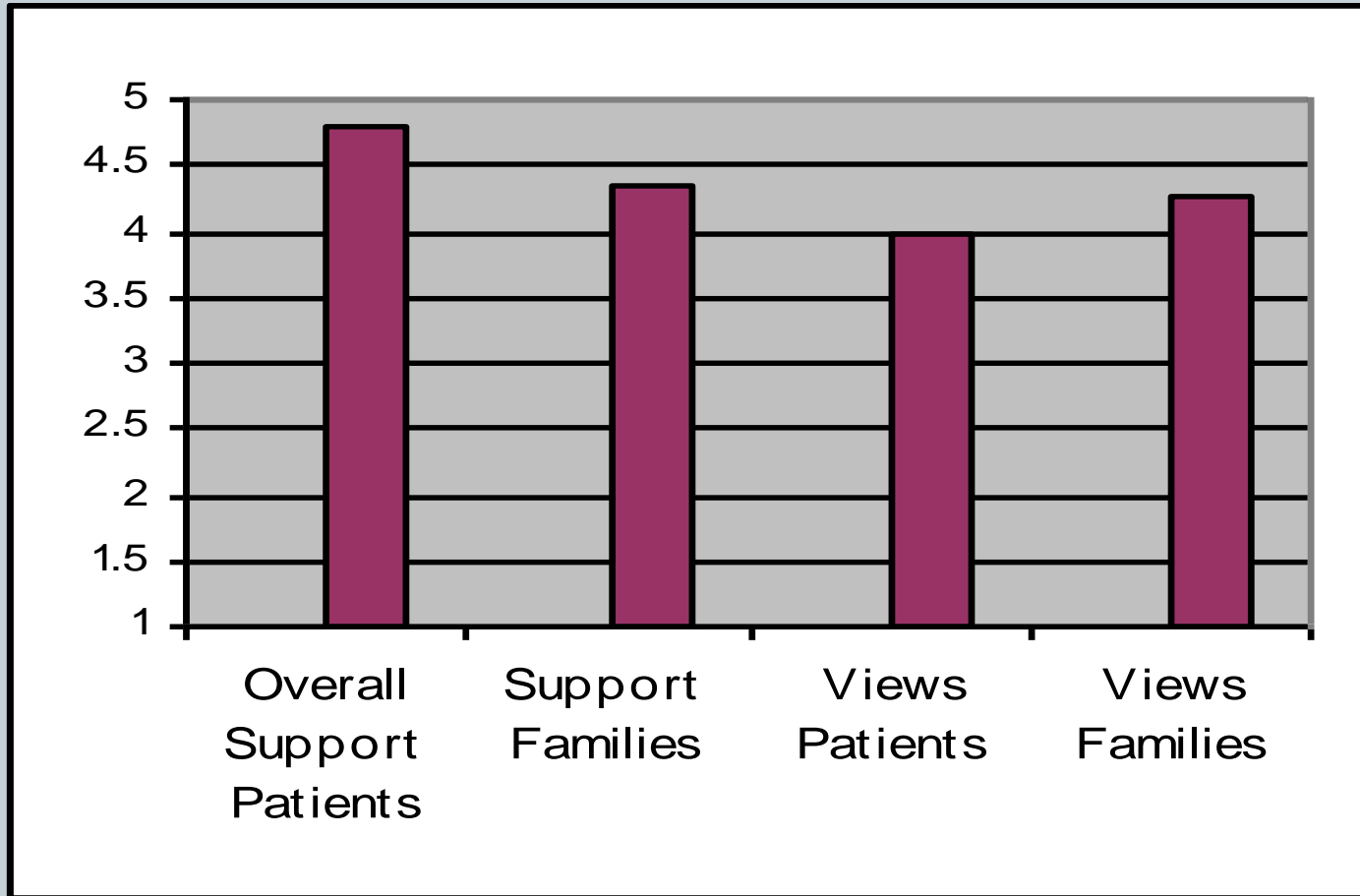
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Process Improvement Data Sheet filings – Old Unit

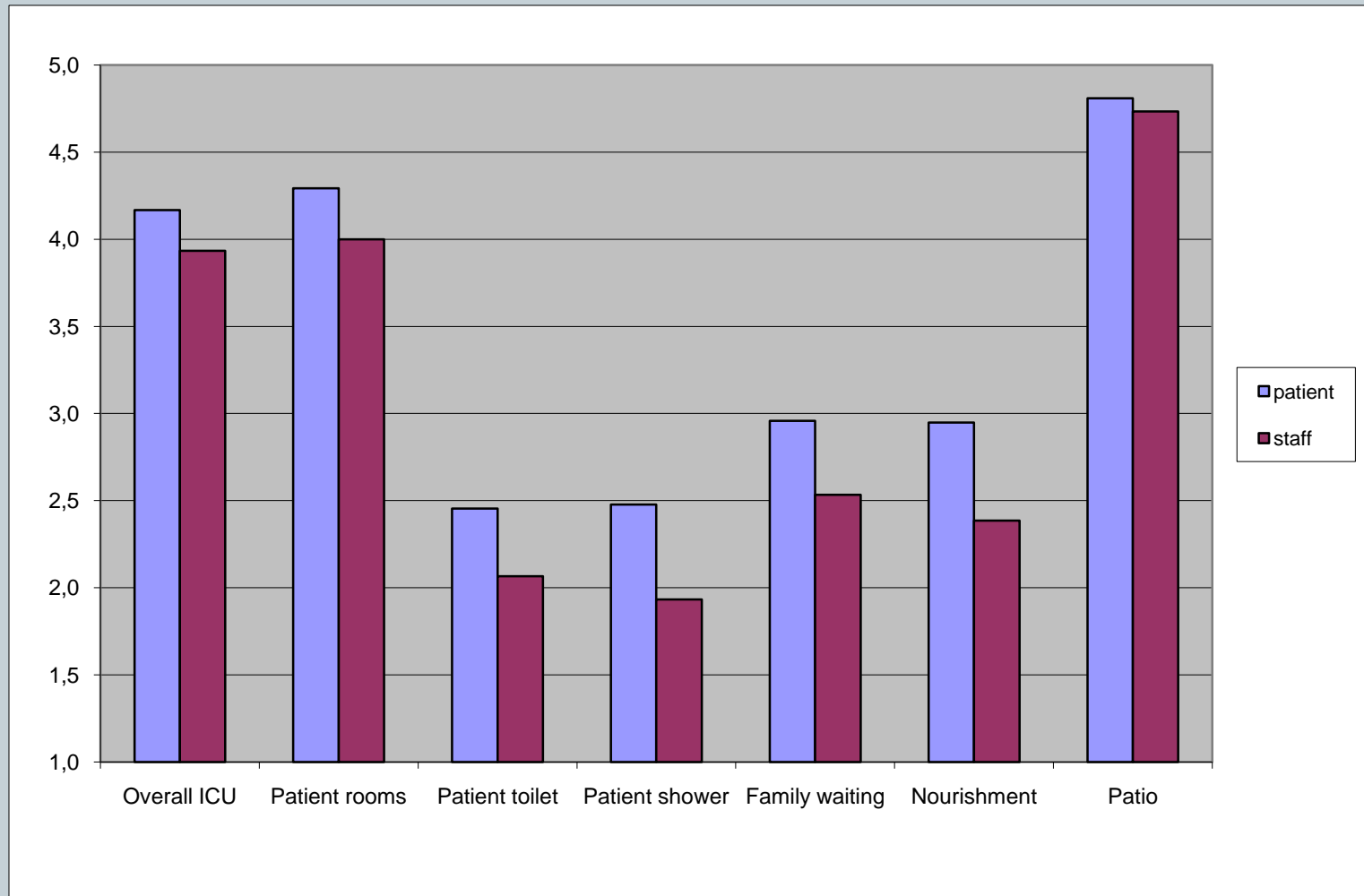
POE Study

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POE Study

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Next Steps

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

