Evidence Based Design: What is the Fuss About?

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Learning Objectives

- A Brief History of EBD
- The Evidence Base
- The Impact of EBD
- What to do
• “It is the unqualified result of all my experience with the sick, that second only to their need of fresh air is their need of light ...“.”

• “They [the sick] should be able, without raising themselves or turning in bed, to see out of window from their beds, to see sky and sun-light at least, if you can show them nothing else, I assert to be, if not of the very first importance for recovery, at least something very near it. “
NOTES ON NURSING
What it is, and what it is not

BY
FLORENCE NIGHTINGALE

New York
D. Appleton and Company
1860

[First American Edition]
EBD Timeline

- 1970: Behavioral Architecture studies
- 1980: Planetree established (1978)
- 1980s: Roger Ulrich’s pioneering studies on healing environments
- 1990: First Planetree M/S unit opens
- 1995: Cochrane Collaboration formed
- 2000: CHD’s analytical summary reports
- 2005: Ulrich & Zimring Meta-Analyses
- 2001: IOM publishes The Quality Chasm
- 1999: IOM publishes To Err is Human
- 2003: JCAHO begins revision of Infection control standards
- 2006: DoD Facility Planning Criteria & AIA Guidelines both recommend single-patient Inpatient rooms

Adapted from Malone, Mann-Dooks & Strauss, 2007
1. More evidence than expected: 1000+ rigorous studies
2. Many designs make hospitals more stressful & riskier for patients, families & staff.
3. A LOT of good evidence is available

Evidence-Based Outcomes

- Reduced hospital-acquired infections, medical errors, patient falls
- Reduced pain, patient stress, sleep depression length of stay
- Improved patient satisfaction
- Improved patient privacy and confidentiality communication with patients & family members social support
- Decreased staff injuries staff stress
- Increased staff effectiveness staff satisfaction
Evidence-Based Interventions

- Single-bed rooms
- Acuity-adaptable rooms
- Family zone in patient room
- Access to daylight
- Appropriate lighting
- Views of nature and positive distraction
- Noise-reducing finishes
- Ceiling lifts
- Nursing floor layout
- Decentralized supplies
- Appropriately located handwashing sinks and alcohol rubs
Reducing Back Injuries

Costs of patient handling injuries based on cost per injury prior to ceiling lifts.

<table>
<thead>
<tr>
<th>Unit</th>
<th>Direct Cost *</th>
<th># Injuries</th>
<th>Avg direct cost per injury</th>
<th>Avg indirect cost (2x) **</th>
<th>Total Cost one injury</th>
<th>Avg # injuries per year</th>
<th>Total Annual Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neuro</td>
<td>$222,646.</td>
<td>15 (3 yrs)</td>
<td>$14,843.</td>
<td>$29,686</td>
<td>$44,529</td>
<td>5</td>
<td>$222,645</td>
</tr>
<tr>
<td>ICU</td>
<td>$ 95,003</td>
<td>10 (2 yrs)</td>
<td>$9,500.</td>
<td>$19,000</td>
<td>$28,500</td>
<td>5</td>
<td>$142,500</td>
</tr>
<tr>
<td>subtotal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total Annual Cost: $365,145</td>
</tr>
</tbody>
</table>

*Direct costs of patient handling injuries only

**Indirect costs include light duty salaries, replacement salaries, and training costs

PeaceHealth Riverbend, OR
Source: Joseph & Fritz, 2006
Actual savings **after** ceiling lifts are installed and used.

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</thead>
<tbody>
<tr>
<td>Neuro</td>
<td>$43,728</td>
<td>6 (2 yrs)</td>
<td>$7288</td>
<td>$14,576</td>
<td>$21,864</td>
<td>3</td>
<td>$54,660</td>
</tr>
<tr>
<td>ICU</td>
<td>$0</td>
<td>0 (2 yrs)</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>0</td>
<td>$0</td>
</tr>
<tr>
<td><strong>subtotal</strong></td>
<td><strong>$43,728</strong></td>
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</table>

Cost reduced by **85%** to **$54,660**

Payback: **2.5 years**
Decentralized nurse stations improve observation of patients, outcomes, safety

Acuity-Adaptable, Family Centered CCU
Methodist Hospital, Indianapolis

Design: BSA LifeStructures

Source: Roger Ulrich
Design to Increase Hand Washing

Conveniently located sink

Easy-to-clean sink counter (continuous impervious surface)

Sinks and gel dispensers should be close to staff movement paths

Source: Roger Ulrich
“Influences of Noise on Outcomes in Coronary Critical Care”  Blomkvist, Theorell, Ulrich, Erikson, Hagerman and Rasmanis, 2004
STUDY


- **Patients:** adults (94) diagnosed with acute myocardial infarction in a coronary critical care unit in a Stockholm hospital
- **Intervention:** Acoustics were improved by periodically changing ceiling tiles from sound-reflecting to sound-absorbing tiles
- **Findings:** During good acoustics patients slept better, had less physiological stress, and a lower incidence of re-hospitalization
Lighting

Improved Lighting Reduced Pharmacy Errors

Booker & Roseman, 1995

<table>
<thead>
<tr>
<th>% of Errors</th>
<th>45 Foot Candles</th>
<th>146 Foot Candles</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.80%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.60%</td>
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</tr>
</tbody>
</table>

Lighting increase from 45 to 146 foot-candles reduced pharmacy errors by 30%.
Growing Impact of EBD
“...I request that you instruct the respective design teams to apply patient-centered and evidence based design principles across all medical MILCON construction projects. A growing body of research has demonstrated that built environment can positively influence health outcomes, patient safety and long-term operating efficiencies to include reduction in staff injuries, reduction in nosocomial infection rates, patient falls and reduction in the length of hospital stay....”
The Growing Impact of Evidence-Based Design

- 58 Center for Health Design Pebble Project Partners
- Military Health System’s commitment to using EBD for $6B in construction
- Kaiser, Healthcare Without Harm, CHD & partners’ Global Health and Safety Initiative representing 100,000 beds
- LSU’s commitment to use EBD for replacement of New Orleans Charity Hospital
Variable Acuity Room Reduces Transfers, Errors

Variable-acuity universal critical care room
350 sq foot with family sleep areas

• Increase in Press Ganey scores from 10% to 95%
• Reduced RN turnover from 12% year to waiting list of 5
• Reduced medication errors by 62%

Source: MCG Health, Augusta, GA
<table>
<thead>
<tr>
<th>Design Drivers, Design Responses and Outcome Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Support families</strong></td>
</tr>
<tr>
<td>• Family zone in patient room</td>
</tr>
<tr>
<td>• Kids’ room</td>
</tr>
<tr>
<td>• Lockers &amp; showers</td>
</tr>
<tr>
<td>• Family quiet room</td>
</tr>
<tr>
<td><strong>Support more procedures at the bedside</strong></td>
</tr>
<tr>
<td>• Medical gas booms</td>
</tr>
<tr>
<td>• Larger patient zone</td>
</tr>
<tr>
<td>• Improved ergonomics</td>
</tr>
<tr>
<td><strong>Reduce infection</strong></td>
</tr>
<tr>
<td>• Numerous rubs and handwashing stations</td>
</tr>
<tr>
<td><strong>Reduce medical errors and increase patient safety</strong></td>
</tr>
<tr>
<td>• Improved ceiling tiles</td>
</tr>
<tr>
<td>• Carpet where appropriate</td>
</tr>
<tr>
<td>• Charting niches</td>
</tr>
<tr>
<td>• Zoned caregiver zone</td>
</tr>
<tr>
<td><strong>Measures</strong></td>
</tr>
<tr>
<td>• Greater satisfaction on Press Ganey and Emory ICU survey</td>
</tr>
<tr>
<td>• Fewer complaints &amp; litigation</td>
</tr>
<tr>
<td>• Less patient transfer complications and costs</td>
</tr>
<tr>
<td>• Fewer errors</td>
</tr>
<tr>
<td>• Shorter stays</td>
</tr>
<tr>
<td>• More time spent by ICU staff in the ICU area</td>
</tr>
<tr>
<td>• Improved handwashing compliance</td>
</tr>
<tr>
<td>• Lower MRSA and nosocomial infection rate</td>
</tr>
<tr>
<td>• Fewer medical and medication errors</td>
</tr>
<tr>
<td>• Less litigation</td>
</tr>
<tr>
<td>• Reduced self-extubation</td>
</tr>
<tr>
<td>• Decreased falls and injuries related to patients leaving beds</td>
</tr>
</tbody>
</table>
And the survey says......

ICU Staff Satisfaction

<table>
<thead>
<tr>
<th>Question</th>
<th>PRE MOVE</th>
<th>POST MOVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff effectively explain their roles to patients/family.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient/family choices are respected to have family members/friends with patient.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concern for the patient is paramount on this unit.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
And the survey says......

ICU Patient Satisfaction

- Friendliness/courtesy of the ICU nurses
- Skill of ICU nurses
- ICU nurses attitude toward your requests
- Overall rating of ICU nurses

Question

Percent Response Rate

PRE MOVE
POST MOVE
Quick introduction…

- Dublin Methodist Hospital (Dublin, Ohio)
  - 8th member hospital in the OhioHealth system
  - 94 inpatient beds
    - 34 women and babies
    - 60 acuity-adaptable medical/surgical/ICU
  - 32-bed Emergency Department
  - Four surgery and two endoscopy suites
  - Full complement of imaging technology
  - Approx. 500 associates
Innovations

- Evidence-based physical design
  - Universal rooms
  - Innovative patient rooms
    - Large family areas
    - Operable windows
    - Family/patient access to IT
  - Re-designed work areas: no traditional nursing station
  - Respite areas for staff, families, patients
  - Natural light, 9 healing gardens

- IT
  - Vocera
  - Complete interoperability

- Culture

- Care Process Change
ARRIVAL EXPERIENCE
BLUR INSIDE/OUTSIDE
Exterior landscape and architecture will connect through to the interior.
Conscious of impairment/age: need to graciously accept the failure to negotiate a large facility. Benches and wheelchairs available at entries.

Natural Light
Dublin Methodist Hospital

Decentralized nurse stations reduce falls and saves staff time
Make Hand Washing Unavoidably Available

- Out of sight is out of mind.
- The sink must be immediately visible and easy to access.
- Alcohol gel dispensing devices are important additions, which should be located:
  - At the head of far-side of the patient’s bed and foot
  - In the patient’s bathroom
  - In the family zone
  - In the staff pod area

What is the current staff hand-washing rate?
What is the Hospital-Acquired Infection rate?

Dublin Methodist Hospital, OH
Support Interactive Team Work

Interactive Team Spaces include:
Decentralized and open staff work stations, windowed work rooms with dictation capability, consultation rooms, and staff lounges

Increase
Visual connections to facilitate information seeking and interactions

Reduce
Barriers between team members

Dublin Methodist Hospital, OH
A few results: Patient Safety

- As of June 15...
  - 1,000 patients, a total of 1 intra-hospital transfer
  - No hospital-acquired infections
  - One serious safety event
  - Rank in 95th percentile or above when we ask:
    - Did we check your ID?
    - Did we wash our hands?
      - Did we provide care in a safe manner?

- As of Aug 15...Still no infections, Press-Ganey patient satisfaction up to 99th percentile
A few results: Patient Satisfaction

- Inpatient (as of June 15)
  - Overall percentile 98th
  - Room (includes noise level) 99th
  - Visitors & Family (inc. accom) 99th
  - Pain Control 87th
  - Emotional needs 95th
  - Response to concerns 95th
  - Include in decisions 95th
  - Staff worked together 93rd
Patient Satisfaction

- **Outpatient (as of June 15)**
  - Overall: 95th percentile
  - Facility: 91st
  - Personal issues: 95th

- **Emergency Department**
  - Overall: 99th percentile
  - Family/Friends: 99th
  - Personal issues: 94th
    - Pain control: 94th
A few results: Associate Satisfaction

- As of June 15, overall turnover at 5.5%
- Associate opinion survey results
  - (Available at time of conference)
What Do We Do Now?

- Focus on outcomes
- Choose evidence-based interventions
- Build the business case
- Create an integrated healing environment
Questions?

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