Using EBD to Create Healing Environments

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A healing environment is a physical setting that supports patients and families through stress imposed by illness, hospitalization, medical visits, recovery, and sometimes, bereavement.
Evidence-Based Design

Healing Environments

Reduced Stress

Better Outcomes
Evidence-based design is the deliberate attempt to base building decisions on the best available evidence.
Research-informed

- Patient outcomes
- Staff satisfaction
- Clinical quality & safety
- Operational efficiency
- Financial performance
EBD Research
Literature Search - 1998

- Johns Hopkins University
- Meta-analysis
- 84 studies
- Published report
EBD Research
Literature Search - 2004

• Robert Wood Johnson Foundation
• Texas A&M, Georgia Tech
• Meta-analysis
• 600 studies
• Published report, webcast
EBD Research
Literature Search - 2004

• Reduce patient stress
• Reduce staff stress
• Improve safety
• Improve quality
EBD Research
Staff Stress Scorecard

Reduce staff stress/fatigue, increase effectiveness in delivering care
Reduce noise stress
Improve medication processing and delivery times
Improve workplace, job satisfaction
Reduce turnover
Reduce fatigue
Work effectiveness; patient care time per shift
Improve satisfaction

Ulrich-Zimring, 2004
Example: Noise

- Adults & staff in coronary critical care unit
- Sound-reflecting ceiling tiles vs. sound absorbing tiles
- Measured noise reverberation time

Blomkvist, Theorell, Ulrich, Eriksen, & Rasmanis (in press)
Example: Noise

Findings -- Staff

- Lessened work demands
- Increased workplace social support
- Improved quality of care
- Improved sleep quality
- Better speech intelligibility

Blomkvist, Theorell, Ulrich, Eriksen, & Rasmanis (in press)
Example: Noise
Findings -- Patients

• More positive evaluations by nursing staff
• Lower pulse amplitude
• Better sleep quality
• Lower incidence of re-hospitalization

Blomkvist, Theorell, Ulrich, Eriksen, & Rasmanis (in press)
Design Recommendations

- High-performance sound-absorbing ceiling tiles (1.0 NRC)
- Sound-absorbing floorcovering
- Private patient rooms
- Elimination/reduction of noise sources
Methodist Hospital CCU
Indianapolis, IN

Architecture & Interior Design
BSA LifeStructures
Methodist Hospital
CCU
Indianapolis, IN

Architecture & Interior Design:
BSA LifeStructures
Methodist Hospital CCU
Indianapolis, IN -- BEFORE
Methodist Hospital
CCU
Indianapolis, IN

Architecture & Interior Design:
BSA LifeStructures
Saint Alphonsus Regional Medical Center
Boise, ID

Architecture & Interior Design: HDR
Saint Alphonsus Regional Medical Center
Boise, ID

Architecture & Interior Design: HDR
MD Anderson Cancer Center
Houston, TX

Architecture & Interior Design:
FKP Architects
**EBD Research**

**Patient Safety Scorecard**

<table>
<thead>
<tr>
<th>Improve patient safety and quality of care</th>
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</thead>
<tbody>
<tr>
<td>Reduce nosocomial infection <em>(airborne)</em></td>
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<tr>
<td>Reduce nosocomial infection <em>(contact)</em></td>
</tr>
<tr>
<td>Reduce medication errors</td>
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<tr>
<td>Reduce patient falls</td>
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<tr>
<td>Improve quality of communication <em>(patient → staff)</em></td>
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<tr>
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<tr>
<td>Improve quality of communication <em>(staff → patient)</em></td>
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<tr>
<td>Improve quality of communication <em>(patient → family)</em></td>
</tr>
<tr>
<td>Increase hand washing compliance by staff</td>
</tr>
<tr>
<td>Improve confidentiality of patient information</td>
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</tbody>
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*Ulrich, Zimring, 2004*
Example: Infections

- Infants in pediatric intensive care unit
- Moving from open wards to private rooms

Ben-Abraham, Keller, Szold, et al, 2002
Example: Infections
Findings -- Patients

- 50% decrease in infection rate
- Reduced respiratory tract, urinary tract, & catheter-related infections

Ben-Abraham, Keller, Szold, et al, 2002
Design Recommendations

• Private patient rooms
• Location of hand-washing facilities
• Materials selection
• HEPA filters

Evidence strength:
Clarian North Medical Center
Indianapolis, IN

Architecture & Interior Design:
HKS Architects
Maregatti Interiors
Hasbro Children’s Hospital
Providence, R.I.

Architecture & Interior Design:
Shepley Bulfinch Richardson & Abbott, CAMA Inc.
The Children’s Hospital at Montefiore
Bronx, NY

Architecture & Interior Design:
Rockwell Group
Reduce stress, improve quality of life and healing for patients and families

- Reduce noise stress
- Reduce spatial disorientation
- Improve sleep
- Increase social support
- Reduce depression
- Improve circadian rhythms
- Reduce pain (intake of pain drugs, and reported pain)
- Reduce helplessness and empower patients & families
- Provide positive distraction
- Patient stress (emotional duress, anxiety, depression)

Ulrich, Zimring, 2004
Example: Stress

- Adult patients undergoing flexible bronchoscopy with conscious sedation
- Nature scene on ceiling with nature sounds

Diette, Lechtzin, Haponik, Devrontes, & Rubin, 2003
Example: Stress
Findings -- Patients

• Those with nature distraction reported significantly less pain

Diette, Lechtzin, Haponik, Devrontes, & Rubin, 2003
Design Recommendations

- Windows with views to nature
- Art with nature scenes
- Television programming with nature scenes & music
- Water features, plants
- Healing gardens, outdoor spaces
- Meditation spaces
Weisberg Cancer Center
Farmington Hills, MI

Architecture & Interior Design:
Cannon Design & TMP Architecture
Parrish Medical Center
Titusville, FL

Architecture & Interior Design:
Earl Swensson Associates
Children’s Hospital
Portland, OR

Architecture & Interior Design:
ZGF, Anshen+Allen Architects
Bronson Methodist Hospital
Kalamazoo, MI

Architecture & Interior Design:
Shepley Bulfinch Richardson & Abbott
Mt. Zion Cancer Center
San Francisco, CA

Architecture & Interior Design: Smith Group
Woodwinds Health Campus
Woodbury, MN

Architecture & Interior Design: 
NBBJ Columbus in collaboration with Jain Malkin Inc.

Photography by Paul Warchol
EBD Research

Quality Scorecard

**Improve overall healthcare quality and reduce cost**

- Reduce length of patient stay ★★★★
- Reduce drugs (see patient safety) ★★★
- Patient room transfers: number and costs ★★★★★
- Re-hospitalization or readmission rates ★
- Staff work effectiveness; patient care time per shift ★★★
- Patient satisfaction with quality of care ★★★★★
- Patient satisfaction with staff quality ★★★

*Ulrich, Zimring, 2004*
Example: Satisfaction

- Female patients
- Roommate vs. no roommate
- Overall satisfaction above 80% among all but one age group

Press Ganey/Kaldenberg, 1999
Example: Satisfaction

Press Ganey/Kaldenberg, 1999
Design Recommendations

• Single patient rooms!

Evidence strength:
Aurora Women’s Pavilion
West Allis, WI

Architecture & Interior Design:
Kahler Slater Architects
Boulder Community Foothills Hospital
Boulder, CO

Architecture & Interior Design:
Boulder Associates
St. Luke’s Community Medical Center
Woodlands, TX

Architecture & Interior Design: HGA Architects
Photography Aker/Zvonkovic
Edward Heart Hospital
Naperville, IL

Architecture & Interior Design:
Matthei Colin Associates
Example: Transfers

- Adults in cardiac intensive care unit
- Acuity-adjustable single patient rooms vs. non acuity-adjustable double rooms
- 90% reduction in transfers

Hendrich, Fay, and Sorrells, 2004
Design Recommendations

• Single, acuity-adaptable patient rooms
  – Larger footprint & sq. ft.
  – Support for equipment
  – Decentralized observation
  – Larger bathroom with wider door
  – Accommodation for families

Evidence strength:
Celebration Health
Celebration, FL

Architecture & Interior Design: NBBJ
Celebration Health
Celebration, FL

Architecture & Interior Design:
NBBJ
Acuity Adaptable Room Concept

Design: Flad & Associates
Methodist Hospital
Indianapolis, IN

Architecture & Interior Design:
BSA LifeStructures
Methodist Hospital
Indianapolis, IN -- BEFORE
Research Conclusions

Many designs make hospitals more stressful & riskier for patients, families, & staff.

A LOT of good evidence is available.

The evidence supports that healing environments can reduce stress & risk.
Research Conclusions
Immediate action

• Provide single-bed rooms
• Reduce noise
• Provide views of nature
• Develop efficient wayfinding systems
• Improve indoor air quality
• Improve lighting
• Design to reduce staff walking and fatigue
First, do no harm.
Environmentally Safe

• Indoor air quality
  – HEPA filters
  – Low/no VOC materials
  – PVC reduction
• Water quality
  – Cleaning & maintenance of holding tanks
Environmentally Responsible

• Conservation of resources
  – Energy-efficient
  – Water reclamation
  – Recycled materials
• Reduce water & air pollution
  – Non-toxic cleaning agents
  – No incinerators
Green Resources

• Green Guide for Healthcare
  www.gghc.org

• U.S. Green Buildings Association
  www.usgbc.org

• LEED Accredited Professionals
Patrick H. Dollard Health Center
Harris, NY -- LEED Certified

Architecture & Interior Design:
Guenther 5 Architects
Evidence-based design is not a prescription, it is a process.
EBD Process

- Establish research questions based on design issues
- Gather information
- Make critical interpretations
- Develop & implement design concepts
- Measure & record results
- Share results
Available Resources

CHD Experts

• Board of Directors
• Staff
• Consultants
Available Resources

Ideas

• Pebble colloquia: March, August, November
• Pebble Listserv
• HEALTHCARE DESIGN.07 conference: November 3-6, Dallas
Available Resources

Information

• Healthcare Design Action Kit
• Research reports, papers (CD, CHD website)
• Journal of Healthcare Design (CD)
• Healthcare Design magazine
• Improving Healthcare with Better Building Design book
• Published articles (CHD website)
• Research Design Connections (www.researchdesignconnections.com)
Questions?