

How Evidence-Based Design Can Improve Care/Safety While Actually Lowering Costs

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Today's Learning Objectives

- Learn about new published articles on evidence-based design that correlates improved clinical outcomes, staff recruitment and retention with improved design.
- Understand the compelling business case (capital costs vs. operating savings and increased revenue) for building optimal hospitals.

Components of Quality



Components of Quality



Patient-Centered

- ✦ Private rooms
- ✦ Positive distractions
- ✦ Accommodation for family
- ✦ Access to information



Timely

- ✦ Increased access to patients
- ✦ Better communication with patients & family members



Efficient



- ✦ Reduced patient transfers
- ✦ Increased work efficiency

Effective

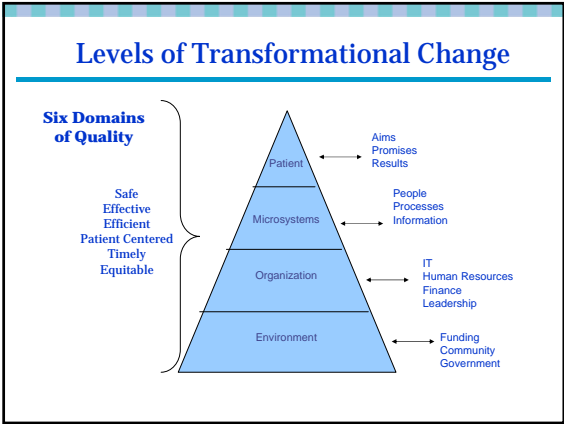


- ✦ Improved sleep quality
- ✦ Decreased nosocomial infections
- ✦ Reduced stress
- ✦ Increased staff satisfaction

Safe



- ✦ Fewer patient falls
- ✦ Fewer medical errors
- ✦ Comforting environment
- ✦ Enhanced security



Big Issues in the Next Ten Years of Improvement

- ✦ The interactions between patients and the system of care
- ✦ The organization context of care
- ✦ The environmental context of care

Donald M. Berwick, MD, MPP
Institute for Healthcare Improvement
1st Annual Forum for Improving Children's Health Care
March 12, 2002


**“In service industries,
the environment is the most
objective and visible sign of respect
for the patient, family and staff.”**

Leonard L. Berry
Author, *Discovering The Soul of Service*


“Although the premise that physical environment affects well-being reflects common sense, evidence-based design is poised to emulate evidence-based medicine as a central tenet for healthcare in the 21st century.”

Colin Martin
The Lancet
August 2000

EBD Research
Literature Search - 1998

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- ✦ Johns Hopkins University
- ✦ Rubin & Golden meta-analysis
- ✦ 84 studies
- ✦ Published report



EBD Research
Literature Search - 2004

- ✦ Robert Wood Johnson Foundation funded
- ✦ Texas A&M, Georgia Tech
- ✦ Ulrich & Zimring meta-analysis
- ✦ 600+ studies (more inpatient than outpatient)
- ◆ Published report, webcast (July 2004)

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More Evidence Than Expected



Conclusions:

1. Many designs make hospitals more stressful and riskier for patients, families and staff.
2. A LOT of good evidence is available.

EBD Research Literature Search - 2004

Rigorous studies link the environment to outcomes in four areas:

1. Reduce patient stress
2. Reduce staff stress
3. Improve safety
4. Improve quality



EBD Research Patient Stress Scorecard



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 and families	★★★★★
Provide positive distraction	★★★★★
Patient stress (emotional duress, anxiety, depression)	★★★★★

Ulrich & Zimring,
2004

EBD Research
Reduce staff stress and fatigue
Increase effectiveness

- ✦ Improve staff health and safety through environmental measures
- ✦ Increase staff effectiveness, reduce errors, and increase staff satisfaction by designing better workplaces

EBD Research
Staff Stress Scorecard



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Reduce staff stress/fatigue, increase effectiveness in delivering care

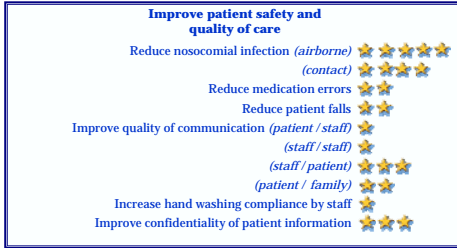
- Reduce noise stress ★★★★★
- Improve medication processing and delivery times ★★★★★
- Improve workplace, job satisfaction ★★★★★
- Reduce turnover ★★★★★
- Reduce fatigue ★★★★★
- Work effectiveness; patient care time per shift ★★★★★
- Improve satisfaction ★★★★★

Ulrich & Zimring,
2004

EBD Research
Improve patient safety

- ✦ Hospital-acquired infections
- ✦ Reducing infections from airborne pathogens
 - Source of airborne pathogens
 - Controlling and preventing airborne infection
- ✦ Reducing infections by increasing hand washing
 - Effect of number and location of sinks/dispensers
- ✦ Reducing infections with single-bed rooms
- ✦ Reducing medication errors
- ✦ Reduce patient falls
- ✦ Improve patient confidentiality and privacy

EBD Research Patient Safety Scorecard

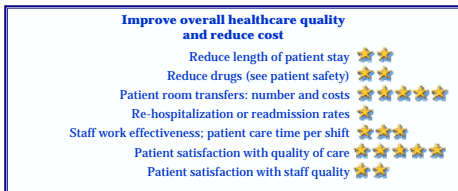


Ulrich & Zimring,
2004

EBD Research Improve overall health quality

- ✦ Provide single-bed patient rooms
- ✦ Reduce length of stay
- ✦ Increase patient satisfaction with quality of care

EBD Research Quality Scorecard



Ulrich & Zimring,
2004

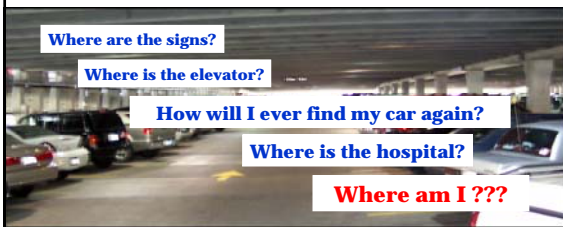
Research Conclusions

Immediate Action

- ✕ Provide single-bed rooms
- ✕ Hospitals should be much quieter to reduce stress and improve sleep
- ✕ Provide stress-reducing views of nature
- ✕ Develop efficient wayfinding systems
- ✕ Improve ventilation
- ✕ Improve lighting
- ✕ Design to reduce staff walking and fatigue




Problem: Loss of Control



The Pebble Pioneers

- ✦ Nonprofit, non-membership research & advocacy organization
- ✦ Founders began the work in 1988
- ✦ Serve & nurture network of 25,000 professionals worldwide



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HEALTH DESIGN™

The Pebble Project's Mission

- ✦ Create a Ripple Effect in the Healthcare Community by Providing Research and Documented Examples of Projects that have created Life-Enhancing Environments for Patients, Families, and Staff

Project Goals

- ✦ Select pioneering organizations who are committed to revolutionary architecture and design and measure their results (early adopters)
- ✦ Understand how organizational behavior changes as a result of the planning and design process
- ✦ Develop standardized evaluation methodologies and share with other Pebble Projects
- ✦ Develop methodologies to spread lessons learned to other healthcare organizations throughout the world

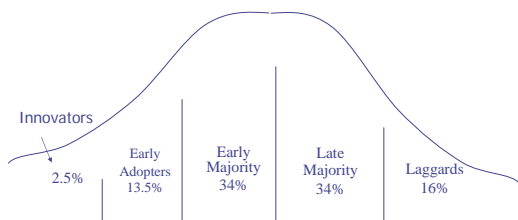
Methods to Achieve These Goals

- ✦ Compare outcomes concurrently
- ✦ Identify best practices
- ✦ Continuously improve healthcare design
- ✦ Publish results overtime
- ✦ Find the next wave of innovative organizations

Partners

- ✦ 40 active participants
- ✦ Various project types
- ✦ Different stages of design

The Pebble Pioneers are the Early Adopters in Design



Reference: [Diffusion of Innovations](#), Everett M. Rogers, 1992

Pebble Partners

- ✦ Children's Hospital & Health Center, San Diego, CA
- ✦ SW Washington Medical Center, Vancouver, WA
- ✦ Froedtert Hospital, Milwaukee, WI
- ✦ **Weill Cornell, New York, N.Y.**
- ✦ Parrish Medical Center, Titusville, FL
- ✦ Yavapai Regional Medical Center, Prescott, AZ
- ✦ Scott & White Memorial Hospital, Temple, TX
- ✦ Sitrin Health Care Center, New Hartford, N.Y.
- ✦ **M.D. Anderson Cancer Center, Houston, TX**
- ✦ PeaceHealth Oregon Region, Eugene, OR
- ✦ Columbia St. Mary's, Milwaukee, WI

Pebble Partners

- ✦ Affinity Health System, Appleton, WI
- ✦ Banner Estrella Medical Center, Phoenix, AZ
- ✦ Edward Hospital & Health Center, Naperville, IL
- ✦ St. Elizabeth's Hospital, Appleton, WI
- ✦ Shawnee Mission Medical Center, Shawnee Mission, KS
- ✦ St. Benedict's Family Medical Center, Jerome, ID
- ✦ Community Mercy Health Partners, Springfield, OH
- ✦ Village Care of New York, New York, NY
- ✦ St. Joseph's Community Hospital, West Bend, WI
- ✦ OhioHealth Corporation, Columbus, OH
- ✦ Yale-New Haven Hospital, New Haven, CT
- ✦ Provena St. Joseph Medical Center, Joliet, IL

Bronson Methodist Kalamazoo, MI

- ✦ **\$181 million**
- ✦ **December 2000**
- ✦ **\$42 million less for new construction**

Architecture & Interior
Design:
Shepley Bulfinch
Richardson & Abbott



Bronson Methodist Areas of Measurement

- ✦ Turnover
- ✦ Outcomes
- ✦ Length of stay
- ✦ Cost per unit of service
- ✦ Waiting times
- ✦ Satisfaction
- ✦ Organizational
- ✦ Productivity

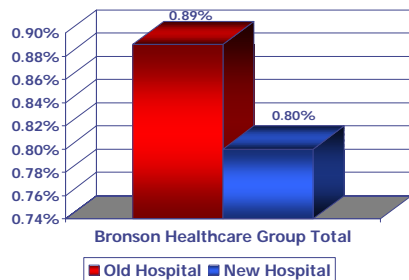


Bronson Methodist Selected Data: Safety & Operations

- ✦ 11% decrease in infections
- ✦ \$500,000 savings a year in transfers
- ✦ Increased market share



Bronson Methodist Selected Data: Nosocomial Infections



Bronson Methodist Selected Data: Satisfaction

- ✦ 6.5% nurse turnover
- ✦ Increased employee satisfaction
- ✦ 95.7% patient satisfaction



Pebble Project Research Matrix

Comparative Group →	Patients (S,G or A)	Employees/Physicians (S,G or A)	Family/Visitors (S, G, A)	Community	Organization/Institution
Clinical/Technical Outcomes		NA	NA	NA	NA
Economic/Financial Resource Utilization					
Operational Improvements				NA	
Satisfaction, Quality of Life, Cultural Assessment					
Safety/Error Reduction Outcomes			NA		NA
Environmental Sustainability					
Other Measurable Outcomes					

The Business Case for Better Buildings

The 'Fable' Hospital

How much does a better building cost?

To answer that, we invented
The Fable Hospital.

Based on Pebbles' measured experience using
Evidence Based Design (EBD).

The 'Fable' Hospital

- ✦ 300-bed regional medical center
- ✦ Urban site
- ✦ \$240 M replacement facility
- ✦ Values: quality, safety, patients, families, staff, cost, value, community responsibility

Based on strong EBD, the following design innovations were incorporated into Fable:

- ✦ Oversized, windowed, single rooms
- ✦ Additional and strategically placed hand-washing capability in every room
- ✦ Variable acuity rooms
- ✦ Decentralized, barrier-free nursing stations
- ✦ Computerized order entry, bar code, PDAs
- ✦ HEPA filters for all rooms

Design Innovations (cont'd)

- ✦ Double-door bathroom access
- ✦ Healing art, music, and gardens
- ✦ Consultation spaces
- ✦ Patient education center
- ✦ Staff support facilities

The 'Fable' Hospital

Detailed Construction Cost Estimates

Changes	Additional Cost	Calculations
Larger private patient rooms	\$4,717,500	(Based on an assumption of an increase of 100 square feet for each of 255 single patient rooms. Fifteen percent of the beds (45) are in an ICU configuration)

+ \$12 Million
(5% of project cost)

The 'Fable' Hospital

Findings	Savings	Calculations
Patient Falls Reduced	\$2,452,800	<p>Patient falls are common and can cause significant harm. Falls result from patient instability, confusion, insufficient surroundings, lack of assistance, poor lighting, and slippery surfaces.</p> <p>The national anticipated average cost of a fall is \$30,000 (Hendricks 1997). Reported falls cost over a million. Like many other hospitals, Fable is well-served by the high cost of malpractice insurance. The cost of patient falls goes directly to the bottom line.</p> <p>The national incident rate of acute care falls is 3.5 falls/1,000 patient days and this is the rate experienced by Fable's predecessor hospital. Fable reduced patient falls by 80% by locating railers closer to the patient, putting double doors on bedrooms, utilizing bed rail features that notify a nurse when a patient is out of bed, decentralizing nursing stations, and locating supplies close by to reduce the amount of time the nurse is away from the patient.</p> <p>Fable's medical patient fall rate is the same as that experienced by Duke, partner Clarian Health Partners Methodist Hospital, Indianaapolis (Hendricks, Denver, Nyhan 2002, Flynn 2002).</p> <p>Savings: 500 beds at 80% occupancy = 240 beds = 87,600 patient days / 1000 x 3.5 = 295 falls x \$13,000 = \$3,835,000. Reduced by 80% = savings of \$2,452,800.</p>

The 'Fable' Hospital

Savings & Revenue
(One-Year Savings)

Fewer Patient Falls	\$2,452,800 (- 80%)
Fewer Patient Transfers	\$3,893,200 (- 80%)
Fewer Nosocomial Infections	\$80,640 (- 4/m)
Reduced Nurse Turnover	\$164,000 (- 14%-10%)
Reduced Drug Cost	\$1,216,666 (- 5%)
Total Cost Savings: \$7,807,306	

The 'Fable' Hospital

Savings & Revenue
(One-Year Revenue Gains)

Market Share Increase	\$2,168,100
Increased Philanthropy	\$1,500,000
Total Revenue Gain: \$3,668,100	
+ Total One-Year Savings: \$7,807,306	
Total : \$11,475,406	

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Six questions Boards and CEO's **must** address before building a new hospital

1. Urgency
2. Appropriateness
3. Cost of project
4. Financial impact
5. Sources of funds
6. **Evidence-based design**

Six questions Boards and CEO's **must** address before building a new hospital (cont.)

1. **Urgency:** Is the expansion/replacement actually needed now to fulfill the mission or can it be deferred? For example, are the market and volume assumptions sound, and have other external factors that would affect the decision been honestly and accurately considered?
2. **Appropriateness:** Is the proposed plan the most appropriate and sound? For example, have all alternatives been explored, such as partnerships with other hospitals and satellite operations as opposed to expanding or upgrading the facility in question?
3. **Cost of the project:** Has the project been reviewed to offer the maximum value for every dollar spent? Is the cost appropriate for the expected level of construction quality?

Six questions Boards and CEO's **must** address before building a new hospital (cont.)

4. **Financial impact:** Has the operating impact of the additional volume been accurately analyzed financially and has the operating impact of not proceeding also been analyzed?
5. **Sources of funds:** Have the sources of funds for the new facility been identified? For example, is the combination of reserves, borrowing, philanthropy and additional operating income reasonable and defensible?
6. **Evidence-based design:** Has the project incorporated the new and emerging widely published literature on evidence-based building design's influence on its business, as well as quality, safety, and the built environment's impact on patients, families, and staff?

Two Key Conclusions

1. **Bottom line:** most hospital boards and leaders have only one or two opportunities to create a permanent legacy that can transform their organizations and their communities. Building a better hospital is an opportunity that must not be wasted. The evidence for making an investments in facility excellence can no longer be ignored.

Two Key Conclusions

2. *The lesson for all healthcare organizations is clear:* Provide a built environment that is welcoming to patients, measurably improves their quality of life, and supports families and employees-or suffer the consequences in an increasingly competitive and demanding economic environment.
