

# The research-based practice

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# Content:



Better design through research?  
Researchers' perspective  
Architect as researcher  
Practitioners' perspective

# Performance

- can be simulated, measured and tested...
- a distraction from architecture?



# The promise of research

More time to create inspiring design

Build upon knowledge base to innovate



## The promise of research: Measured outcomes

Know why poor design  
doesn't work



Advocate why inspiring  
design does work



## The promise of research Measured outcomes

Staff productivity

Staff safety



## The promise of research Measured outcomes

Therapeutic environments



Family participation



## Doubting Thomases

Has EBD been "over-sold"?

Has research improved outcomes?

Devaluation: EBD-rigorous enough?

Too much generalization?

## Evidence-based design:

“The process of basing decisions about the built environment on credible research to achieve the best possible outcomes.”

Kirk Hamilton

## Evidence-based design

‘Instant expert’ problem: How to help architects avoid generalization? **Education!**

- EDAC
- Publications
- ACHA testing
- AAHID testing



## Evidence-based design

### EDAC

- An excellent basic education
- As a credential, may be misleading
- Evolve higher level credential?



Credit: Center for Health Design

## The Application of Research

### Professional Responsibility

- Research Quality
- Research Design
- Research Methodology
- Relevance
- Applicability



## EDAC: EBD process

1. Define goals
2. Find evidence
3. Interpret evidence
4. Create concepts
5. Hypothesize
6. Collect baseline
7. Monitor design
8. Measure results

## Researchers' Perspective

## Researchers' Perspective

### What is evidence?

that which tends to prove or disprove something

Dictionary.com

## Researchers' Perspective

### What is a knowledge base?

a database of related information about a particular subject

Dina Battisto

## Researchers' Perspective

What are some research examples?

1. Case Studies
2. Architectural Prototypes and Simulations
3. Post Occupancy Evaluations
4. Focused Research Study

### 1. Case Studies

A systematic and standardized approach for comparing multiple environments to identify best practices and benchmarks

### 2. Architectural Prototypes and Simulation Studies

Simulations or mock-ups used to evaluate potential scenarios and outcomes.

### 3. Post Occupancy Evaluation

"...systematically comparing actual building performance, i.e., performance measures, with explicitly stated performance criteria"

Wolfgang Preiser and Edward White, 1995.

## 4. Focused Research

A focused inquiry to answer a research question to improve the design of healthcare environments

Studies sponsored by the AAH Foundation

## Architect as researcher

## Architect as researcher

Opportunity:  
Create the knowledge you need

Challenge:  
Time and staff to do it

## Architect as researcher

Research question:  
In IPU using EMR,  
how should EMR  
and support  
resources be  
distributed to  
increase direct  
patient care time?



## Architect as researcher

### Background:

- Nurses' "hunting and gathering", reduces direct patient care time
- EMR has helped decentralize some activity, but not all
- Which unit plans are best?



## Architect as researcher

### Literature search-highlights

- Hendrich et al., 2008:
  - 7.2% of nurse time for assessment/surveillance
  - 3 miles walked--10-hr shift
  - No correlation to general unit type
  - Increased "centrality" increased direct patient care time



## Architect as researcher

### Literature search-highlights

- Aiken, et al, 2002:
  - More nurse direct patient care=lower mortality
- Tyson, et al., 2002
  - Decentralized units reduced communication, mentoring
- Flynn, 2005
  - Suggest need to balance decentralized resources w/centralized collaboration areas.



## Architect as researcher

### Research design

- AAHF Grant
- National invitation, included architect and nurses
- 50 units joined study; 15 units completed
- Correlational study: nurse survey and floor plans



## Architect as researcher

Preliminary findings: (effect on patient care time)

### •Meds/supplies/linen:

- nurse servers scored best; supply satellites close second
- issues with stocking/restocking

### •Meds: decentralized stock floor meds important also

### •EMR:

- in-room location not always preferred to satellite
- issues with distractions

### •Equipment:

- decentralized scored higher than central

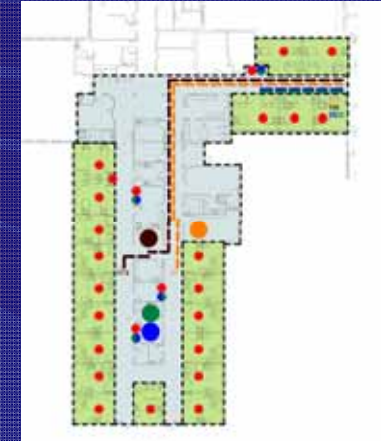
### •Collaboration

- Satellite w/ enough space scored highest

## Documentation--satellite

Hospital A: 4.0

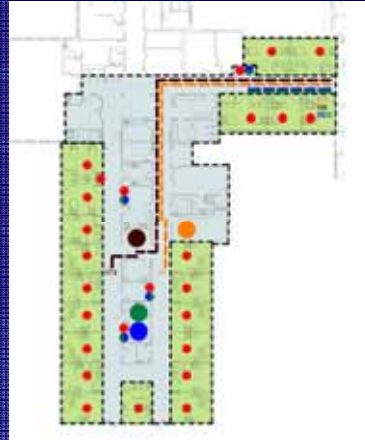
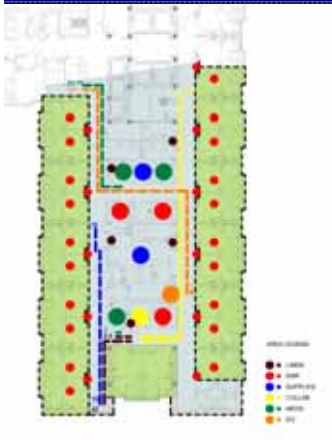
Hospital B: 3.5



## Medications--satellite

Hospital A: 4.1  
2' to 64'

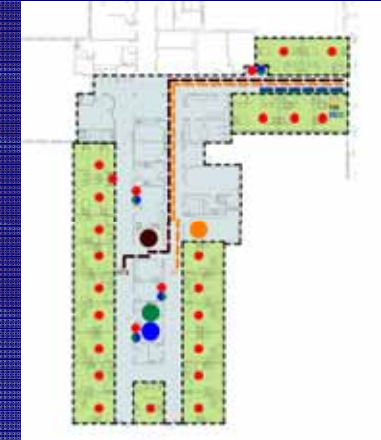
Hospital B: 4.3  
0' to 35'



## Supplies--satellite

Hospital A: 3.75  
10' to 70'

Hospital B: 3.3  
0' to 35'

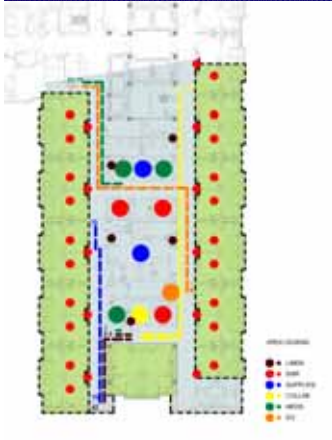




## Linen

Hospital A: 3.9  
7' to 42'

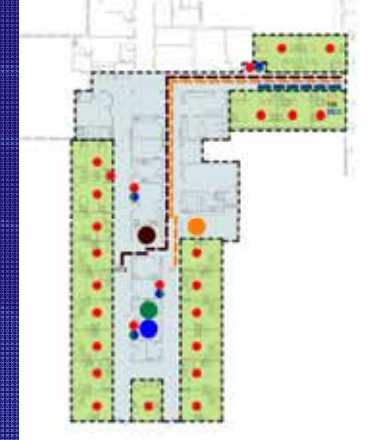
Hospital B: 3.4  
17' to 159'



## Equipment

Hospital A: 3.8  
1' to 141'

Hospital B: 3.1  
21' to 132'



## Practitioners' Perspective

## Practitioners' Perspective

- Architects want to integrate research
- Architects don't know where to find it
- Architects don't speak 'research-ese'



## AIA AAH Research Committee

Dina Battisto, co-chair  
Tom Clark, co-chair  
Byron Edwards  
Terri Kurrasch  
Mark Patterson  
Erin Peavey  
Ron Smith  
George Tingwald  
Frank Zilm



### Research Committee Mission:

1. Identify Knowledge Needs
2. Support Research
3. Disseminate Knowledge

## AAH Research Committee

### 1. Identifying knowledge needs:

Expanding the research agenda



### It all started with Institute of Medicine's Quality Aims



Credits: Joint Commission Resource, Center for Health Design

## The research agenda

### Current emphasis in Evidence-based design field:

- Patient/family experience and satisfaction
- Staff experience and satisfaction
- Quality of care (as consumer)
- Safety for patient and staff



## The research agenda

### Proposed expanded agenda topics:

#### Staff workplace design:

- **Effectiveness:** improve work quality, direct patient care, teamwork
- **Efficiency:** reduce labor costs, lean operations
- **Safety:** ergonomics, distances
- **Impact of changing practice models:** Medical Home, Accountable Care Orgs, etc.



## The research agenda

### Proposed expanded agenda topics:

#### Planning typology studies:

- **Macro:** medical campus planning, hospital, ACC's, etc.
- **Departmental:** hospital/ACC/Clinic department
- **Micro:** Key room design typologies (OR, ED treatment, procedure, exam, etc.



## The research agenda

### Proposed expanded agenda topics:

#### Return-on-Investment Studies:

- **Flexibility concepts:** extruded plans, dual corridors, "empty chair", etc.
- **Universal room designs:** IPU, ED treatment, clinic exam, etc
- **Sustainable strategies:** low energy solutions, day-lighting, water reuse, etc.
- **'Right-sizing' of key rooms:** OR's, ED treatment, exams, imaging rooms, etc.



**AAH Research Agenda: The beginning of an expanded resource**  
 AAH Research Initiatives Committee  
 Jan 062011

\*Ehrlich, LAMB, et al 2008, 2009

Desired outcome	Design intervention	Significant existing research + home research, more needed *	Research studies needed
<b>Patient experience outcomes</b>			
Reduce depression	Daylight lighting noise stress family zone		
Improve sleep	single bed rms daylight lighting noise reduction		
Reduce patient stress	noise stress noise reduction single bed rooms daylight lighting family zone		
<b>Patient satisfaction</b>			
improve pt privacy and confidentiality	single bed rooms family zone noise reduction		
improve social support	single bed rooms family zone coping		
increase "system satisfaction" generally	single bed rooms daylight lighting noise stress family zone coping noise reduction single adaptable rooms		

<b>Safety and quality outcomes</b>			
<b>Patient safety</b>			
reduce hospital acquired infection	single bed rooms ISOs outside air tests increase handwash sink flows door filters at diffusers in OR's use of copper surfaces		
reduce medication error	single bed rooms lighting noise reduction security adaptable rms centralized drug dispensers barcode scanners at bedside computer security of med supply to patient		
Reduce patient falls	single bed rooms lighting family zone coping nursing floor layout security adaptable rms room-room design layout		
increase staff communication w/pt and family	Handrails between bed and toilet single bed rooms family zone noise reduction decentralized I call decentralized supplies I call to pt room		
improve social support	single bed rooms family zone coping		
<b>Quality</b>			
reduce pain meds	nature views daylight lighting noise reduction		
Reduce length of stay	daylight lighting security adaptable rooms natural views		

<b>Workforce outcomes</b>			
<b>Staff experience</b>			
increase staff satisfaction	single bed rooms daylight lighting noise stress noise reduction		
Decrease staff stress	single bed rooms daylight lighting noise stress noise reduction		
<b>Staff effectiveness &amp; efficiency</b>			
increase ICU staff efficiency generally	single bed rooms lighting noise reduction nursing floor layout decentralized supplies		
optimum quality of staff communication/ interaction/ mutual respect in ICU	central vs. decentralized staff stations visibility & flow of collaboration spaces		
optimum work efficiency in the OR D-T centers	single bed rooms		
nurses spend more time w/ direct patient care in ICU	decentralized supplies decentralized collaboration spaces		
optimum staff documentation quality	improved design of documentation spaces		
most effective care in ICU, in specific units	central ICU typologies		
lean production & maximum throughput: hospital ED, imaging dept, heart/vascular centers, cath dept, surgery dept, short stay units, lab, pharmacy, CT dept, materials management dept, PT	central D-T department typologies		
lean production & maximum throughput: outpatient, clinic group practice (GPs), urgent care, imaging centers, cancer centers, women's centers	central ambulatory care center typologies		

<b>Staff safety</b>			
decrease staff injuries	cooling lifts security adaptable rooms		
decrease documentation area injuries	stand up, stand sitting, chair sitting, which has lower injuries?		
<b>Return-on-investment outcomes</b>			
minimize cost & duration of expanding and changing hospital D-T depts and ambulatory centers	"irreversible" floor plan layouts which allow expansion within rebuilding flexible shell concepts to allow change (flexplate elevators, floor floor heights, core layout, building services nodes, etc)		
reduce construction costs	Optimum key room sizes: hospital-OR, recovery, imaging rooms, etc. Optimum key room sizes: OR/limb-room, procedure, etc.		
more efficient layouts in terms of net to gross area	Overall plan typologies-hospital Overall plan typologies-ambulatory centers		
reduce cost of facility change over time	interstitial service floors		

## The research agenda

### Surveys of healthcare architects

- AAH Summer Leadership Summit 2011
- AIA South Atlantic Healthcare Conference 2011

...a test of our Research Agenda...

## AAH Research Committee

### Highest priorities from survey: knowledge needed

- Decentralized IP nursing facilities: recovery outcomes
- Decentralized IP nursing facilities: error rates
- Decentralized IP nursing facilities: direct care time
- Decentralized IP nursing facilities: communication
- EMR workstation types: staff effectiveness
- Planning typologies: staff effectiveness
- Optimum key room sizes: staff effectiveness
- Various interventions: fall rates

## AAH Research Committee

### 2. Support Research

Working with growing  
Network of Stakeholders

- FGI
- ASHE
- EDRA
- AAHF
- ACHA
- AAHID
- CHD & Research Coalition
- NIOSH/CDC
- Clemson University



## AAH Research Committee

### 3. Disseminate knowledge

- Partnering with CHD --Ripple Database
- Publication/outreach
  - HCD
  - HERD
  - Academy Journal
  - AIA KnowledgeNet

Your Thoughts?