



## Can Single Rooms Pay Back Their Cost?

“RESEARCHING THE EVIDENCE”

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The maximum number of beds per room shall be one unless the functional program demonstrates the necessity of a two-bed arrangement.

## AIA Guidelines

FOR DESIGN AND CONSTRUCTION OF  
Health Care Facilities



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From Roger Ulrich, Texas A&M University, Founder – The Center for Health Design

## Single vs Double Rooms

Of 24 performance indicators, only one favored double rooms (initial construction cost)

Healthcare associated infections

Medical errors

Falls

Staff observation of patients

Staff/patient communication

Confidentiality of information

Presence of family

Patient privacy and dignity

Avoid mixed-sex accommodation

Death with dignity

Noise

Sleep quality

Pain

Patient stress

Daylight exposure

Patient satisfaction

Choice

Staff satisfaction

Staff work effectiveness

Reducing room transfers

Adapt to handle high acuity

Managing bed availability

**Initial construction costs**

Operations and whole life costs



Each indicator has an associated cost reduction impact, some more dramatic than others. Anecdotal, but not yet substantiated evidence suggest 10% fewer rooms are required to deliver same occupancy with single rooms vs. double rooms.

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Precedents

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## Single vs Double Rooms

Research published metrics for the 4 indicators most likely to have measurable results.

### **Healthcare associated infections**

### **Medical errors**

### **Falls**

Staff observation of patients

Staff/patient communication

Confidentiality of information

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### **Reducing room transfers**

Adapt to handle high acuity

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Initial construction costs

Operations and whole life costs



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Premise

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Can a percentage of the debt service required to build single rooms be recovered by cost of care savings?

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Hypothesis

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# Healthcare Associated Infections - HAI

A localized or systemic adverse condition that occurs during a hospital admission, that results from the presence of an infectious agent or its toxin, and for which there was no evidence of at admission.

- CAUTIs – Catheter Associated Urinary Tract
- Cdiff – Antibiotic Overuse
- SSIs – Surgical Site
- BSI – Bloodstream
- VAP – Pneumonia



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Study Definitions

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# HAI's: Impact in USA

Cost per HAI	Prevalence	Percentage
\$35,367 *	1.7 million in-patients per year	5% of in-patients
Stone et al. AJIC (2002)	CDC 2002	CDC 2002

Length of Stay	Deaths from HAI	Portion of Total In-patient Costs
17.6 day increase	98,987 in hospitals per year	9.4%
CDC 2002	CDC 2002	CDC 2002

\* Other studies have indicate higher costs of \$153,871 (2006 Pennsylvania Health Care Cost Containmentment)



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## Patient Transfers (Intrahospital)

Movement of a patient from one room to another, whether or not there is also a change in staff responsibility for the patient's care.

- Infection Control
  - Difficulties Between Roommates
  - Requests for Privacy
- 
- Change in Health Status Not Included



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# Patient Falls

For a fall in the care setting to be categorized as an adverse event, an injury must result causing a serious disability or death; a fall without injury is not an adverse event.



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Study Definitions

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# Medical Error

Unintended physical injury to the patient resulting from **inappropriate** medical care, that requires additional monitoring, treatment, hospitalization or results in death. For example:

- Inappropriate Diet
- Mechanical Complication of Device, Implant, Graft
- Medication Related Events



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- **All Costs of Care Derived from Published Sources**
- **Litigated Costs not Included**
- **Data is for Adult Medical/Surgical Units**  
Does not include long-term care, critical care, pediatrics or OB
- **Calculated Assumptions** (Multi-bed Rooms):
  - Annual Admissions/Bed is **60.36**
  - Annual Patient Days/Bed is **292**



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Study Parameters



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# HAI

(Healthcare Associated Infections)

## Double Room HAI Rate / Admission

## Double Room HAI per Bed Annually

## Cost per HAI

Low Reference	4.5/100 Klevens Mar-Apr 2007, p 5	2.72 (60.36/100x4.5)	x	\$18,454 Scott, 2009 CDC Publication
High Reference	5% Gardner 2002, NHS p 21	3.02 (60.36x5%)	x	\$35,367 Stone et al. AJIC (2002)

## Cost / Bed in Double Room Annually

## % Cost Reduction per Bed in Single Rm

## Annual Savings per Bed in Single Rm

Low Reference	= \$50,100	11% Bronson per Chaudhury p 16	\$5,500
High Reference	= \$106,700	25% NHS p. 83	\$26,700



Findings



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## Patient Transfers

### Double Room Transfer Rate

### Double Room Transfers per Bed Annually

### Cost per Transfer

Low Reference	-	-	-
High Reference	15%-20% per Admission EBD in MHS ref. 110	10.56 (60.36x0.175)	x \$1,000 Walters re: Alegent Health

### Cost / Bed in Double Room (calculated)

### Savings per Bed in Single Room

### Annual Savings per Bed in Single Room

Low Reference	-	-	\$1,400 Bronson per Chaudhury 2004
High Reference	= \$10,600	90% NHS p. 83	\$9,500

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Findings



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## Patient Falls (resulting in injury)

**Double Room Fall  
Rate per 1000 Patient Days**

**Double Room Falls  
per Bed Annually**

**Cost per Fall**

Low Reference	3.1 Barach HCD Nov 2008, p. 1	0.91 (292/1000x3.1)	x	\$20,000 Barach HCD Nov 2008
High Reference	5.09-6.64 JAMA, Nov 3, 2010 Vol 304	1.71 (292/1000x5.87)	x	\$20,000 Barach HCD Nov 2008

**Cost / Bed in Double  
Room (calculated)**

**Savings per Bed in  
Single Rm**

**Annual Savings  
per Bed in Single Rm**

Low Reference	= \$18,000	60% Indiana Methodist per Chaudhury	\$10,900
High Reference	= \$34,300	75% NHS p. 20	\$25,700

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Findings



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## Medical Errors (resulting in injury)

**Double Room Rate**  
(per Annual Admissions)

**Double Room Errors**  
per Bed Annually

**Cost per Error**

Low Reference	1.39% Shreve pgs. 5-7	0.84 (60.36x1.39%)	x	\$13,000 Shreve p. 6
High Reference	4.16% Shreve pgs. 5-7	2.51 (60.36x4.16%)	x	\$13,000 Shreve p. 6

**Cost / Bed**  
in Double Room

**Savings per Bed**  
in Single Room

**Annual Savings**  
per Bed in Single Rm

Low Reference	= \$10,900	37% Chaudbury 2004 p.56	\$4,000
High Reference	= \$32,700	67% NHS p. 21	\$40,400

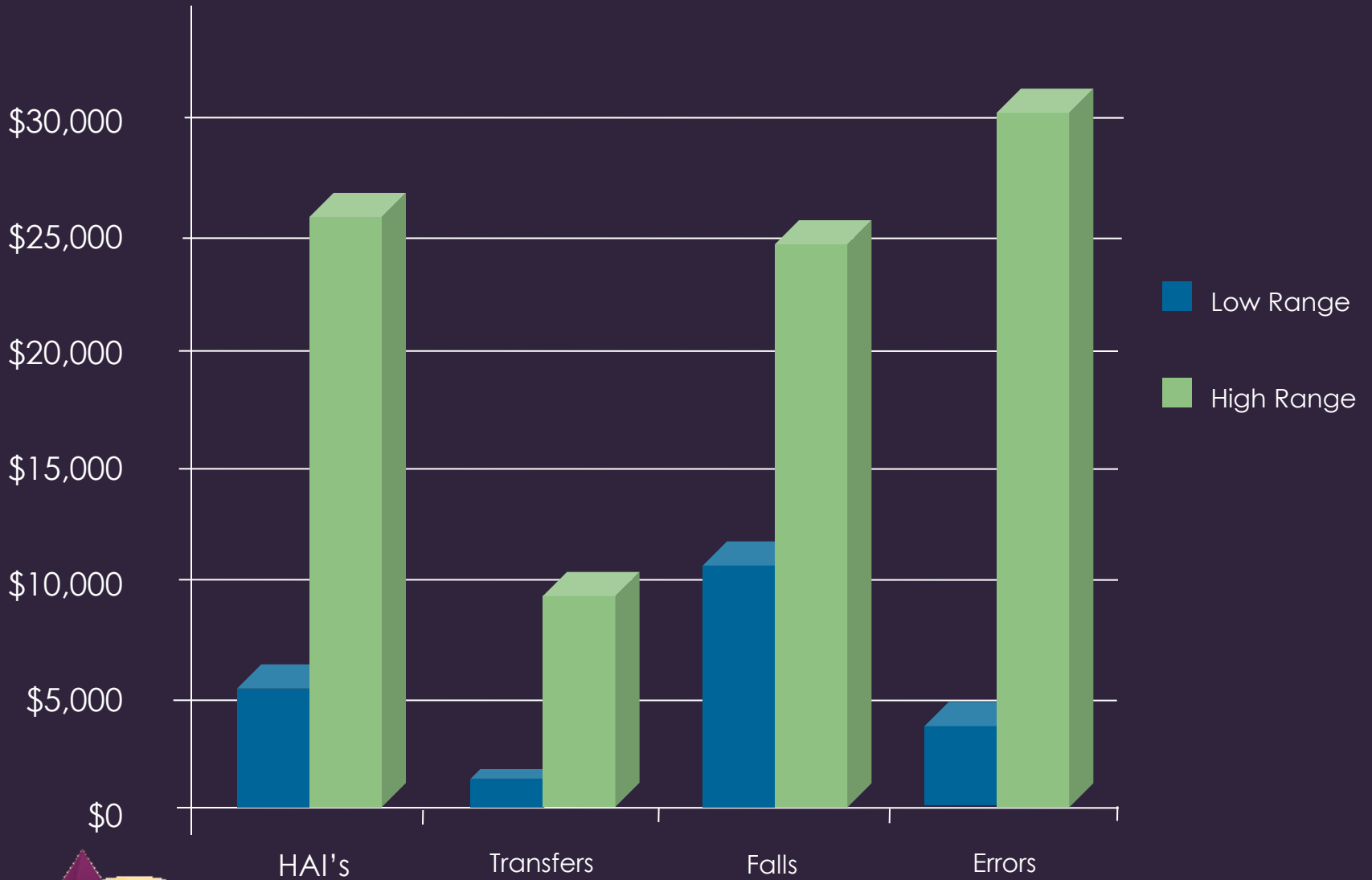
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Findings



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Annual Savings per Bed

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# Compare Annual Debt Service per Bed vs. Annual Savings per Bed

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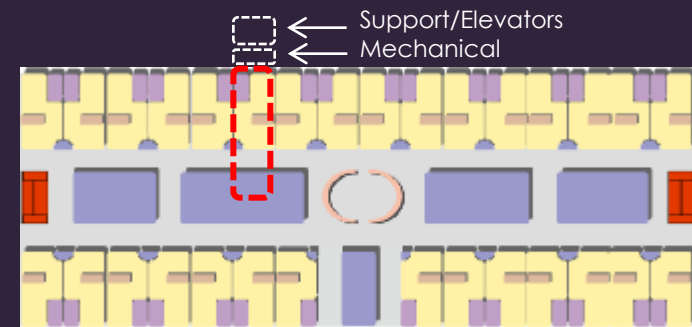
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## ■ New Single Room: \$820,000 per Bed

Project Cost /SF : \$1000

Construction Area per Bed : 820 SF

Size of Patient Room & Toilet : 360 SF (Acuity Adaptable)



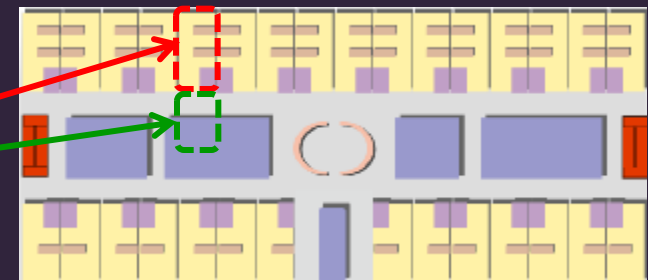
## ■ Double Room to Single Room Conversion : \$276,000 per Bed

Patient Room Conversion Project Cost /SF : \$600

Support Area Project Cost/SF : \$300

Construction Area per Bed : 610 SF

Size of Patient Room & Toilet : 310 SF



## ■ Blend 50% New Singles, 50% Converted Doubles : \$548,000 per Bed

Capital Cost Assumptions

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Project Cost/Bed All New	Debt Term	Institutional Debt Rate	Annual Debt Service/Bed
\$820,000	30 Years	5%	\$52,800

Project Cost/Bed 50/50 New/Renovated	Debt Term	Institutional Debt Rate	Annual Debt Service/Bed
\$548,000	30 Years	5%	\$35,300

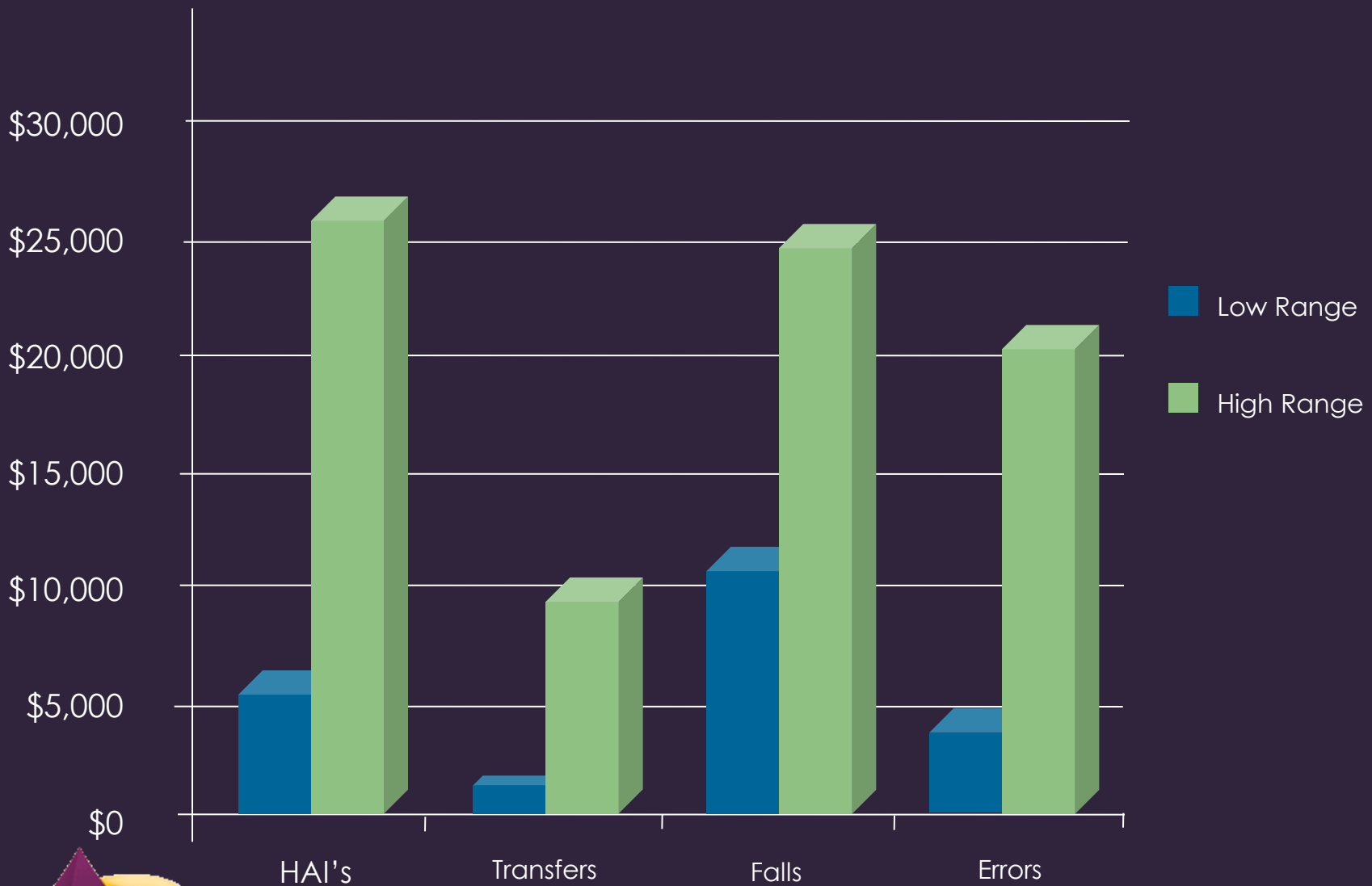
Annual Debt Assumptions

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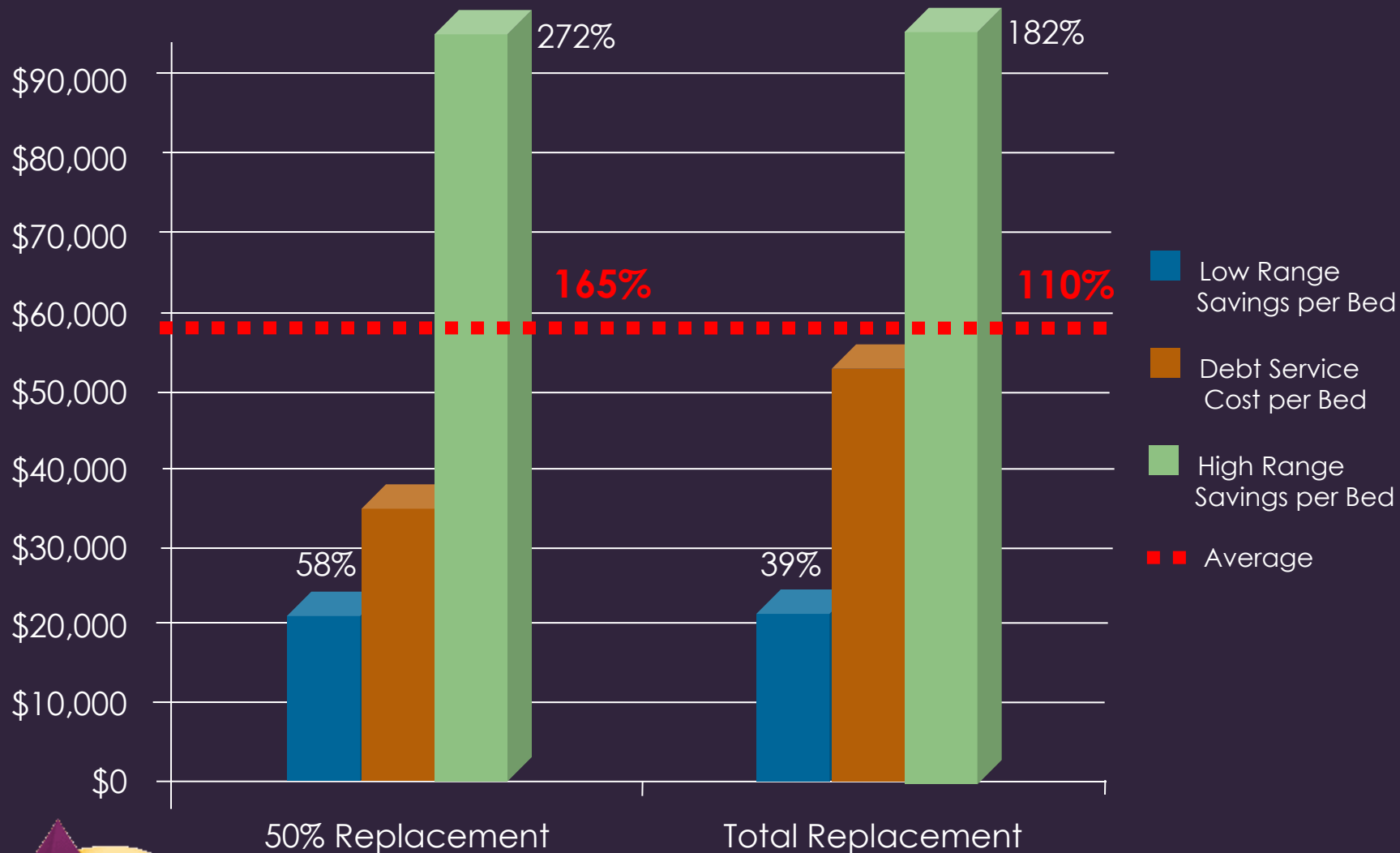
Annual Savings vs. Debt Service

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Annual Savings vs. Debt Service



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The total number of Med/Surg beds in 2005 was 945,199.

The number of beds at that time in multi-bed rooms was  
602,134.

$$602,134 \times \$90,000 = \text{*****}$$

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Projected Savings Annually Nationwide



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# Call for Participation

Help us continue our research by filling in your information.

<b>HAI</b> (Healthcare Associated Infections)	<b>Multi-Room HAI Rate / Admission</b>	<b>Cost per HAI</b>
	<input type="text"/>	<input type="text"/>
<b>Patient Transfers</b>	<b>Multi-Room Transfer Rate</b>	<b>Cost / Transfer</b>
	<input type="text"/>	<input type="text"/>
<b>Patient Falls</b>	<b>Multi-Room Fall Rate</b>	<b>Cost per Fall</b>
	<input type="text"/>	<input type="text"/>
<b>Medical Errors</b>	<b>Multi-Room Rate</b>	<b>Cost per Error</b>
	<input type="text"/>	<input type="text"/>

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Continued Research

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### Medical Errors

<sup>1</sup> Joseph, A. (2006). The Role of the Physical and Social Environment in Promoting Health, Safety and Effectiveness in the Healthcare Workplace. The Center for Health Design web site, www.healthdesign.org, in the Research Reports section, p.3-4.

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### Healthcare Associated Infections

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<sup>9</sup> Klevens, R. et al: (2002). Estimating Health Care-Associated Infections and Deaths in U.S. Hospitals, Public Health Reports , March–April 2007, Volume 122.

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### Patient Falls

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<sup>13</sup> Hendrich, A., Nyhuis, A., Kippenbrock, T., & Soja, M. E. (1995). Hospital falls: Development of a predictive model for clinical practice. Applied Nursing Research, 8(3), 129-139.

<sup>14</sup> Hendrich A.L., Bender, P.S., Nyhuis, A. (2003). Validation of the Hendrich II Fall Risk Model: A Large Concurrent Case/Control Study of Hospitalized Patients. Applied Nursing Research 16(1):9-21.

### Patient Transfers

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<sup>16</sup> Hendrich , A.L. & Lee, N. (2005). Intra-Unit Patient Transports: Time, Motion, and Cost Impact on Hospital Efficiency. Nurs Econ; July 1; 23(4):157-64.



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## References



Questions?

Comments?

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