

“Critical Care Management of Cardiovascular Patients”

Glenn J. R. Whitman, MD
Director, CVSICU and Heart Transplant
Johns Hopkins Hospital

Michigan Society of Thoracic and Cardiovascular Surgery
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JOHNS HOPKINS
M E D I C I N E

Disclosures

- Abbott Nutrition

QUALITY AND REPORTING

September 12, 2016

3



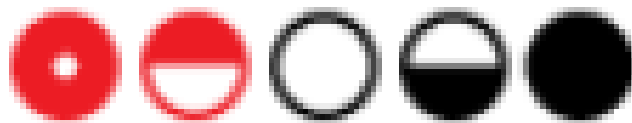
HEART QUEST Zvi Frankel and his grandfather searched extensively to find the right heart hospital.

Where should you go for heart surgery?

Our new Ratings of more than 400 hospitals
can help you find the right one

Consumer Reports August 2014

Consumer Reports





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Adult Cardiac Surgery Database Public Reporting

Since its inception in 2010, the STS adult cardiac surgery public reporting initiative continues to grow, both in the number of voluntarily enrolled participants and the composite measures offered. STS now publicly reports outcomes for isolated coronary artery bypass grafting (CABG), isolated aortic valve replacement (AVR), and AVR+CABG surgeries. The Society plans to report outcomes for mitral valve replacement/repair and mitral valve replacement/repair + CABG composites in the future.

Isolated CABG:

[Search or browse star ratings for surgery groups](#)

[Search or browse star ratings for hospitals](#)

Isolated AVR:

[Search or browse star ratings for surgery groups](#)

[Search or browse star ratings for hospitals](#)

AVR+CABG:

[Search or browse star ratings for surgery groups](#)

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[Glossary for STS Public Reporting Online and the Public Reporting Tools.](#)

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STS Star Ratings for Coronary Bypass Surgery

NQF Report Metrics:

1. Operative Mortality (Risk-Adjusted)
2. Major Morbidity (5 Risk-Adjusted variables)
RF, Reop, Stroke, Mediastinitis, Intub > 24 hrs
3. Use of Internal Mammary Artery
4. Medications
 - Pre-op. Beta Blockers
 - Discharge Beta Blockers
 - Discharge Anti-Lipids
 - Discharge Anti-Platelets

CABG Star Rating Distribution



STS Composite Score

CABG Composite Score =

$$\underline{0.81 \times \text{score}_{\text{mort}}} + \underline{0.10 \times \text{score}_{\text{morb}}} + 0.07 \times \text{score}_{\text{IMA}} + 0.03 \times \text{score}_{\text{meds}}$$

AVR Composite Score =

$$\underline{0.73 \times \text{score}_{\text{mort}}} + \underline{0.27 \times \text{score}_{\text{morb}}}$$

It is all about “morbidity and mortality”

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Key Resources

[STS Annual Meeting Online](#)[STS Public Reporting Online](#)[Short-Term Risk Calculator](#)

Search CABG Data by Group

Group name

Year:

Jan. 2015 - Dec. 2015 ▾

State:

MD ▾

Name ▲	Overall Composite Score (?)	Absence of Operative Mortality (?)	Absence of Major Morbidity (?)	Use of Internal Mammary Artery (?)	Receipt of Required Perioperative Medications (?)
Cardiac Vascular & Thoracic Surgery Associates, P. C. <i>Takoma Park, MD</i>	★★	★★	★★	★★	★★★★
Johns Hopkins Cardiac Surgery <i>Baltimore, MD</i>	★★	★★	★★	★★★★	★★★★
Medstar Union Memorial Open Heart <i>Baltimore, MD</i>	★★	★★	★★	★★★★	★★★★
NIH Heart Center at Suburban Hospital <i>Bethesda, MD</i>	★★	★★	★★	★★	★★

[Glossary](#)

Search CABG Data by Group

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Key Resources

[STS Annual Meeting Online](#)

[STS Public Reporting Online](#)

[Short-Term Risk Calculator](#)

[ASCERT Long-Term Survival Calculator](#)

[Locate a Member Surgeon](#)

[CT Surgery Online Buyer's Guide](#)

[Downtown Chicago Hotel Discount for STS Members](#)

Group name:

Year:

State:

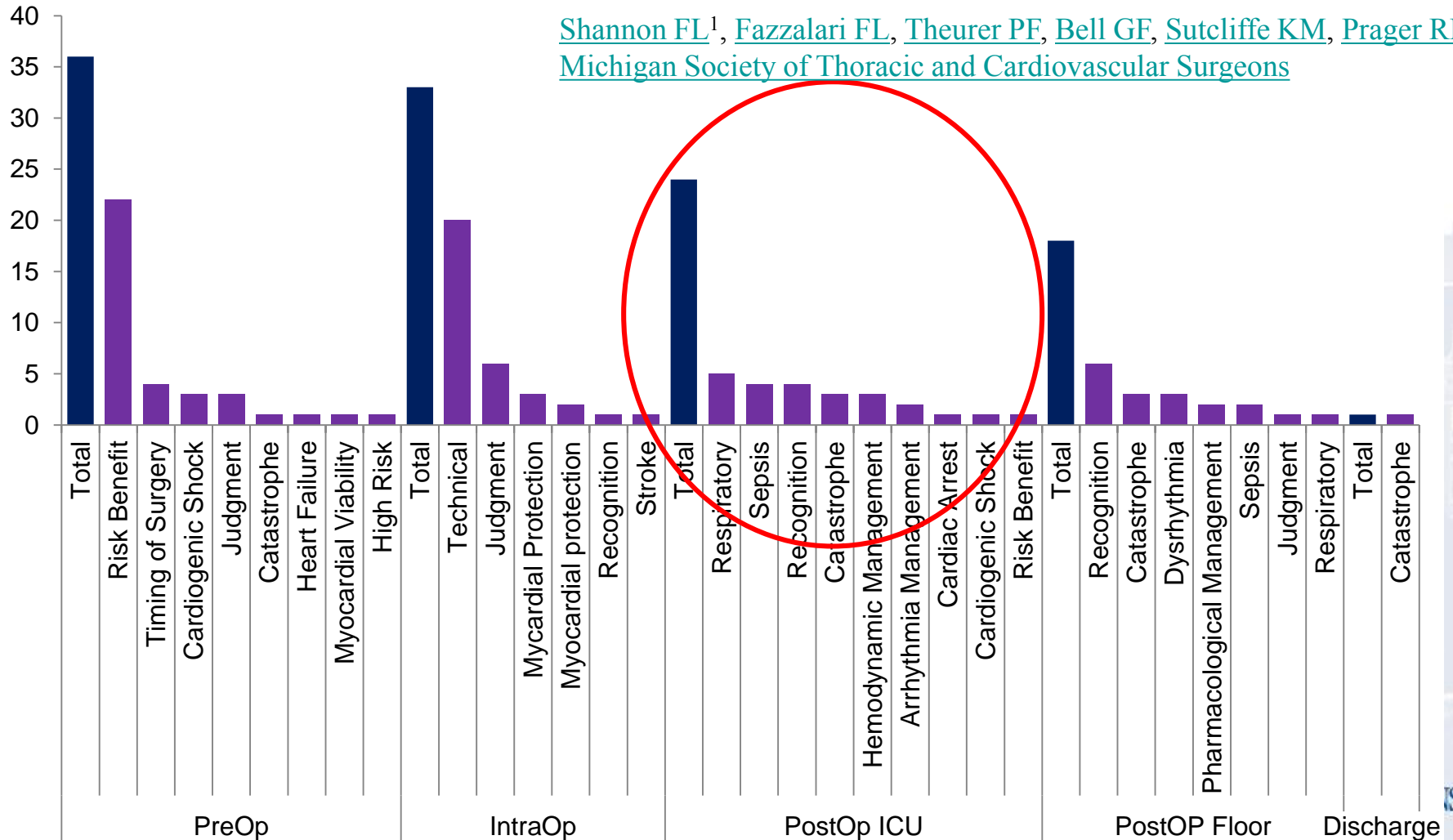
Name ▲	Overall Composite Score (?)	Absence of Operative Mortality (?)	Absence of Major Morbidity (?)	Use of Internal Mammary Artery (?)	Receipt of Required Perioperative Medications (?)
Genesys Heart Institute Grand Blanc, MI	★★	★★	★★	★★	★★
Genesys Heart Institute Physician Group Rochester, MI	★★	★★	★★	★★	★★
Henry Ford Hospital Cardiac Surgery Detroit, MI	★★	★★	★	★★	★★★★
HFMG - Henry Ford Macomb Clinton Township, MI	★★★★	★★	★★	★★	★★★★
IHA Cardiovascular and Thoracic Surgery Ann Arbor, MI	★★★★	★★	★	★★	★★★★
Lakeshore Cardiothoracic and Vascular Surgery Saint Joseph, MI	★★	★★	★★	★★	★★★★
McLaren Cardiothoracic Vascular Surgeons Lansing, MI	★★	★★	★★	★★	★★
McLaren-Flint Flint, MI	★★	★★	★★	★★	★★★★
MCVI Saginaw, MI	★★	★★	★★	★★	★★
Michigan Cardiovascular Institute Saginaw, MI	★★	★★	★★	★★	★★

Numeric Value: 99.6
Percentage of first-time CABG patients who received at least one IMA graft.

Numeric Value: 98.9
Percentage of first-time CABG patients who received at least one IMA graft.

Deaths by POCA Category and Problem

[Shannon FL](#)¹, [Fazzalari FL](#), [Theurer PF](#), [Bell GF](#), [Sutcliffe KM](#), [Prager RL](#)
[Michigan Society of Thoracic and Cardiovascular Surgeons](#)



Full Time Intensivists: How It All Began

On-site Physician Staffing in a Community Hospital Intensive Care Unit

Impact on Test and Procedure Use and on Patient Outcome

Theodore C. M. Li, MD; Malcolm C. Phillips, MD; Linda Shaw, MPH;
E. Francis Cook, ScD; Charles Natanson, MD; Lee Goldman, MD, MPH

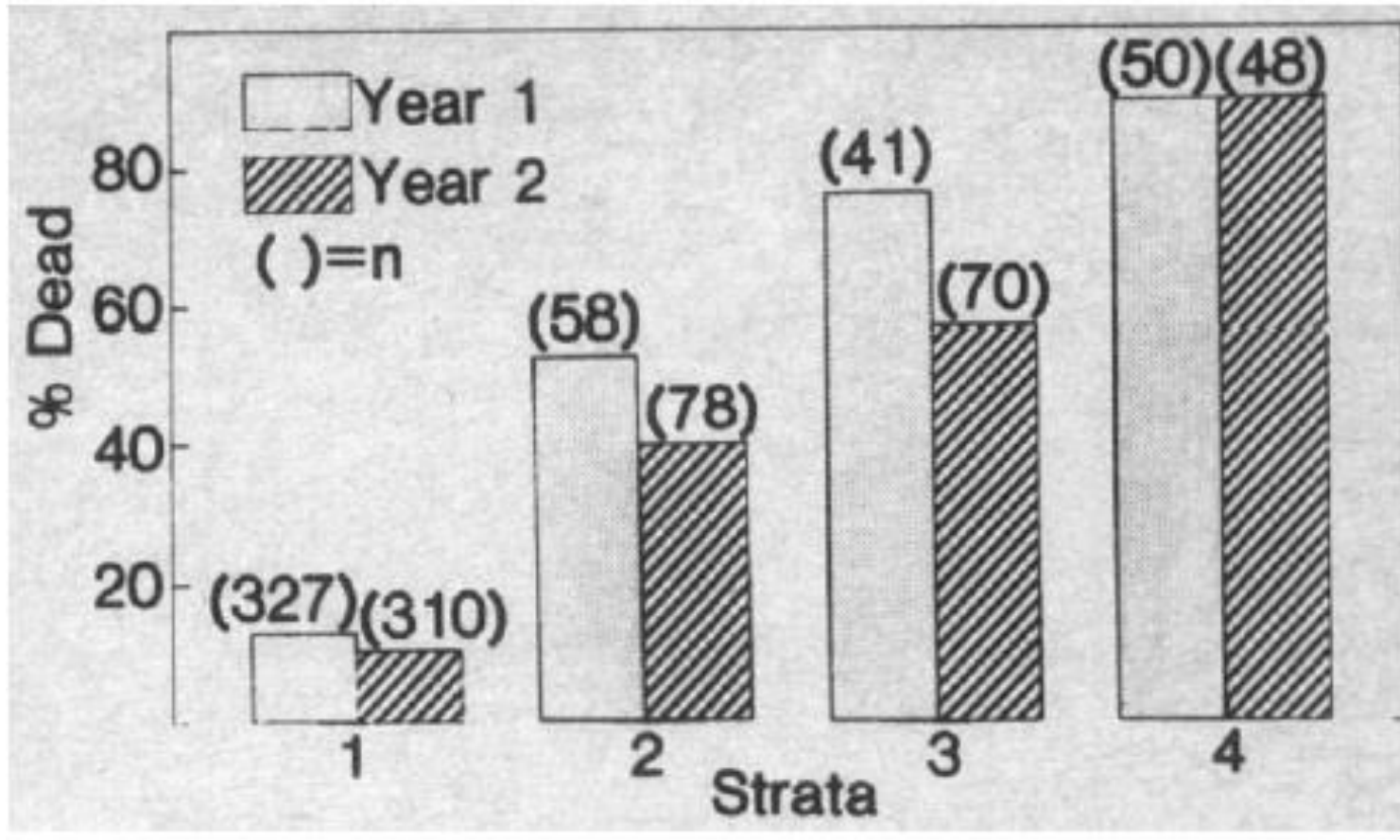
JAMA
1984;252:2023

- St Barnabas Hospital, Bronx, NY
- 1979-1981 10 bed ICU n =1070

ICU Care	Daytime	Nighttime
Yr. 1	Office based MD	Agency MD: board eligible
Yr. 2	Full time MD (IM/Cards)	Subspecialty Fellow

Benefit of On-Site Physician:

Mortality Decreased (OR 0.62, p=0.01)

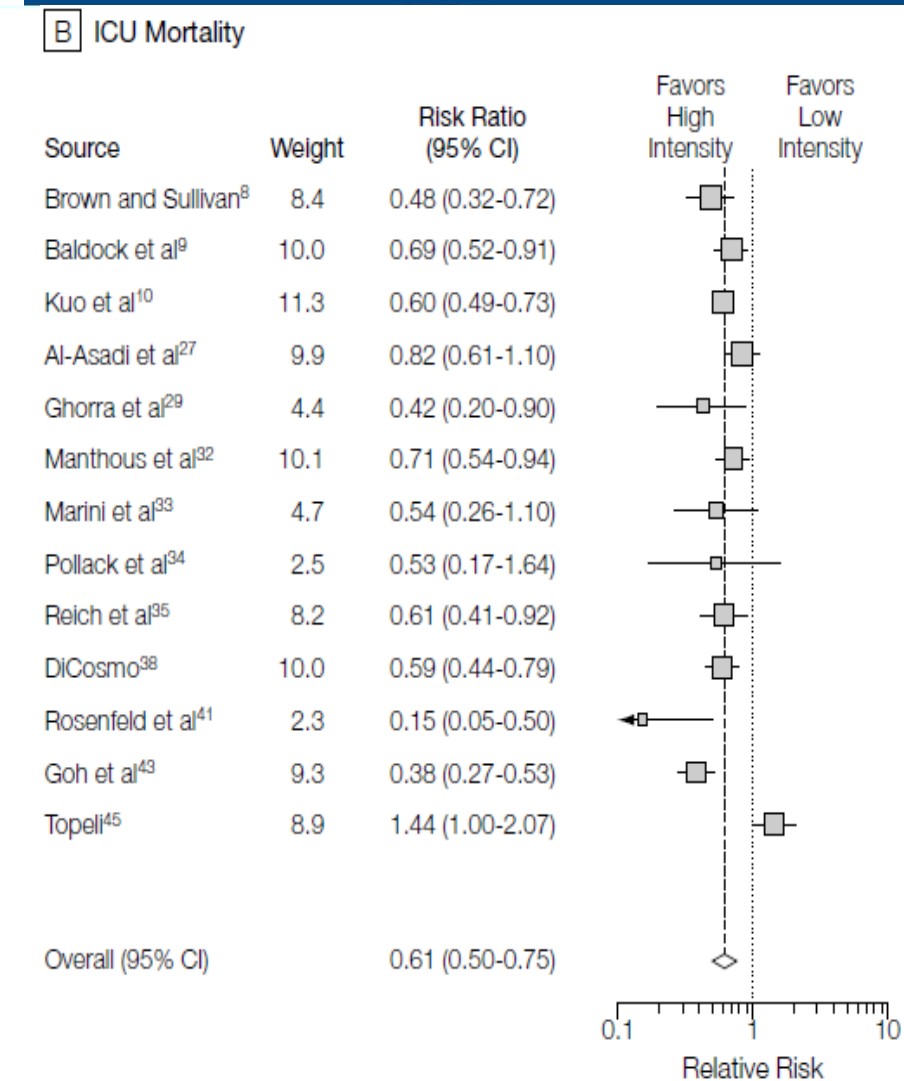
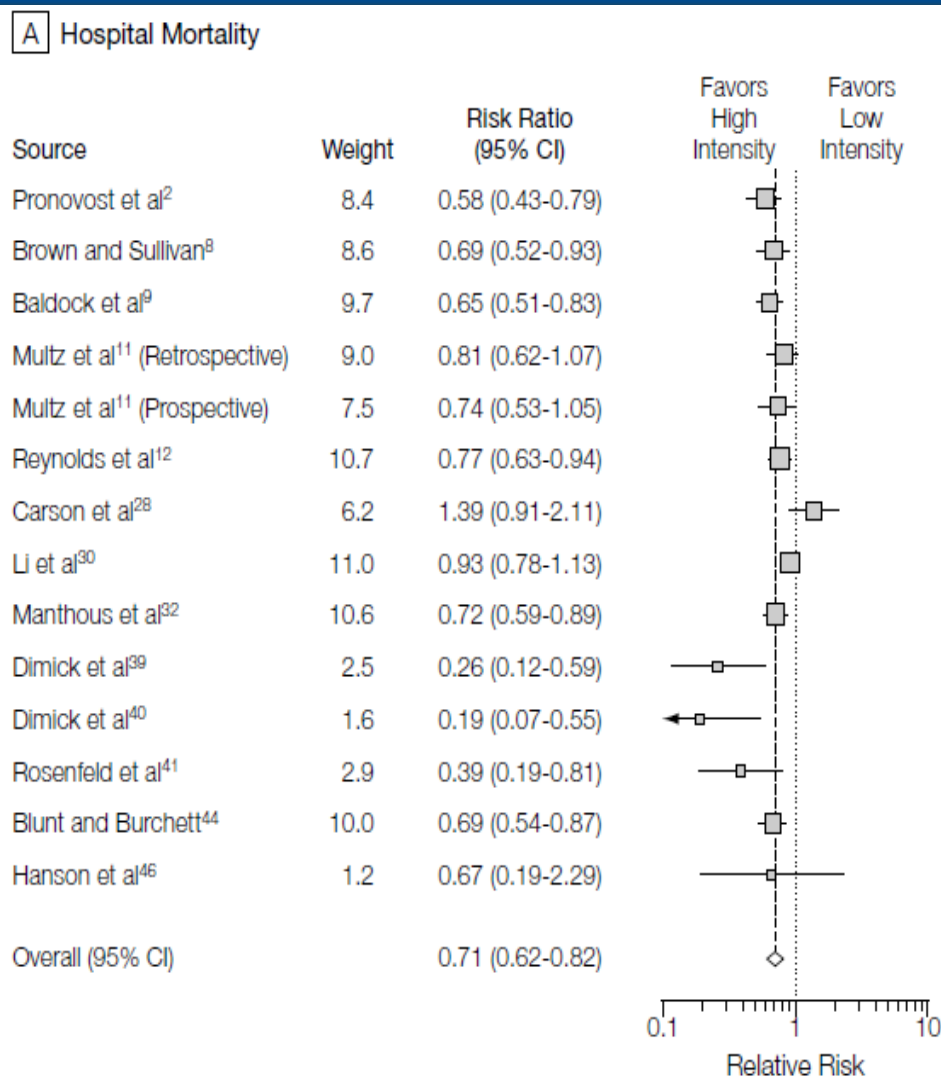


Physician Staffing Patterns and Clinical Outcomes in Critically Ill Patients

Pronovost et al JAMA 2002;288:2151

- 26 Observational Trials: staffing patterns and outcomes
- Staffing:
 - Low Intensity: no intensivist/elective consultation
 - High Intensity: closed ICU/mandatory consult

Staffing Patterns Matter in the ICU: Pronovost et al JAMA 2002



FULL TIME INTENSIVIST ICU STAFFING

- Improves Mortality
- Decreases Length of Stay
- Improves Cost Efficiency

Fuchs et al
Clinical Anesthesiology 2005;19:125-135

Effect of Multi-D Rounds and ICU Mortality

Table 3. Association Between Intensivist Physician Staffing and 30-Day Mortality for All Patients^a

Variable	OR (95% CI)	P Value
Model 1: multidisciplinary care staffing alone		
No multidisciplinary care	1 [Reference]	
Multidisciplinary care	0.84 (0.76-0.93)	.001
Model 2: Intensivist physician staffing alone		
Low Intensity	1 [Reference]	
High Intensity	0.84 (0.75-0.94)	.002
Model 3: Interaction between intensivist physician staffing and multidisciplinary care teams		
Low Intensity + no multidisciplinary care	1 [Reference]	
Low Intensity + multidisciplinary care	0.88 (0.79-0.97)	.01
High Intensity + multidisciplinary care	0.78 (0.68-0.88)	<.001

Kim M et al, Arch Int Med
 2010;170:369-376

Pa Hospitals n = 112 ,
 Patients = 108,000
 2004-2006

Low intensity: Intensivist
 optional/none

Hi intensity:
 Intensivist mandatory

Multi-D:

- Pharmacy,
- Resp Therapy
- Social Work

From: **Pharmacist Participation on Physician Rounds and Adverse Drug Events in the Intensive Care Unit**

366 recommendations
with a 95% acceptance rate

Table 2. Adverse Drug Event Rates*

	MICU Study Unit		CCU Control Unit	
	Phase 1	Phase 2	Phase 1	Phase 2
Average daily census	13.9	12.4	12.9	11.9
Total patient-days No.	787	861	461	644
No. of patients	75	75	50	75
All adverse drug events, No.	35	10	16	30
Rate per 1000 patient-days†	33.0 (27-39)	11.6 (8-15)‡	34.7 (26-43)	46.6 (38-55)
Preventable ordering adverse drug events, No.	11	3	5	8
Rate per 1000 patient-days†	10.4 (7-14)	3.5 (1-5)‡	10.9 (6-16)	12.4 (8-17)

*Phase 1 (preintervention) February 1, 1993-July 31, 1993; phase 2 (postintervention) October 1, 1994-July 7, 1995.

†Data expressed as percentage (95% confidence interval).

‡ $P < .001$ for comparison with both phase 1 in the study unit and phase 2 in the control unit.

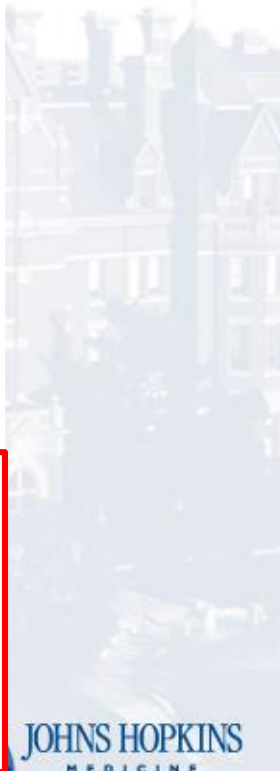
JAMA. 1999;282(3):267-270. doi:10.1001/jama.282.3.267

Cardiac Surgery Clinical Practice Guidelines: POD 0

Phase 1: Upon Admission to the CVSICU	Comments
<i>* Check when addressed</i>	
<input type="checkbox"/> Rapid Extubation Protocol Ordered, <i>If appropriate</i>	
<input type="checkbox"/> Review EKG and CXR Immediately	
<input type="checkbox"/> External & internal pacemakers addressed	
<input type="checkbox"/> Change to single chamber pacer, <i>if appropriate. (AICD to be re-programmed on POD 1, if stable)</i>	
<input type="checkbox"/> Apply anchor device to Central Line	
<input type="checkbox"/> Foley cath secured? <i>*If not, please secure using the Grip-lok device</i>	
<input type="checkbox"/> If Swan in place, check height, weight and computation <input type="checkbox"/> Send SvO2	
<input type="checkbox"/> OGT to LIS and check placement	
<input type="checkbox"/> Validate current Type and Cross	
<input type="checkbox"/> Insulin drip <input type="checkbox"/> Notify provider for IV insulin bolus if any BG >160mg/dl	
<input type="checkbox"/> Chest Tubes to 20 cm suction	
<input type="checkbox"/> MAP goal discussed (<i>Reflected in orders</i>)	
<input type="checkbox"/> Date/Team Information Completed (<i>Top left</i>)	
<input type="checkbox"/> Clip PINK "Vent Alert Sign", <input type="checkbox"/> BG Clock, and <input type="checkbox"/> POD 0 Checklist to door	
Provider Signature: _____	Nurse Signature: _____

Phase 2a: Assessment / Management: Nursing (<i>within 2 Hours post-admission</i>)	Comments
<i>* Check when addressed</i>	
<input type="checkbox"/> Correlate manual BP to A-line	
<input type="checkbox"/> VAP bundle (<i>HOB 30°, Mouth Care q4hr., CHG q12hr.</i>)	
<input type="checkbox"/> Stockings and SCD's in place	
<input type="checkbox"/> Notify Attending If Chest tube output > 150cc/hr. x 2hr. <input type="checkbox"/> Send Heme 8 / coags	
<input type="checkbox"/> Family contacted <input type="checkbox"/> Phone #'s in chart	
<input type="checkbox"/> ASA 325mg via NG tube NOW if no signs of bleeding	
<input type="checkbox"/> Carrier D5W (<i>Goal rate 20 cc per hr.</i>)	
Phase 2b: Assessment / Management: Provider (<i>within 2 Hours post-admission</i>)	
<i>* Check when addressed</i>	
<input type="checkbox"/> Vent changes, review initial ABG, aim for alkalemia until weaning	
<input type="checkbox"/> Appropriate POD 1 labs ordered	
<input type="checkbox"/> Verify MRSA/MSSA PCR status <input type="checkbox"/> Verify Isolation status	
<input type="checkbox"/> Continue mupirocin dosing, <i>If applicable</i>	
Provider Signature: _____	Nurse Signature: _____

Nursing: Daily Goals/Plan of Care			
Neuro / Pain	Pain Control:	Infectious Disease	Antibiotics:
	Fentanyl: (<i>Intermittent/Continuous</i>)		Antibiotic stop dates:
	Propofol:		GI/Nutrition:
CV	Other:	GI/Nutrition/ Volume	Diuresis Goal:
	MAP Goal:		Anticoag:
	CVP/PAD Goal:	Heme Study	Study Patient: Yes* No
	Pressors/Wean Plan:		*If yes, what study: _____
(Afib) Amio Treatment Plan:			
Resp	Early Extubation: <input type="checkbox"/> Y <input type="checkbox"/> N		

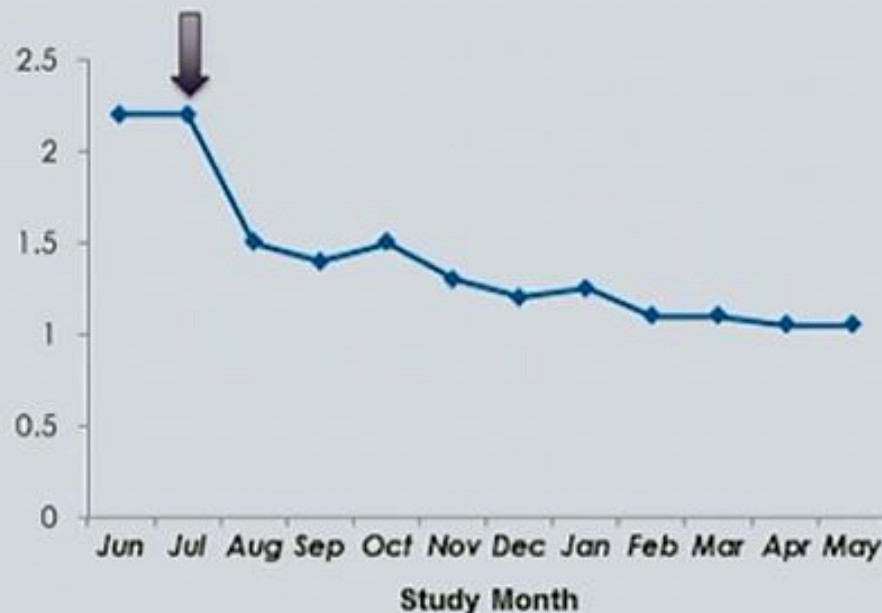


Daily Goals: Impact on ICU Care

Provider Understanding of Daily Goals



Average ICU Length of Stay (days)



654 New Admissions: 7 Million Additional Revenue

Pronovost JCC 2003;18:71-75

Cardiac Surgery Clinical Practice Guidelines: POD 0

Phase 1: Upon Admission to the CVSICU Comments

** Check when addressed*

- Rapid Extubation Protocol Ordered, *If appropriate*
- Review EKG and CXR Immediately
- External & internal pacemakers addressed
- Change to single chamber pacer, *if appropriate. (AICD to be re-programmed on POD 1, if stable)*
- Apply anchor device to Central Line
- Foley cath secured? **If not, please secure using the Grip-lok device*
- If Swan in place, check height, weight and computation Send SvO2
- OGT to LIS and check placement
- Validate current Type and Cross
- Insulin drip Notify provider for IV insulin bolus if any BG >160mg/dl
- Chest Tubes to 20 cm suction
- MAP goal discussed (*Reflected in orders*)
- Date/Team Information Completed (*Top left*)
- Clip PINK "Vent Alert Sign", BG Clock, and POD 0 Checklist to door

Provider Signature: _____ **Nurse Signature:** _____

Phase 2a: Assessment / Management: Nursing (*within 2 Hours post-admission*) Comments

** Check when addressed*

- Correlate manual BP to A-line
- VAP bundle (*HOB 30°, Mouth Care q4hr., CHG q12hr.*)
- Stockings and SCD's in place
- Notify Attending If Chest tube output > 150cc/hr. x 2hr. Send Heme 8 / coags
- Family contacted Phone #'s in chart
- ASA 325mg via NG tube NOW if no signs of bleeding
- Carrier D5W (*Goal rate 20 cc per hr.*)

Phase 2b: Assessment / Management: Provider (*within 2 Hours post-admission*) Comments

** Check when addressed*

- Vent changes, review initial ABG, aim for alkalemia until weaning
- Appropriate POD 1 labs ordered
- Verify MRSA/MSSA PCR status Verify Isolation status
- Continue mupirocin dosing, *If applicable*

Provider Signature: _____ **Nurse Signature:** _____

Nursing: Daily Goals/Plan of Care

Neuro / Pain	Pain Control:	Infectious Disease	Antibiotics:
	Fentanyl: (<i>Intermittent/Continuous</i>)		Antibiotic stop dates:
	Propofol:		GI/Nutrition:
CV	Other:	GI/Nutrition/ Volume	Diuresis Goal:
	MAP Goal:	Heme	Anticoag:
	CVP/PAD Goal:		Study Patient: Yes* No
	Pressors/Wean Plan:		*If yes, what study: _____
(Afib) Amio Treatment Plan:	Study		
Resp	Early Extubation: <input type="checkbox"/> Y <input type="checkbox"/> N		

Selected Process Measures before and after Checklist Implementation, According to Site

N Engl J Med 2009 360(5):491-499

Table 1. Elements of the Surgical Safety Checklist.*

Sign in
Before induction of anesthesia, members of the team (at least the nurse and an anesthesia professional) orally confirm that:
* The patient has verified his or her identity, the surgical site and procedure, and consent The surgical site is marked or site marking is not applicable
* The pulse oximeter is on the patient and functioning All members of the team are aware of whether the patient has a known allergy
* The patient's airway and risk of aspiration have been evaluated and appropriate equipment and assistance are available
* If there is a risk of blood loss of at least 500 ml (or 7 ml/kg of body weight, in children), appropriate access and fluids are available
Time out
Before skin incision, the entire team (nurses, surgeons, anesthesia professionals, and any others participating in the care of the patient) orally:
Confirms that all team members have been introduced by name and role
Confirms the patient's identity, surgical site, and procedure
Reviews the anticipated critical events
Surgeon reviews critical and unexpected steps, operative duration, and anticipated blood loss
Anesthesia staff review concerns specific to the patient
Nursing staff review confirmation of sterility, equipment availability, and other concerns
* Confirms that prophylactic antibiotics have been administered ≤ 60 min before incision is made or that antibiotics are not indicated
Confirms that all essential imaging results for the correct patient are displayed in the operating room
Sign out
Before the patient leaves the operating room:
Nurse reviews items aloud with the team
Name of the procedure as recorded
* That the needle, sponge, and instrument counts are complete (or not applicable)
That the specimen (if any) is correctly labeled, including with the patient's name
Whether there are any issues with equipment to be addressed
The surgeon, nurse, and anesthesia professional review aloud the key concerns for the recovery and care of the patient

* The checklist is based on the first edition of the WHO Guidelines for Safe Surgery.¹⁵ For the complete checklist, see the Supplementary Appendix.

Years 2007- 2008
8 hospitals
8 countries
2 time intervals: pre
and post checklist
Appr. 3750 pts /
group

Selected Process Measures before and after Checklist Implementation, According to Site

Table 6. Selected Process Measures before and after Checklist Implementation, According to Site.*

Site No.	No. of Patients Enrolled		Objective Airway Evaluation Performed (N = 7688)		Pulse Oximeter Used (N = 7688)		Two Peripheral or One Central IV Catheter Present at Incision When EBL ≥ 500 ml (N = 953)		Prophylactic Antibiotics Given Appropriately (N = 6802)		Oral Confirmation of Patient's Identity and Operative Site (N = 7688)		Sponge Count Completed (N = 7572)		All Six Safety Indicators Performed (N = 7688)	
	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After
1	524	598	97.0	98.5	100.0	100.0	95.7	83.6	98.1	96.9	100.0	100.0	98.9	100.0	94.1	94.2
2	357	351	72.0	75.8	97.5	98.6	78.8	61.3	56.9	76.9	9.5	97.2	100.0	100.0	3.6	55.3
3	497	486	74.7	66.3	98.6	100.0	83.8	82.5	83.8	87.7	47.1	90.1	97.8	96.8	30.8	51.0
4	520	545	94.6	95.8	100.0	100.0	66.7	48.6	80.0	81.8	98.9	97.6	97.3	99.1	67.1	63.7
5	370	330	6.2	0.0	68.9	91.2	7.6	2.7	29.8	96.2	0.0	86.1	0.0	92.4	0.0	0.0
6	496	476	46.2	56.3	76.4	83.0	49.2	57.9	25.4	50.6	21.8	64.9	99.4	99.4	1.4	18.1
7	525	585	97.5	99.7	99.4	100.0	32.0	100.0	42.5	91.7	98.9	100.0	100.0	100.0	46.7	92.1
8	444	584	6.5	94.0	99.3	99.5	68.8	57.1	18.2	77.6	16.4	98.8	61.5	70.0	0.0	51.7
Total	3733	3955	64.0	77.2	93.6	96.8	58.1	63.2	56.1	82.6	54.4	92.3	84.6	94.6	34.2	56.7
P value			<0.001		<0.001		0.32		<0.001		<0.001		<0.001		<0.001	

* Prophylactic antibiotics were considered to be indicated for all cases in which an incision was made through an uncontaminated field and appropriately administered when given within 60 minutes before an incision was made. Sponge counts were considered to be indicated in all cases in which an incision was made. P values are shown for the comparison of the total values before and after checklist implementation, calculated by means of the chi-square test. EBL denotes estimated blood loss, and IV intravenous.

Outcomes before and after Checklist Implementation, According to Site

Table 5. Outcomes before and after Checklist Implementation, According to Site.*

Site No.	No. of Patients Enrolled		Surgical-Site Infection		Unplanned Return to the Operating Room		Pneumonia		Death		Any Complication	
	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After
	<i>percent</i>											
1	524	598	4.0	2.0	4.6	1.8	0.8	1.2	1.0	0.0	11.6	7.0
2	357	351	2.0	1.7	0.6	1.1	3.6	3.7	1.1	0.3	7.8	6.3
3	497	486	5.8	4.3	4.6	2.7	1.6	1.7	0.8	1.4	13.5	9.7
4	520	545	3.1	2.6	2.5	2.2	0.6	0.9	1.0	0.6	7.5	5.5
5	370	330	20.5	3.6	1.4	1.8	0.3	0.0	1.4	0.0	21.4	5.5
6	496	476	4.0	4.0	3.0	3.2	2.0	1.9	3.6	1.7	10.1	9.7
7	525	585	9.5	5.8	1.3	0.2	1.0	1.7	2.1	1.7	12.4	8.0
8	444	584	4.1	2.4	0.5	1.2	0.0	0.0	1.4	0.3	6.1	3.6
Total	3733	3955	6.2	3.4	2.4	1.8	1.1	1.3	1.5	0.8	11.0	7.0
P value			<0.001		0.047		0.46		0.003		<0.001	

* The most common complications occurring during the first 30 days of hospitalization after the operation are listed. Bold type indicates values that were significantly different (at $P < 0.05$) before and after checklist implementation, on the basis of P values calculated by means of the chi-square test or Fisher's exact test. P values are shown for the comparison of the total value after checklist implementation as compared with the total value before implementation.



Cardiac Surgery Intraoperative Timeout Checklist

- Patient Name
- Operation
- Allergies?
- Introduction of Team
- Patient position (supine, L/R thoracotomy) and marking and incision?
- Planned cannulation (site and cannulae needed)?
- Valve or graft prosthesis and sizers?
- Sutures?
- Other special equipment (RF device, cryoprobe, etc)?
- Blood availability
- If redo or high risk sternal re-entry, redo pads and plan for emergent CPB?
- Room temperature setting?
- Wall monitors programmed appropriately?
- Antibiotics given (Vancomycin if MRSA+)?
- Beta blockers given (CABG only)? **IF NOT, DOCUMENT WHY**
- Pulmonary artery catheter?
- Temporary dual chamber pacemaker in room?
- ICD deactivated (if applicable)?
- Sterile magnet if patient has pacemaker?
- Lowest NP temperature on bypass?
- Transfusion trigger on CPB (notify surgeon of all transfusions)?
- Whole blood removed before CPB?
- Suction working?
- Plan to notify family?
- Disposition after OR?
- Is all hair/jewelry covered and eye protection on?

FIRE RISK ASSESMENT
 Surgical site above xyphoid?
 Open Oxygen source?
 Available ignition source?
 If all 3 are yes, initiate high risk protocol.

Nurse

Anesthesiologist

Surgeon (date)

Checklist Prior to Leaving OR for CVSICU

- Patient Hemodynamically Stable
- Chest Tube Output Acceptable
- CVSICU Notified and Ready to Accept Patient
- Last Potassium > 3.2
- Last pH > 7.35
- Pacer Connected and in DDD Mode
- Oxygen in Tank
- Breathing Mask Accompanying Patient
- Adequate Fluid for Resuscitation
- Emergency/Resuscitation Meds
- Specimen and documents checked with surgeon
- Debrief
- Resident Review
- STS Surgeon worksheet
- STS risk form in packet
- Op note dictated?
- Claves placed on all infusion ports?

If leaving OR with open chest:

- Use Kerlix gauze only
- Is this documented in CLINDOC?
- IRFO green sticker on dressing?
- Documented on IRFO logbook?

Nurse

Anesthesiologist

Surgeon

(date) _____

Resident OR to ICU Handoff

- **Pre-op Diagnosis:** *Include EF, STS risk score*
- **Post-op Diagnosis:**
- **Procedure:** *(Include: elective, urg, emerg, salvage)*
- **Surgeon:**
- **X Clamp time:**
- **Bypass time:**
- **Off Pump:** *Filling pressures, Inotropes, Cardiac Output*
- **Chest Tubes:** *MT's L Pleural R Pleural*
- **Cardioversion:**
- **Wires :** *Atrial Ventricular*
- **Blood Products :**
PRBCs FFP Plts Cryo
- **TEEcho**
- **Points of note** *(e.g. questionable grafts, goal BP/pH, bleeding, pacing, call resident/surgeon parameters, etc.)*

OR to ICU Handoff - Checklist

- Out of OR Time: _____
- Patient arm band intact? Y N _____
- Pacemaker connected? Y N _____
- Is dual chamber pacer needed? Y N *If not, change to Single Chamber Pacer* _____
- Are Medication Infusions Standard Concentrations? Y N _____
- Ancef and Amicar Drips stopped? Y N _____
- Central line dressings occlusive? Y N _____
- Are lines in order? Y N _____
- IV pump for GTTS - Verify patient weight and "infusion mode" Y N _____
- Was IV insulin protocol (*OR goal: 130-160*) utilized in the OR? Y N *Last Intraop BS: _____
- Admitting temperature: _____ *If <35°, is fluid warmer used?* Y N _____
- Was Beta Blocker Given? (*For Isolated CABG Only*) Y N _____
- If patient on iNO, discussed plan to switch to inhaled epoprostenol within 4 hours Y N _____
- Pink Donut in place? Y N _____
- Is patient in a study? Y* N **If yes, what study?* _____
- Does patient need coagulation labs? Y N _____
- Claves placed on all infusion ports? Y N _____
- Anesthesia Infusions Zeroed & Discontinued in EPIC? Y N _____

If Vascular Surgery Patient:

- Obtain Vascular MD on Call: _____, Pager/cell number _____
- Obtained neuro checks at time of handoff Y N _____
- Check LP drain set-up (*if applicable*) Y N _____

Date: _____
 POD #: _____
 Cardiac Surgery Attending: _____
 CVSICU Attending/Provider: _____
 Nurse: _____

Patient Name, MRN, DOB

Cardiac Surgery Clinical Practice Guidelines: POD>0

* Check if addressed Assessments:

- Daily Weights
- VAP bundle (HOB 30°, Mouth Care q4hr., CHG q12hr., Wean Screen)
- Sedation vacation at least q24hours
- If intubated, pink donut-shaped ring to back of head
- If patient on iNO, discussed plan to switch to inhaled epoprostenol
- Pacemaker settings addressed (Threshold & Sensitivity)
- Change to single chamber pacer, if appropriate (AICD to be re-programmed)
- Central lines/Arterial lines: Necessary?
- Dressings Occlusive? Dated/timed
- Scrub the Clave Alcohol swabs at head of bed Date dressing
- If Central Line > 14 days old, team should consider new site
- Verify MRSA/MSSA pre-op PCR / Need for mupirocin
- Foley securement device in place?
- Document need for Foley cath. If no need, D/C Foley cath by MN POD #2
- Sequential compression devices, sub q heparin
- PT/OT needs assessed Consult Issued, if applicable
- Nutrition: If on TF, make up % deficit from prior day.
- Chart TF goal deficit over past 24 hrs-% and cc's Chart Prostat dose on flow
- If on Veletri, is nebulizer upright / inflow arm

Diagnostics:

- Appropriate testing ordered
- If POD ≥2, CXR Needed?
- If valve repair, myectomy, or VSARR, order echo on transfer to Z10

Medications Addressed:

- Med Reconciliation with Pre-op Meds
- PPI A-fib Prophylaxis
- Statin Diuretic
- ASA Stool softeners
- DVT Prophylaxis ABX
- Beta Blocker Sleeping Aid?

Miscellaneous:

- Pt Fall Risk(Low / Moderate / High) Fall risk alert card matches
- Family contacted Contact info verified
- Document pressure ulcer prophylaxis, need for specialty bed
- SSI, CLABSI, Fall prev, d/c plan, pt/family ed. provided and documented
- Restraint order in POE, if applicable
- Social work/Pastoral needs addressed Consult Issued, if applicable
- Supportive care needs addressed Consult Issued, if applicable

Provider Signature: _____
 Nurse Signature: _____

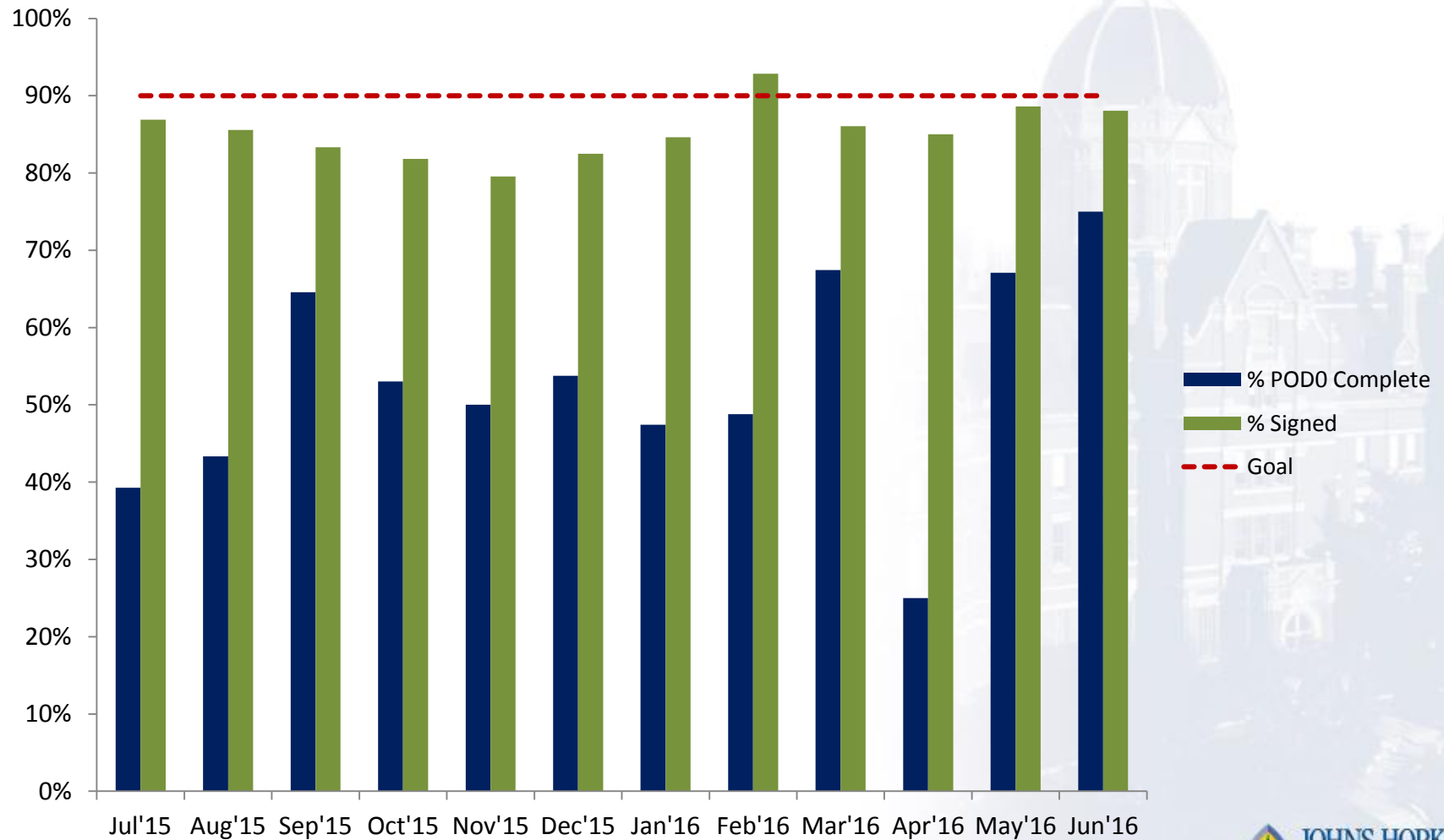
Nursing Daily Goals - Plan of Care:

Skin:	Wound care Consult?
	Active Issues:
Neuro/ Pain	Sedation Vacation?
	Pain Control:
	Activity Plan:
Pulm	PT/OT/SLP Needs:
	Vent/BiPAP changes:
	Pulm Toilet Plan:
CV	CT Removal
	MAP / SBP Goal:
	Pressors:
	(Afib) Amio Tx Plan:
GI/ Nutrition & Glucose Control	Diet:
	TF: ____ @ ____ ml/hr, Goal rate: ____
	*If possible, make up yesterday's deficit.
Volume/ I&O	Insulin gtt. / SS Aspart:
	Diuresis/Lasix Plan:
	I&O Goals:
Endocrine (POD 1)	BG Target Window: _____ (Date)
	From _____ to _____ (Time)
	*Call Provider if BG >180
	Diets: All POD1 diets should be CL, no conc sweets, or 30 gram carb control until > 24 hrs post-op.
ID	Current Abx:
	Abx Levels/Pan Culture/Cx Results:
	Antibiotic Stop Dates:
Heme	D/C Lines?
	DVT Prophylaxis: Hep SQ <input type="checkbox"/> ASA ____ mg / TEDs SCDs
	Anticoagulation & Protocol?
Procedures	Procedures Today:
	Sedation / Analgesia Plan:
Study	Study Patient: Yes* No *If yes, what study:
Patient Transfer	Patient ready for transfer? Yes* No *Issues delaying transfer :



*Updated by Miranda 06.20.2016

POD 0 Checklist Compliance



Cardiac Surgery Clinical Practice Guidelines: POD 0

Phase 1: Upon Admission to the CVSICU	Comments
<i>* Check when addressed</i>	
<input type="checkbox"/> Rapid Extubation Protocol Ordered, <i>if appropriate</i>	
<input type="checkbox"/> Review EKG and CXR Immediately	
<input type="checkbox"/> External & internal pacemakers addressed	
<input type="checkbox"/> <u>Change to single chamber pacer, if appropriate. (AICD to be re-programmed on POD 1, if stable)</u>	
<input type="checkbox"/> Apply anchor device to Central Line	
<input type="checkbox"/> <u>Foley cath secured? *If not, please secure using the Grip-lok device</u>	
<input type="checkbox"/> If Swan in place, check height, weight and computation <input type="checkbox"/> Send SvO2	
<input type="checkbox"/> OGT to LIS and check placement	
<input type="checkbox"/> Validate current Type and Cross	
<input type="checkbox"/> Insulin drip <input type="checkbox"/> Notify provider for IV insulin bolus if any BG >160mg/dl	
<input type="checkbox"/> Chest Tubes to 20 cm suction	
<input type="checkbox"/> MAP goal discussed (<i>Reflected in orders</i>)	
<input type="checkbox"/> Date/Team Information Completed (<i>Top left</i>)	
<input type="checkbox"/> Clip PINK "Vent Alert Sign", <input type="checkbox"/> BG Clock, and <input type="checkbox"/> POD 0 Checklist to door	
<input type="checkbox"/> If on Veletri, is nebulizer upright / inflow arm	
<input type="checkbox"/> <u>Is patient a candidate for late transfer today?</u> <input type="checkbox"/> Y <input type="checkbox"/> N	
Provider Signature: _____	Nurse Signature: _____

Phase 2a: Assessment / Management: Nursing (<i>within 2 Hours post-admission</i>)	Comments
<i>* Check when addressed</i>	
<input type="checkbox"/> Correlate manual BP to A-line	<input type="checkbox"/> Family contacted <input type="checkbox"/> Phone #'s in chart
<input type="checkbox"/> <u>VAP bundle (HOB 30°, Mouth Care q4hr., CHG q12hr.)</u>	<input type="checkbox"/> ASA 325mg via NG tube NOW if no signs of bleeding
<input type="checkbox"/> <u>Stockings and SCD's in place</u>	<input type="checkbox"/> Carrier D5W (<i>Goal rate 20 cc per hr.</i>)
<input type="checkbox"/> <u>Notify Attending If Chest tube output > 150cc/hr. x 2hr.</u>	<input type="checkbox"/> <u>Send Heme 8 / coags</u>

Phase 2b: Assessment / Management: Provider (<i>within 2 Hours post-admission</i>)	Comments
<i>* Check when addressed</i>	
<input type="checkbox"/> Vent changes, review initial ABG, aim for alkalemia until weaning	
<input type="checkbox"/> Appropriate POD 1 labs ordered	
<input type="checkbox"/> Verify MRSA/MSSA PCR status <input type="checkbox"/> Verify Isolation status	
<input type="checkbox"/> Continue mupirocin dosing, <i>if applicable</i>	
Provider Signature: _____	Nurse Signature: _____

Cardiac Surgery Clinical Practice Guidelines: POD 0

Phase 1: Upon Admission to the CVSICU	<u>Comments</u>
<i>*Check when addressed</i>	
<input type="checkbox"/> Rapid Extubation Protocol Ordered, <i>If appropriate</i>	
<input type="checkbox"/> Review EKG and CXR Immediately	
<input type="checkbox"/> External & internal pacemakers addressed	
<input type="checkbox"/> Change to single chamber pacer, <i>if appropriate. (AICD to be re-programmed on POD 1, if stable)</i>	
<input type="checkbox"/> Apply anchor device to Central Line	
<input type="checkbox"/> Foley cath secured? <i>*If not, please secure using the Grip-lok device</i>	
<input type="checkbox"/> If Swan in place, check height, weight and computation <input type="checkbox"/> Send SvO2	
<input type="checkbox"/> OGT to LIS and check placement	
<input type="checkbox"/> Validate current Type and Cross	
<input type="checkbox"/> Insulin drip <input type="checkbox"/> Notify provider for IV insulin bolus if any BG >160mg/dl	
<input type="checkbox"/> Chest Tubes to 20 cm suction	
<input type="checkbox"/> Correlate manual BP to A-line	
<input type="checkbox"/> MAP goal discussed (<i>Reflected in orders</i>)	
<input type="checkbox"/> Date/Team Information Completed (<i>Top left</i>)	
<input type="checkbox"/> Clip PINK "Vent Alert Sign", <input type="checkbox"/> BG Clock, and <input type="checkbox"/> POD 0 Checklist to door	
<input type="checkbox"/> If on Veletri, is nebulizer upright / inflow arm	
<input type="checkbox"/> Is patient a candidate for late transfer today? <input type="checkbox"/> Y <input type="checkbox"/> N	
<input type="checkbox"/> Vent changes, review initial ABG, aim for alkalemia until weaning	
<input type="checkbox"/> Appropriate POD 1 labs ordered	
<input type="checkbox"/> Verify MRSA/MSSA PCR status <input type="checkbox"/> Verify Isolation status	
<input type="checkbox"/> Continue mupirocin dosing, <i>If applicable</i>	
<input type="checkbox"/> Stockings and SCD's in place	
Provider Signature:	Nurse Signature:
Phase 2: Assessment / Management: Nursing (<i>within 2 Hours post-admission</i>)	<u>Comments</u>
<i>*Check when addressed</i>	
<input type="checkbox"/> VAP bundle (<i>HOB 30°, Mouth Care q4hr., CHG q12hr.</i>)	<input type="checkbox"/> Family contacted
<input type="checkbox"/> ASA 325mg via NG tube NOW if no signs of bleeding	<input type="checkbox"/> Phone #'s in chart
<input type="checkbox"/>	<input type="checkbox"/>
Provider Signature:	Nurse Signature:

ICU TEAMWORK MATTERS

September 12, 2016

34

Cardiac Surgery Quality Assurance Performance Improvement Committee

(2009 – 2012)

- First and Third Friday of Every Month
- Representatives From:
 - Attendings
 - Fellows
 - AP's: both CVSICU and CVPCU
 - Respiratory Therapy
 - Physical Therapy
 - Pharmacy
 - Nursing: both CVSICU and CVPCU
 - Administration
 - Quality Improvement

INFLUENCE OF THE COMPREHENSIVE UNIT-BASED SAFETY PROGRAM IN ICUS: EVIDENCE FROM THE KEYSTONE ICU PROJECT

Hsu Y, Marsteller J
Am J Med Qual 2016;31:349-
357

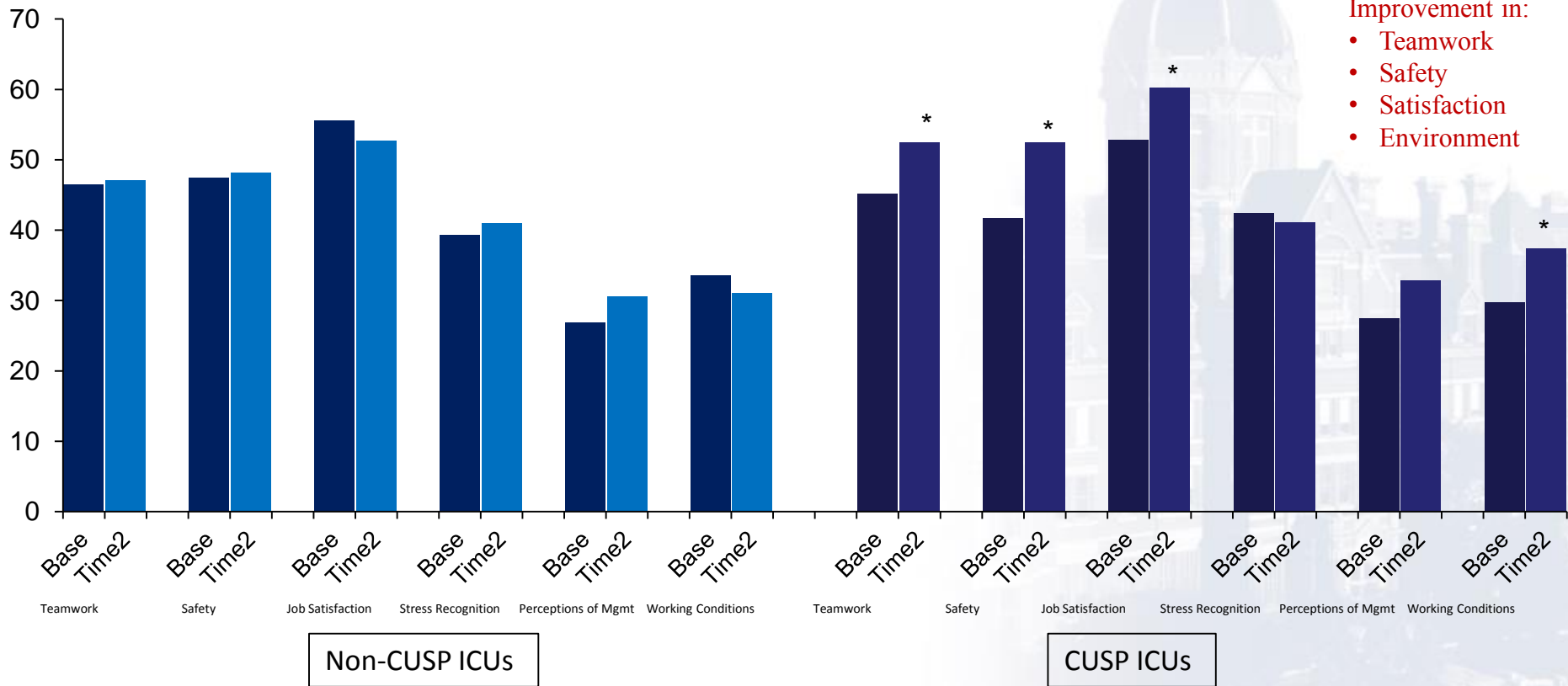
CUSP: Comprehensive Unit Based Safety Program

- CUSP Members:
- Team Leader
- Physician Champion
- Executive Champion
- Nurse Manager
- Infection Prevention Representative
- Resp Therapy, Environmental, Invited Stakeholders

CUSP

- Monthly Meetings
- Monthly Safety Rounds
- Identify system defects
- Develop safety and monitoring tools
- Educate the staff
- Present outcomes

Influence of CUSP on ICU Culture



*significantly positive difference

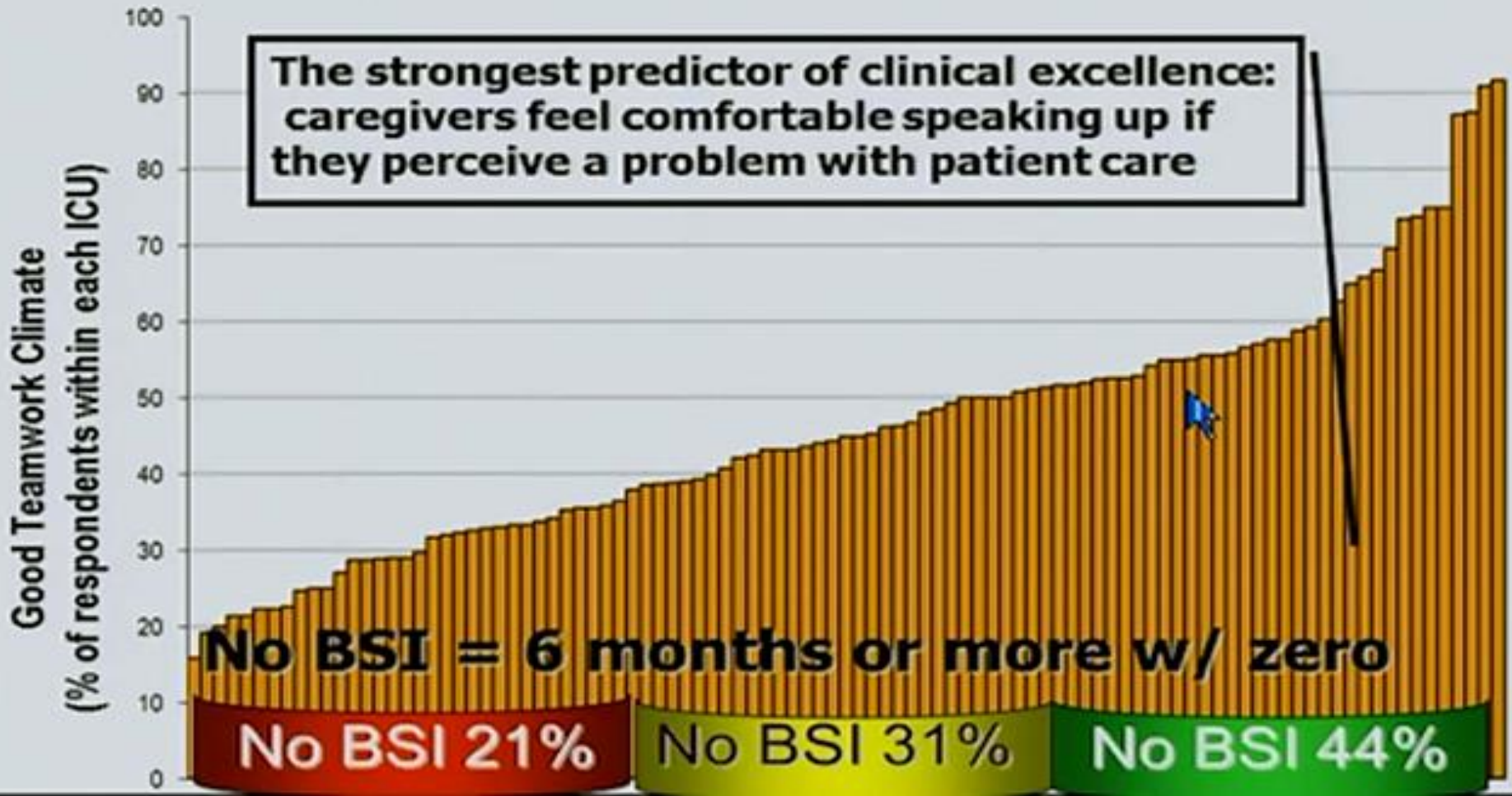
Hsu Y, Marsteller J

American Journal of Medical Quality 2016;31:349-357

Teamwork Climate



**The strongest predictor of clinical excellence:
caregivers feel comfortable speaking up if
they perceive a problem with patient care**



No BSI = 6 months or more w/ zero

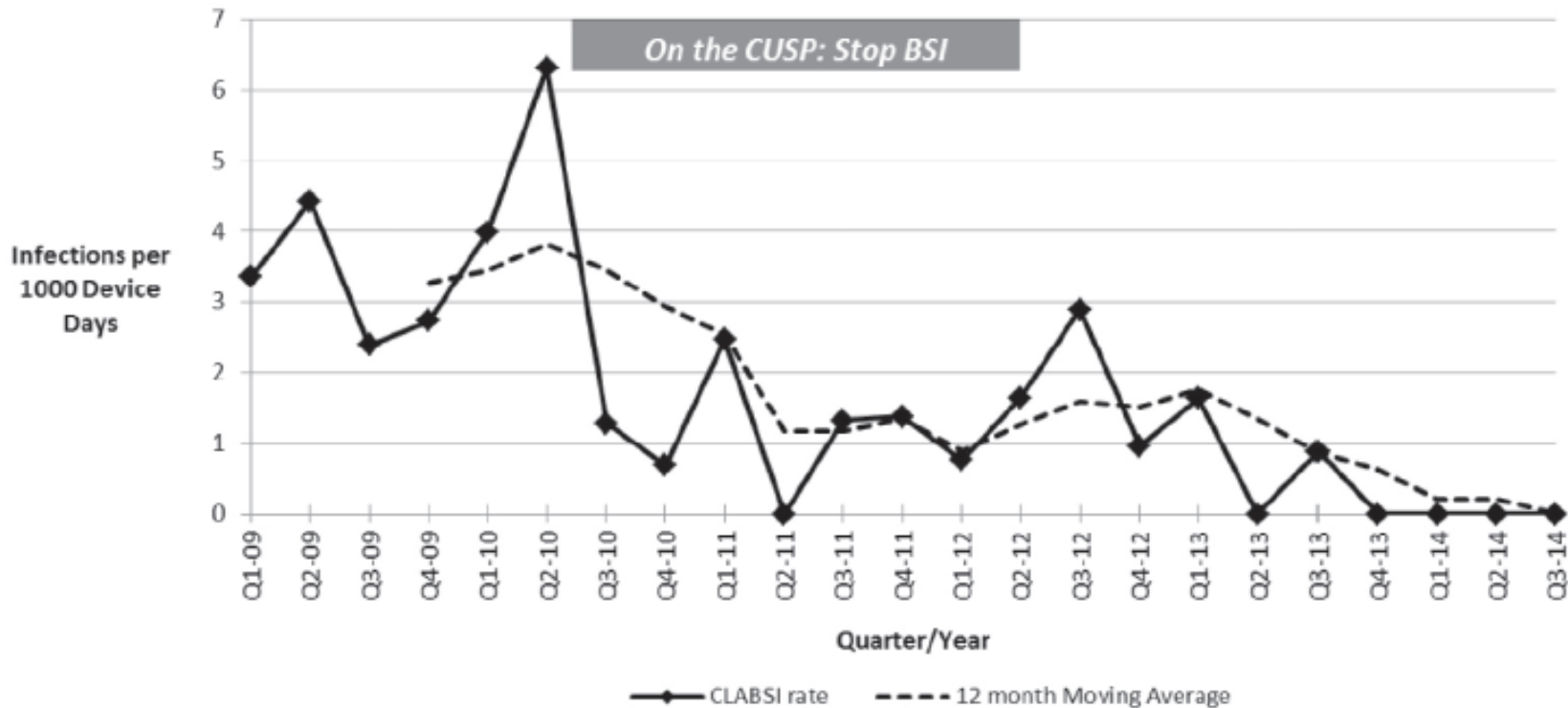
No BSI 21%

No BSI 31%

No BSI 44%

The Effect of a Comprehensive Unit Based Safety Program on CLABSI

Miller K et al, 2016 Am J Infection Control

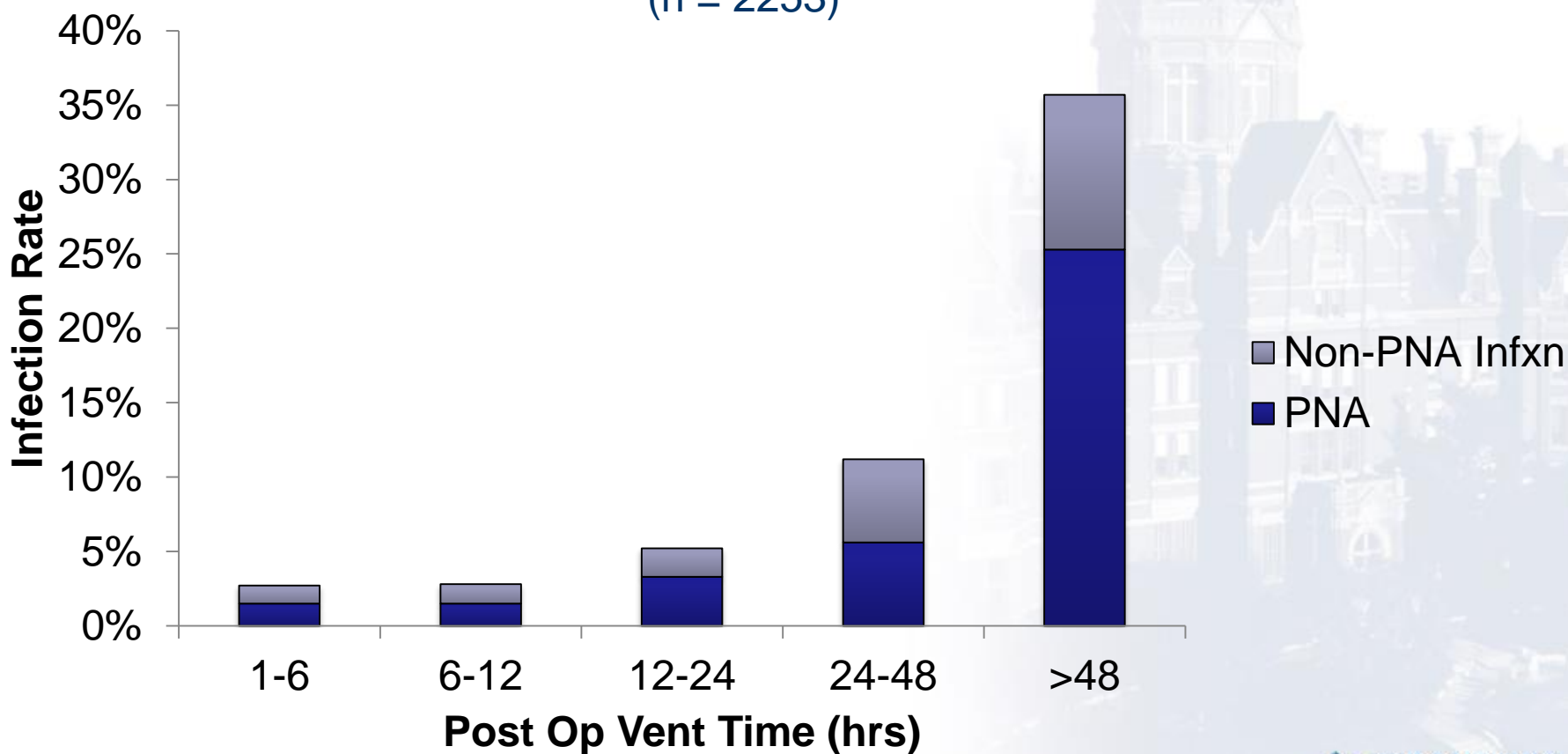


The Impact of ICU Structure and Processes on Outcomes

- Full Time Intensivists
- Multidisciplinary Teams
- Organization of Rounds
- Checklists
- Teamwork
- **Performance Improvement and Metrics**

Post-Op SSI and PNA Rate in Open Heart Surgery Patients

Johns Hopkins Hospital: 11/2011 – 3/2014
(n = 2253)

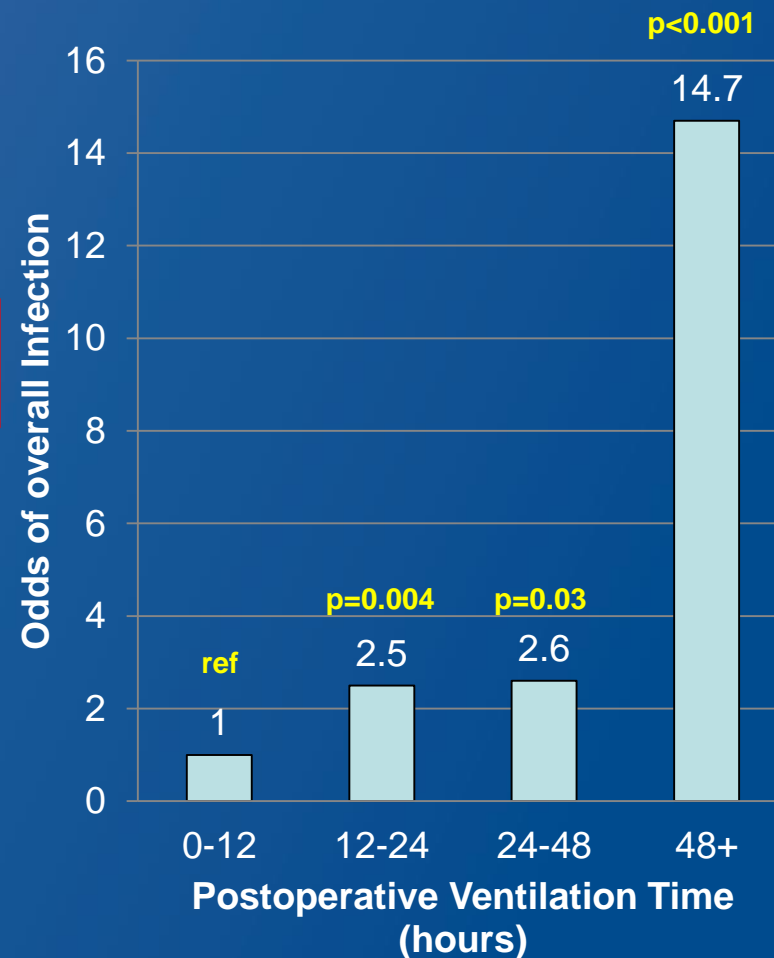


Primary Outcome

Postoperative Overall Infection (n=127)

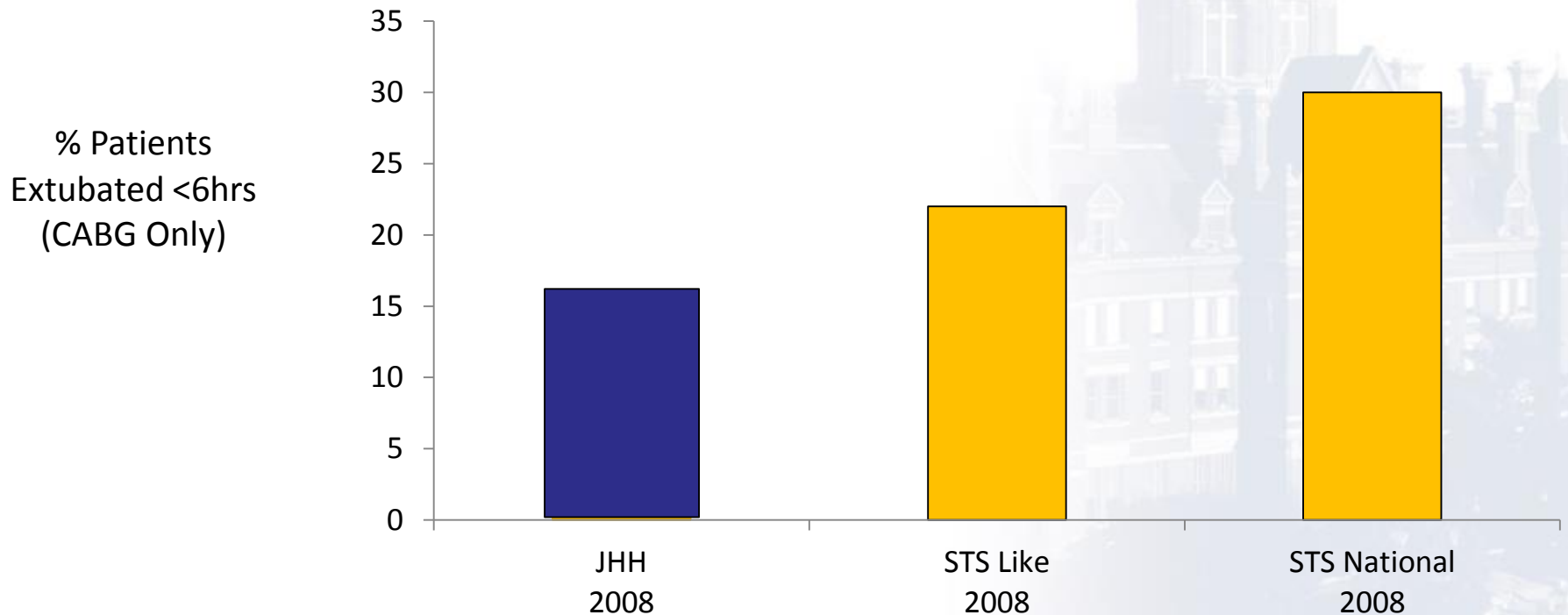
with/without Vent time adjusted

Odds of Infection (95%CI)	Without Vent Time	p-value	With Vent Time	p-value
Intraop + Postop Transfusion				
RBC (unit)	1.1(1.0-1.2)	0.04	1.0(0.9-1.1)	0.76
FFP	1.3 (0.8-2.2)	0.26	1.1(0.6-1.8)	0.81
Platelet	0.8(0.5-1.3)	0.34	0.8(0.5-1.4)	0.48
Cryo	1.2 (0.6-2.5)	0.60	1.2(0.4-3.2)	0.78
Preop WBC	1.1(1.0-1.1)	<0.001	1.05(1.0-1.1)	0.001
Preop COPD	3.3(2.2-5.0)	<0.001	2.6(1.6-4.3)	<0.001
Preop Cr > 1.5mg/dL	1.7(1.0-2.7)	0.04	1.34(0.8-2.2)	0.26

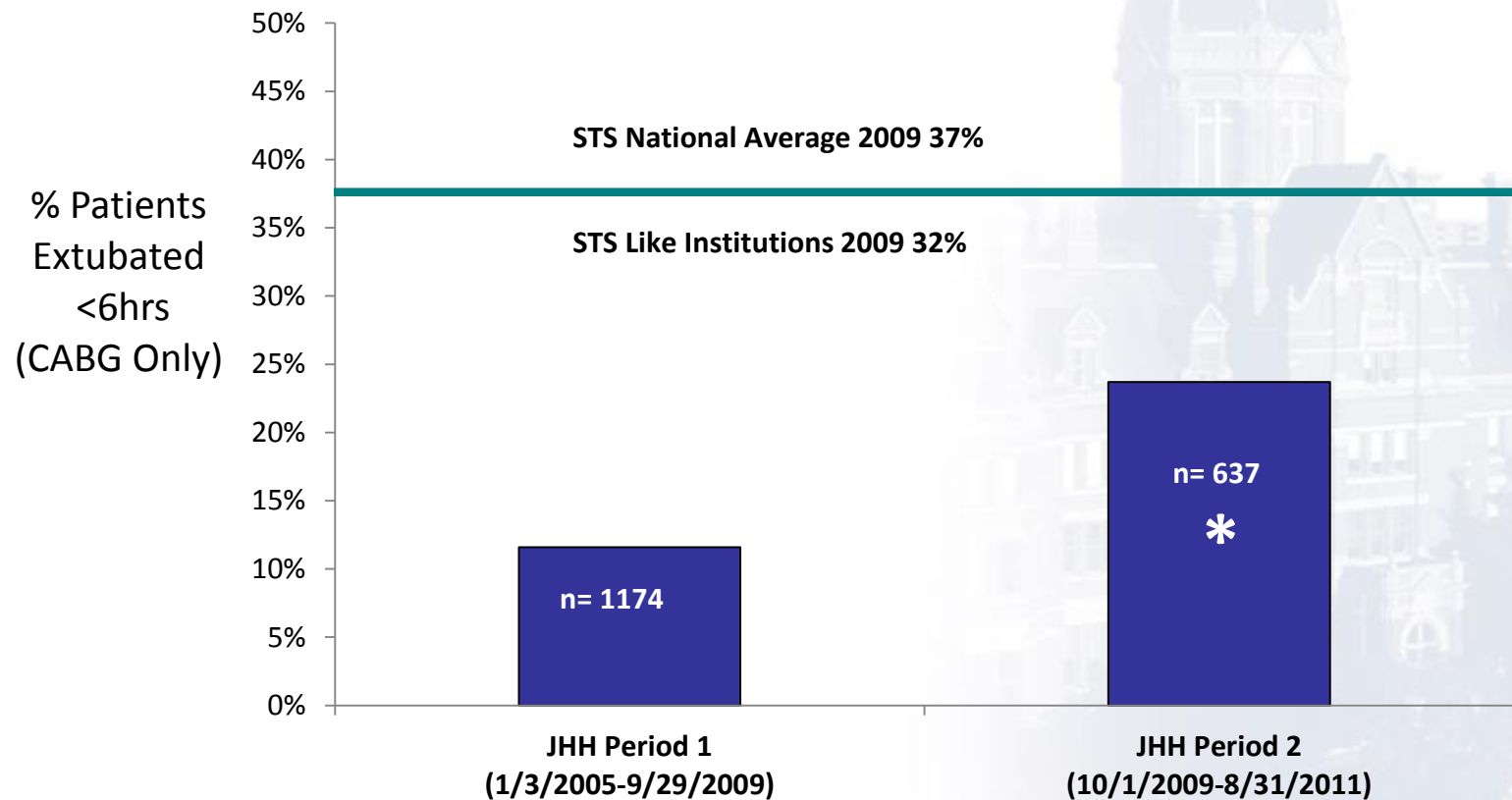


Adjusted variables were blood products, previous cardiac surgery, preoperative WBC value, heart failure within 2 weeks prior to surgery, preoperative COPD, preoperative serum creatinine, CPB time, and surgery type vs. isolated CABG, and postoperative ventilation time. Only values < 0.05 are shown, except for transfusions.

Early Extubation Performance at the Johns Hopkins Hospital - 2008

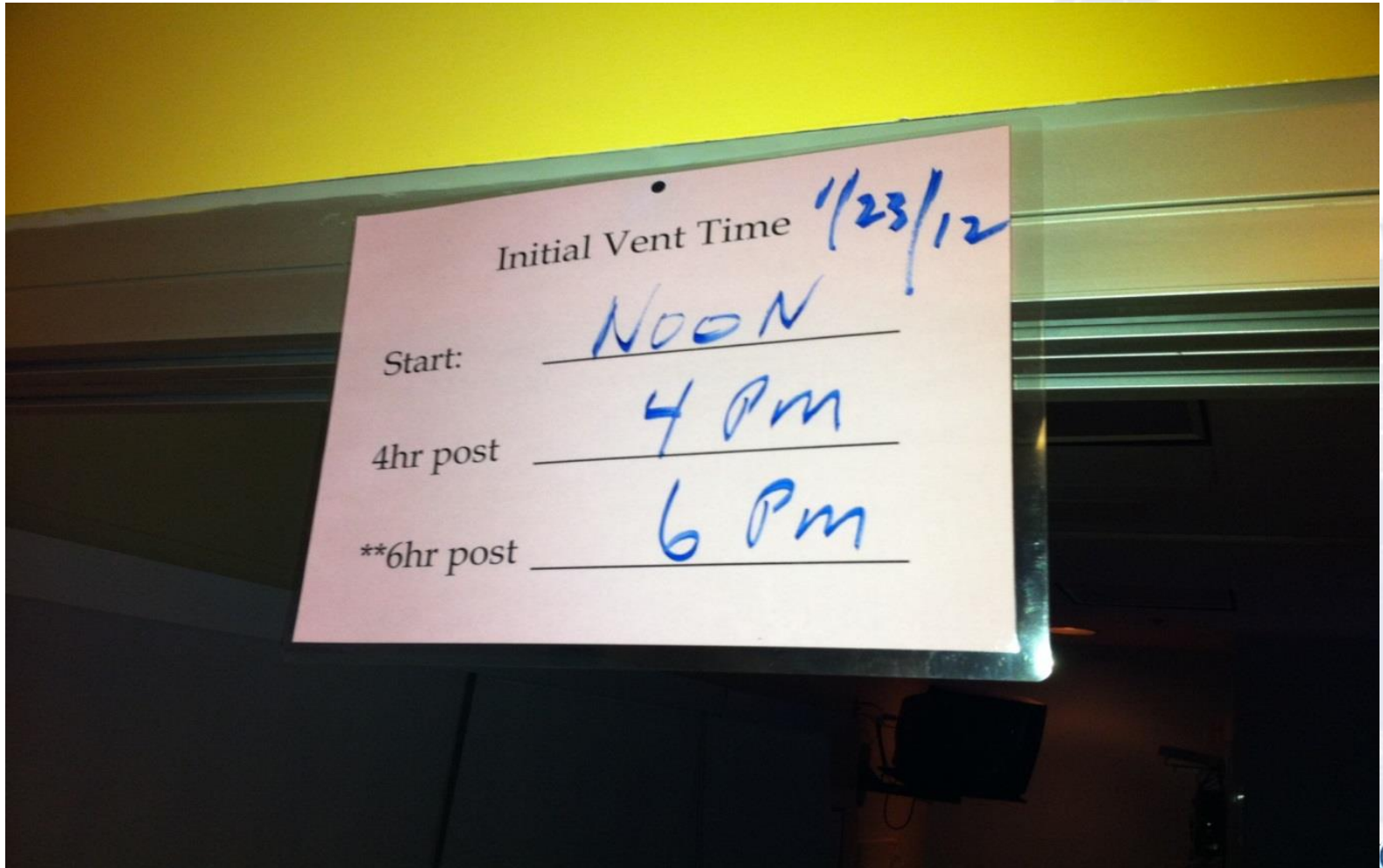


Pre vs. Post Implementation of New MV Weaning Protocol

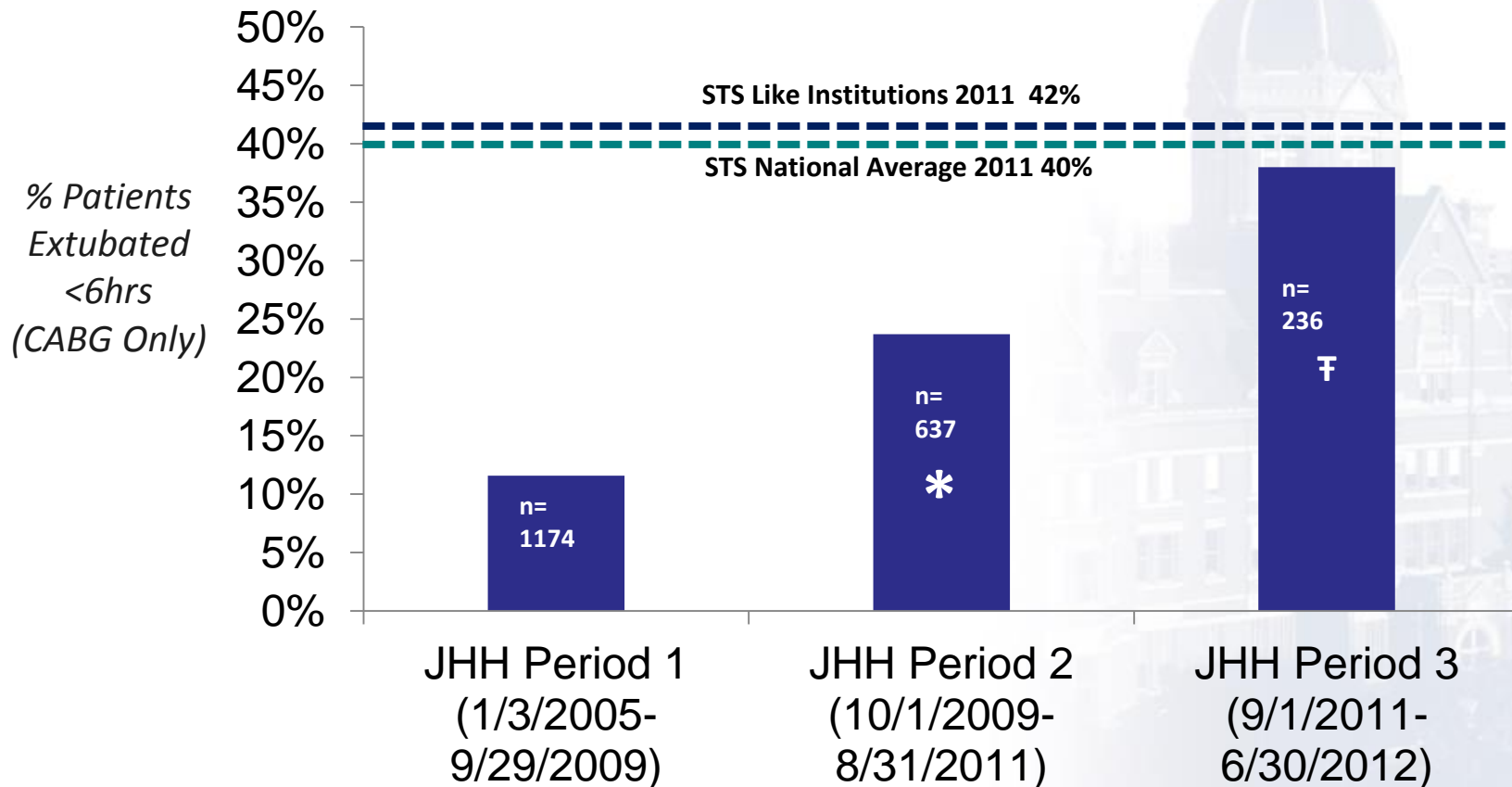


* p<0.01 compared to JHH Period 1

A Bow Around Your Finger



Results Following Additional Protocol Changes



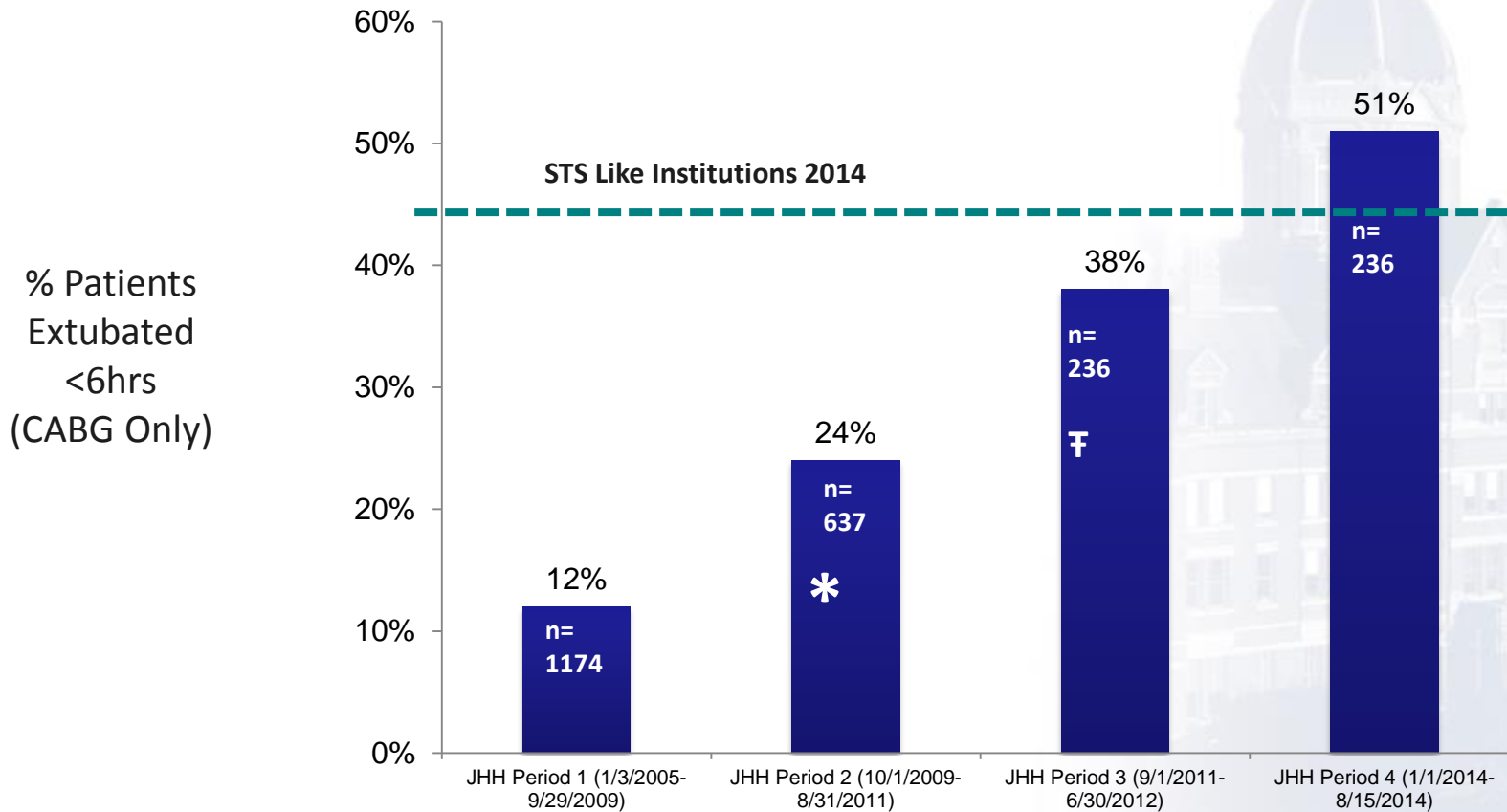
* $p < 0.01$ compared to JHH Period 1

‡ $p < 0.01$ compared to JHH Period 2

Fitch ZW, Debesa O, Ohkuma R, et al.

J Thorac Cardiovasc Surg. 2014 Apr; 147(4):1344-50

Extubation < 6 Hours Current Performance: 2014



* p<0.01 compared to JHH Period 1
† p<0.01 compared to JHH Period 2

Early Extubation Guidelines

Out of OR Time (T) 15.20

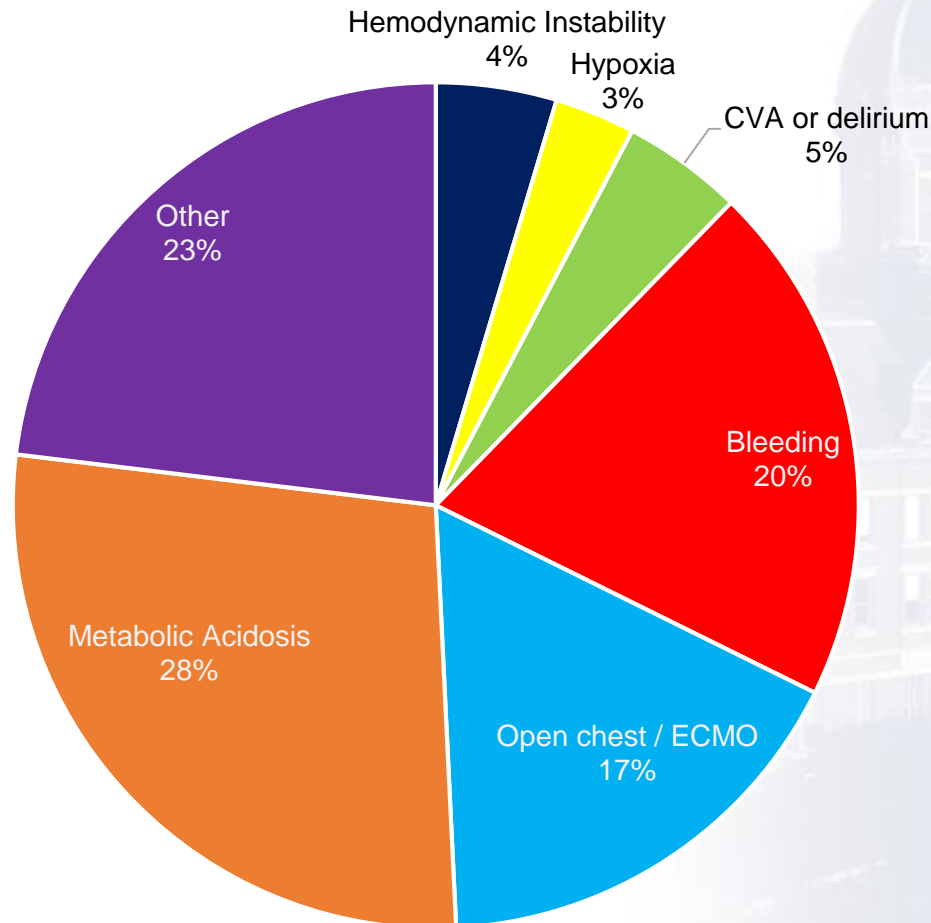
Reversal (T+2Hr) 17.20

1st SBT (T+4hr) 19.20

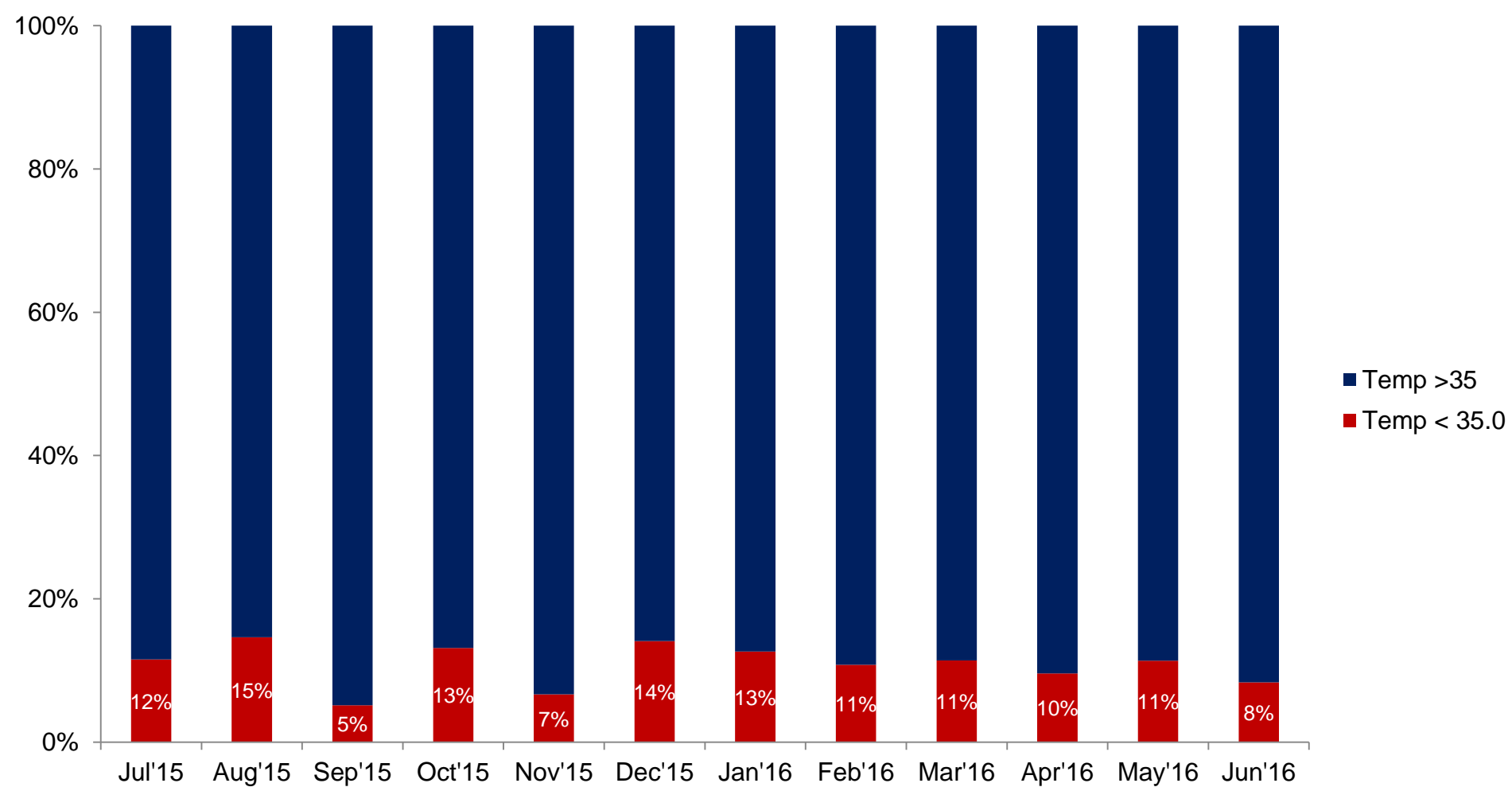
Extubated (T+5hr) 20.20

Dr. Conte
Cardiac Red

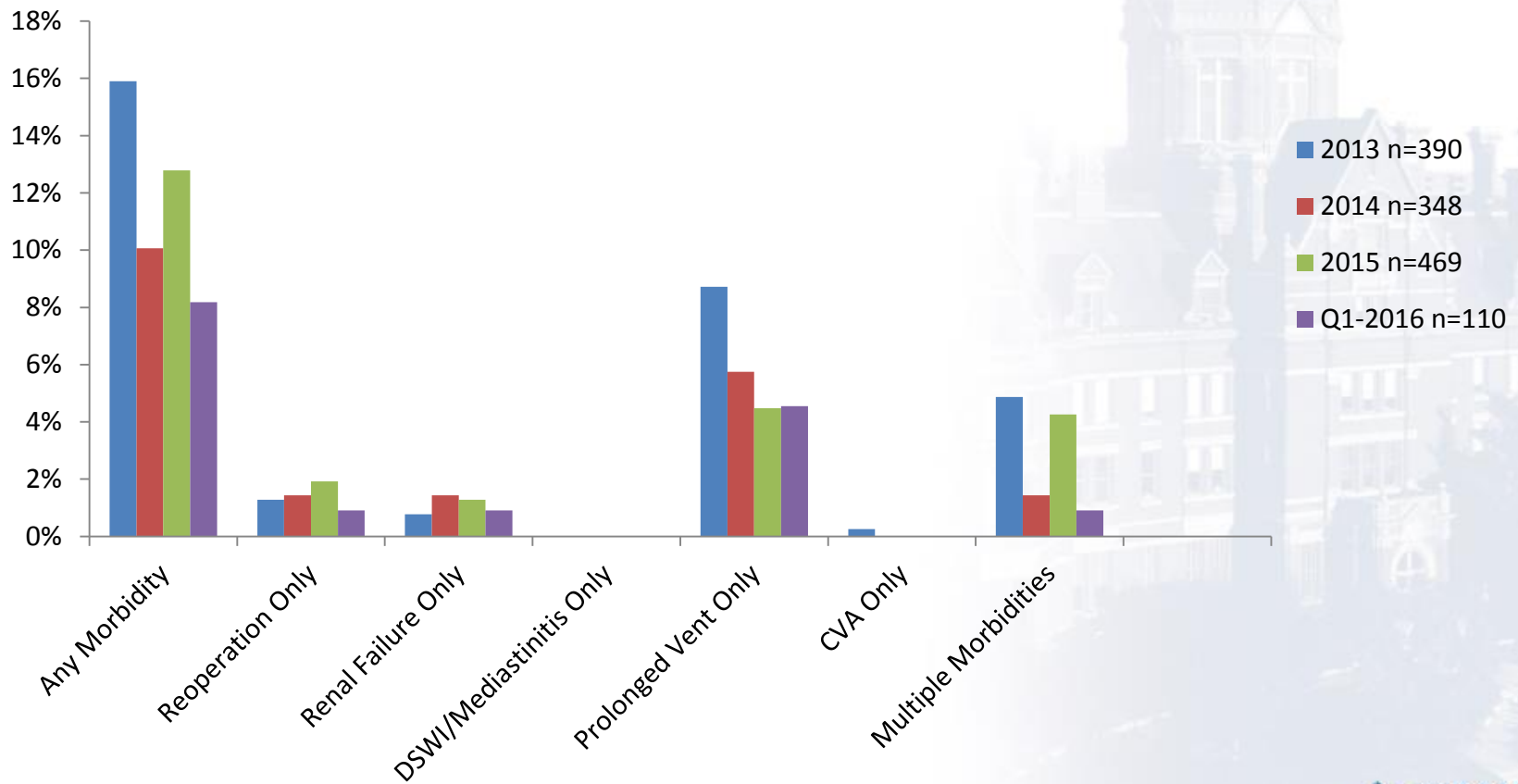
CVSICU Reasons For Extubation >6h



CVSICU Arrival Temp

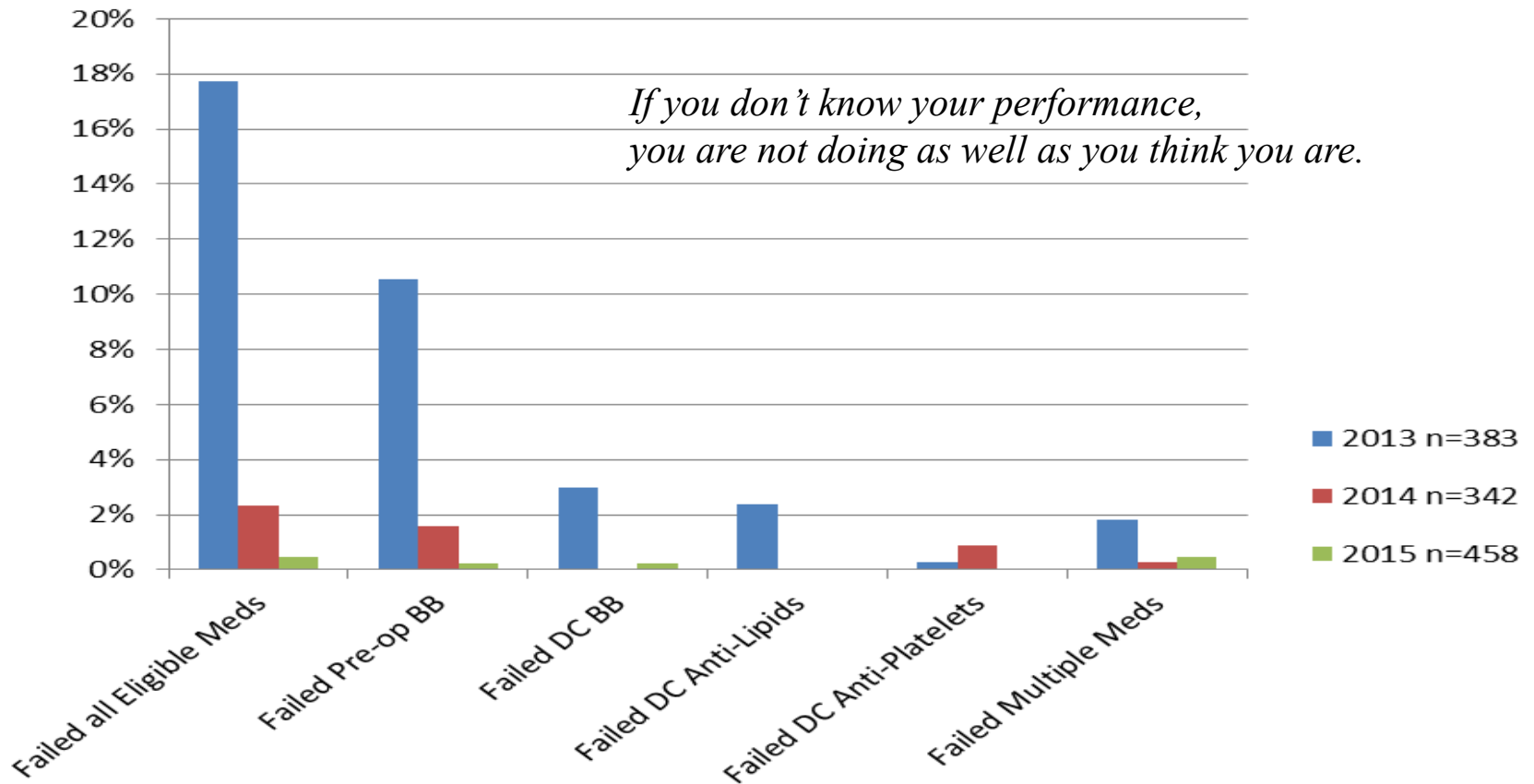


Isolated CAB Morbidity



Failed to Prescribe All Eligible Medications for Isolated CAB

If you don't know your performance, you are not doing as well as you think you are.



Intervention – PCR testing

- Preoperative PCR testing for MRSA
 - Nasal swab by PAs on preop visit

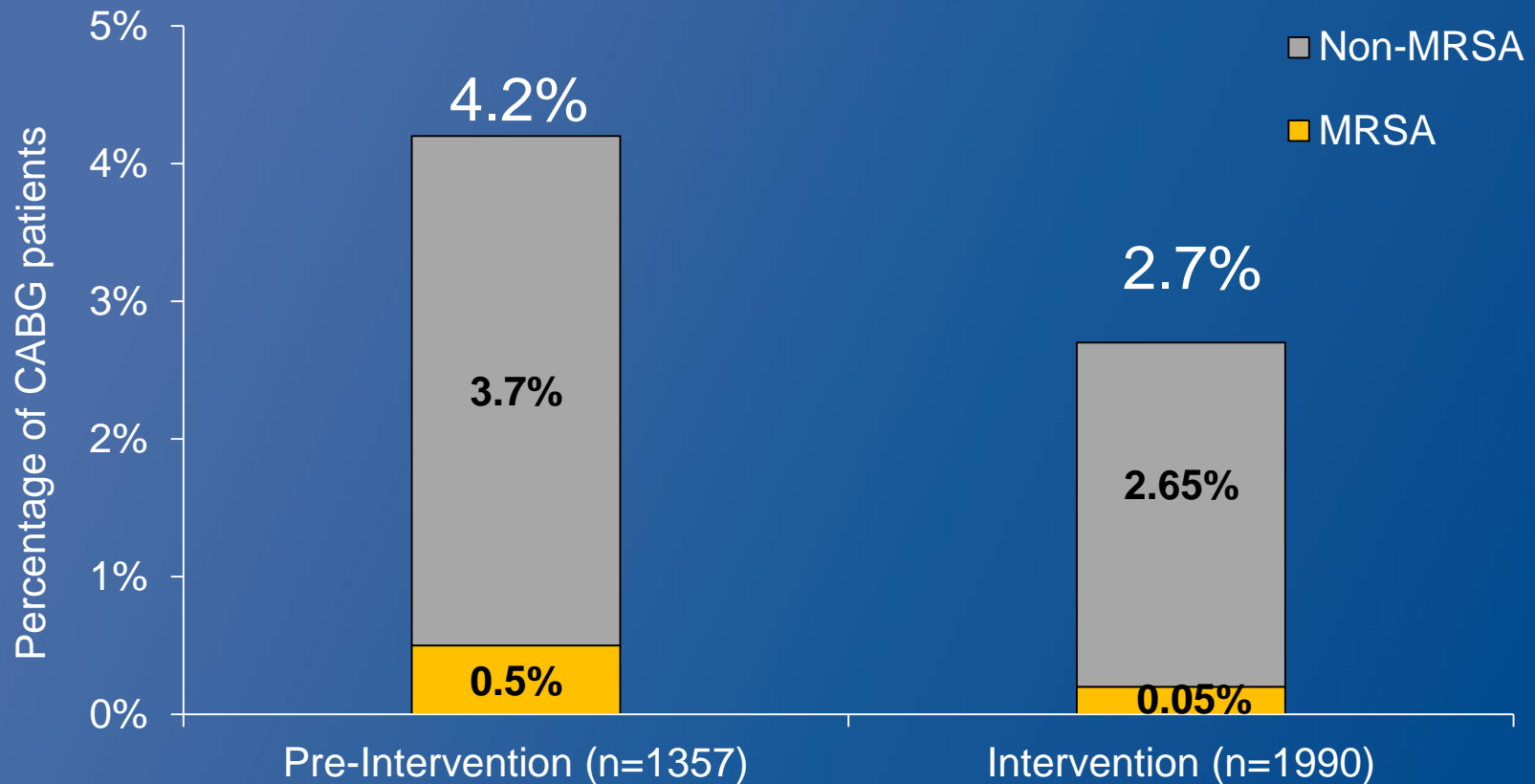


- If positive:
 - Intranasal mupirocin bid
 - Chlorhexidine baths



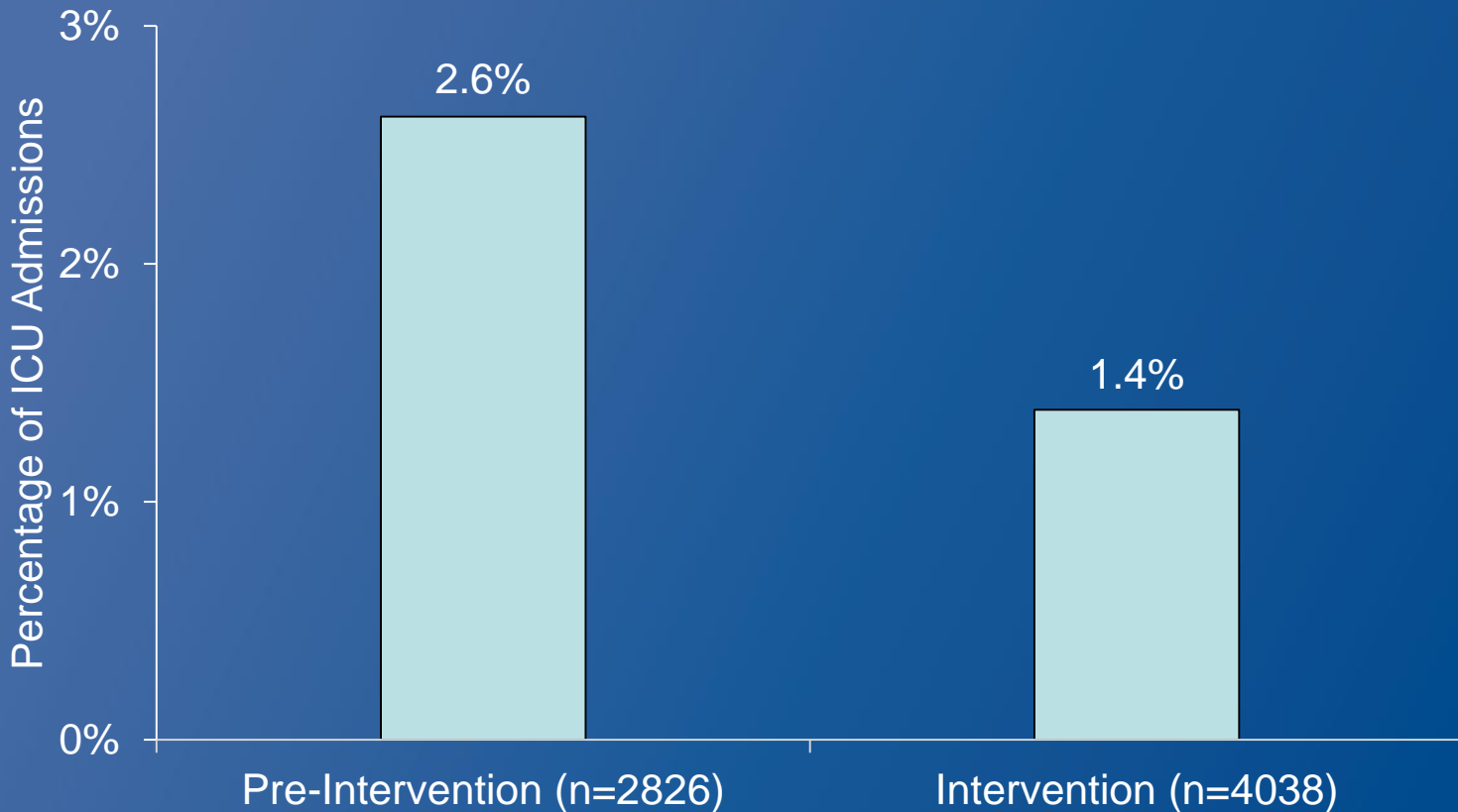
- Both for 5 days (or as many days as possible preop; full course completed in ICU if necessary)

Overall SSI in CABG Patients



	Un-adjusted			Adjusted		
	OR	95% CI	p-value	OR	95% CI	p-value
Intervention Era	0.64	0.44 0.93	0.02	0.58	0.40 0.86	0.007

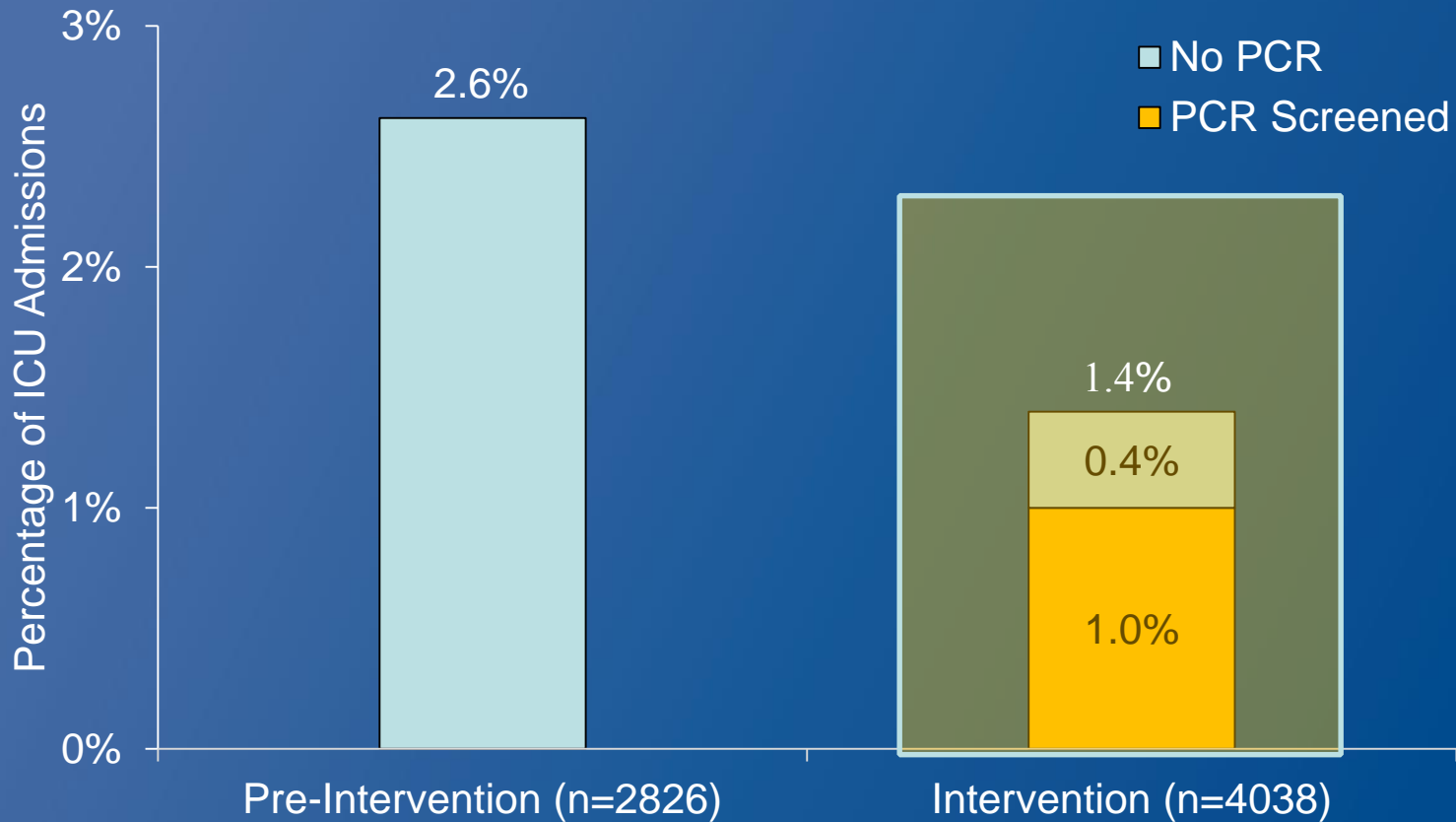
MRSA ICU Admissions



MRSA-Positive on ICU Admission

	Univariate			Multivariate		
	OR	95% CI	p-value	OR	95% CI	p-value
Intervention Era	0.5	0.37 0.74	<0.001	0.5	0.37 0.76	<0.001

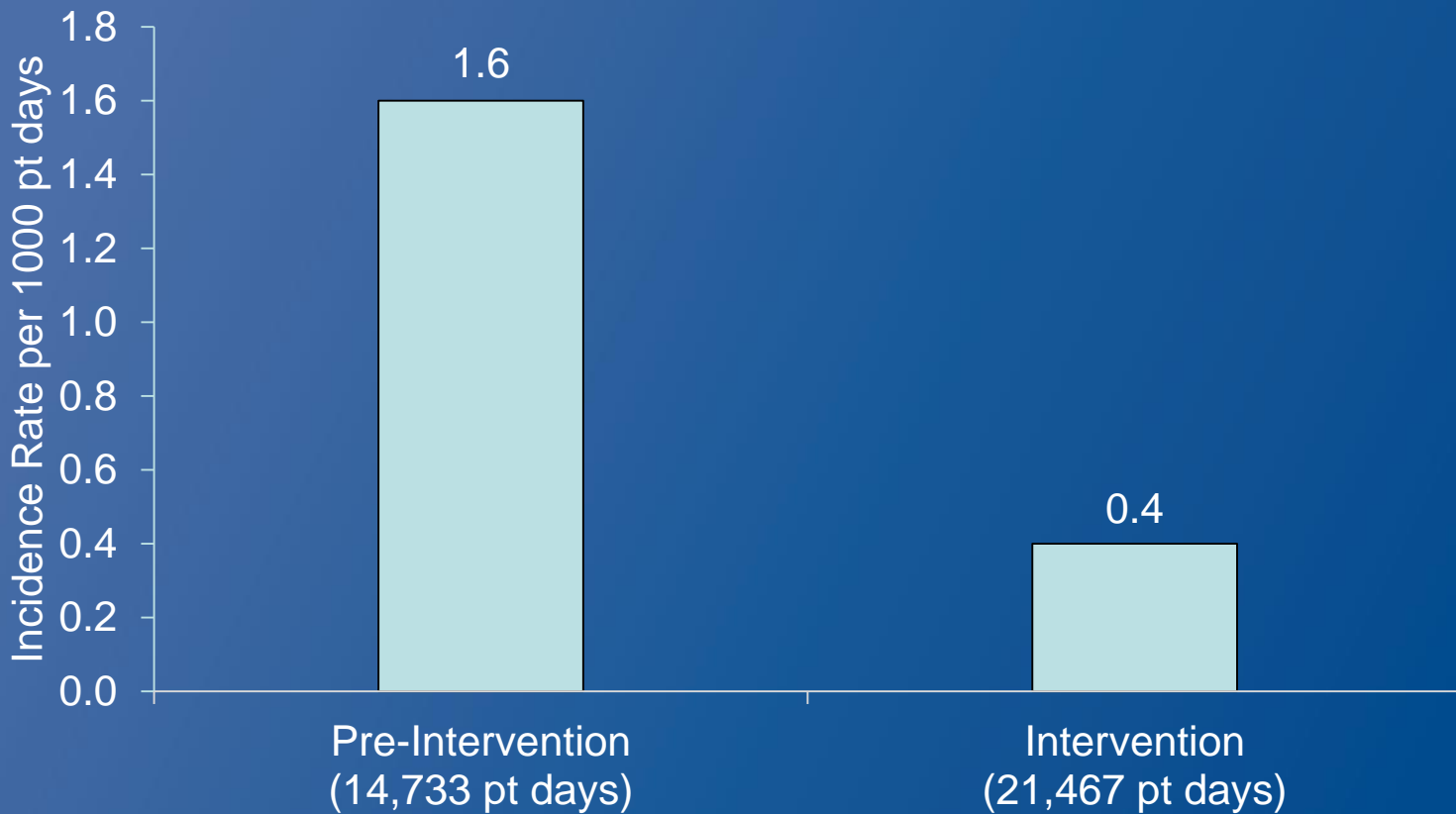
MRSA ICU Admissions



MRSA-Positive on ICU Admission

	Univariate			Multivariate		
	OR	95% CI	p-value	OR	95% CI	p-value
Intervention Era	0.5	0.37 0.74	<0.001	0.5	0.37 0.76	<0.001

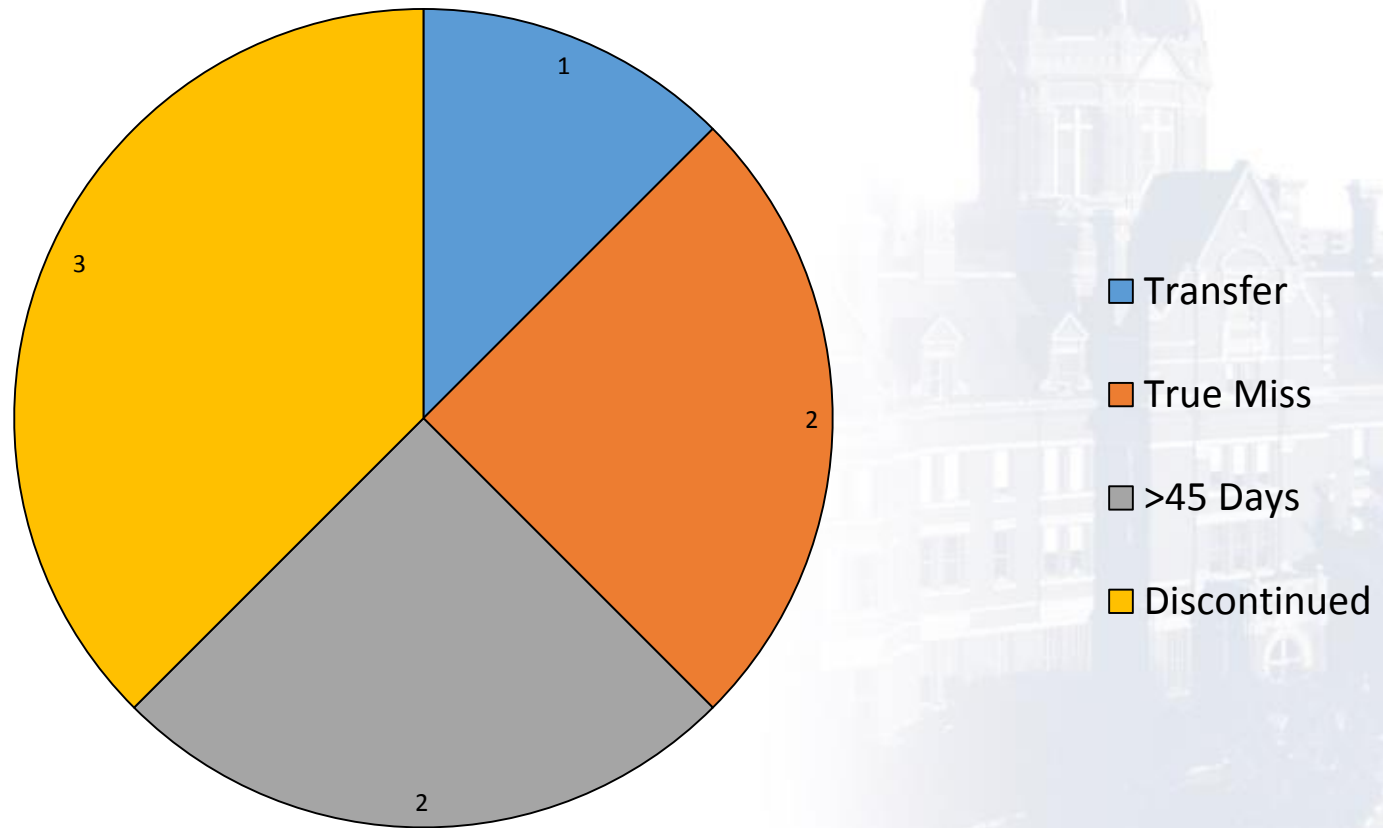
MRSA ICU Transmission



Adjusted Poisson Regression: MRSA transmissions				
	aIRR	95% CI		P
Intervention era	0.29	0.13	0.65	0.002

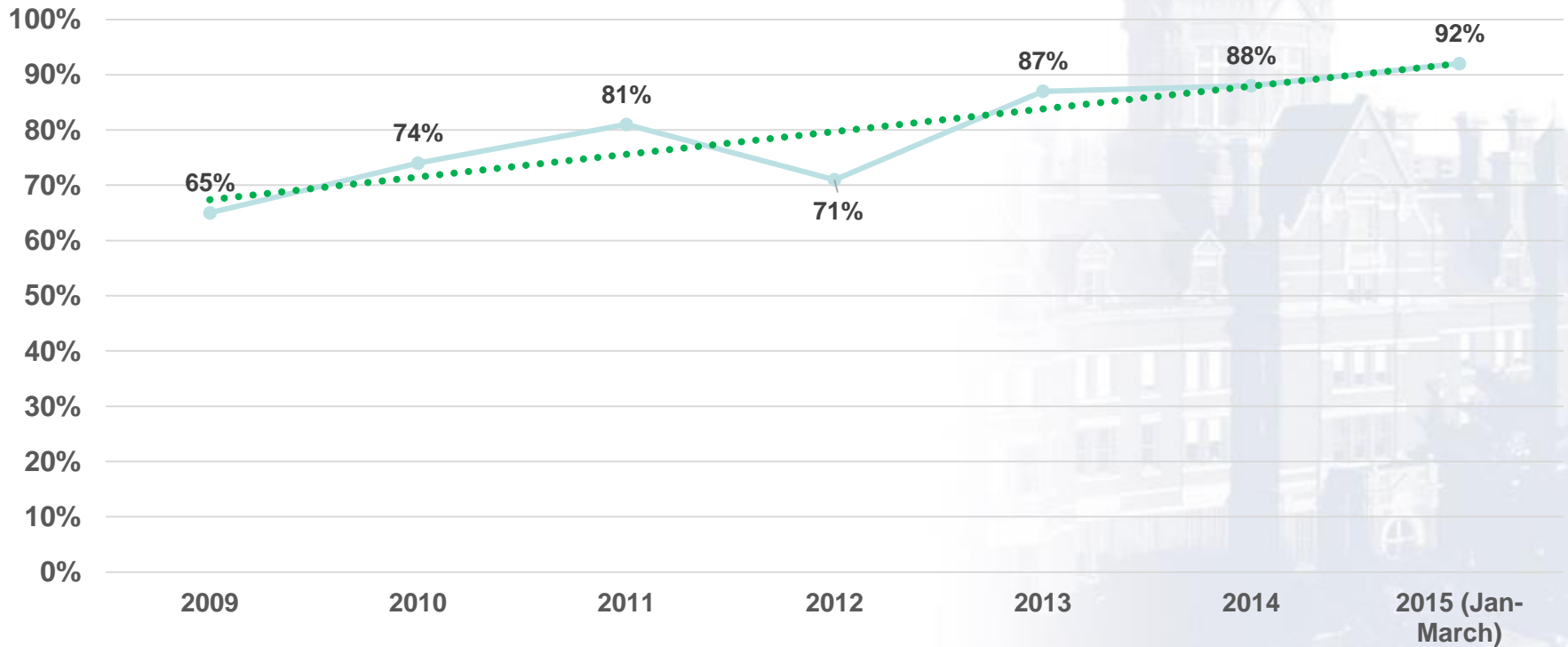
Staph Screening Miss Categories

July 2016



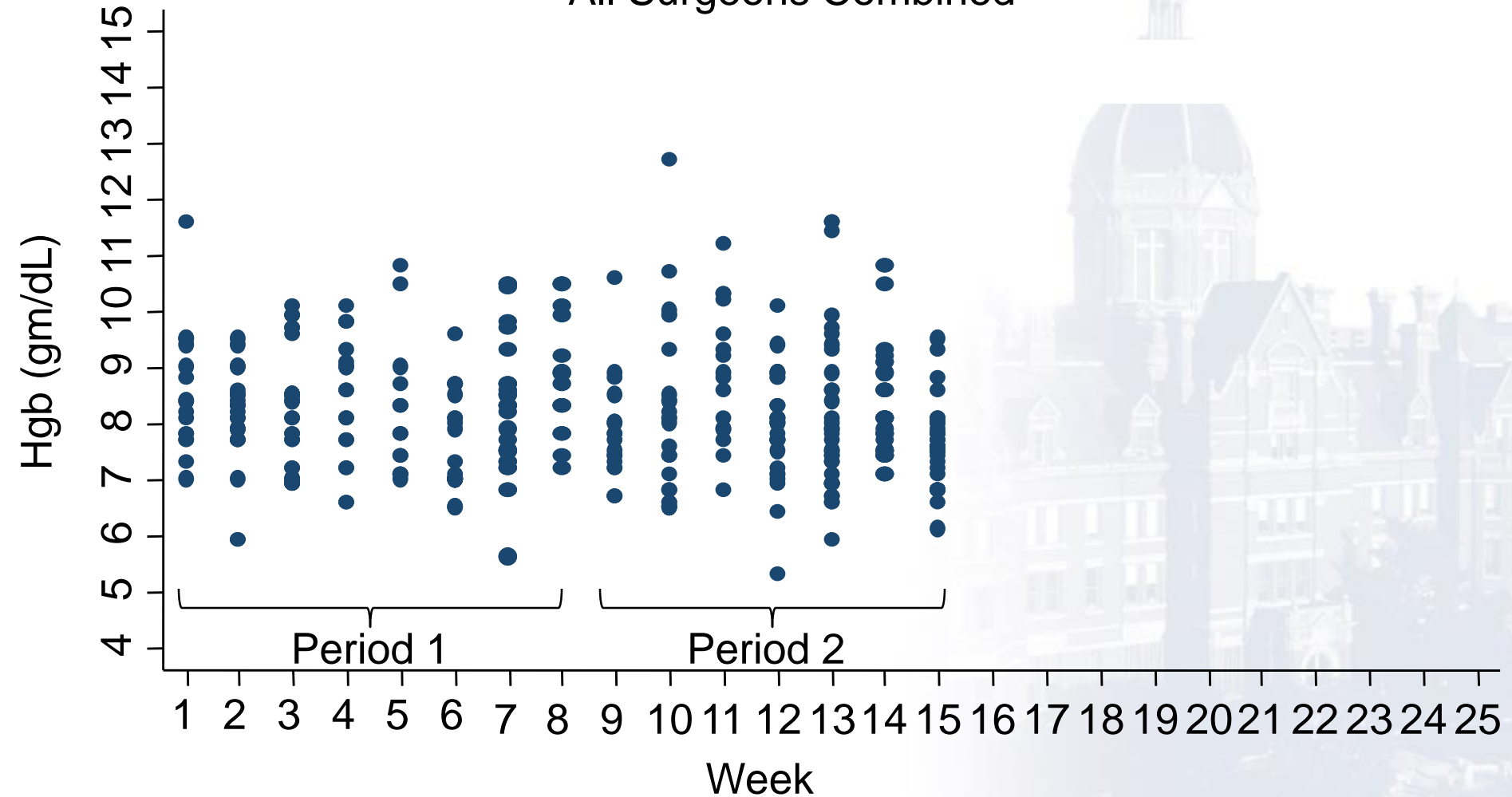
Group, but not Individual, Accountability

CVSICU Hand Hygiene Compliance by Year



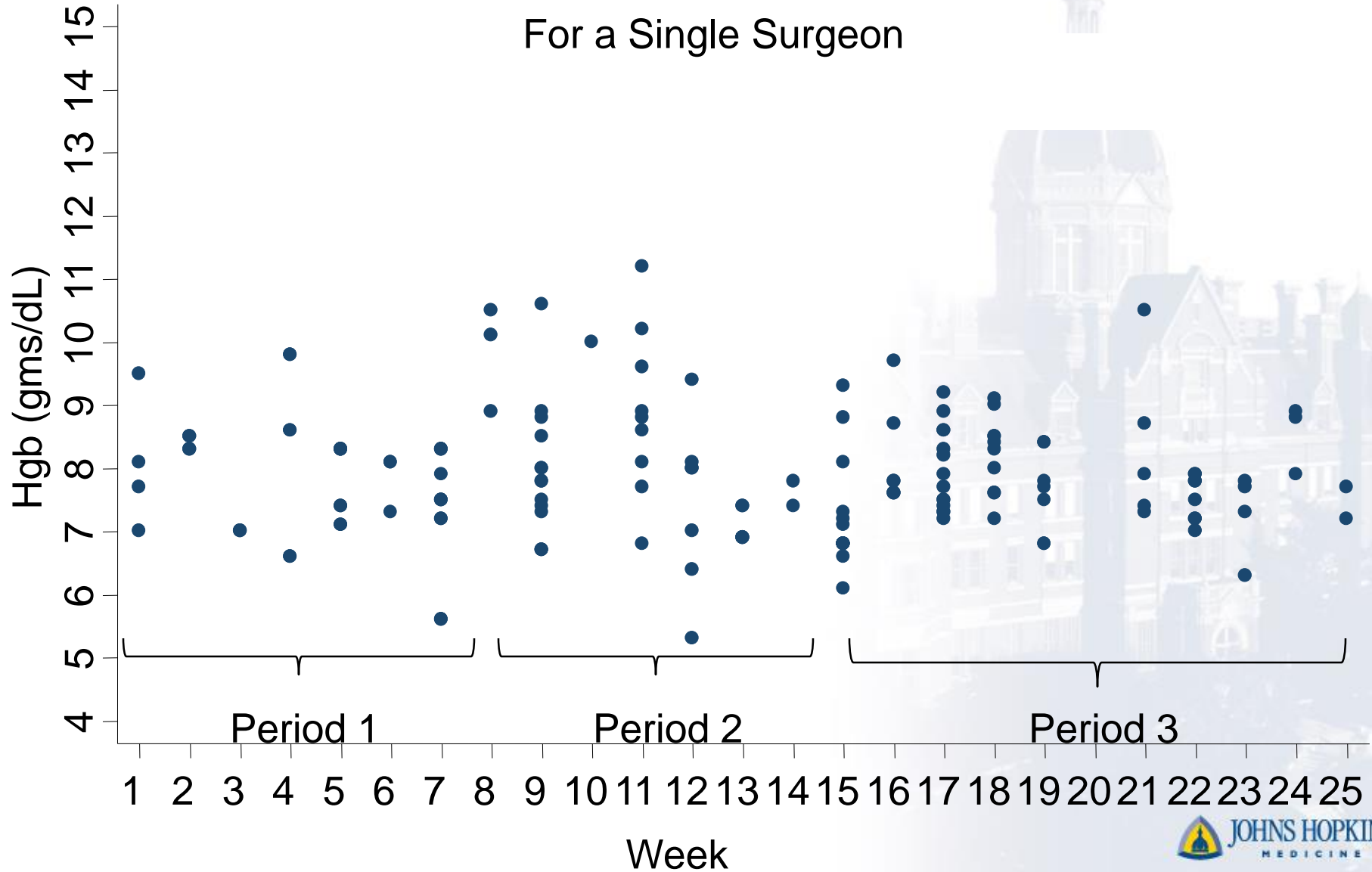
Weekly Transfusions with Corresponding Hgb for All Procedures

All Surgeons Combined



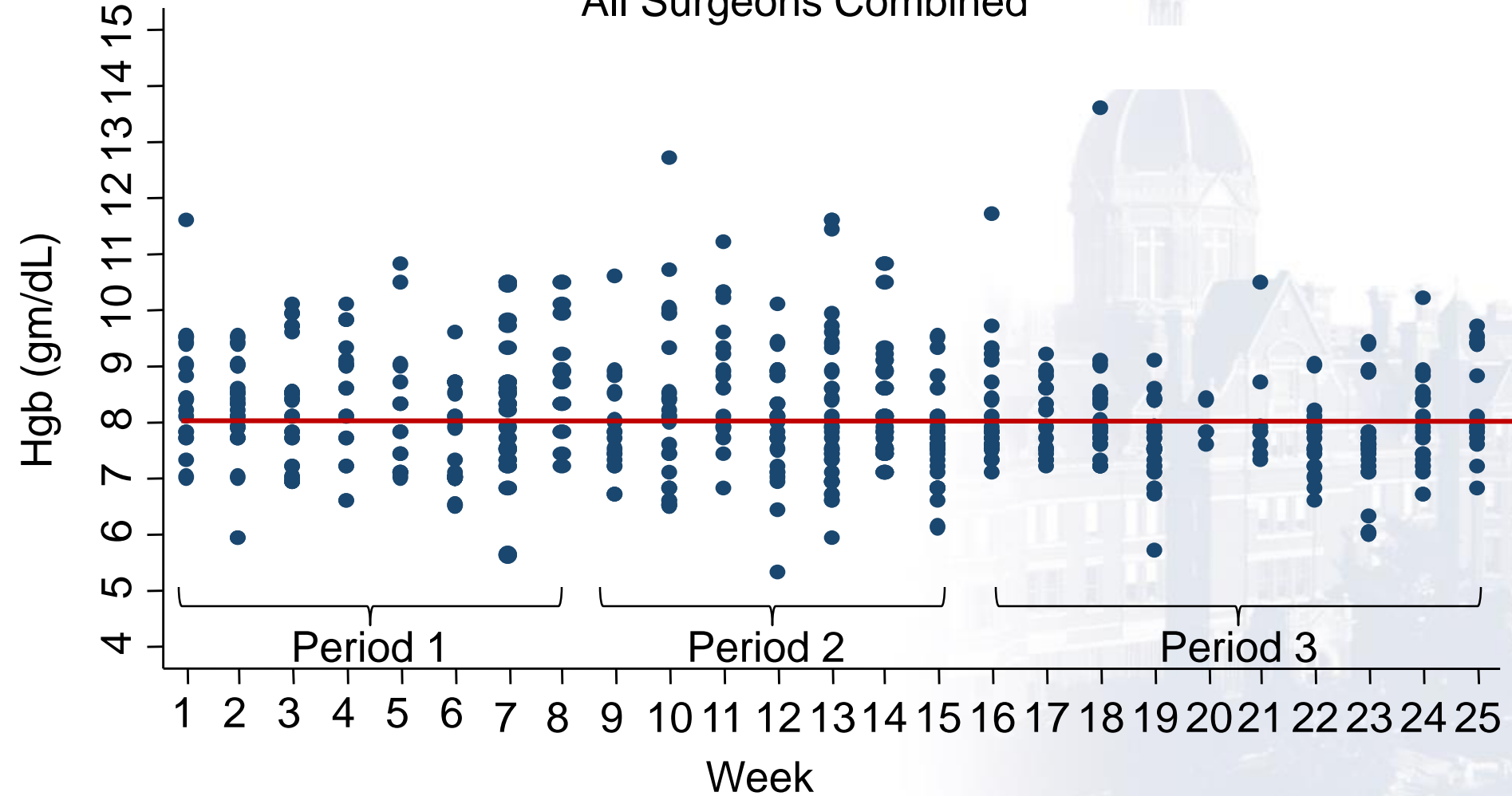
Weekly Transfusions with Corresponding Hgb for All Procedures

For a Single Surgeon



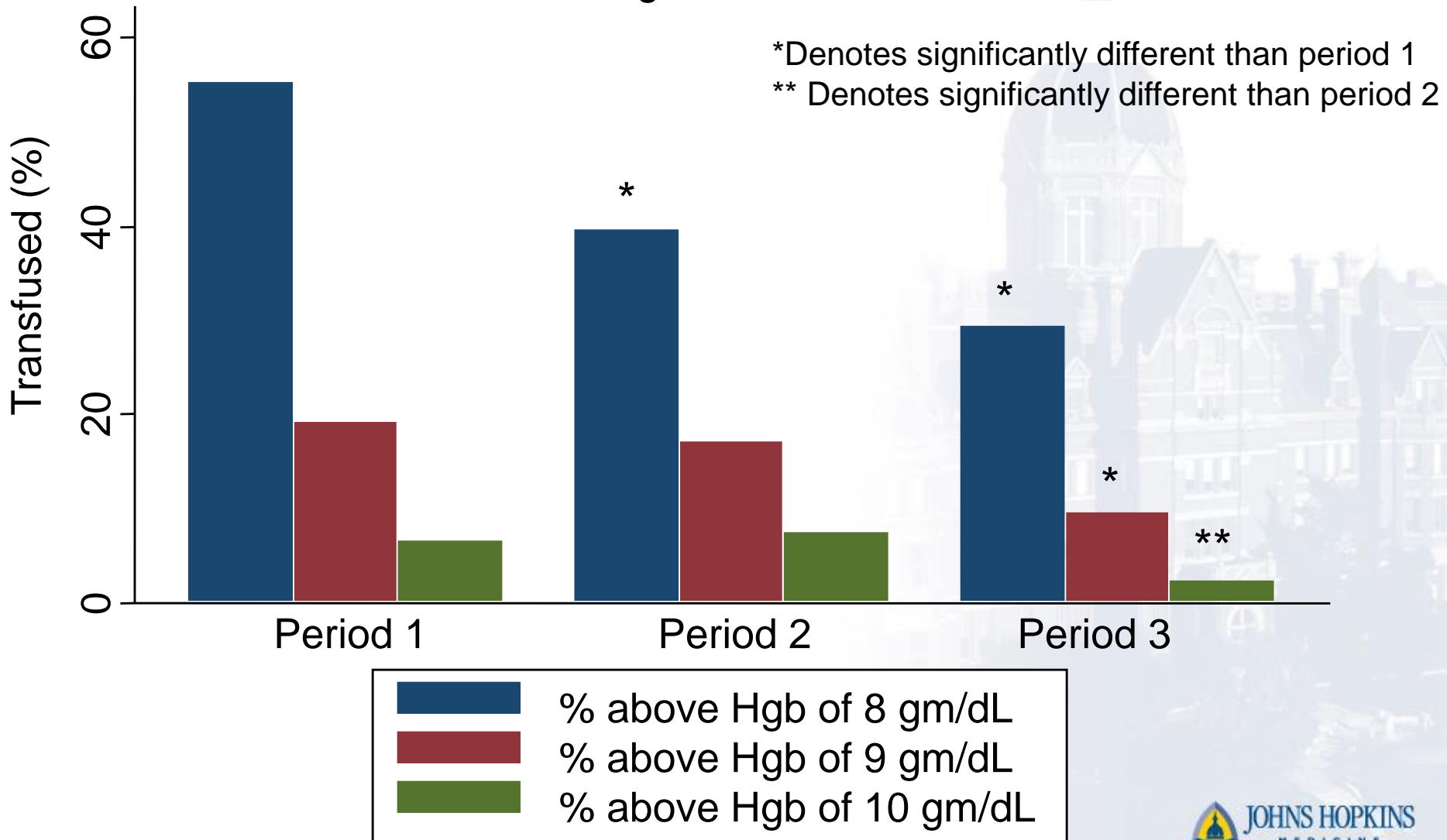
Weekly Transfusions with Corresponding Hgb for All Procedures

All Surgeons Combined



Percent of Transfusions at Increasing Hgb Thresholds

All Surgeons Combined



Monthly Cardiac Surgery Dashboard

- Vent Times
- Reasons for ext > 6 hrs
- iNO vs Veletri hrs
- Hyper/Hypo glycemia
- Checklist Compliance
- Staph screening (with reasons for misses)
- Blood Utilization
- CVSICU arrival:
 - K+
 - Temp
 - Base Deficit
- Daily Weights
- Transfers > 6 pm
- Bouncebacks (Total, < 24 hrs with Reasons)

And Weekly Mortality and Morbidity

The Johns Hopkins Cardiac Surgery Code of Conduct and Professional Behavior

- A. I will treat everyone with respect and trust and acknowledge diversity by:
1. Greeting patients and staff in a courteous manner.
 2. Taking responsibility for offering constructive criticism, when necessary, in a respectful and non-threatening manner
 3. Praising publicly, criticizing privately
 4. Acknowledging concerns, taking them seriously and investigating.
 5. Respecting different cultures, backgrounds, religions, gender and sexual orientation of peers, other co-workers, patients, and families.
 6. Allowing people to express both opinions and feelings and to ask questions.
- B. I will promote an image of professionalism and support co-workers by:
1. Fostering a culture that does not seek to assign blame but that learns and then moves on from errors—a culture characterized by “forgive and remember.”
 2. Being open to, respectful of and involved in developing new ideas and processes and by reserving judgment until the development process is complete.
 3. Teaching constantly and being accountable for participation in educational programs and in-service training.
 4. Accepting responsibility and providing leadership in support of the adoption of new procedures designed to address service problems.
- C. I will demonstrate professionalism, effective communication skills and display openness by:
1. Never using profanity.
 2. Recognizing when help is needed and then asking for it in a timely manner.
 3. Being willing to listen and understand other perspectives.
 4. Approaching colleagues positively, always giving them the benefit of the doubt.
 5. Taking responsibility for communicating to colleagues any changes in patient care.
 6. Being non-defensive and non-judgmental in dealing with peers, other co-workers, patients, and families.

Signature

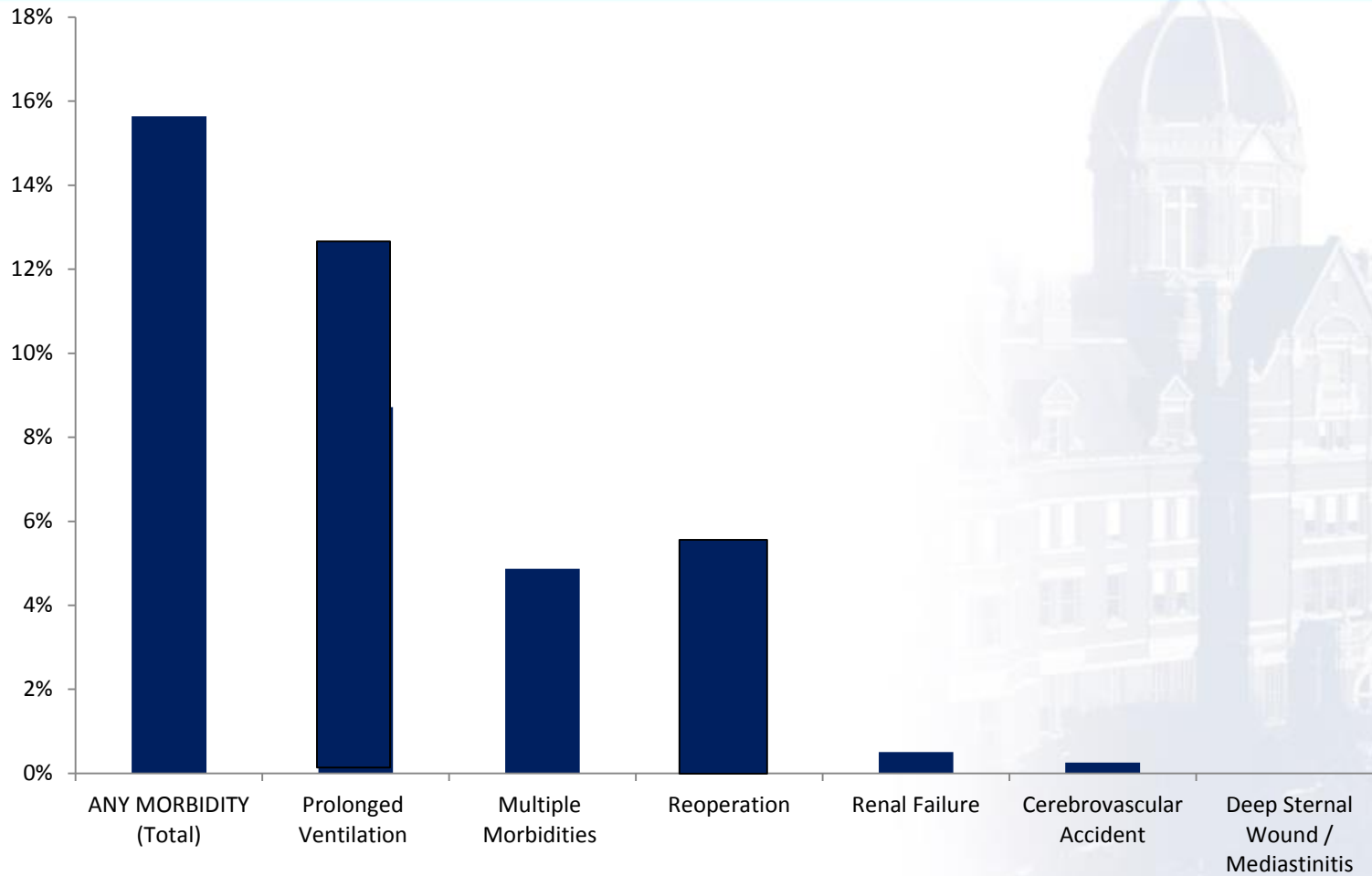
Date

Critical Care of the Cardiovascular Patient:

The essentials for high quality

1. Full time intensivists
2. Structured Multi-D rounds (Pharmacy?)
3. Nurse readbacks
4. Checklists
5. Culture of safety/teamwork (CUSP)
6. Performance improvement requires:
 - Multidisciplinary input
 - Agreed upon targets
 - Review of outcomes
 - Continual reassessment
6. Individual accountability matters

Isolated CABG Post Op Morbidities



*2014: Jan 1 – Jun 30

- Universal public reporting is inevitable
- ICU care plays a major role in patient outcomes

Surgeon-Reported Conflicts with Intensivists About Postoperative Goals of Care

JAMA Surg 2013;148:29-35

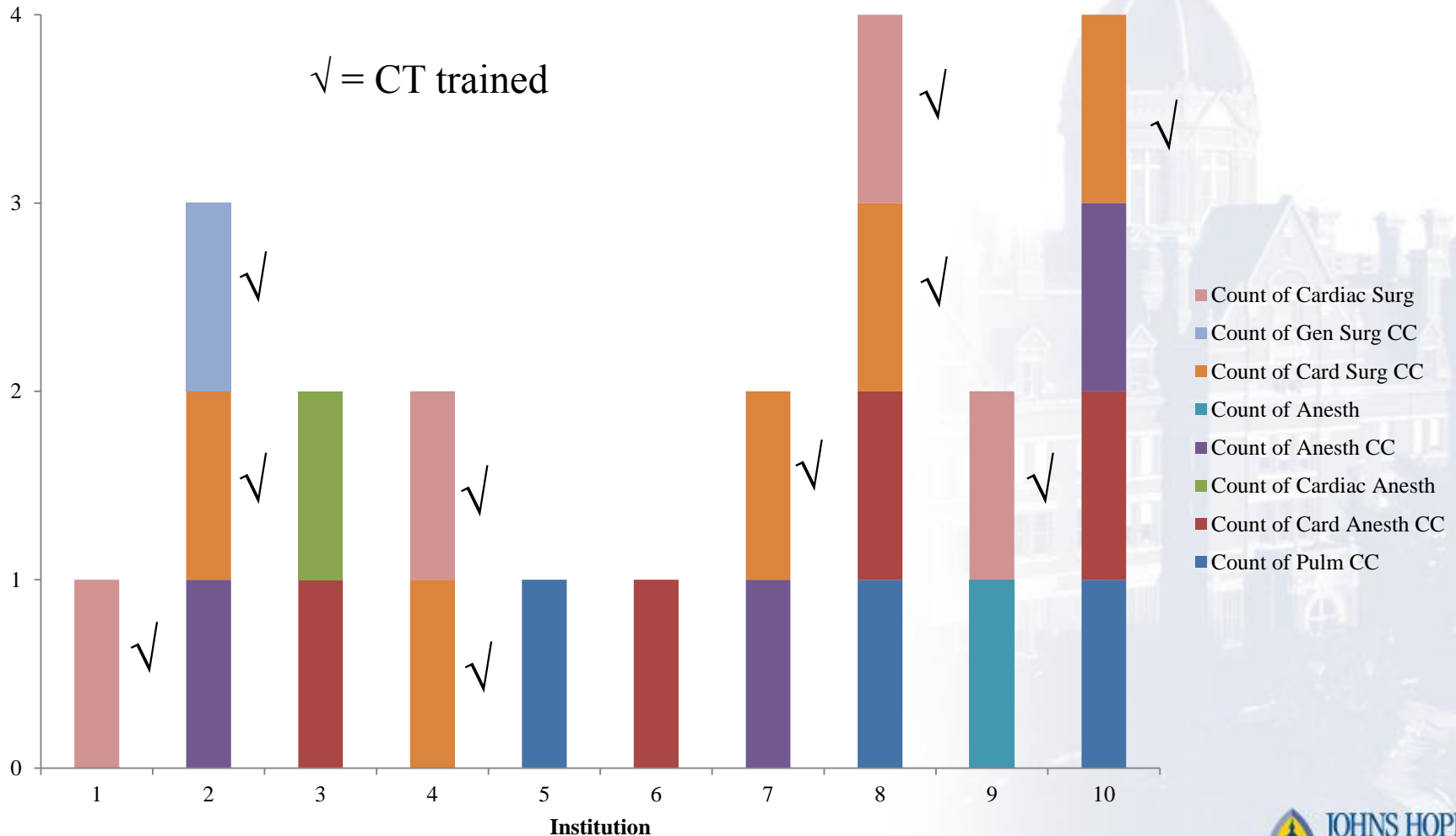
- Vascular, Neurologic, and Cardiothoracic Surgeons
 - Mail Questionnaire
 - 56% response rate, n = 2100

Rates of Surgeon Reported Conflicts

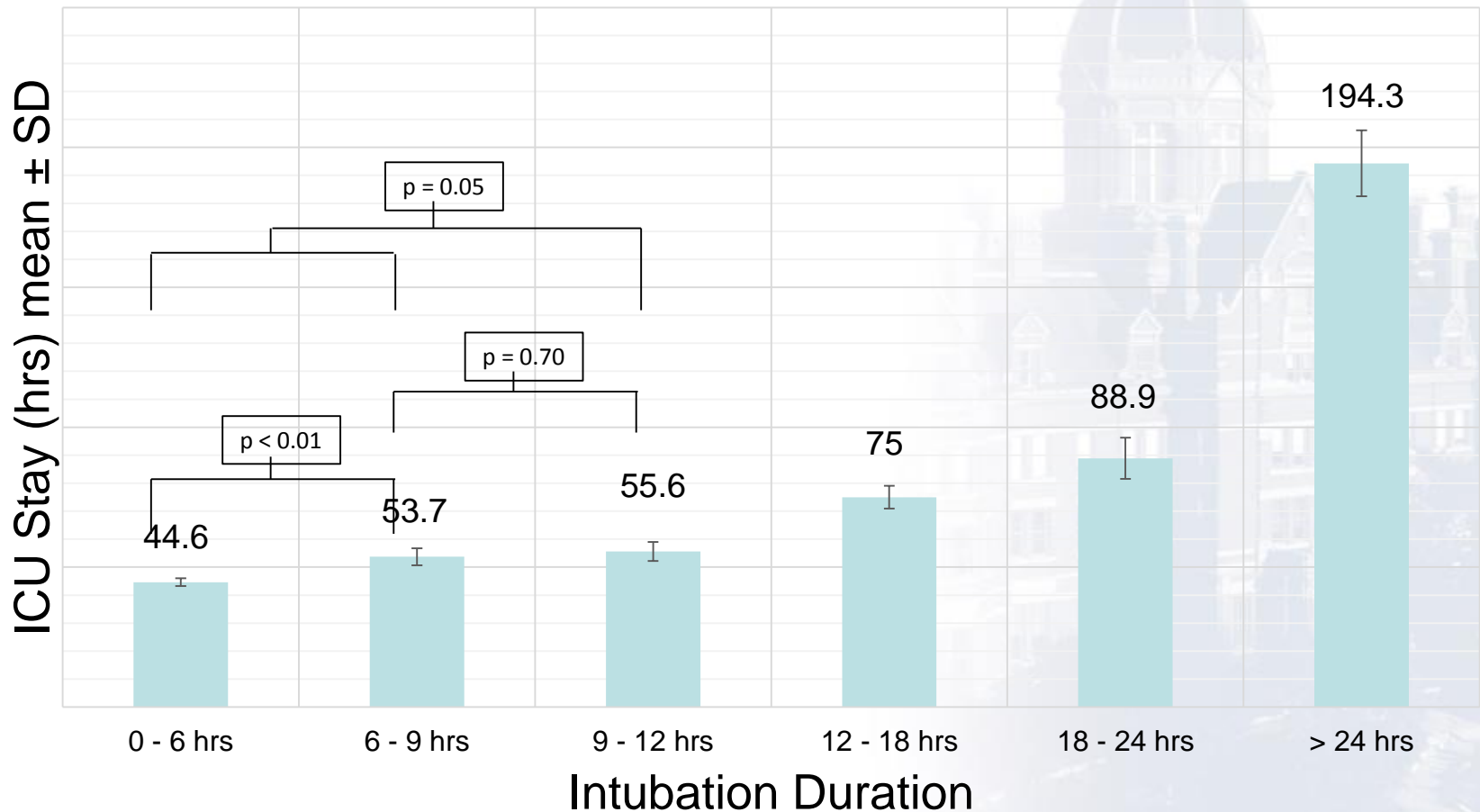
JAMA Surg 2013;148:29-35

Question	Answer, %
At times, conflicts may arise among different parties involved in the care of a patient who has a poor postsurgical outcome. How frequently, if ever, do you experience conflict with each of these groups about the goals of care for your postoperative patients?	Sometimes/ always
Critical care physicians	43
Nursing staff	43
Primary care physicians	23
Ethics consultants	16
Family members of the patient	60
Surgical colleagues	18

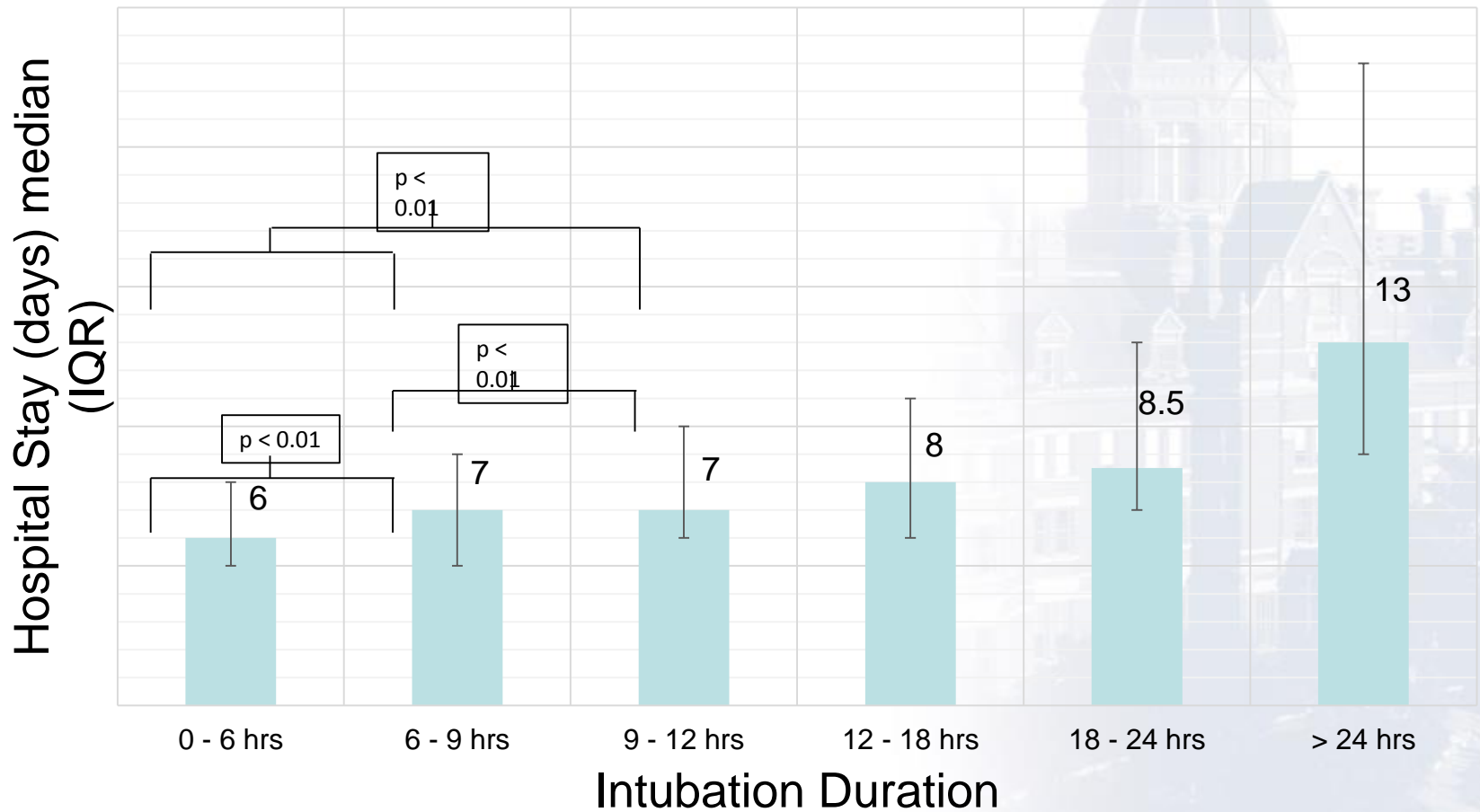
Heterogeneity of Specialties in Cardiac Intensive Care Units



Unadjusted ICU Length of Stay



Unadjusted Hospital Length of Stay



Multidisciplinary Teams: Physician, Nurse, and ≥ 1 more Health Care Professional

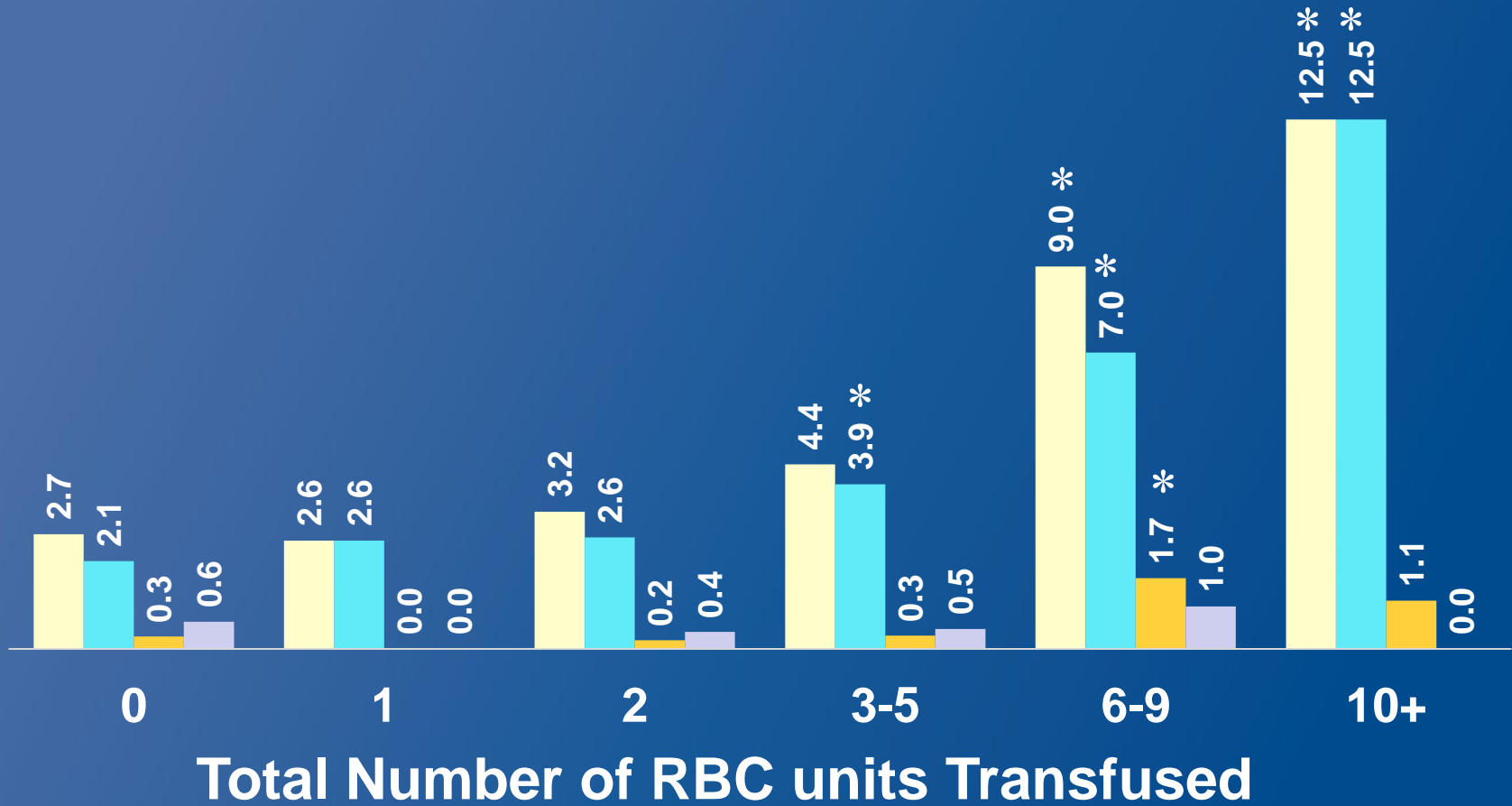
- Avoids adverse drug events
 - Pharmacists on team decreased ADE 66%
- Decreases length of stay
 - Team care shortened ICU LOS by 4.2 days
- Saves money
 - Team care saved \$7500 in hospital cost per patient
- Saves lives
 - Team care lowered hospital mortality by 16%

Leape. JAMA 1999
Young. Int J Qual Health Care 1998
Kim. Arch Int Med 2010

% of Patients with Infection by RBC Units Transfused

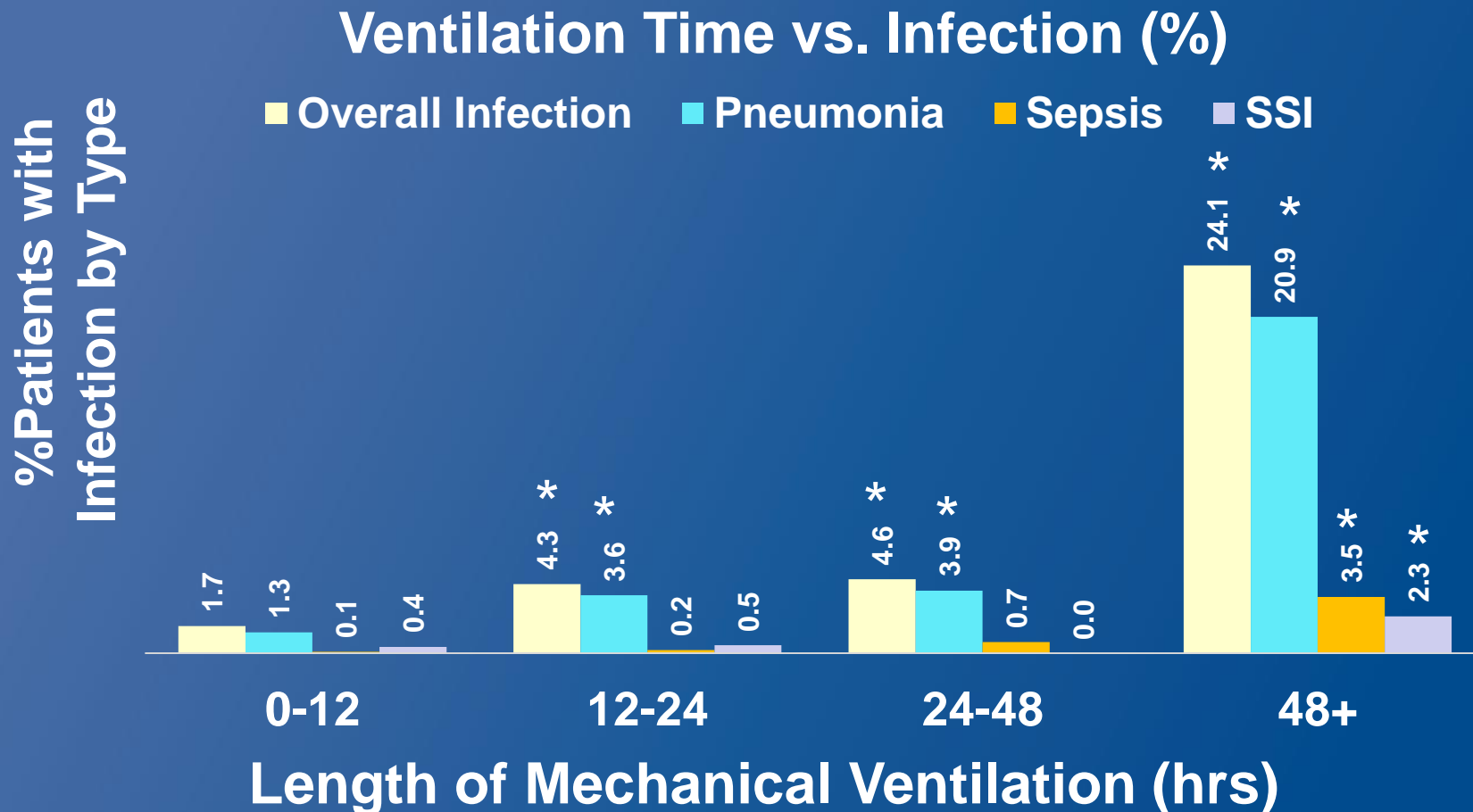
% of patients with Infection

Overall Infection Pneumonia Sepsis SSI



**significantly different (p<0.05) compared to no RBC exposure*

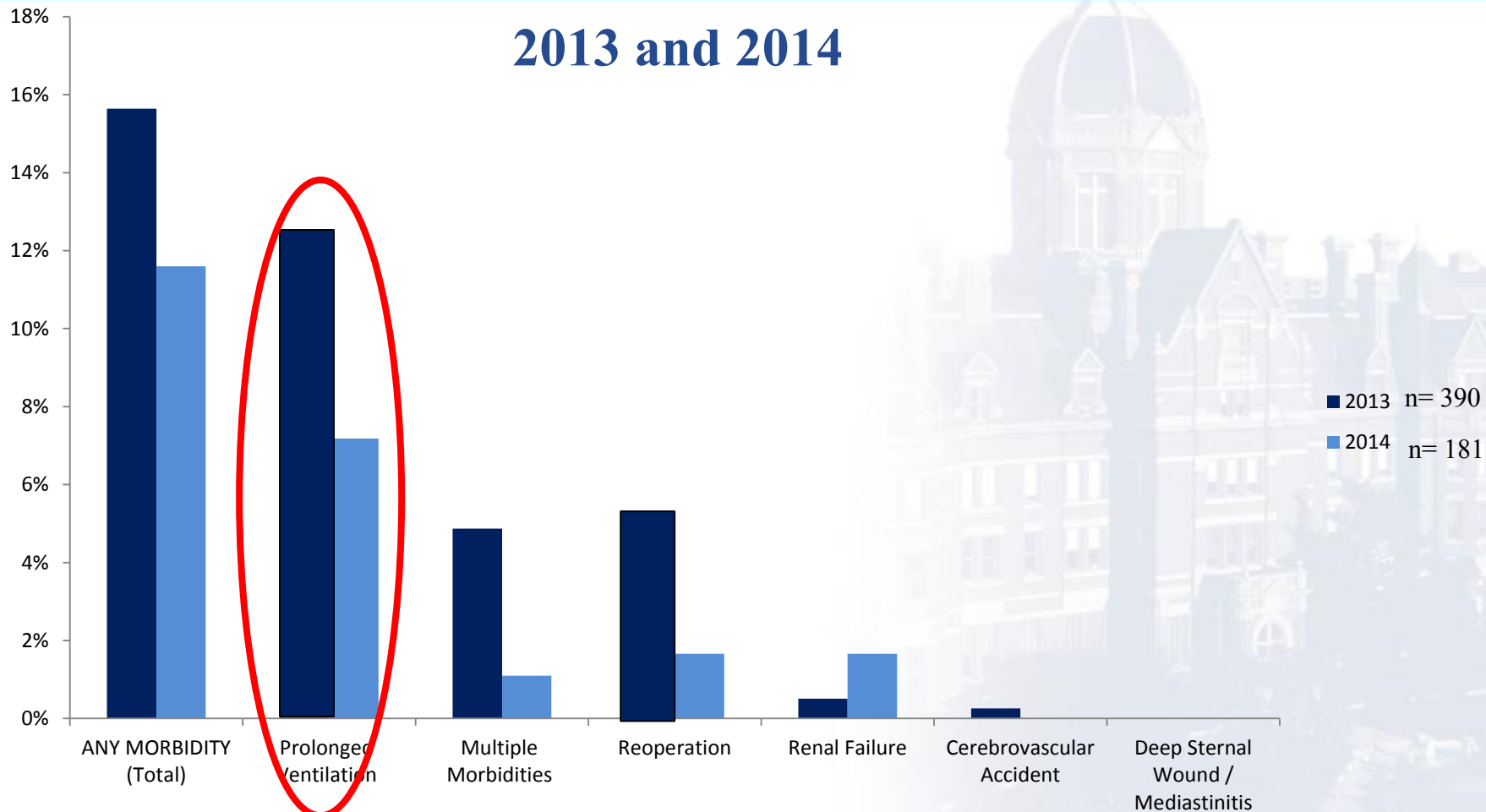
Relationship between Infection and Ventilation Time



Note: 48% of all infections occurred in patients with 48+ hours ventilation

*significantly different ($p < 0.05$) compared to vent time < 12 hrs group

Isolated CABG Post Op Morbidities



*2014: Jan 1 – Jun 30

The Tenets of CUSP

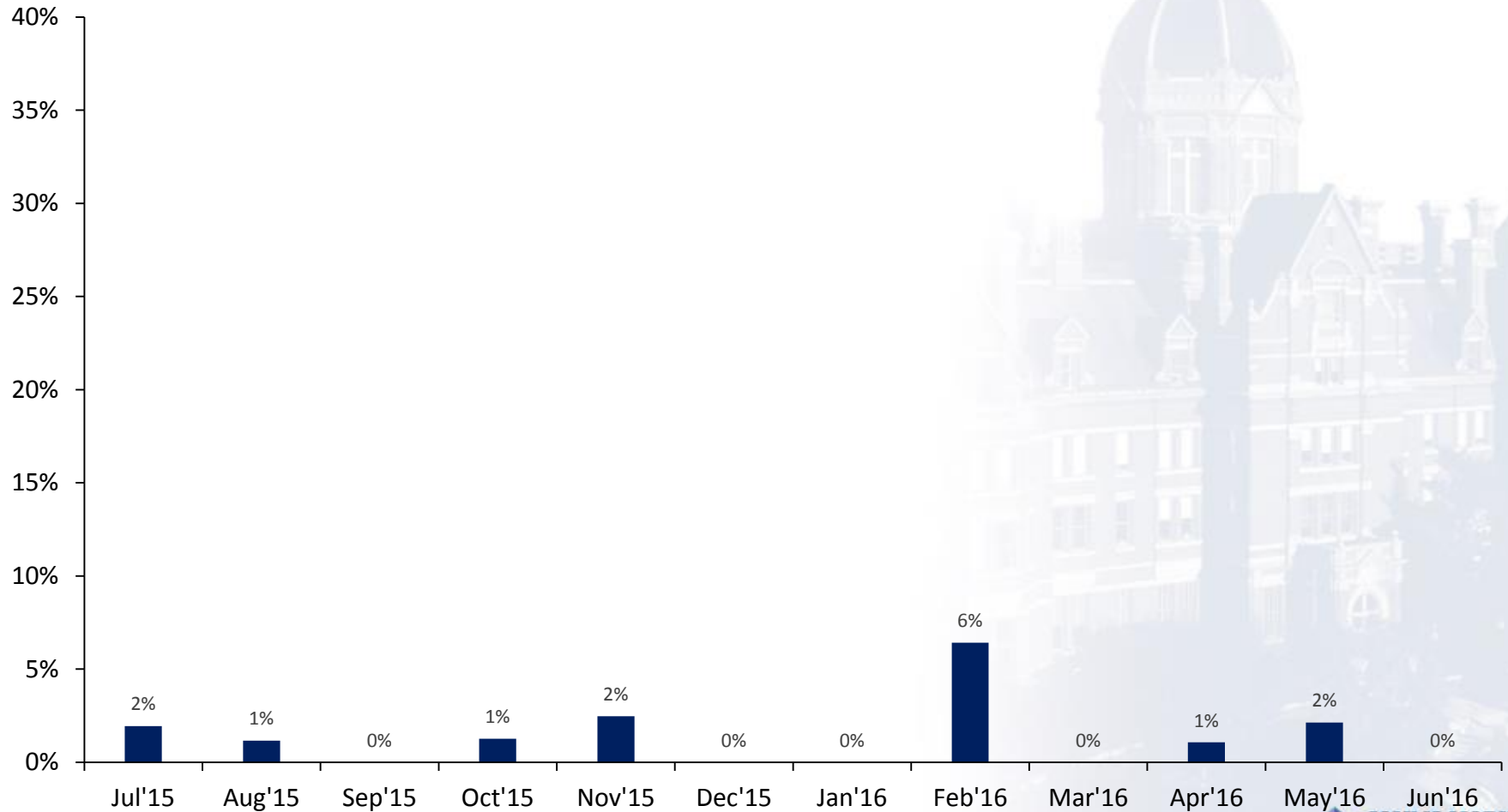
- Step 1: Safety Attitude Questionnaire (SAQ)
- Step 2: Educate re: Science of Improving
- Step 3: Identify Defects (events that should not recur)
- Step 4: Executive Partnership to “Bridge the Gap”
- Step 5: Choose a Defect each Month that poses a hazard
- Step 6: Reassess



Table 3. SAQ Scale Scores by CUSP Use Status and Time.

	Non-CUSP ICUs					CUSP ICUs					Adjusted Difference-In-Difference Measure ^c		
	Baseline (n = 19)		Time 2 (n = 14)		P Value ^b	Baseline (n = 47)		Time 2 (n = 38)		P Value ^b			
	Mean	SD	Mean	SD		Mean	SD	Mean	SD		SE	P Value	
SAQ scale scores^a													
Teamwork climate	46.5	20.9	47.1	13.6	.923	45.2	14.0	52.5	12.6	.015	6.2	4.6	.172
Safety climate	47.4	21.2	48.1	16.5	.924	41.7	13.1	52.5	13.0	<.001	9.6	4.2	.023
Job satisfaction	55.6	16.4	52.7	18.4	.635	52.8	15.4	60.2	15.4	.030	9.6	4.6	.037
Stress recognition	39.3	11.1	41.0	11.7	.673	42.4	8.5	41.1	7.3	.433	-3.1	3.6	.380
Perceptions of management	26.9	16.3	30.5	17.9	.559	27.5	14.2	32.9	16.9	.113	3.5	4.1	.394
Working conditions	33.5	18.8	31.1	9.0	.662	29.7	10.1	37.4	14.0	.004	9.8	4.6	.032

% Patients with $BD < -4$ and $K < 3.3$ by Month

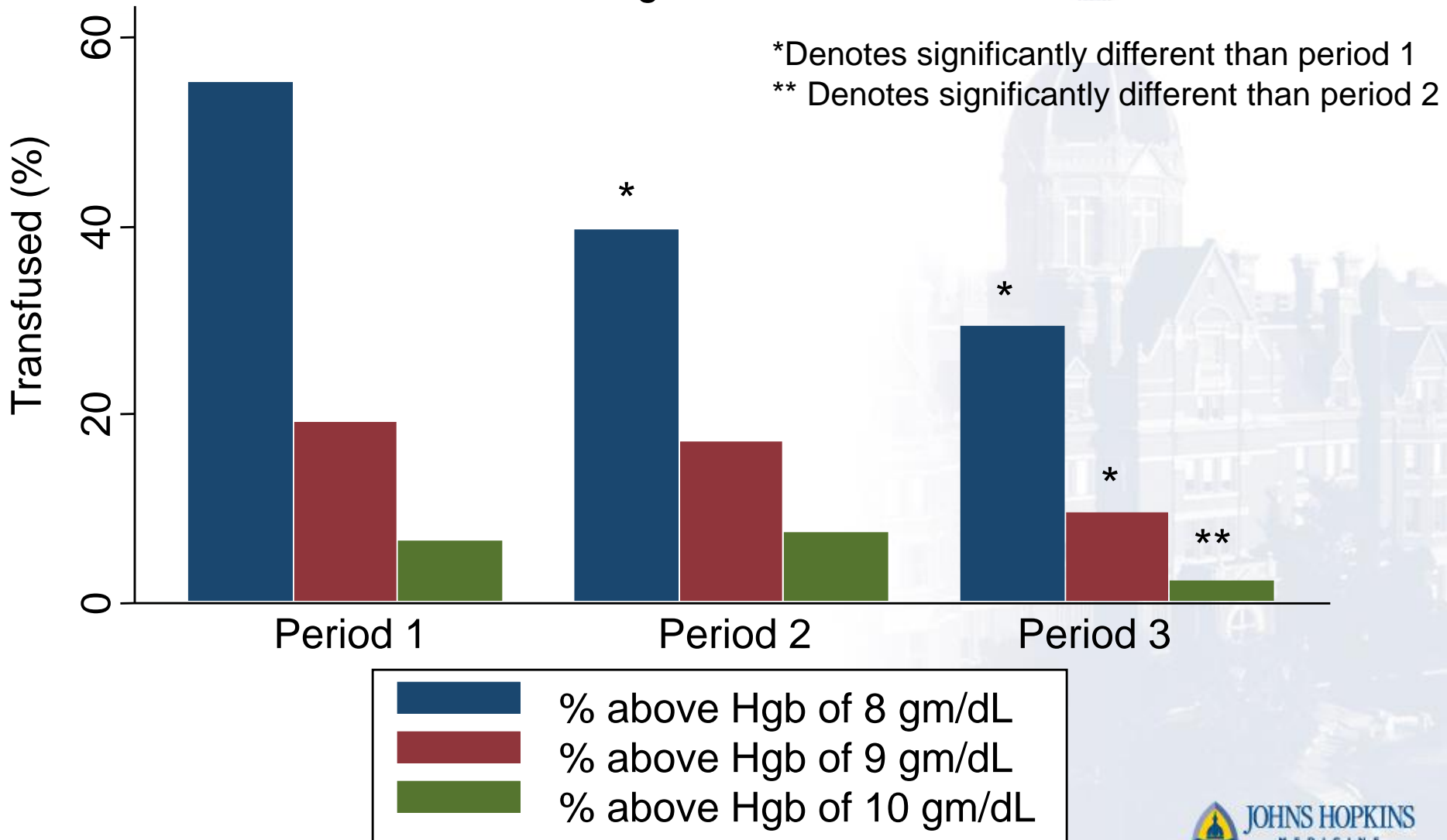


Quality Improvement

- Insight regarding what metric to target
- A sense of comfort to embark upon new initiatives
- Involves ability to create consensus

Percent of Transfusions at Increasing Hgb Thresholds

All Surgeons Combined



Conclusion

- Though recognizing that this is as yet untested, the perspective that comes with cardiothoracic surgical training and practice best addresses the above issues which face every cardiothoracic surgical team and ICU.

As a result, thoracic surgeons:

- Should be the directors of the CTICU, and
- Should play an integral part in the delivery of day to day ICU care.

Procedures for which the STS database has a predictive model

(Based on roughly 2.7 million patients)

Procedure groups for which models exist:

- Isolated CABG (CAB)
- Isolated Aortic Valve Replacement (AVRepl)
- Aortic Valve Replacement and CABG (AVRepl+CAB)
- Isolated Mitral Valve Replacement (MVRepl)
- Mitral Valve Replacement and CABG (MVRepl+CAB)
- Isolated Mitral Valve Repair (MVRepr)
- Mitral Valve Repair and CABG (MVRepr+CAB)

Model endpoints:

- Operative Mortality
- Stroke
- Renal Failure
- Prolonged Ventilation
- Deep Sternal Wound Infection
- Reoperation
- Mortality/Morbidity combined endpoint (any of the 6 previous endpoints)
- Prolonged length of stay (length of stay >14 days)
- Short length of stay (length of stay < 6 days)