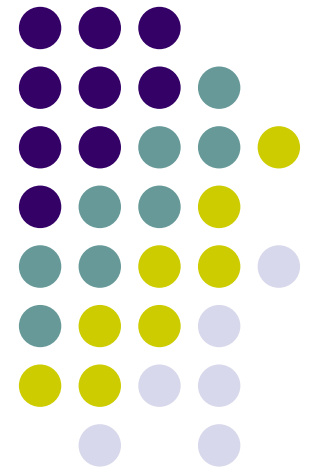


Mandatory Reporting

Background Information

*Marion Kainer MD MPH
Tennessee Department of Health*



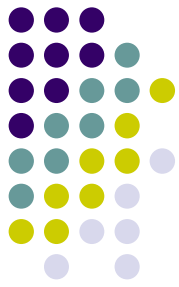


Acknowledgements

- **Vicki Brinsko (Vanderbilt University)**
- **Teresa Horan (CDC, DHQP)**
- **Carlene Muto (University of Pittsburgh)**

For sharing their slides

Hospital Acquired Infections



- **Affects 5-10% of US hospitalized patients**
 - 1/20 patients
 - Nearly 2 million patients
- **99,000 will die**
 - More deaths than those caused by breast cancer, colon cancer and stroke combined
 - More deaths than those caused by breast cancer, AIDS, and auto accidents combined
 - 30 times greater than the number of soldiers that have died in Iraq since the beginning of this battle (3,312 as of April 21, 2007)
 - Equivalent to a 747 plane crash killing all passengers/crew every other day.

Healthcare Quality Seeking Groups



- **JCAHO**
- **APIC, SHEA, CDC**
- **CMS – Medicare reimbursement**
- **LeapFrog Group**
- **Institute of Healthcare Improvement (IHI)**
- **National Quality Forum**
- **American Nurses Association – Magnet Status**

JCAHO's National Safety Goals

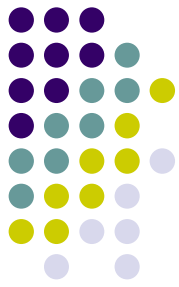


- National Patient Safety Goals
- Sentinel Event Reporting
- Hand Hygiene Monitoring



Sentinel Event

Centers for Medicare & Medicaid Services

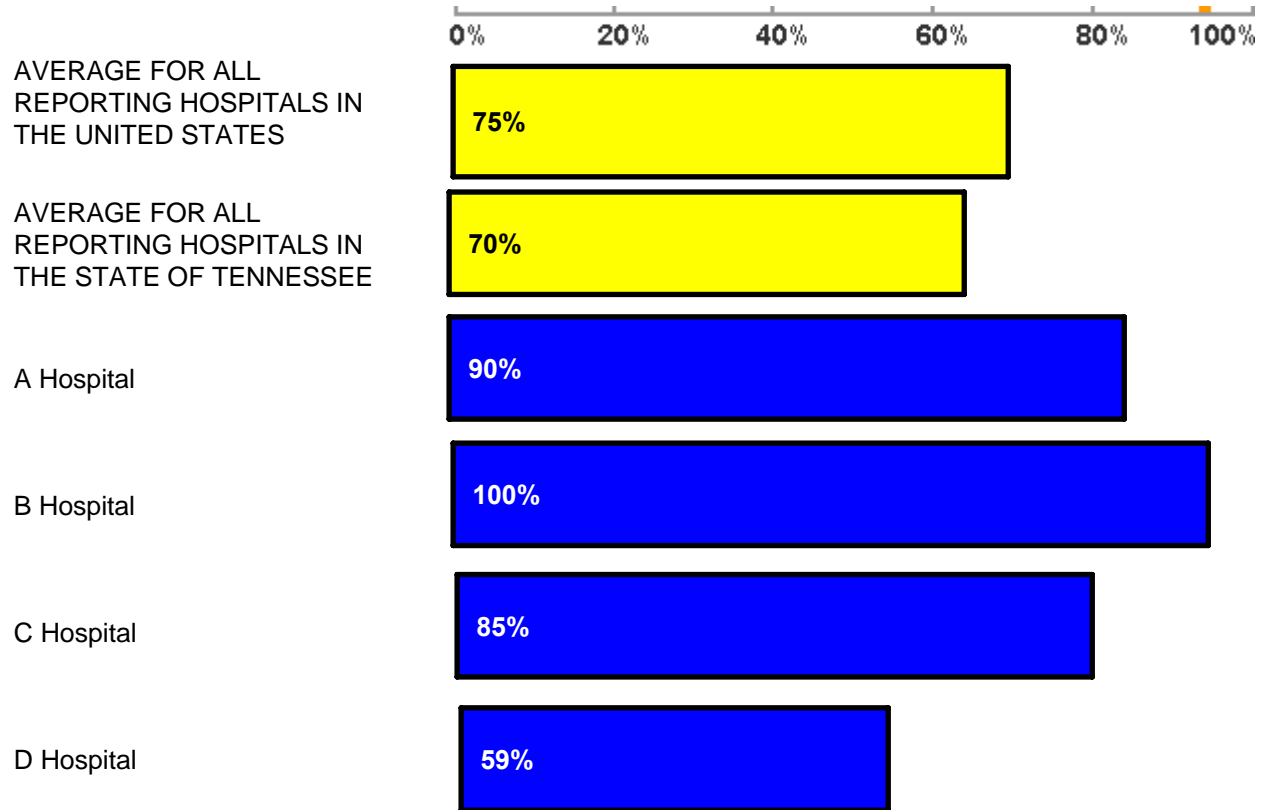
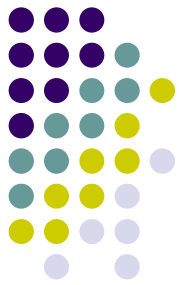


- **Surgical Care Improvement Project (SCIP)**
- **Voluntary, but soon will be mandatory in order for reimbursement to occur**



- **Partnership: CDC, CMS, ACS, AHA, VA, ASA, AORN JCAHO, AHRQ...**
- **Surgical complications: surgical site infections, perioperative myocardial infarction, postoperative thromboembolic events, and postoperative ventilator-associated pneumonia**
- **Specific surgical procedures: Cardiac surgery, major vascular procedures, hip and knee replacements, colorectal, hysterectomy**

CMS Hospital Compare Website



Top Hospitals represents the top 10% of hospitals nationwide. Top hospitals achieved a 94% rate or better.

% surgery patients who received antibiotics one hour prior to surgery.

<http://www.hospitalcompare.hhs.gov/Hospital/Search/Results.asp>

Centers for Medicare & Medicaid Services



- **Pay for Performance....is near!**
- **Major financial implications: details are still being worked out**



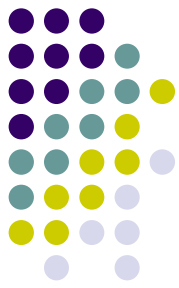


THE LEAPFROG GROUP

Informing Choices. Rewarding Excellence.
Getting Health Care Right.

- **Computer physician order entry**
- **ICU physician staffing**
- **27 Safe Practices score**
- **Evidence based hospital referral**
 - ◆ **CABG/stents**
 - ◆ **AAA**
 - ◆ **Pancreatic resection**
 - ◆ **Esophagectomy**
 - ◆ **High risk delivery**

Leapfrog Consumer Web Page



City	Leap1	Leap2	Leap3						Leap4	Results Submitted	
	<u>CPOE</u>	<u>ICU</u>	<u>High Risk Treatments</u>						<u>Safe Practices Score</u>		
Nashville, TN											7/28/2005
Nashville, TN											6/28/2005
Nashville, TN			NA			NA					6/23/2005
Nashville, TN									NA		6/30/2005
Madison, TN			NA	NA		NA	NA	NA	NA		6/03/2005
Nashville, TN											6/30/2005

<http://www.leapfroggroup.org>

Leapfrog Criteria For Hospital Rankings



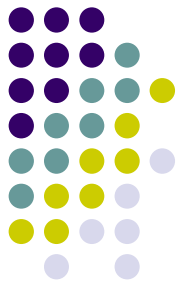
Healthcare culture of safety
Informed consent processes
Insure adequate nursing staff levels
Patients managed by intensivists
Pharmacist participation
Verbal orders recorded and read-back
Standardize Rx abbreviations
Patient care summaries not from memory
Timely information dissemination
Verify Informed Consent understanding
Living will and terminal care instructions
Implement CPOE system
Protocol to avoid mislabeled radiographs
Protocol to avoid “wrong” surgery
Ischemia protection in elective surgery

Pressure ulcer protocols
DVT protection protocol
Dedicated DVT team
Evaluate patients for aspiration risk
Central line BSI avoidance
Pre-operative prophylaxis evaluation
Avoid contrast-induced nephropathy
Check for malnutrition
Avoid thrombosis with pneumatic cuffs
Hand hygiene protocol implementation
Influenza vaccine for staff and patients
Clean, clear, uncluttered workspaces
Standardized drug handling
Hi-alert medication procedures
Unit dosing of medications



The 100,000 Lives Campaign

- **Institute of Healthcare Improvement (IHI) and several organizations**
- **Engagement of providers of healthcare**
- **Commitment to save lives through prevention of**
 - **Central-line associated infections**
 - **Surgical site infections**
 - **Ventilator-associated pneumonia**
 - **Adverse drug events**



National Quality Forum



- **Voluntary consensus standard-setting organization representing providers, consumers, purchasers, and researchers**
- **Ambulatory Care Performance Measures**
- **Diabetes Care Performance Measures**
- **DVT Prevention Performance Measures**
- **22 performance measures initiatives**



Quality Reporting

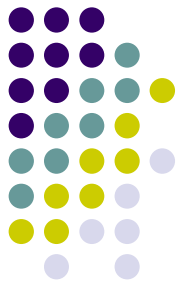
- **Currently lots of quality reporting through many quality forums**
- **Many of these reports are publicly accessible**
- **The JCAHO requires a comprehensive Infection Control program**
- **Reducing hospital acquired infections is part of an overall effective infection control program**

Surveillance of Healthcare Acquired Infections



- Encouraged since 1970
- Association for Practitioners in Infection Control 1972
- National benchmarks and national definitions through the National Nosocomial Infection Surveillance System (NNIS)

NNIS System



- **Established in the early 1970s**
- **Has grown from 60 to approximately 300 hospitals in 2004**
- **Participation voluntary and confidential**
 - **hospitals with at least 100-occupied beds**
 - **inpatients only**
 - **somewhat over-represents Northeast/Southeast; academic institutions***

*Richards C, et al. *AJIC* 2002

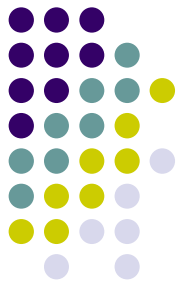


Goals of the NNIS System

- **Describe the epidemiology of healthcare-associated infections (HAIs) in U.S. hospitals**
- **Describe antimicrobial resistance associated with HAI**
- **Produce aggregated HAI rates suitable for interhospital comparison (“benchmarking”)**
- **Promote epidemiologically sound surveillance in hospitals**



Using NNIS Benchmarks in NNIS and non-NNIS Hospitals

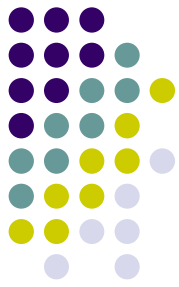


Site	Hospital A	Infection Rate*				
	Infection Rate*	10%	25%	50%	75%	90%
UTI	7.2 (at 50%)	1.3	3.05.1	7.1	9.6	
BSI	8.0 (above 90%)	.0	2.4	4.6	6.3	7.9
VAP	3.8 (below 10%)	6.5	10.1	13.4	17.5	

* Rate = # infections per 1000 device-days

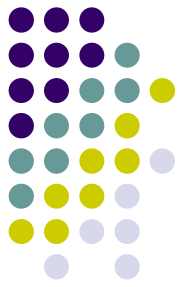
UTI = urinary catheter-associated infection
 BSI = central catheter-associated bloodstream infection
 VAP = ventilator-associated pneumonia

Three National Tracking Systems



- **NNIS** was a DOS based system offered to hospitals of 100 beds or greater
- Infections were reported to CDC through a modem and benchmarks returned to the user
- **NaSH** was a surveillance system for employee vaccine, blood body fluid exposure, and TB skin test tracking
- **DSN** was a surveillance system for dialysis infections and antibiotic tracking related to dialysis





NHSN combine Three National Reporting Systems into One

NNIS (National Nosocomial Infection Surveillance)

NaSH (National Surveillance System for Healthcare)

DSN (Dialysis Safety Network)



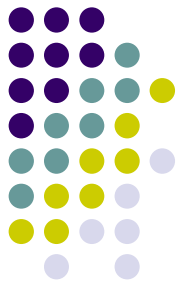
NHSN

CDC Definitions



- **18 page document that describes multiple criteria for each infection category**
- **Definitions include: Laboratory Confirmed Bloodstream infections, device associated pneumonia, catheter associated urinary tract infections, surgical site infections including superficial, deep and organ involvement, among many others**
- **The definitions include laboratory criteria, clinical signs and symptoms, microbiology data, radiological evidence and surgical evidence***
- ***<http://www.cdc.gov/ncidod/hip/nnis/NosInfDefinitions.pdf>**

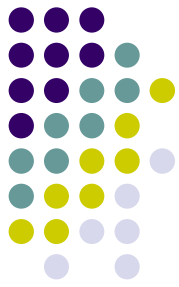
A Model for Healthcare Safety



- **NNIS System is a model for patient safety**
 - High quality data used for local performance improvement
 - Reductions in national infection rates have been achieved
- **NHSN will help expand and enhance this model for patient and healthcare personnel safety**

¹Leape LL. Reporting of adverse events. *NEJM* 2002;347:1633-8.

²Burke JP. Infection control—a problem for patient safety. *NEJM* 2003;348:651-6.

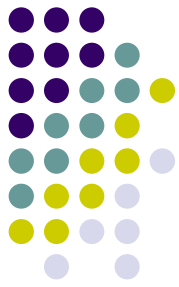


Key Features for Success

- **Standard definitions for events**
- **Specified monitoring protocols**
- **Feedback to participants**
- **Trained personnel for data collection and for interventions (e.g., infection control practitioners)**

Gaynes R, et al. *Clin Infect Dis* 2001; Richards C, et al *Emerg Infect Dis* 2001

Factors Affecting Risk of Infection



- Age
- Heredity
- Physical/emotional stressors
- Medical therapies
- Diagnostic procedures
- Chronic diseases



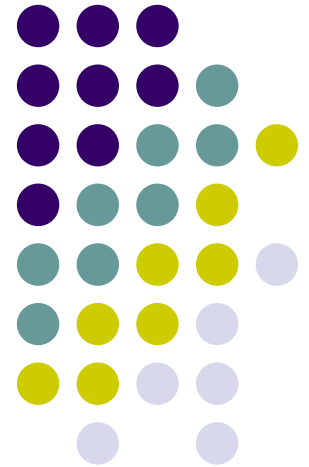


Differences in Patient Populations

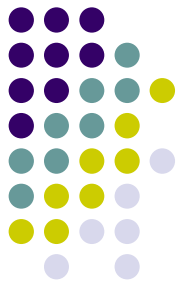
- **Trauma Centers and Burn Centers**
- **High Risk Nurseries (Level III or IV Neonatal Intensive Care units)**
- **Solid Organ Transplants**
- **Stem Cell Transplants**
- **Teaching Hospitals**
- **Large hospitals in urban areas vs small rural hospitals**

Effectiveness of Infection Control Interventions:

**Central Line Associated
Blood Stream Infections
(CLABSI)**



Blood Stream Infections (BSIs)



- **250,000 per year**
- **Increase LOS ~2 weeks**
- **3.5 million extra hospital days**
- **\$3.5 billion in costs related to excess stay**
- **Crude mortality 25 - 50%**
- **62,500 direct deaths**

Pittet. Nosocomial Bloodstream Infections, p711. In: Prevention and Control of Nosocomial Infections.;Williams and Wilkens, 1997.



Preventing Blood-Stream Infections Seeking Zero Tolerance

A Bundle of Joy Evidence based Prevention of BSIs: Multi-Center Success

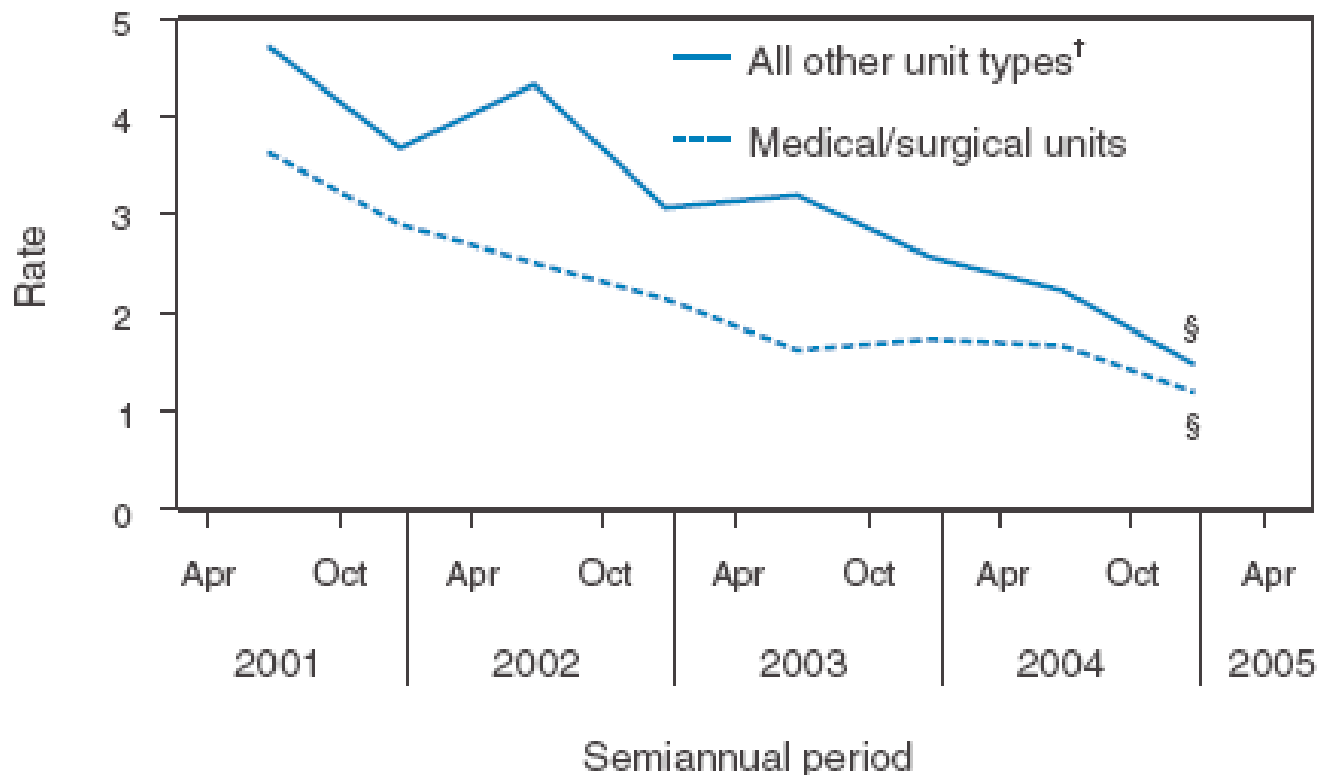
Carlene A. Muto, MD, MS

University of Pittsburgh Medical Center (UPMC), Pittsburgh, PA

CLABSI in ICUs: PA: 2001-2005



FIGURE. Central line–associated bloodstream infection rate* in 66 intensive care units (ICUs), by ICU type and semiannual period — southwestern Pennsylvania, April 2001–March 2005

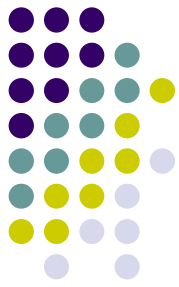


* Pooled mean rate per 1,000 central line days.

† Includes cardiothoracic, coronary, surgical, neurosurgical, trauma, medical, burn, and pediatric ICUs.

§ $p < 0.001$.

Interventions



- 1. Standardized the procedure note (checklist)**
- 2. Required documentation of process measures**
- 3. Mandated CLAB educational module (electronic availability) for clinicians who placed catheters.**
- 4. Bundling of necessary components (CHG, a large drape, sterile gown, mask with face shield, and hat) into kits.**
- 5. Placed Kits in all areas where Catheters were placed.**

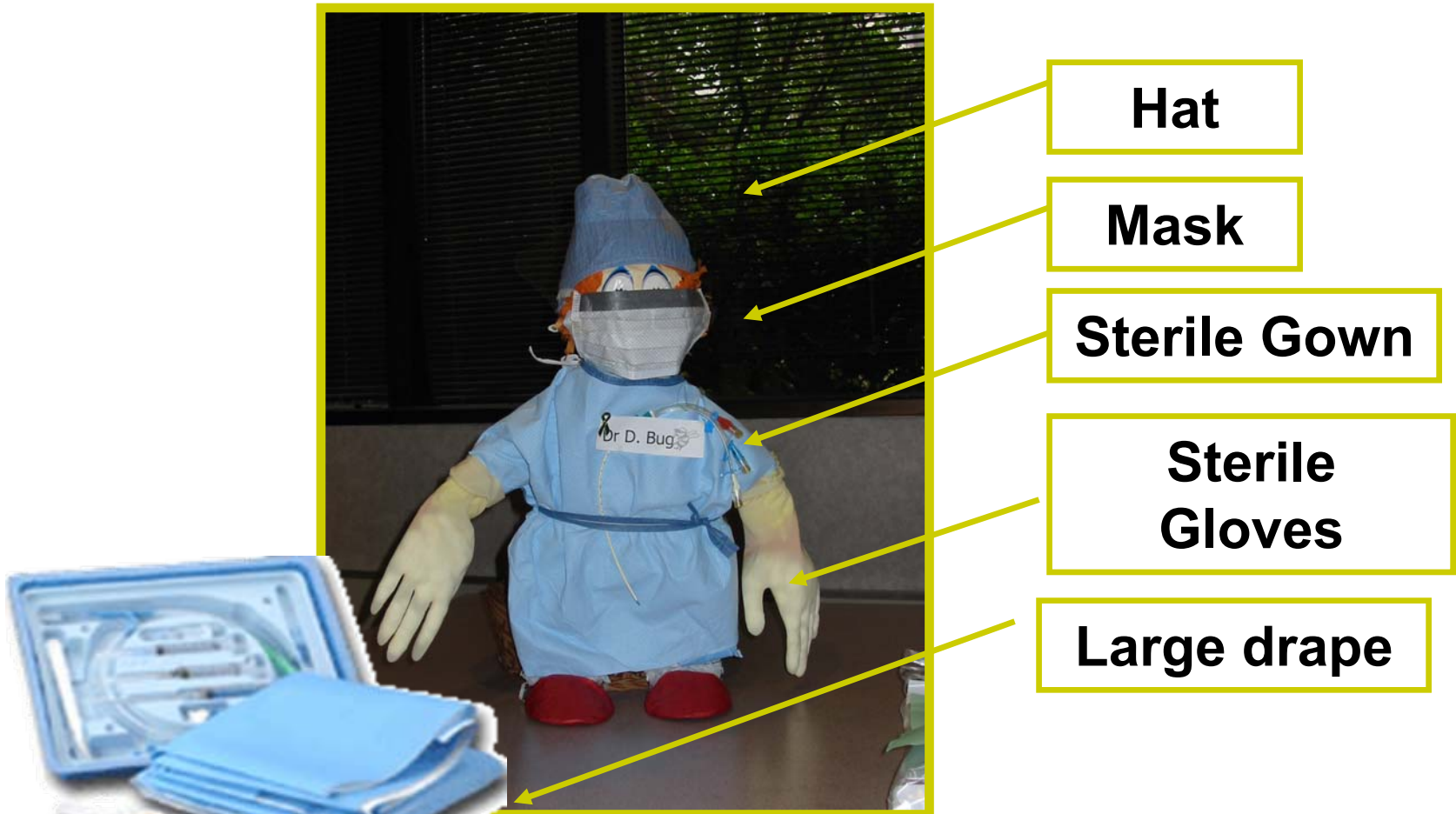
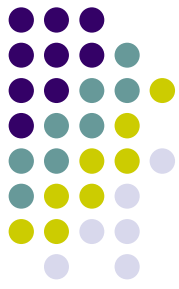
Interventions



6. **Recorded Process information for all CVC insertions**
7. **Analyzed data monthly and compared to baseline rates.**
8. **Accountability for non-compliance**
 - **Non-compliant clinicians received a letter from administration.**
9. **Feedback – ACTIONABLE CLAB data and compliance with targeted practice was collected, analyzed, and reviewed monthly and feedback to the clinicians and administrators, including all of the O's (CEO, COO, CFO, etc...)**

Gimmicks don't hurt

Meet Dr. D. Bug using his MBPs



Hat

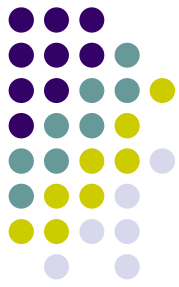
Mask

Sterile Gown

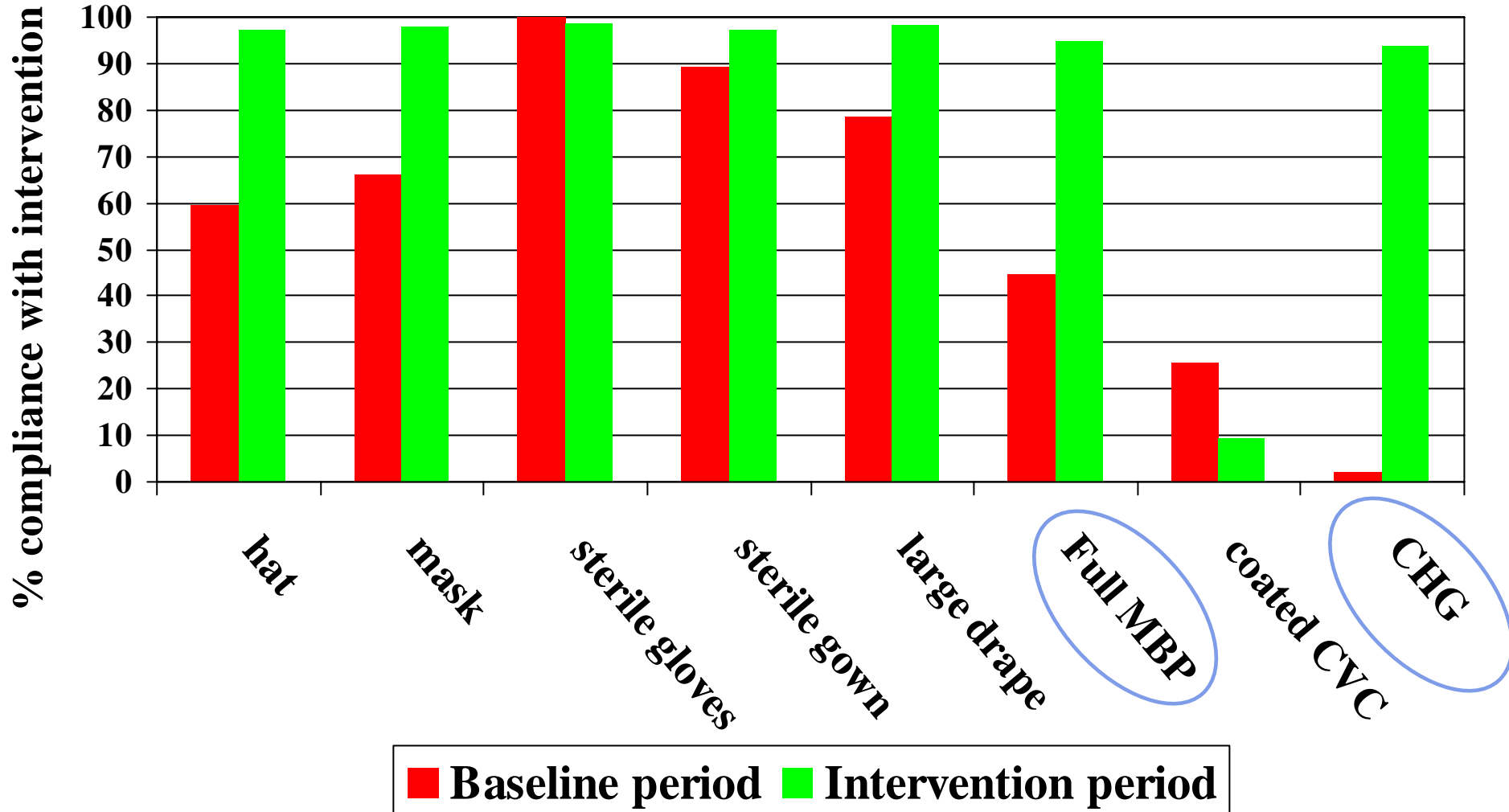
Sterile
Gloves

Large drape

UMC-PUH Process Measures



Compliance with targeted practice for CVC insertions



UMC-PUH Process Measures



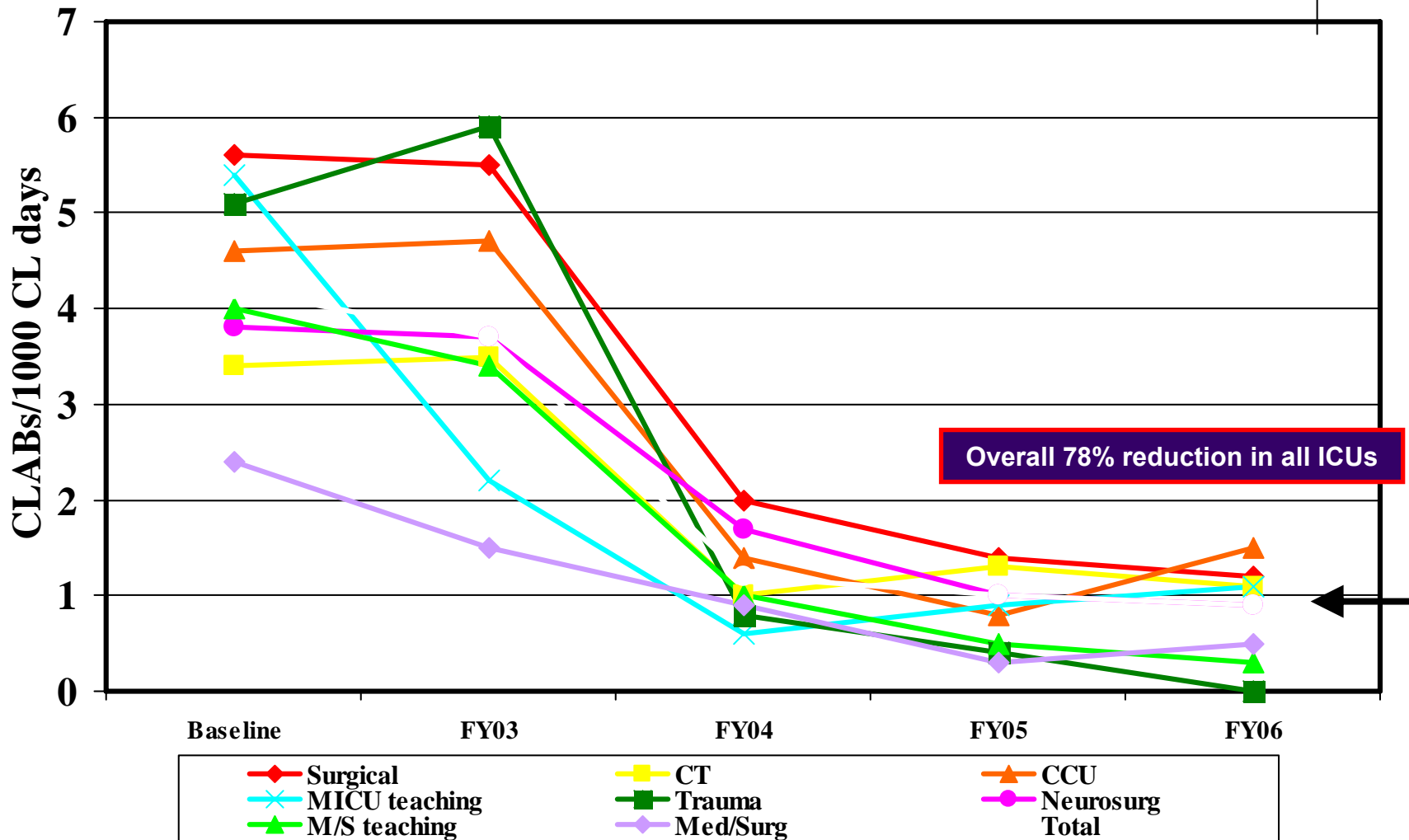
	Hat (%)	Mask (%)	Sterile gloves (%)	Sterile gown (%)	Large sterile drape (%)	Full MBP (%)	Coated CVC (%)	CHG (%)
Baseline Period N= 47	28 (59.6)	31 (66.0)	47 (100)	42 (89.4)	37 (78.7)	21 (44.7)	12 (25.5)	1 (2.1)
Intervention Period N=2,653	2586 (97.4)	2596 (97.9)	2616 (98.6)	2579 (97.2)	2603 (98.1)	2513 (94.7)	251 (9.5)*	2483 (93.6)
P value	<10 ⁻⁷	<10 ⁻⁷	0.5	0.01	<10 ⁻⁷	<10 ⁻⁷	0.001	<10 ⁻⁷

- *As per CVC inserter, as CHG and coated CVCs came in the same kit it appears that inserters may not have been aware that they were using a coated CVC.
- 1,240/1,397 (88.84%) clinicians completed the CLAB education module over time.

All insertion interventions were occurring > 93% of the time.

Results

UPMC HS CLABSI Rates



Results

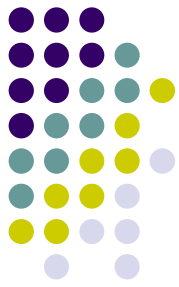
UPMC HS CLAB Rates Table




CLAB Rates						
		Baseline 1/02 – 6/02	FY 03	FY 04	FY 05	FY 06
	Goals NNIS 25 th percentile	CLABs/CL days (Rate)	CLABs/CL days (Rate)	CLABs/CL days (Rate)	CLABs/CL days (Rate)	CLABs/CL days (Rate)
Surgical		28/5,027 (5.6)	54/9,782 (5.5)	17/8,704 (2.0)	17/12,543 (1.4)	5/7,047 (0.7)
CT		14/4,771 (3.4)	33/9,399 (3.5)	10/9,650 (1.0)	14/11,060 (1.3)	14/14,783 (0.9)
CCU	1.9		21/4,500 (4.7)	3/2,158 (1.4)	2/2,435 (0.8)	8/10,456 (0.8)
MICU	3.4	16/2,942 (5.4)	12/3,220 (3.7)	3/5,387 (0.6)	8/8,489 (0.9)	5/2,236 (2.2)
Trauma	5.0	5/976 (5.1)	11/3,252 (3.4)	1/1,252 (0.8)	2/4,799 (0.4)	10/11,413 (0.9)
Neurosurg	2.5	7/1,847 (3.8)	13/3,503 (3.7)	1/1,252 (0.8)	4/3,829 (1.0)	1/5,621 (0.2)
Med/Surg	1.9	8/3,372 (2.4)	9/5,954 (1.5)	5/5,381 (0.9)	1/1,252 (0.8)	1/3,458 (0.7)
M/S teaching	3.2	10/2,503 (4.0)	14/4,063 (3.4)	7/7,296 (1.0)	2/4,150 (0.5)	0/5,376 (0)
Total	NA	99/23,413 (4.2)	170/45,528 (3.7)	55/47,058 (1.2)	51/53,564 (1.0)	46/61,516 (0.7) ↓

HOW LOW CAN WE GO???

Process Measures C						
	Goal	Baseline period	FY03	FY 04	FY 05	FY 06
Use of all 5 MBP	70%	Not collected	2,364/5,966 (39.6%)	10,318/11,640 (88.6%)	12,993/13,641 (95.2)	14,164/14,543 (97.4%)



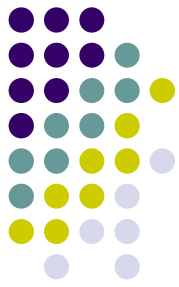
Avoided CLABs/Avoided Costs

Year	Actual # CLABs	Expected # CLABs	Δ (E-A)	Cost avoided
2003	170	191	21	698,628
2004	55	198	143	4,757,324
2005	51	225	174	5,788,632
2006	31	145	114	3,792,552
Total	307	759	452	15,037,136
Annual savings			\$4,176,982	

There would have been an additional 452 CLABs over the past 3.5 years resulting in \$15 million in spending

Annually, 129 CLABs were avoided associated with a cost avoidance of **\$4.18M**

**Using published cost BSI estimates (Pittet, D et al. JAMA 1994;271:1598-1601)*



Summary

Estimated Annual Benefits of CLAB Prevention

Avoided CLABs...	129
Lives Saved...	45
Avoided Costs...	>\$4M

Sending Patients Home Alive and Well...Priceless!!

Michigan Keystone Project: Baseline Data: 103 ICUs



Table 2. Baseline Data.

Characteristic	No. of ICUs	Baseline Period		
		No. of Infections	Catheter-Days <i>median (interquartile range)</i>	No. of Infections per 1000 Catheter-Days
All hospitals	55*	2 (1–3)	511 (220–1091)	2.7 (0.6–4.8)
Teaching status				
Teaching	33	2 (1–4)	744 (377–1134)	2.7 (1.3–4.7)
Nonteaching	22	1 (0–2)	306 (194–608)	2.6 (0–4.9)
No. of beds				
<200	13	1 (0–1)	247 (75–377)	2.1 (0–3.0)
200–299	12	2 (1–6)	595 (338–1670)	3.2 (0.3–4.3)
300–399	12	2 (1–3)	902 (184–1376)	2.7 (1.7–5.8)
≥400	18	2 (1–3)	616 (424–1102)	2.0 (1.3–4.7)

* Of the 103 participating ICUs, 48 did not contribute baseline data — 40 because they implemented the intervention at the initiation of the study and 8 because they did not report baseline data.

Michigan Keystone Project: Results of Intervention



Table 3. Rates of Catheter-Related Bloodstream Infection from Baseline (before Implementation of the Study Intervention) to 18 Months of Follow-up.*

Study Period	No. of ICUs	No. of Bloodstream Infections per 1000 Catheter-Days				
		Overall	Teaching Hospital	Nonteaching Hospital	<200 Beds	≥200 Beds
		<i>median (interquartile range)</i>				
Baseline	55	2.7 (0.6–4.8)	2.7 (1.3–4.7)	2.6 (0–4.9)	2.1 (0–3.0)	2.7 (1.3–4.8)
During implementation	96	1.6 (0–4.4) [†]	1.7 (0–4.5)	0 (0–3.5)	0 (0–5.8)	1.7 (0–4.3) [†]
After implementation						
0–3 mo	96	0 (0–3.0) [‡]	1.3 (0–3.1) [†]	0 (0–1.6) [†]	0 (0–2.7)	1.1 (0–3.1) [‡]
4–6 mo	96	0 (0–2.7) [‡]	1.1 (0–3.6) [†]	0 (0–0) [‡]	0 (0–0) [†]	0 (0–3.2) [‡]
7–9 mo	95	0 (0–2.1) [‡]	0.8 (0–2.4) [‡]	0 (0–0) [‡]	0 (0–0) [†]	0 (0–2.2) [‡]
10–12 mo	90	0 (0–1.9) [‡]	0 (0–2.3) [‡]	0 (0–1.5) [‡]	0 (0–0) [†]	0.2 (0–2.3) [‡]
13–15 mo	85	0 (0–1.6) [‡]	0 (0–2.2) [‡]	0 (0–0) [‡]	0 (0–0) [†]	0 (0–2.0) [‡]
16–18 mo	70	0 (0–2.4) [‡]	0 (0–2.7) [‡]	0 (0–1.2) [†]	0 (0–0) [†]	0 (0–2.6) [‡]

* Because the ICUs implemented the study intervention at different times, the total number of ICUs contributing data for each period varies. Of the 103 participating ICUs, 48 did not contribute baseline data. P values were calculated by the two-sample Wilcoxon rank-sum test.

[†] P≤0.05 for the comparison with the baseline (preimplementation) period.

[‡] P≤0.002 for the comparison with the baseline (preimplementation) period.