

# Providing Timely Infection Data to Nurse Leaders Using a Automated Surveillance System Reduces Infection Rates

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# Brookwood Medical Center



- 631-bed full service medical facility located in Birmingham, Alabama
- More than 800 privately practicing physicians treat and refer patients to Brookwood.
- Over 300 physicians practice in offices located in one of the four professional office buildings connected to the hospital.
- over 2,500 employees and volunteer staff that support the medical center.

Women's Medical Center

Cardiovascular Services, Cardiothoracic surgery

Surgery, including robotics

Orthopedics & Rehabilitation

Psychiatric Care

Cancer Center

Oncology



# Purpose:

- Reduce Nosocomial Infection Markers (NIMs)
- Reduce Hospital-Acquired Infection (HAI) Rates
  - Provide rapid feedback to nurse leaders and bedside staff on infections that occurred.
    - Explored the use of "real-time" reports from an automated infection surveillance system.

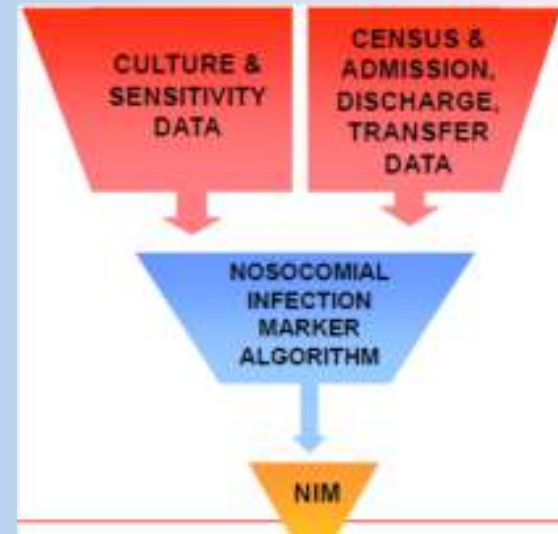
# Significance:

*Why?*

- Pay for Quality
  - Blue Cross & Blue Shield of Alabama
    - benchmarking tool compares NIM rates to the rates of other Alabama hospitals.
  - Hospitals ranked as “excellent” receive funding from the cost of the system as well as quality tiering points.
  - Our hospital ranked as ‘average’ and sought methods to improve the ranking score.




# Background: What's a NIM?

- The data mining service uses hospital-specific and patient-specific factors to account for the risk of acquiring healthcare-associated infections (HAI), using the Nosocomial Infection Marker (NIM) as an objective proxy for Hospital-acquired infection (HAI). (risk adjustment)
- The NIM looks at positive culture data, in relation to a set of algorithms, to determine probable instances HAI.
  - Based on the number of patient stays with a NIM per the total number of Stays per Unit. Rates are calculated as # admissions with a NIM / Total admissions
- All the culture & sensitivity data, census and admission, discharge, & transfer data from the facility goes through the data mining system.
- Positive cultures, that are obtained after a 48 hour inpatient stay that also meet criteria for a series of algorithms are determined to be NIMS.
- Because the system does not have access to clinical information, timing for obtaining cultures can be a critical factor in a positive culture being called a NIM.



- Provides objective, risk-adjusted infection prevention performance data at the hospital and unit level.

# Benchmarking coding for Hospital Performance Comparison

- The Hospital Performance table displays the hospital's Observed and Predicted Rate as well as its corresponding z-score.
  - The z-score represents how many standard deviations away is the actual (observed) rate from the expected (predicted) rate. A negative z-score indicates the hospital is performing better than expected, while a positive value implies under-performance.
- \* A z-score less than or equal to -1.0 indicates **Excellent** performance and is listed with a **Green Circle**. 
- \* A z-score between -1.0 and 1.0 indicates **Good** performance and is listed with a **Grey Triangle**. 
- \* A z-score greater than or equal to 1.0 indicates **Fair** performance and is listed with a **Red Square**. 

Names of Hospitals participating in transparency will be visible.  
Others will appear only as "Hospital"



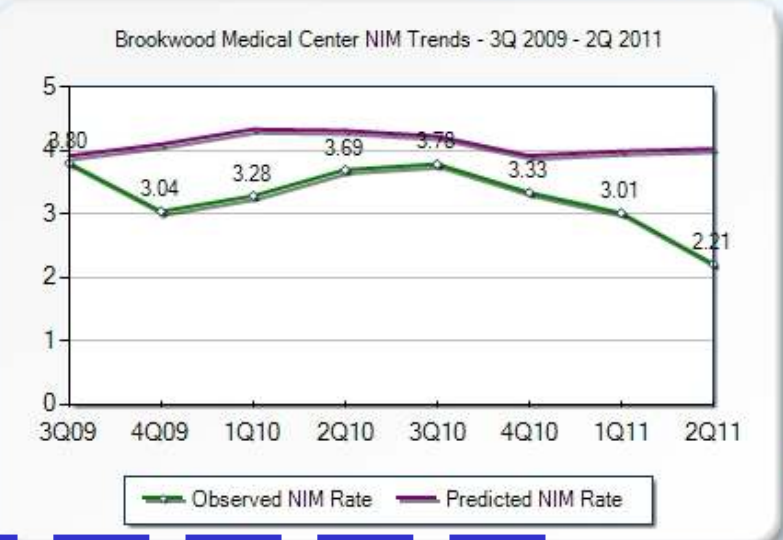
**Hospital Comparison: Alabama**

Hospital	Obs(%)	Pred(%)	Z-score
Hospital	1.89	5.52	-2.27
C	1.56	4.31	-2.22
H	2.21	5.75	-2.11
F	1.26	3.13	-2.11
H	2.41	6.26	-1.99
C	2.00	4.53	-1.98
V	2.36	4.63	-1.78
M	2.38	4.88	-1.77
A	1.70	3.35	-1.75
E	2.93	5.46	-1.70
H	2.58	4.75	-1.65
E	2.62	4.90	-1.63
H	3.07	5.77	-1.63
E	2.70	4.80	-1.59
T	2.52	4.44	-1.58
S	2.95	5.10	-1.54
M	3.56	6.00	-1.50
H	3.02	5.44	-1.48
H	2.40	4.21	-1.47
H	2.48	4.16	-1.43
H	2.92	4.68	-1.40
F	3.98	6.39	-1.38
A	2.14	3.50	-1.38
C	1.81	2.90	-1.38
S	3.34	5.22	-1.33
E	2.44	3.84	-1.33
E	3.48	5.41	-1.31
F	4.36	6.75	-1.30
J	3.49	5.34	-1.27
H	2.20	3.29	-1.19
H	2.83	4.15	-1.14
S	3.54	4.99	-1.07
M	2.37	3.29	-1.00
C	2.88	3.95	-1.00
Hospital	2.84	3.87	-0.97
Hospital	2.60	3.55	-0.96
<b>Brookwood</b>	<b>3.09</b>	<b>4.13</b>	<b>-0.93</b>
Hospital	3.00	4.01	-0.92
Hospital	3.13	4.18	-0.90
Hospital	1.86	2.47	-0.90



**Brookwood Medical Center NIM Trends**

My Hospital ▼ View



**The Observed Rate = Hospital NIM Rate**

**The Predicted NIM rate is the rate predicted for your unit/hospital based on the risk-adjustment model. Patient-specific variables such as age, prior hospitalization history, unit type to which admitted and hospital-specific variables like CMI, annual discharges and academic status are used to risk-adjust NIM rates.**

**You want to see a declining Observed Rate that is less than the Predicted Rate**

**Unit Performance**

Unit	Obs(%)	Pred(%)	Z-score
IMC	0.92	2.87	-1.67
ICU	3.38	8.06	-1.52
5M	3.60	5.88	-1.35
PIC	0.91	2.47	-1.31
CCU	3.15	6.52	-1.26
2M	1.55	2.73	-1.19
4M	1.62	2.62	-1.19
W3	1.52	2.53	-1.16
SIC	5.29	7.87	-0.78
4W	2.54	3.41	-0.75
GR	0.56	0.90	-0.59
3W	2.11	2.77	-0.59
PCU	2.93	3.60	-0.44
IM2	0.62	0.89	-0.42
7M	4.93	5.39	-0.18
IM3	1.28	0.90	0.62
CVSU	8.07	5.16	1.34

- [NIM Rate](#)
- [Risk Adjustment](#)
- [Hospital Performance Comparison](#)
- [Unit Performance Comparison](#)

Performance for 7/1/2010 - 6/30/2011



**Unit Comparison**

Comparison of all units within my hospital with similar units of other hospitals

Minimum Rate	0.56%
Maximum Rate	8.07%
Mean Rate	2.55%
Start Date	7/1/2010
End Date	6/30/2011

Print Matrix Zoom

- Unit List**
- |         |          |
|---------|----------|
| 1. IMC  | 11. PCU  |
| 2. ICU  | 12. 3W   |
| 3. 5M   | 13. GR   |
| 4. CCU  | 14. IM2  |
| 5. PIC  | 15. 7M   |
| 6. 4M   | 16. IM3  |
| 7. 2M   | 17. CVSU |
| 8. W3   |          |
| 9. 4W   |          |
| 10. SIC |          |

# Strategy and Implementation:

- Traditional infection rate reporting makes it hard for bedside nurses to identify practices with the patients who have untoward outcomes.
- NIM patient information is available weekly.
- NIM patient level information is provided to nursing leaders to share with bedside staff members each week.



# Identified 3 Key Nursing Strategies



- Eliminate cultures on asymptomatic patients, especially cultures done at greater than 48 hours past admission
- If a culture is needed, assure that the specimen is collected using accurate technique. Contamination will result in a positive culture and a NIM
- When the specimen has been collected, make sure the most accurate description of the specimen source is selected in the HBO order entry. RN to assist the Unit secretary to make a correct choice

## NIM Annotation Workflow


(10/24/2011-10/30/2011)

[◀ Enter HAI](#)   [◀ Create a NIM Scorecard/Report](#)

Location	NIMs Found for Week	# NIMs Annotated	# NIMs Unannotated
DD2; IM3	1		
PCU; SIC	1		
3W	2		
4W	2		
5M	2		
7M	3		
ICU	1		
IM4	1		
NIC	1		
SIC	3		
	<u>17</u>		

**The data mining service generates a weekly NIM count per patient unit.**

Select Week:

Week of Mon Oct, 24 2011 

[Change Week](#)

\* For patients in multiple locations on the estimated acquired date, the NIM is counted only once

**BMCAL**  
**Total Nosocomial Infection Marker (NIM v2008) Scorecard Patient Listing\***  
**(10/24/2011 - 10/30/2011)**

 [Export to Excel](#)
 [Display Chart](#)
 [Send Feedback](#)
 [Back to VSI Home](#)
 [Back to Selection](#)
 [Enter HAI](#)
 [Back to Workflow](#)

	Patient #	NIM Source	Est. Acq. Loc.	Admit Date	Collected Date	Collected/Event Loc.	NIM Org.	Patient Acct#
1.		resp:lower	7M	10/15/2011	10/20/2011	7M	pseud aeruginosa	
2.		urine	7M	10/17/2011	10/22/2011	7M	kleb pneumoniae	
3.		urine	IM4	10/12/2011	10/19/2011	GR	e coli	
4.		blood:line	SIC	09/17/2011	10/20/2011	SIC	cand albicans	
5.		blood	NIC	10/08/2011	10/18/2011	NIC	sta aureus	
6.		resp:upper	7M	10/17/2011	10/21/2011	7M	e coli	
7.		urine:catheterize	SIC	10/10/2011	10/19/2011	SIC	ento faecalis	
8.		wound	3W	10/03/2011	10/20/2011	5M	prot mirabilis;sta aureus	
9.		urine:catheterize	ICU	10/17/2011	10/23/2011	ICU	cand albicans	
10.		resp:upper	3W	10/17/2011	10/25/2011	SIC	kleb oxytoca	
11.		urine	DD2; IM3	10/20/2011	10/24/2011	DD2	e coli	
12.		stool	5M	10/18/2011	10/23/2011	5M	clostridium difficile	
13.		urine	4W	10/12/2011	10/21/2011	4W	ento faecalis	
14.		other:abscess	4W	10/12/2011	10/22/2011	SIC	e coli	
15.		resp:upper	5M	10/15/2011	10/21/2011	PCU	pseud aeruginosa	
16.		stool	SIC	10/02/2011	10/26/2011	PCU	clostridium difficile	
17.		urine:catheterize	PCU; SIC	10/02/2011	10/27/2011	PCU	cand albicans	

- A case list of NIMs is generated
- The case list is e-mailed to the unit directors

# Drilldown Guide

- Caregivers review almost real-time cases and are asked to answer four questions:
- 1) **What happened?**
  - 2) **Why did it happen?**

3) **What did you do to fix it?**

4) **How do you know it's been fixed?**

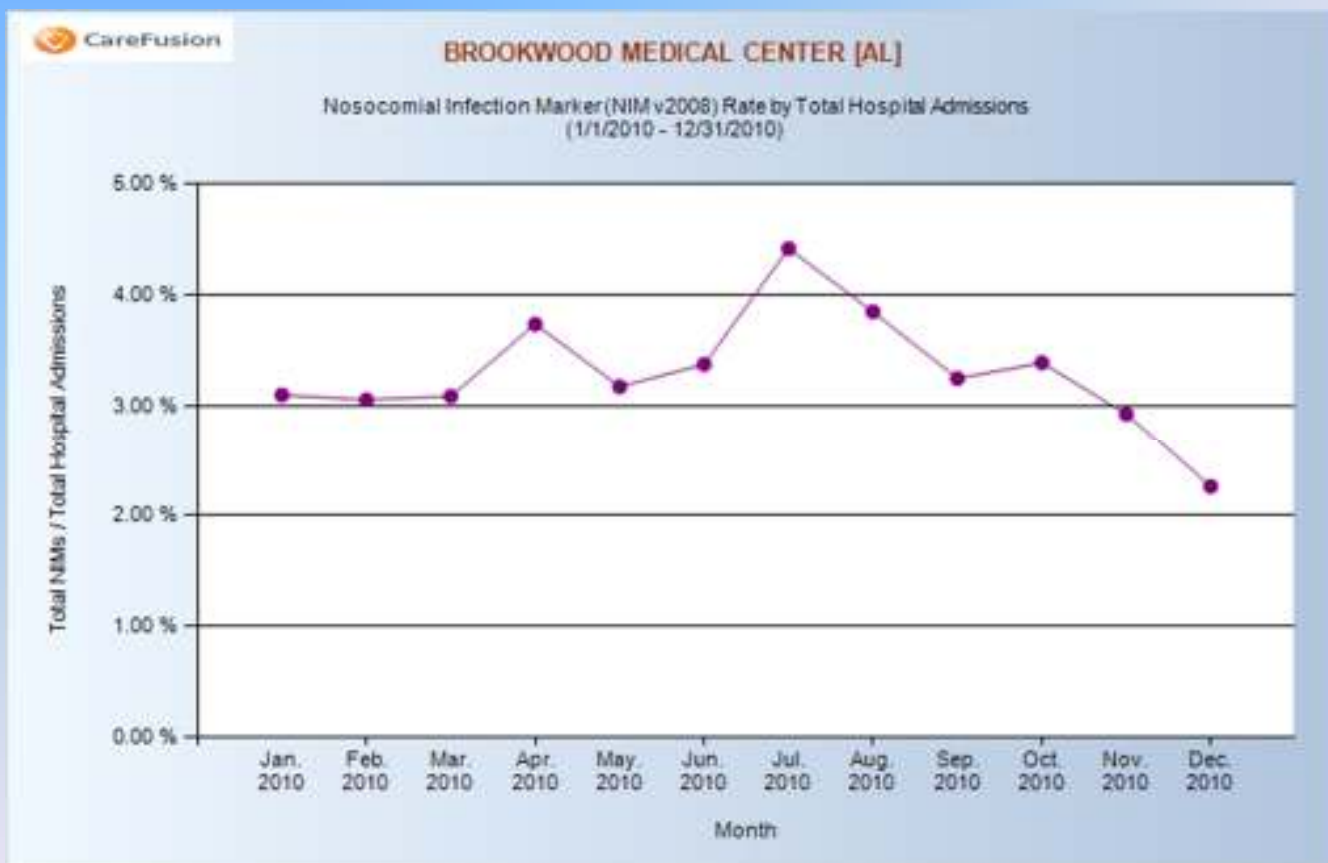
- Information gathered is shared in a monthly HAI team meeting where common variables and opportunities for improvement are identified.
- Rapid cycle quality improvement methods are used to implement change.

Borrowed from the CUSP Program



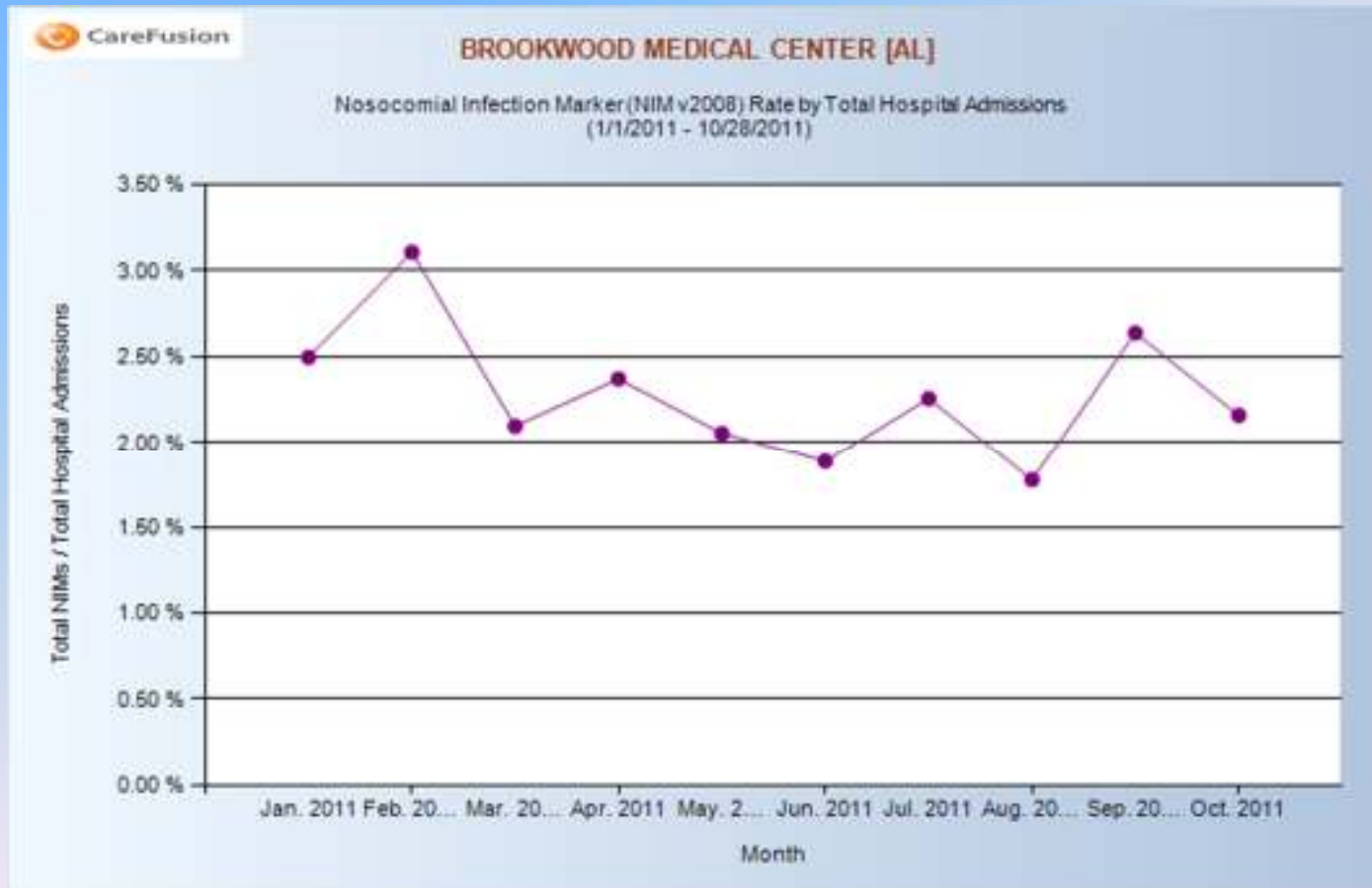
# Evaluation:

Prior to the project, NIM rates for 2010 averaged 3.30%, ranging from 2.25% to 4.42%.

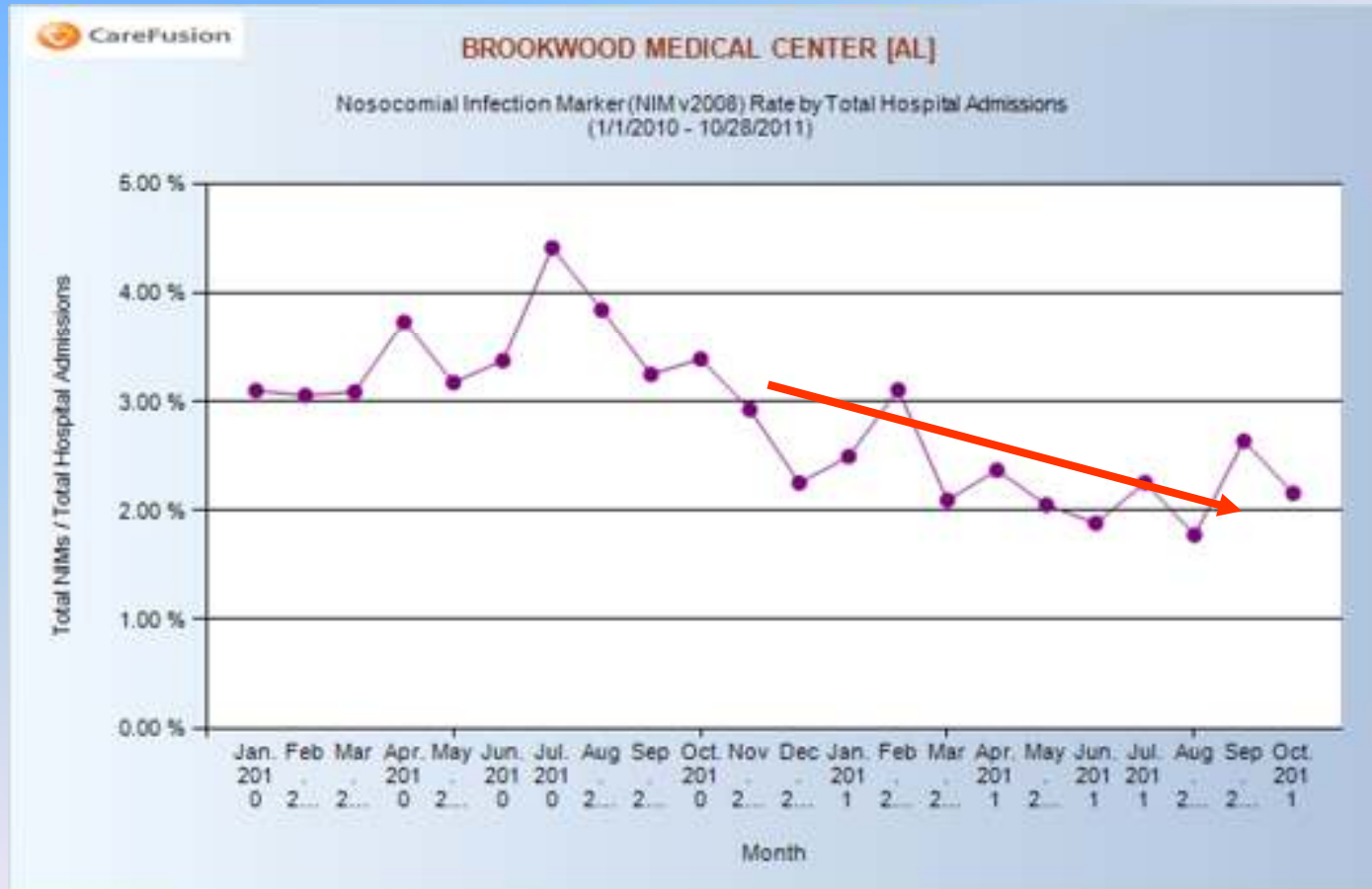




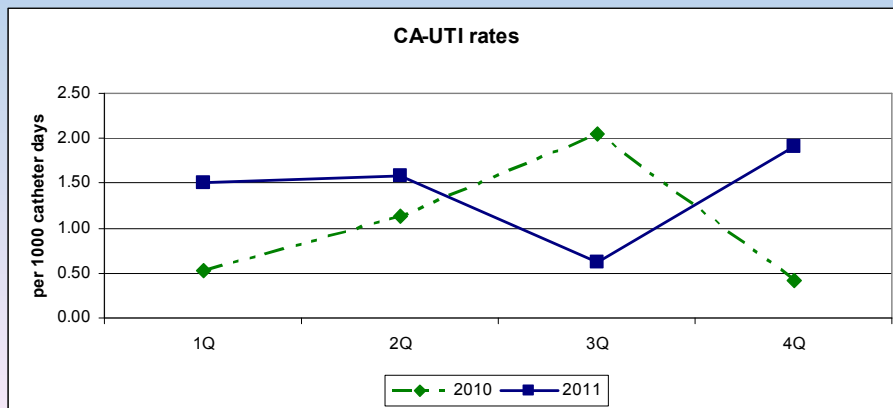
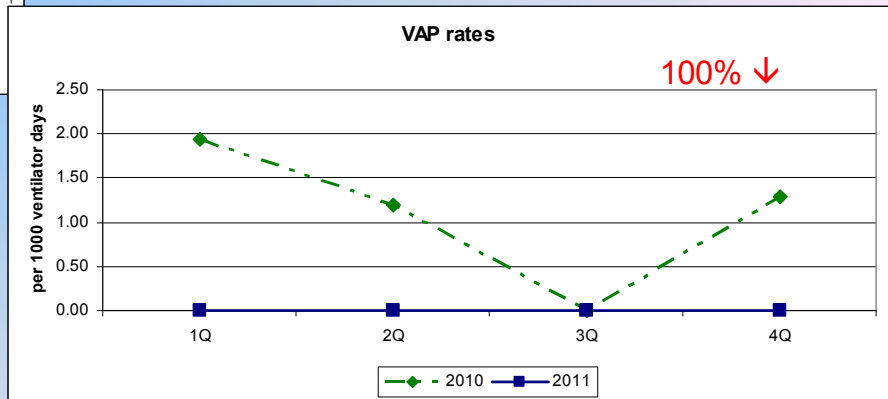
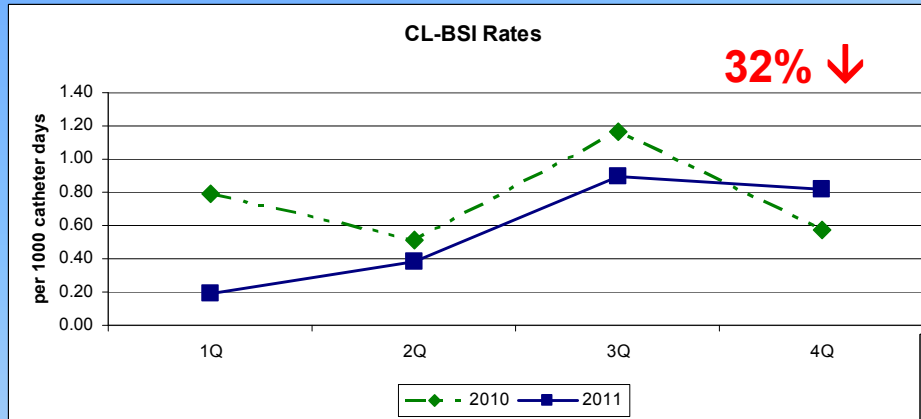
- Weekly sharing of NIM information with nursing leaders began in March, 2011.
- Since implementation, NIM rates have averaged 2.28%, ranging from 1.38% to 3.25%.



Representing a 30.9% decrease in the total NIM rate.



# Traditional HAI rates have declined as well



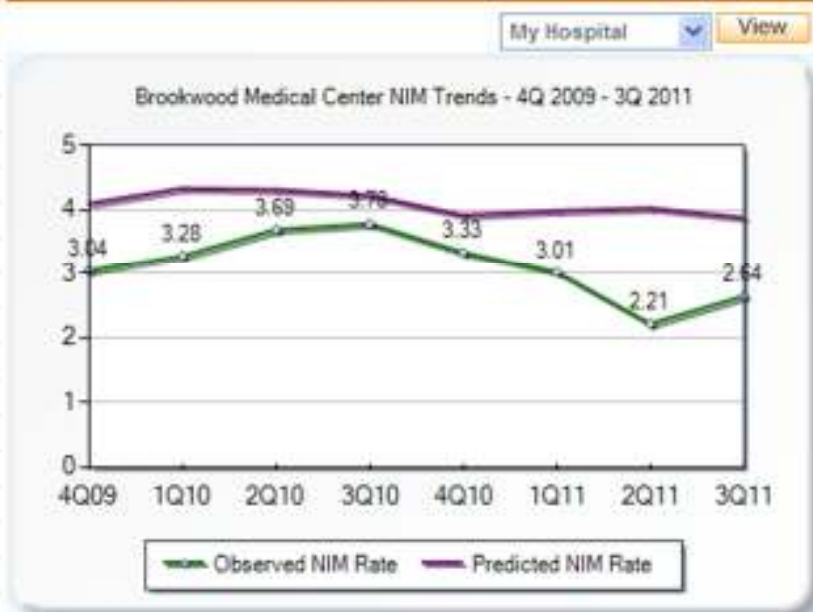
### 3rd Quarter 2011 Benchmarking Scores

#### Hospital Comparison: Alabama

Hospital	Obs(%)	Pred(%)	Z-score
1	1.68	5.72	-2.36
2	1.52	4.57	-2.28
3	1.51	4.35	-2.19
4	2.05	5.64	-2.10
5	1.23	3.14	-2.09
6	1.20	3.10	-2.07
7	1.96	4.74	-1.99
8	2.25	5.93	-1.95
9	2.11	5.18	-1.91
10	2.12	4.71	-1.83
11	1.69	3.34	-1.71
12	2.27	4.40	-1.69
13	2.48	4.77	-1.68
14	2.66	5.03	-1.65
15	2.11	4.17	-1.64
16	2.45	4.61	-1.64
17	2.25	4.20	-1.60
18	2.64	4.80	-1.57
19	3.20	5.95	-1.55
20	3.11	5.49	-1.53
21	4.04	6.77	-1.43
22	2.29	3.86	-1.42
23	3.67	6.09	-1.41
24	2.85	4.71	-1.40
25	3.17	5.24	-1.40
26	3.45	5.45	-1.29
27	1.54	2.45	-1.29
28	2.09	3.31	-1.28
29	2.19	3.48	-1.27
30	4.05	6.31	-1.26
31	2.11	3.32	-1.25
32	1.94	2.92	-1.17
33	3.62	5.39	-1.16
34	3.51	5.07	-1.08
<b>Brookwood</b>	<b>2.80</b>	<b>4.02</b>	<b>-1.08</b>
DCH	2.80	3.94	-1.03

Hospital  
Names  
hidden

#### Brookwood Medical Center NIM Trends



	My Observed NIM Rates	My Predicted NIM Rates
B-quarter low	2.21%	3.88%
B-quarter average	3.12%	4.09%
B-quarter high	3.78%	4.33%

#### Unit Performance

Unit	Obs(%)	Pred(%)	Z-score
IMC	0.48	2.78	-2.03
ICU	2.64	7.84	-1.65
5M	3.44	5.41	-1.46
4M	1.34	2.61	-1.45
PIC	0.87	2.46	-1.36
CCU	3.07	6.51	-1.29
W3	1.41	2.54	-1.19
4W	2.35	3.47	-0.94
2M	1.71	2.69	-0.92
SIC	4.86	7.64	-0.89
3W	1.77	2.72	-0.83
PCU	2.32	3.41	-0.73
GR	0.58	0.90	-0.54
IM2	0.62	0.89	-0.40
7M	4.51	5.47	-0.38
IM3	1.13	0.90	0.36
CVSU	6.31	4.88	0.71

#### My Hospital Summary

Hospital	Obs(%)	Pred(%)	Z-score
<b>Brookwood</b>	<b>2.80</b>	<b>4.02</b>	<b>-1.08</b>

**We made Excellent!**

My Performance for 10/1/2010 - 9/30/2011



#### Unit Comparison

Comparison of all units within my hospital with similar units at other hospitals

Minimum Rate	0.48%
Maximum Rate	6.31%
Mean Rate	2.32%
Start Date	10/1/2010
End Date	9/30/2011

Mean Rate: The mean of the Observed NIM Rates shown on the adjacent matrix/list.

Unit	Mean Rate
1. IMC	11.4%
2. ICU	12.0%
3. 4W	13.0%
4. 5M	14.0%
5. PIC	15.0%
6. CCU	16.0%
7. W3	17.0%
8. 2M	18.0%
9. SIC	19.0%
10. 3W	20.0%

# Implications for Practice:

- Traditional infection rate data takes time to prepare
  - Chart review
  - Comparison to criteria
  - Calculation of rates
- Data is often one to two months old by the time it is seen by frontline staff members
- The numbers are disconnected from patients and any actions that may have contributed to an infection



# Summary

The closer one can come to exploring actual events, the better staff are able to connect with the patient who experienced the event, which leads to better compliance for key indicators.

Reviewing cases that are months old contributes to a disconnect between the event and staff actions and processes that may have contributed to the event.

Providing “real-time” data on HAI's to nurses gives a face to numbers, associating patients that nurses have cared for to their own individual care provided. Practices that may contribute to the acquisition of infection can be identified more readily. Consequently, infection rates decrease.



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