

Catheter Associated Blood Stream Infection (CABSI)

LOCAL Perspectives

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- The Local Project to Control CABSI
- Combined Data
- Further Thoughts as to whether we can do better

Infection Control: Local ICUs

- Joint Project of the Infection Control Task Force and COC (ICU)

2007	2008	2009
<ul style="list-style-type: none">❑ Mechanism of Data Collection❑ Criteria of Blood Culture	<ul style="list-style-type: none">❑ Phase in 2% Chlorhexidine❑ Seminars on CABSIs to ICU and ICN Staff	<ul style="list-style-type: none">❑ Implementation of 5 Point Care Bundle: with Regular Daily review & Compliance Check
<ul style="list-style-type: none">❑ Baseline Data: 3 months❑ Defining Compliance Check & Daily Review	<ul style="list-style-type: none">❑ Compulsory CABSIs Reporting: 3 months❑ Standardized Hardware & Drapes	

Central Line Bundle Elements As the Intervention:

- Hand hygiene
- Maximal barrier precautions
- One Piece Drape: Preliminary Evaluation
- Chlorhexidine skin antisepsis
 - 2% solution
 - Problem with Registration of Local Preparation
- Optimal catheter site selection,
 - with subclavian vein as the preferred site for
- Daily review of line necessity with prompt removal of unnecessary lines

ALL 5

Previous Definition CABSI: NNIS

- Central Catheter > 48hrs
- NNIS (National Nosocomial Infection Surveillance) Definition Of Lab Confirmed Blood Stream Infection

Criterion 1	Recognized pathogen cultured from one or more blood cultures
and	organism cultured from blood is not related to an infection at another site.
Criterion 2	One S/S of fever>38 , chills, or hypotension SBP<=90 mmHg
and	S/S and organism cultured from blood is not related to an infection at another site.
and	a) common skin contaminant is cultured from two or more blood cultures drawn on separate occasions, or
and	b) common skin contaminant is cultured from at least one blood culture and physician institutes appropriate antimicrobial therapy.

NHSN Definition (Update Jun 2010)

Laboratory Confirmed Blood stream infection (Age >1 yr)

- Central Line in-situ
- Time not Relevant now
- Keep 48hrs Transfer Rule
- **Criteria 2b deleted (Jan 2008)**

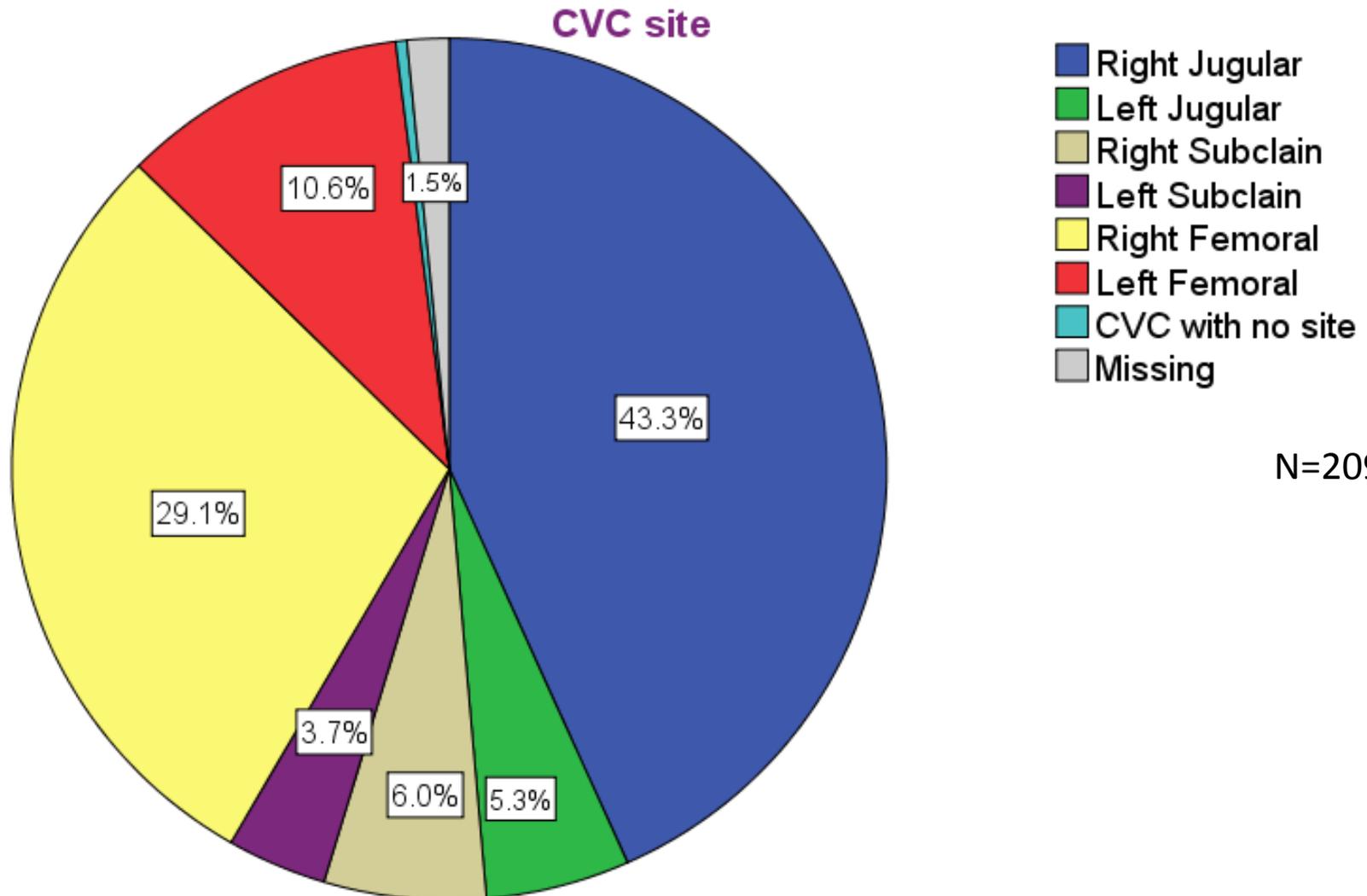
Criteria 1	One or More Blood Culture of known Pathogen	AND	Not Related to Infection at other sites		
Criteria 2	At least one of: <ul style="list-style-type: none">•Fever (>38°C)•Hypotension•Chills	AND	Not Related to Infection at other sites	AND	Common Skin Contaminants cultures 2 or more times in Separate Occasions.

Central Lines on Daily Review

		Freq	Percent	Valid Percent
Valid	QMH	234	10.9	10.9
	PYN	108	5.0	5.0
	RH	44	2.1	2.1
	CMC	51	2.4	2.4
	KWH	172	8.0	8.0
	PMH	195	9.1	9.1
	QEH	289	13.5	13.5
	UCH	214	10.0	10.0
	AHNH	14	.7	.7
	NDH	178	8.3	8.3
	PWH	290	13.6	13.6
	TKOH	74	3.5	3.5
	TMH	207	9.7	9.7
	YCH	70	3.3	3.3
Total	2140	100.0	100.0	

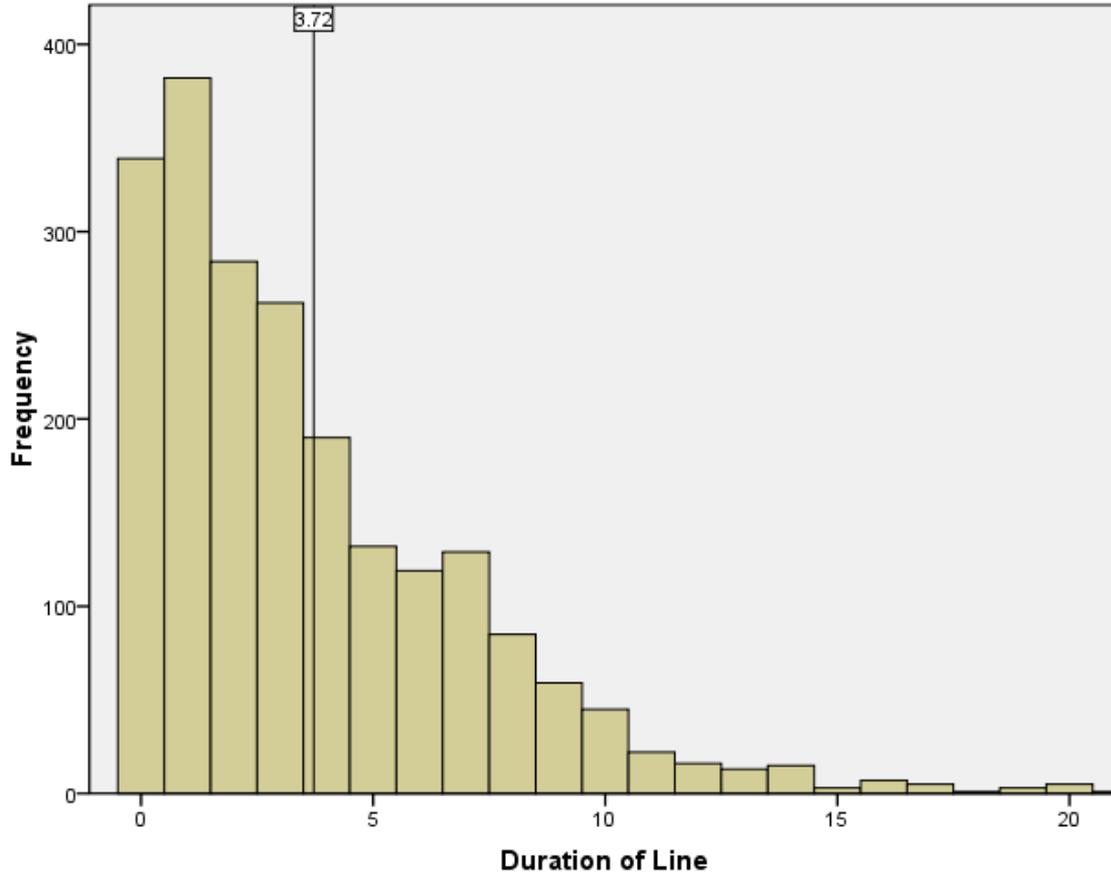
- Preliminary Uncensored Data
- Jan-Mar 2009
- M:F=1192 (62%):732 (38%) :
 - Missing 216
- Age: 63.5± 16.4 years (n=1888)

CVC by Site: 2009 Survey



Duration of Insertion in 2009 Survey

Duration of Inserted Central Lines



Mean = 3.72
Std. Dev. = 3.809
N = 2,125

		Duration of Line
N	Valid	2125
	Missing	15
Mean		3.72
Median		3.00
Std. Deviation		3.809

Infected Lines Analysis

- 67 episodes of CABSI till Q4 2012
 - 6 episodes (9.0%) had 2 organisms isolated
- Age: Mean 60.9 SD 16.6
- Time to Infection in Days

DEVICE DAYS		
N	Valid	67
	Missing	0
Mean		7.72
Median		7.00
Std. Deviation		3.029
Range		18(2-20)

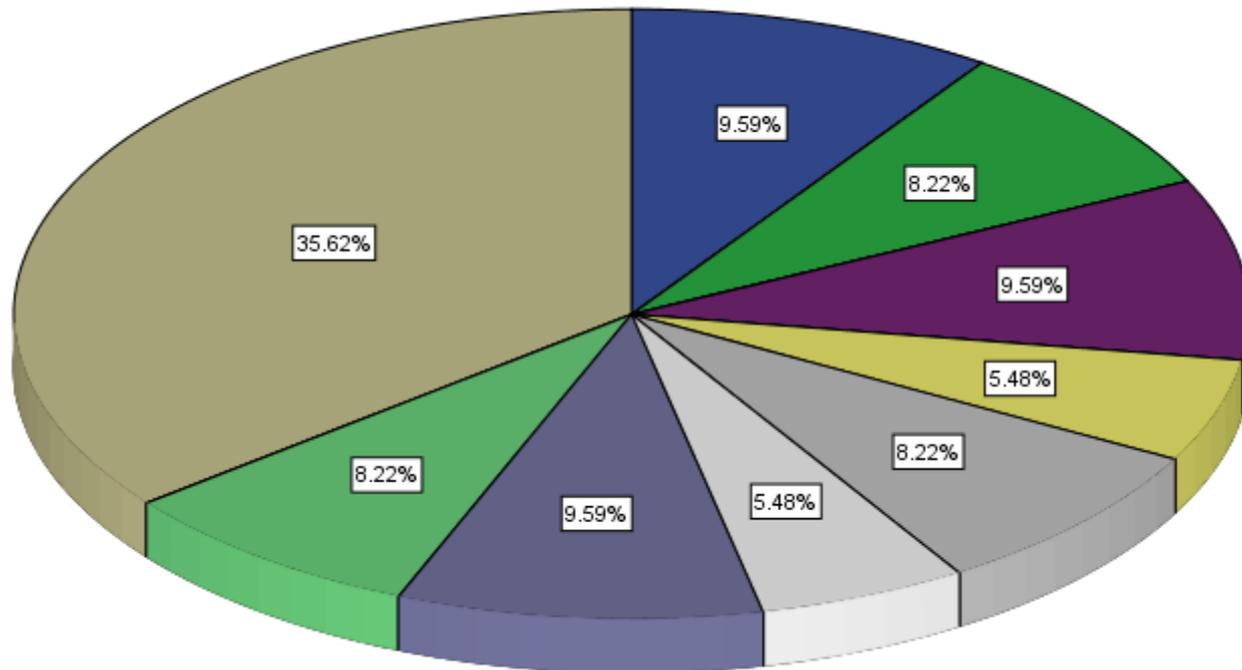
Infecting Organisms

Till Q4 2012

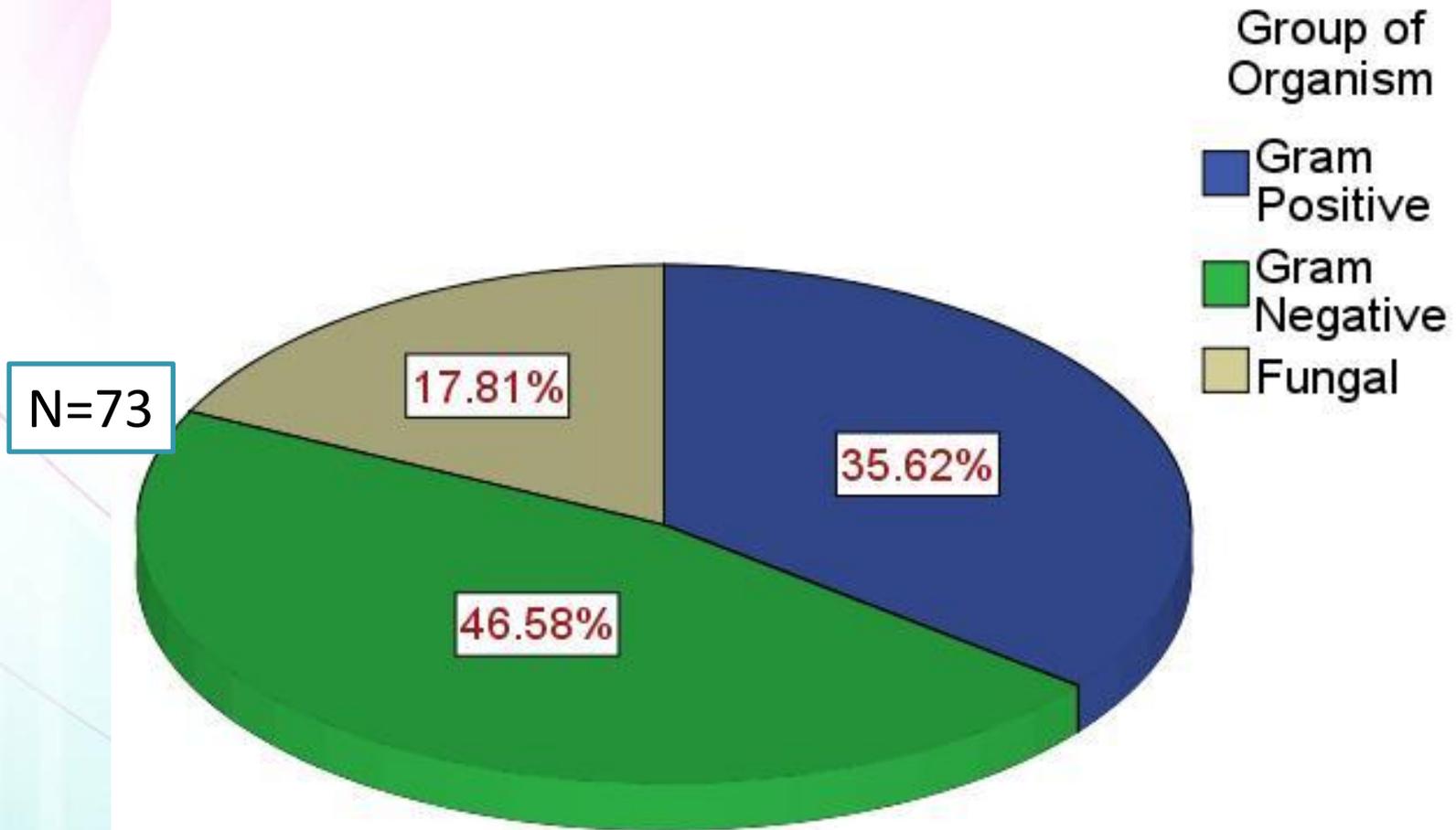
Organism

- MRSA
- MSCNS
- Bacillus sp
- Other Gram +ve
- Kleb pneumoniae
- Other Gram Negative
- Candida albicans
- Candida - non-albicans
- Other

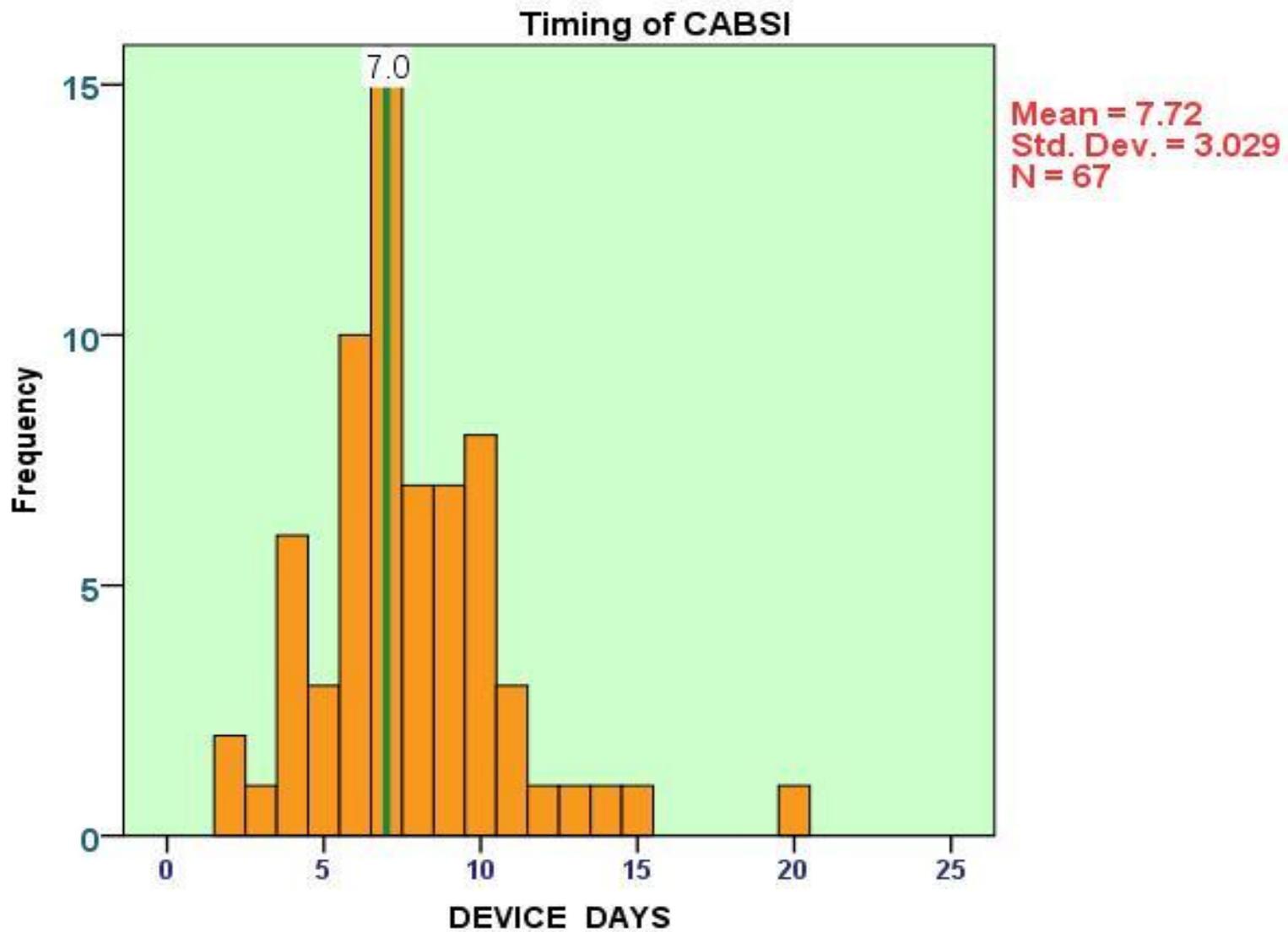
N=73



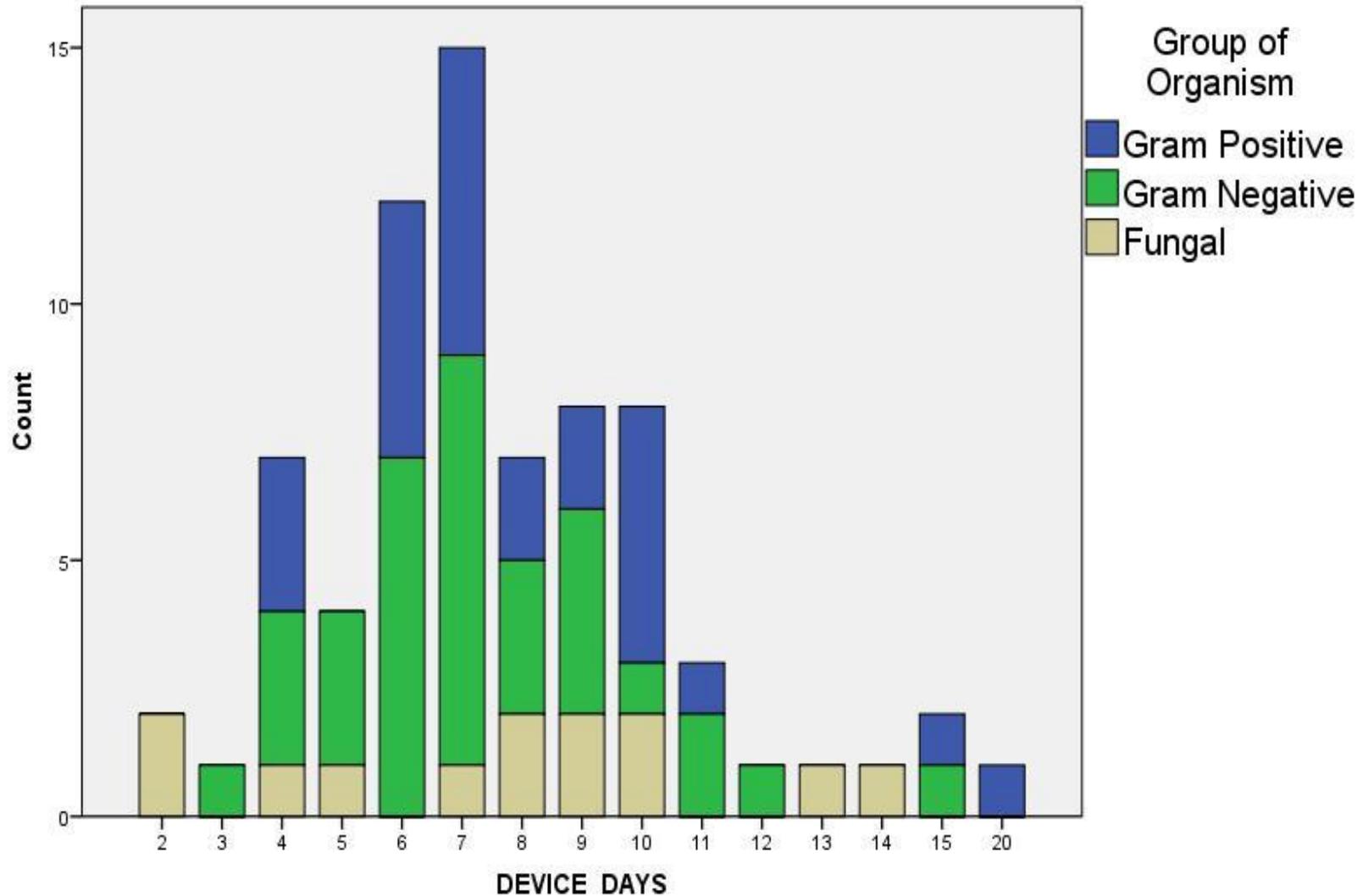
Organisms by Group



Timing of Infection



Organism by Time



Infected Catheters by Sites

Q1 2009 to Q4 2012

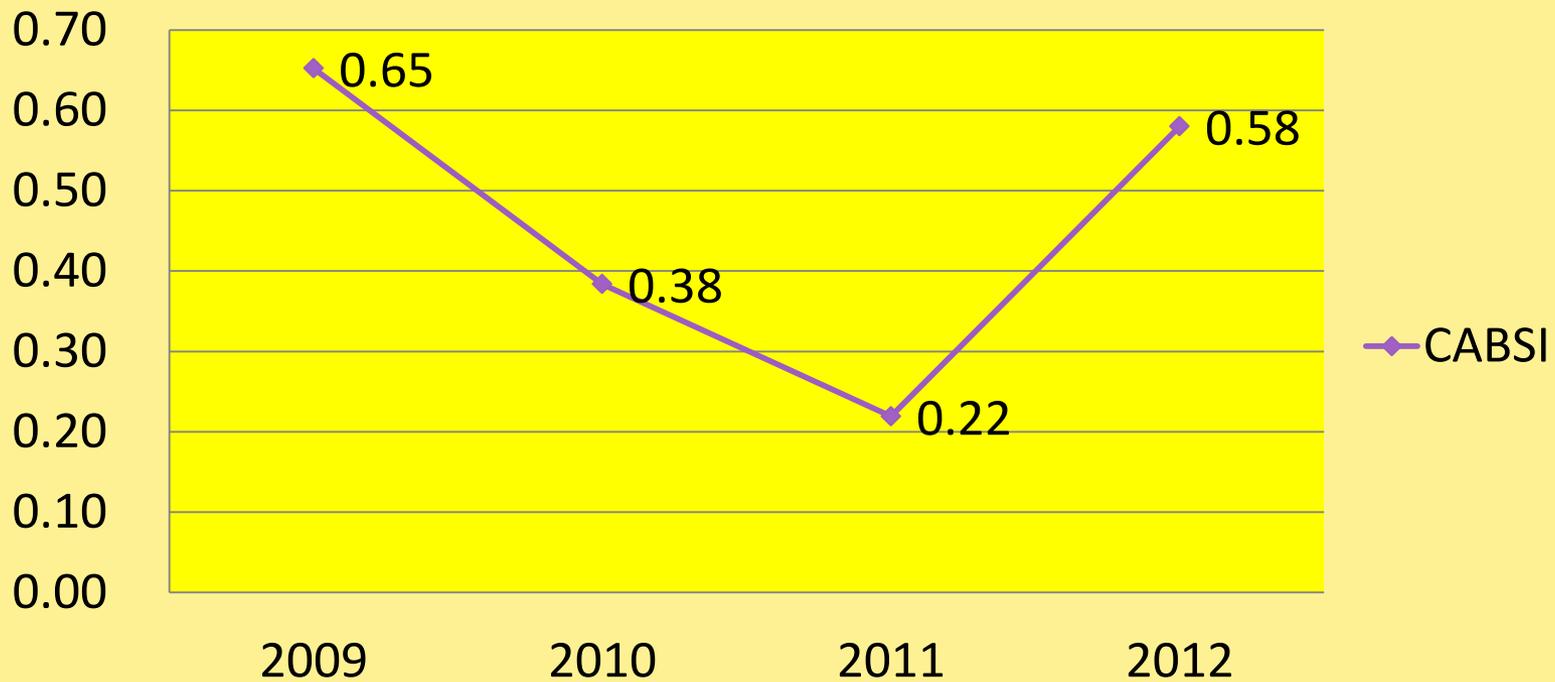
Site	total	%	Utilization at Q1_2009
Femoral	31	46.3%	40.4%
Jugular	28	41.8%	49.4%
Subclavian	8	11.9%	9.8%
total	67	100%	100%

* Subclavian lines are not exempted from CABSI.

CABSI Rate 2009 – 2012

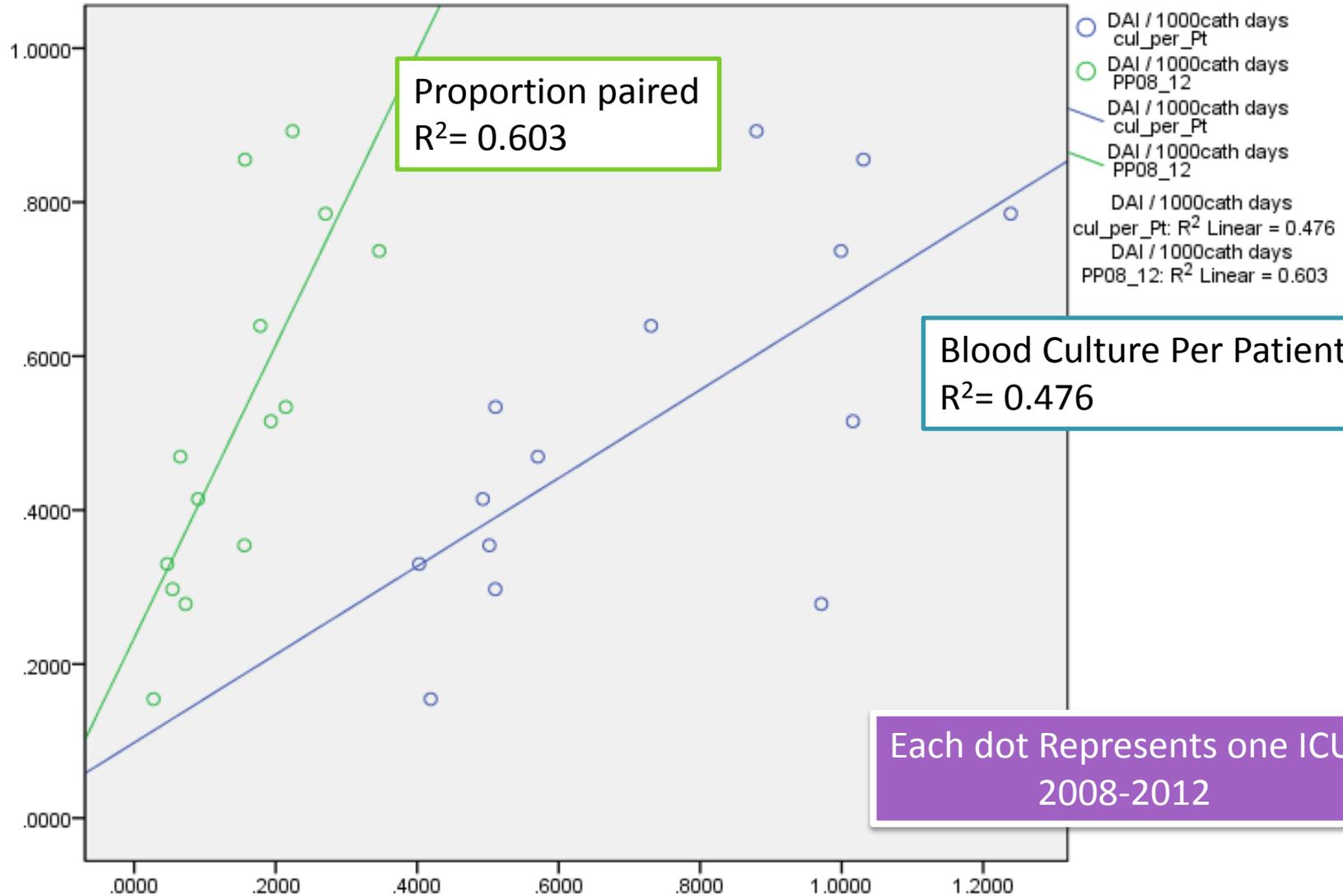
Total Catheter Days: 130157
Total Infections: 67
CABSI/1000 Cath Days: 0.514

CABSI



- Paired Blood Culture Percentage
 - Patient with more than 1 blood culture taken
 - Sample time within 24 hours
- Blood Culture per Patient
 - Total Number of Blood Culture / No. of Patients

CABSI Rate with Practice of Blood Culture



CABSI Rate Q4 2008 to Q4 2012

Relationship with Blood Culture Practice:

Correlation Coefficients: with

	Year	Average Number of Blood Culture per Patient	Paired Blood Culture Percentage
Average CABSI Rate Q4-08 to Q4-12	Pearson	0.690	0.655
	p	0.006	0.011
	Spearman	0.679	0.837
	p	0.008	0.000

How about if we correlate year by year?

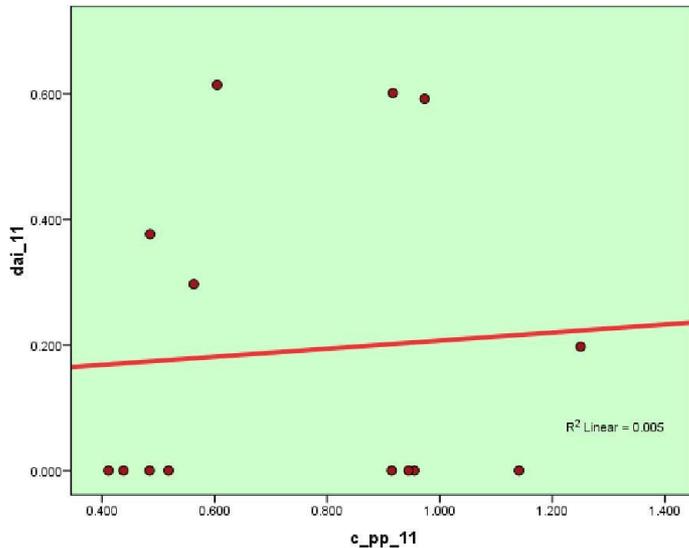
- The average rate of Paired culture for an ICU might be habitual and might not change over a long time
- But we cannot identify a standard rate of Blood Culture to Benchmark!
- Try looking at yearly rate of CABSI, which might be more sensitive to change in practice.

Recent Year: 2011

Each dot Represents one ICU in one year

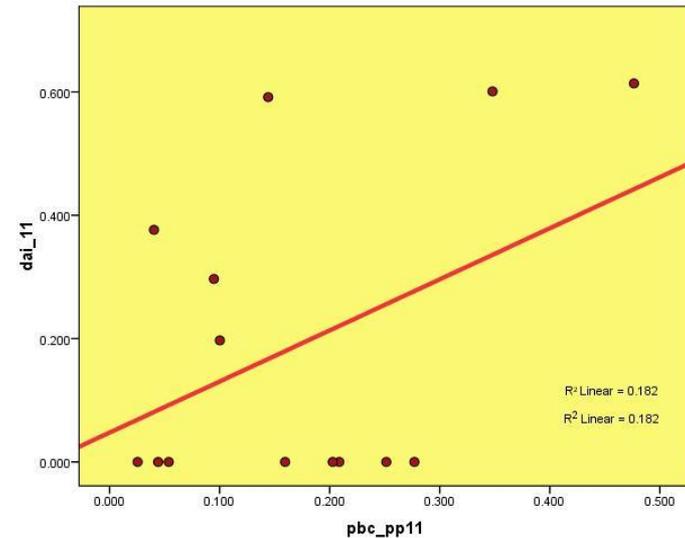
$R^2 = 0.005$

CABSI Rate 2011



Number of Blood Culture Per Patient admitted ICU

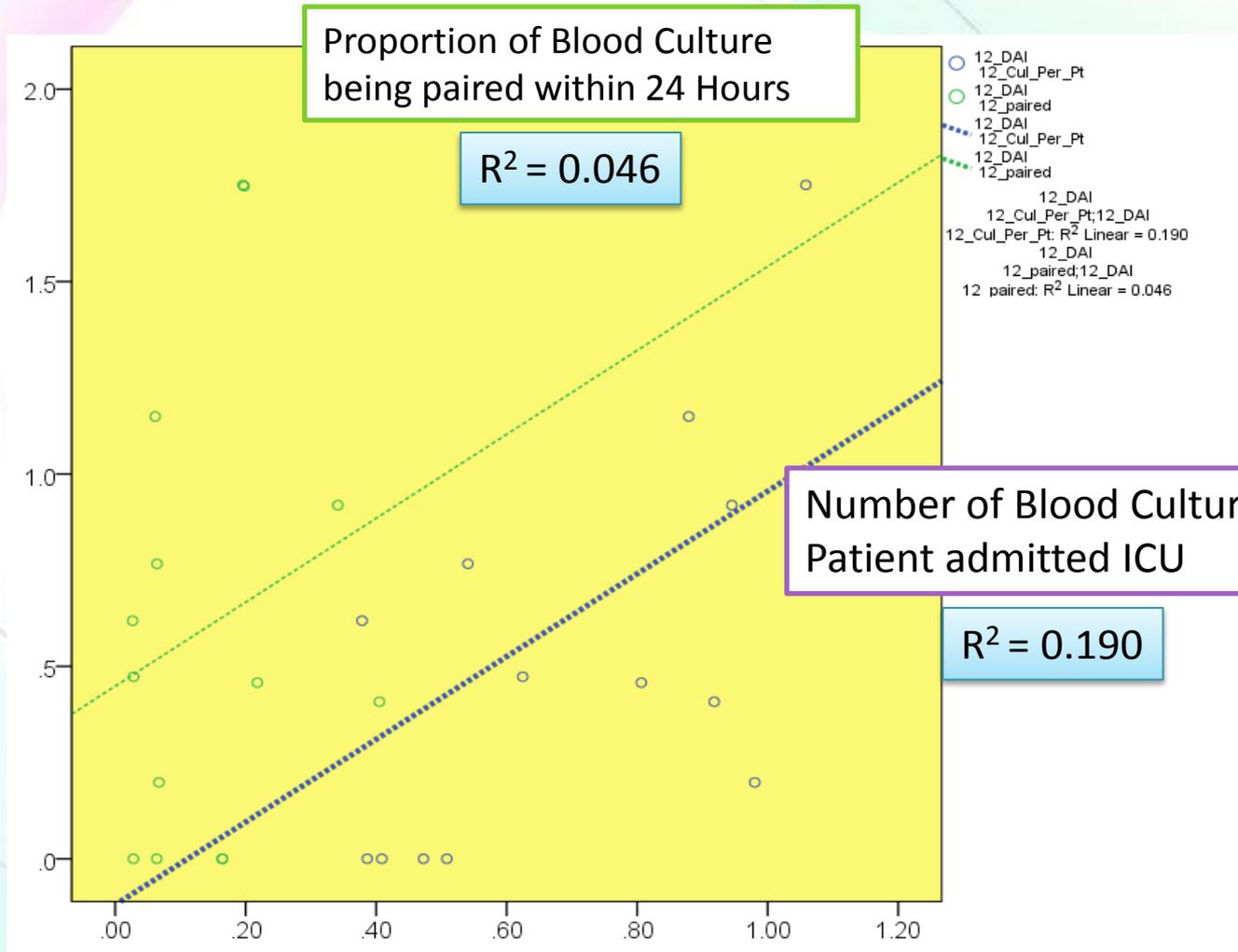
$R^2 = 0.182$



Proportion of Blood Culture being paired within 24 Hours

Last Year: 2012

CABSI Rate 2012



Each dot Represents one ICU in one year

Recent Years: 2011& 2012

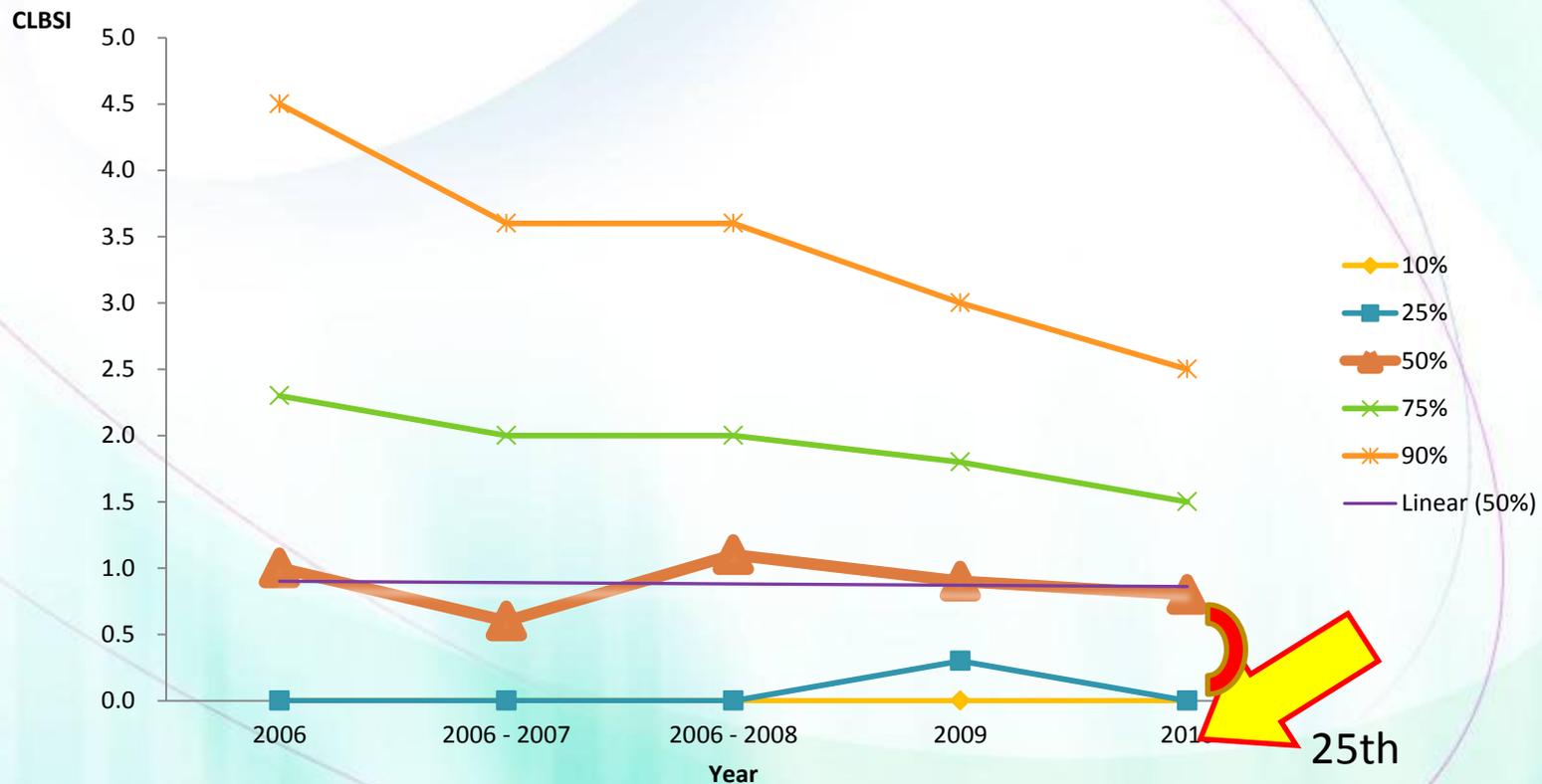
	Year		Average Number of Blood Culture per Patient	Paired Blood Culture Percentage
Hospital CABSI Rate 2011	2011	Pearson	0.072	0.427
		P	0.808	0.128
		Spearman	0.195	0.236
		p	0.505	0.416
Hospital CABSI Rate 2012	2012	Pearson	0.435	0.215
		P	0.120	0.460
		Spearman	0.504	0.189
		p	0.66	0.518

Is the Association Spurious? It might have disappeared!

Shooting at a Moving Target

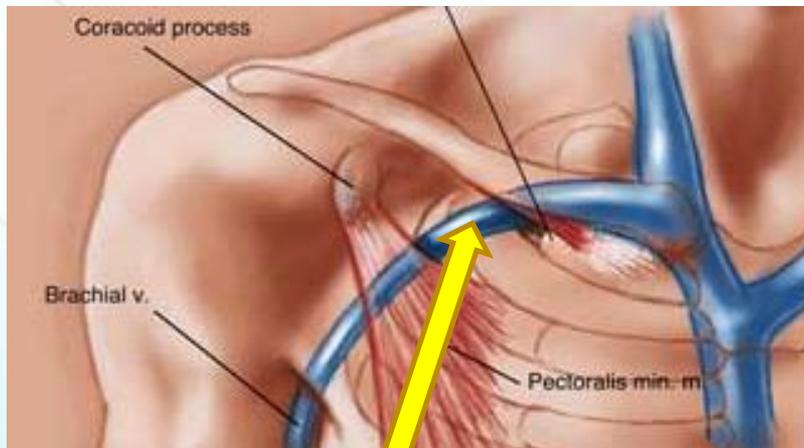
- The NHSN CABSIS Benchmark has changed with time.

Medical/surgical - All others/ > 15 beds



Impact of Ultrasound Guided Central Line Insertion

- Ultrasound Guided Central Lines Insertion is becoming more and more common in ICU
- Our Experience: Short Learning Curve
- Other Alternative Sites:
 - Axillary Vein,
 - Peripherally Inserted Central Catheters (PICC)



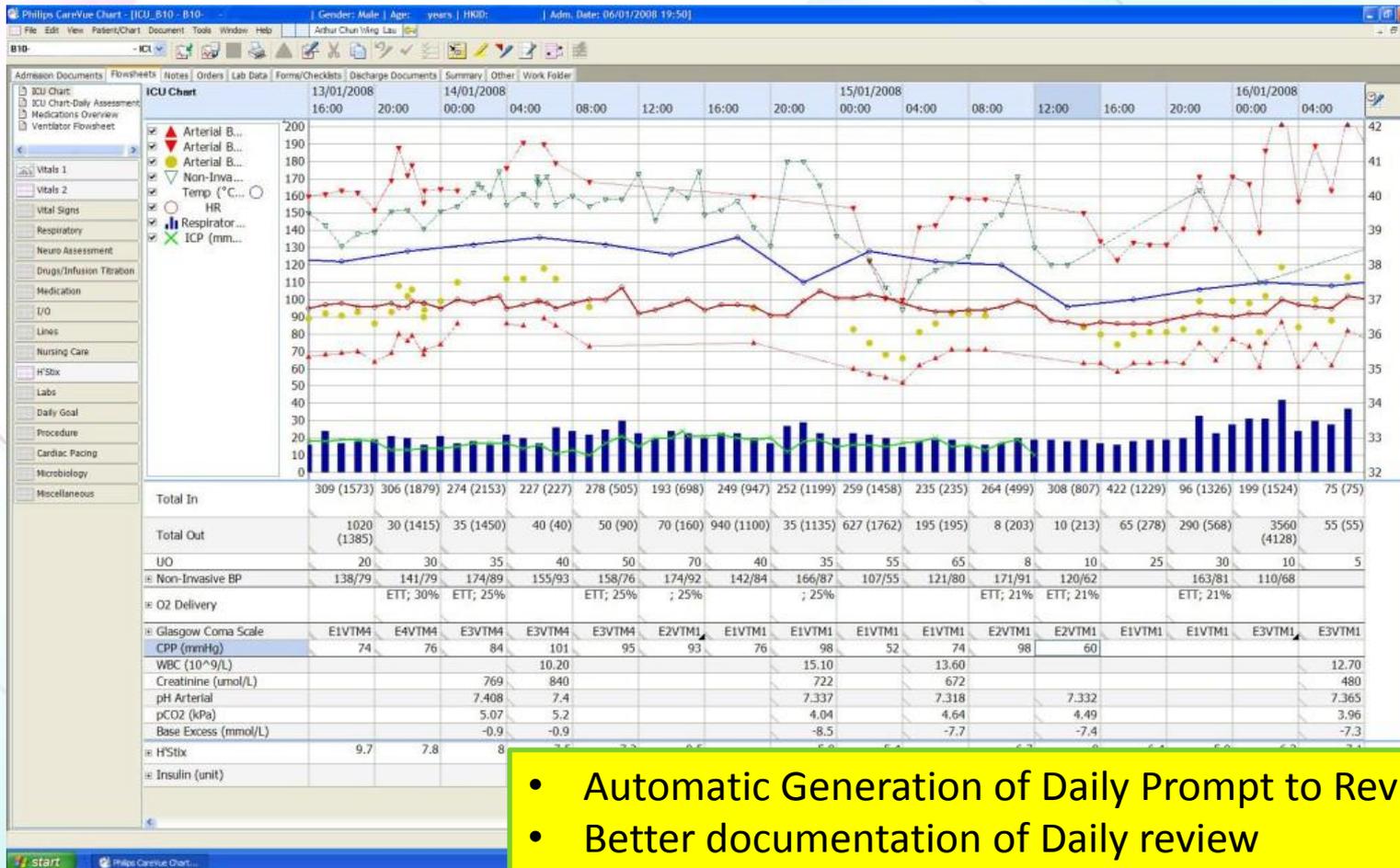
Ultrasound Guided Central Line Insertion

Hind *et al* *BMJ* 2003

- **Meta-Analysis 18 Trials 1646 Subjects**
- Much Lower mechanical complications
 - Feasible for high risk patients: Bleeding risk, Risk of Pneumothorax
- Higher Success Rate at first attempt for Jugular Lines

	OR	95% CI	OR	95% CI	OR	95% CI
	Jugular		Subclavian		Femoral	
Failure of Placement	0.14	0.04-0.33	0.14	0.04-0.57	0.29	0.07-1.21
Failure at First Attempt	0.59	0.39-0.88				
Complications	0.43	0.22-0.87	0.10	0.01-0.71		

We are now moving towards Digitalized Clinical Information Systems in ICUs



- Automatic Generation of Daily Prompt to Review
- Better documentation of Daily review
- Allows Compliance check of daily review

Summary

- A territory wide project to survey and control CABSI is feasible
 - The Result so far is better than average
 - May need more stringent control measures to achieve a zero rate of infection.
- Need to see whether the association of CABSI with Practice of Blood Culture taking being true or spurious
- The Change in practice in ICUs, such as use of Ultrasound, on CABSI rate needs to be analyzed.
- Compliance check in a digitalized system and audit of the local practice seems necessary

Acknowledgment

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- All Participating ICUs
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 - ICU Doctors and Nurses
- HA Head Office
 - Members, COC ICU
 - Mr Leo Cheung
- All Infection Control Officers
- Research Nurses AICU QMH

THANK YOU!