Target Zero

Eliminating Central Line Associated Blood Stream Infections: The Journey to Zero

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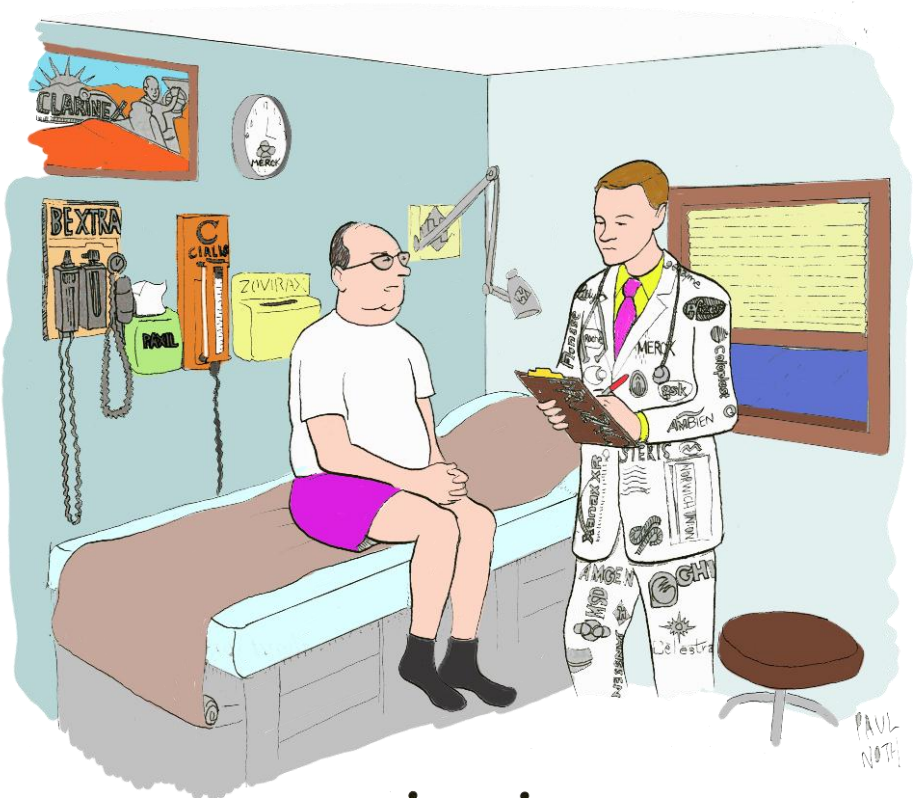
Disclosures

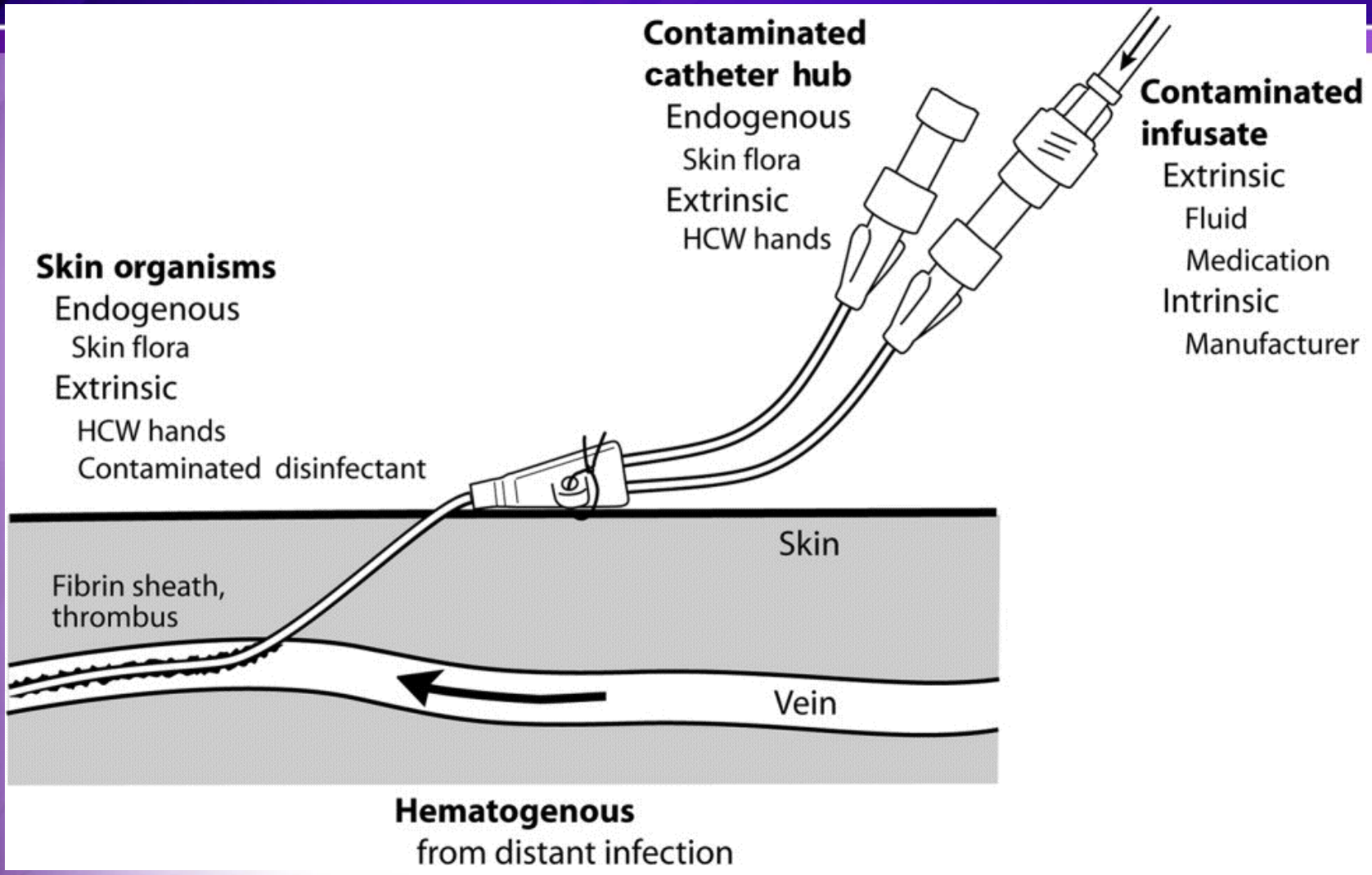
- Consultant-Michigan Hospital Association Keystone Center
- Consultant-Missouri Center for Patient Safety
- Contracted consultant for Advancing Nursing, LLC
  - Consulting services:
    - Edward Lifesciences
    - Sage Products
    - Excelsior Medical (sponsorship for this presentation)



Session Objectives

- Identify risk factors for the development of central line associated blood stream
- Define key care practices based on the evidence that can reduce and sustain zero BSI’s
- Discuss strategies to work on a safety culture as care practices are changed.
- Discuss strategies to sustain the gains and promote continuous improvement

Potential Sources of Infection for Intravascular Devices



Clin Infect Dis 2002;34:1232-42

CUSP & CLABSI Interventions

Adaptive /Cultural

CUSP

1. Educate on the Science of Safety
2. Identify Defects (Staff Safety Assessment)
3. Senior Executive Partnership
4. Learn from Defects
5. Implement Teamwork & Communication Tools

Technical

CLABSI

1. Insertion
2. Maintenance
   a. Assessment & Site Care
   b. Tubing, Injection Ports, Catheter Entry

Blood Stream Infection (BSI) Insertion Prevention Bundle (IB)

- Remove/Avoid unnecessary lines (IA)
- Hand hygiene (IB)
- Maximal barrier (IB)
- Chlorhexadine for skin prep (IA)
- Avoid femoral lines (IA)

Education & Culture of Safety

CDC. Prevention of Catheter Infection: MMWR 2002;51 (No. RR-10):[1-29]
http://www.guideline.gov/summary/summary.aspx?doc_id=13395&nbr=006806&string=CLA-BSI –Oct 2008
www.ihi.org
Grady NP, et al. CDC Guidelines for the Prevention of Intravascular Catheter-Related Infections, 2011. www.cdc.gov
http://www.onthecuspstophai.org/

Catheter-Related Blood Stream Infection Checklist

- If there is an observed violation of infection control practices, line placement should stop immediately and the violation should be corrected. If a correction is required, mark yes to question #6.
- If there are any concerns, the bedside nurse should contact the Senior Resident directly.

1. Today's date/time _____ / _____ / _____ _____
   month day year start time
2. Location: ☐ SICU ☐ MICU ☐ CCU ☐ Livingston
3. Procedure: ☐ New li
4. Is the procedure:

It is More than Just the Checklist!!!

dure follow ☐ ☐

Was a sterile dressing applied to the site ☐ ☐

6. **Was a correction required to ensure compliance with infection control practices?** **Yes** ☐ **No** ☐
7. **Time procedure was completed:** _____
   STOP TIME

Please return completed form to the designated location in your ICU.

Berenholtz et al, 2004; Tsuchida et al, 2007

Maintenance Bundle

- Dressing Care
- Accessing the line
- Administration set changes
- Assessing each day if line is necessary

- Additional strategies:
  - CHG Baths
  - CHG Dressings
  - Disinfection caps
  - Antibiotic impregnated catheters

Dressing Care

- Use a transparent or gauze dressing to cover site (IA)
- Change transparent dressing and perform site care with a CHG based antiseptic every 7 days (IB) or more frequent if the dressing is soiled, loose, or damp; (IB)
- Change gauze dressings every 2 days or more frequent if the dressing is loose, soiled or damp (II)
- Use a chlorhexidine-impregnated sponge dressing for temporary short-term catheters in patients older than 2 months of age if the CLABSI rate is not ↓ despite EBP (1B)
- No recommendation is made for other types of chlorhexidine dressings.

SHEA and IDSA, Infection Control and Hospital Epidemiology Oct 2008
Prevention of Catheter Infection: MMWR 2002;51 (No. RR-10):[1-29]
Salgado CD, et al. Infect Control and Hosp Epidemi, 2007;28:684-688
Grady NP, et al. CDC Guidelines for the Prevention of Intravascular Catheter-Related Infections, 2011. www.cdc.gov

Care After Insertion

- Scrubbing the access port with an appropriate antiseptic (chlorhexidine, povidone iodine, an iodophor, or 70% alcohol) and accessing the port only with sterile devices.(IA)
- 3 sec, 10 sec & 15 sec scrub showed no difference in reducing bacterial load (Simmons S, et al. Crit Care Nurs Q, 2011;34:31-35)
- Replace administration sets not used for blood, blood products or lipids at intervals not longer than 96 hours (IA)
- Replace tubing used to administer blood, blood products, or fat emulsions within 24 hours of initiating the infusion. (IB)
- When needleless system used, consider a split septum valve versus a mechanical valve.(II)
- Change the needleless components at least as frequently as the administration set. (II)
- Use a 2% chlorhexidine wash for daily skin cleansing to reduce CRBSI (II)

Additional Strategies to Eliminate CLABSI

- CHG Baths
- CHG Dressings
- Disinfection caps

St. Joseph Mercy Hospital
Central Line Associated Blood Stream Infection Rate: Infections per 1000 Line Days

	2004	2005	2006	2007	2008	2009	2010	2011	2012
ICUs Ann Arbor	7.6	2.12	1.11	1.13	0.9	0.70	0.84	0.78	0.0
#	**31** (Mar-Dec)	**13**	**8**	**8**	**7**	**5**	**6**	**6**	**0**
Interventions	**Insertion Bundle**				**CHG baths**	**Maintenance bundle**	**Biopatch**	**IPA impregnated disinfection cap**	

No CLABSI in 12 months in all 3 ICUs.
Only 1 CLABSI in past 18 months in 3 ICUs

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Technical

CLABSI

1. Insertion
2. Maintenance
   a. Assessment & Site Care
   b. Tubing, Injection Ports, Catheter Entry

Learning from Defects

- What happened?
- Why did it happen (system lenses) ?
- What could you do to reduce risk ?
- How do you know risk was reduced ?
  - Create policy / process / procedure
  - Ensure staff know policy
  - Evaluate if policy is used correctly

Each CLABSI is considered a DEFECT, and you must learn from each one

Learning from Defects

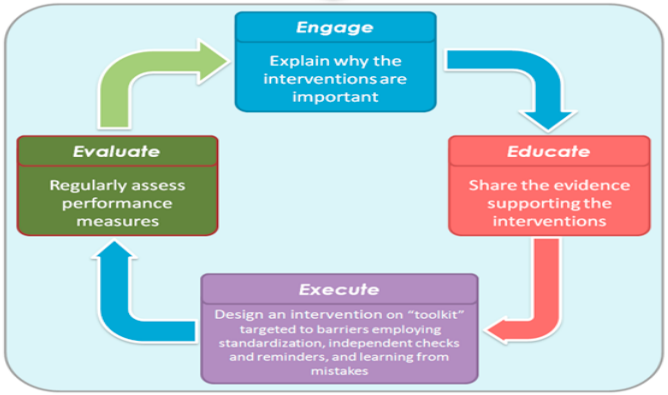
- **What happened?**
  - 3 CLABSIs
- **Why did it happen (system lenses) ?**
  - Reviewed compliance with insertion and maintenance bundles on each of these patients----done well
  - Common theme in patients: significantly immunocompromised
- **What could you do to reduce risk ?**
  - Review of literature and found research on using CHG bathing to reduce CLABSI
  - Implement CHG bathing as an intervention to reduce CLABSI in the ICU
- **How do you know risk was reduced ?**
  - Auditing compliance with new bathing procedure and bathing supply use
  - Monitor for reduction in CLABSI rate

Translating Evidence into Practice (Johns Hopkins model)

Translating Evidence into Practice

- Envision the problem within the larger health care system
- Engage Collaborative multi-disciplinary teams centrally (stages 1,2 & 3) and locally (stage 4)

1. Summarize the Evidence
   - Identify Interventions associated with improved outcomes
   - Select interventions with the largest benefits and lowest barriers to use
   - Convert interventions to behaviors
2. Identify local barriers to implementation: understand the process and context of work
   - Observe staff performing the interventions
   - "Walk the process" to identify defects in each step of intervention implementation
   - Enlist all stakeholders to share concerns and identify potential gains / losses associated with intervention implementation
3. Measure Performance
   - Select Measures (Process and/or outcome)
   - Develop and pilot test measures
   - Measure Baseline Performance
4. Ensure all patients receive the interventions



4 E's: Implementation Framework

	Frontline Staff	Team Leaders	Senior Executives
Engage	Ask, *how does this make the world a better place?* – Help staff understand the preventable harm – Share stories about patients affected – Estimate number of patients harmed – Develop a business case		
Educate	*What do I need to do?* – Convert evidence into behaviors; – evaluate awareness and agreement		
Execute	*How can I do it?* – Listen to resisters – Standardize, create independent checks – Make it easy to do the right thing – Learn from mistakes		
Evaluate	*How do I know we made a difference?* – *Define measures* – *Regularly assess measures*		

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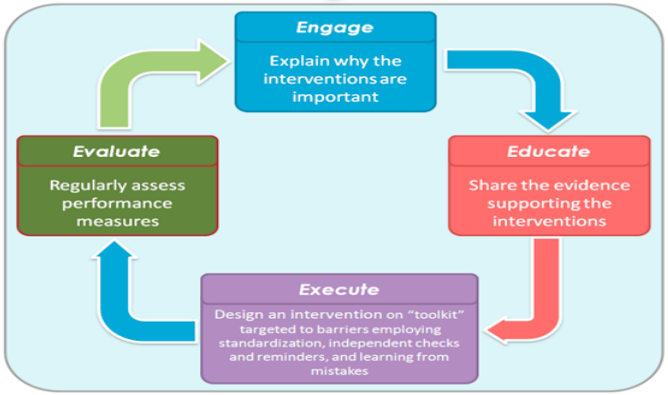


Summarize the Evidence

- Traditional bathing with basins
- CHG bathing

Traditional Bathing

Spreading Microorganism

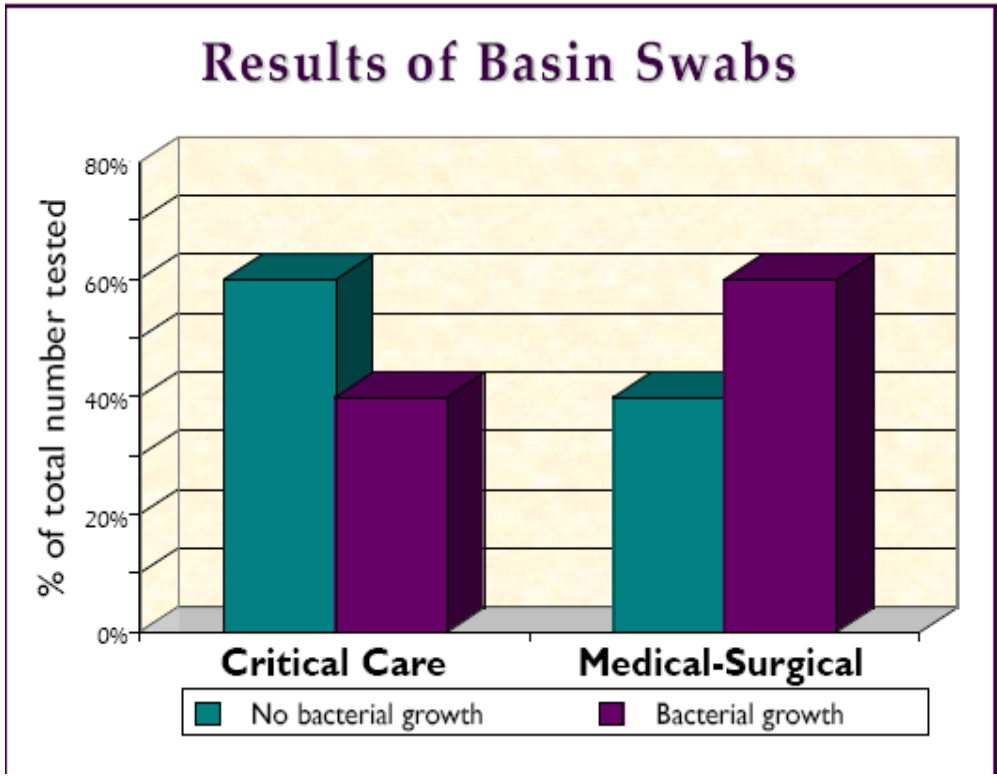
Bath Water: A Source of Health-Care Associated Microbiological Contamination

- Compared normal bath water with chlorhexidine bath water on 3 wards
- Without Chlorhexidine: All samples + for bacterial growth (14/23 > 10^5 cfu/ml)
- With Chlorhexidine: 5/32 grew bacteria with growth 240 to 1900 cfu/ml
- Gloved hands/bathing: objects touch grew significant numbers of bacteria

Shannon RJ. et.al. Journal of Health Care, Compliance & Safety Control. 1999;3(4):180-184

Dry Basin Study: Level of Bacterial Growth

- 25 basins (children's hospital)
- 52% + for organisms
- 62% of those + had multiple organism present
- > multiple organisms present in the CCU



O'Flynn, J. APIC Meeting June 2007
Kosair children's Hospital

Waterborne Infections Study

- Hospital tap water is the most overlooked source for Health-care associated pathogens
- 29 evidenced-based studies present solid evidence of waterborne Health-care associated infections
- Transmission occurs via drinking, bathing, items rinsed with tap water and contaminated environmental surfaces

Anaissie E. et. al. Arch Int Med. 2002; 162:1483-92

Waterborne Infections Study

- Conservative estimates suggest significant morbidity and mortality from waterborne pathogens
- Immunocompromised patients are at the greatest risk
- Recommendation I: Minimize patient exposure to hospital tap water via bottled water and pre-packaged, disposable bathing sponges

Anaissie E. et. al. Arch Int Med. 2002; 162:1483-92

Guidelines for Environmental Infection Control

- Practice hand hygiene to prevent the hand transfer of water borne pathogens and use barrier precautions (Cat 1A)
- Eliminate contaminated water or fluid environmental reservoirs wherever possible (Cat 1B)
- Clean and disinfect sinks & wash basins on a regular basis using an EPA-registered product (Cat 2)
- Evaluate for possible environmental sources ie colonization after use of tap water in patient care (Cat 1B)

CDC. MMWR June 6th, 2003, 52;No. RR-10

P. aeruginosa Outbreak: Tap Water the Culprit

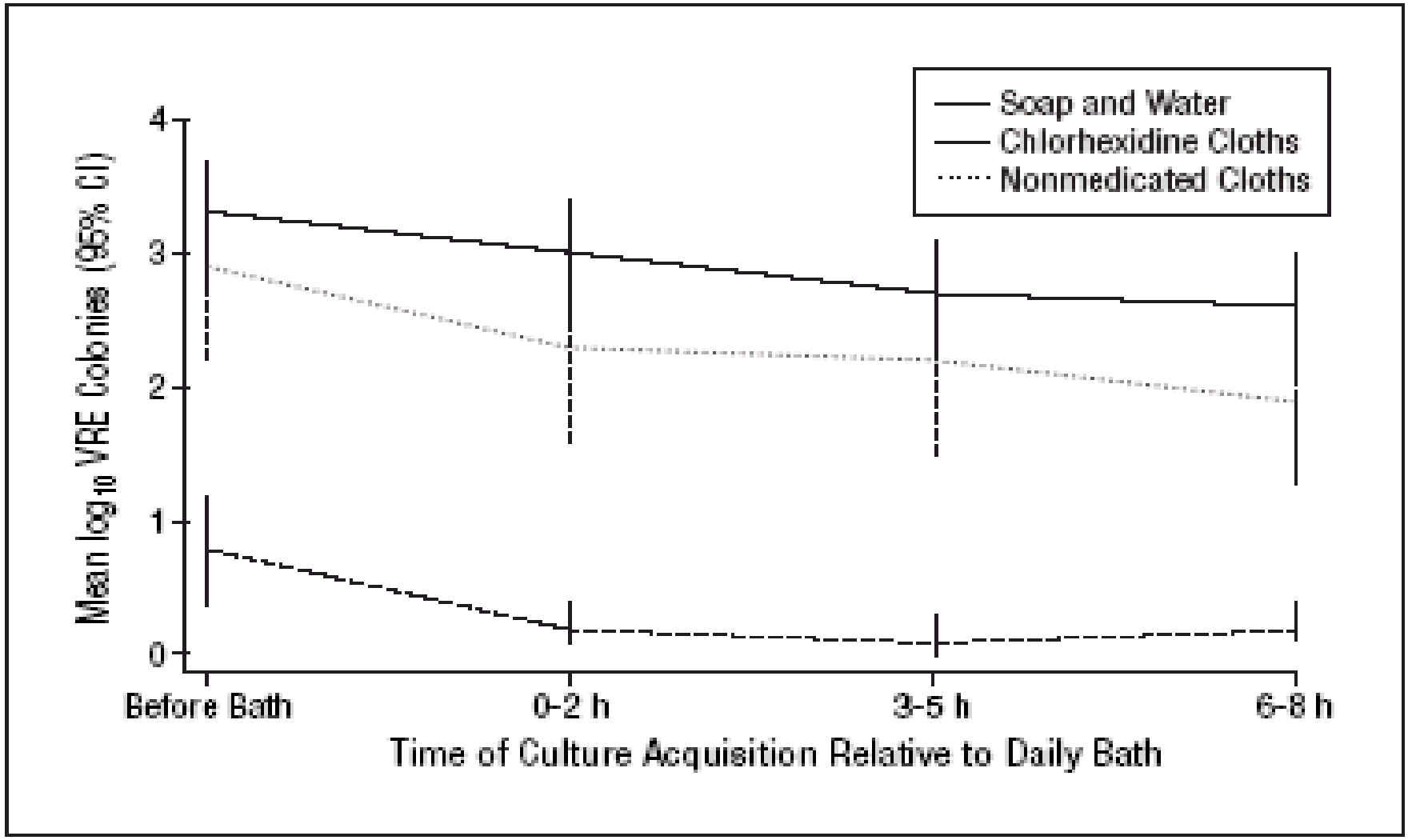
- Single genotype
- 59 burn patients (hydrotherapy tank)
- 19 adult ICU patients (wash basins & water taps)
- 13/31 ICU patients (tap water)
- 5/14 surgical unit patients (tap water)

Trautmann M, et al. Infect Control.2005;33:S41Y9.

Bathing with CHG Basinless Cloths

- Prospective sequential group single arm clinical trial
- 1787 patients bathed
  - Period 1: soap & water
  - Period 2: CHG cloth cleansing
  - Period 3: non-medicated basinless cloth bath

Veron MO et al. Archives Internal Med 2006;166:306-312



26 colonization's with VRE per 1000 patients days vs. 9 colonization's per 1000 patient days with CHG bath

Table 3. Percentage of Environmental Surface Culture Specimens That Were Positive for Vancomycin-Resistant Enterococci During the 3 Study Periods*

Site Where Culture Specimen Was Obtained	Study Period		
	Soap and Water (n = 311)	Chlorhexidine (n = 307)†	Nonmedicated Cloth (n = 140)‡
Table	10 (3)	4 (1)	13 (9)
Bed rail	33 (11)	13 (4)	23 (16)
Pull sheet	63 (20)	17 (6)	43 (31)

CHG Bathing Reduces CLA-BSI's (II)

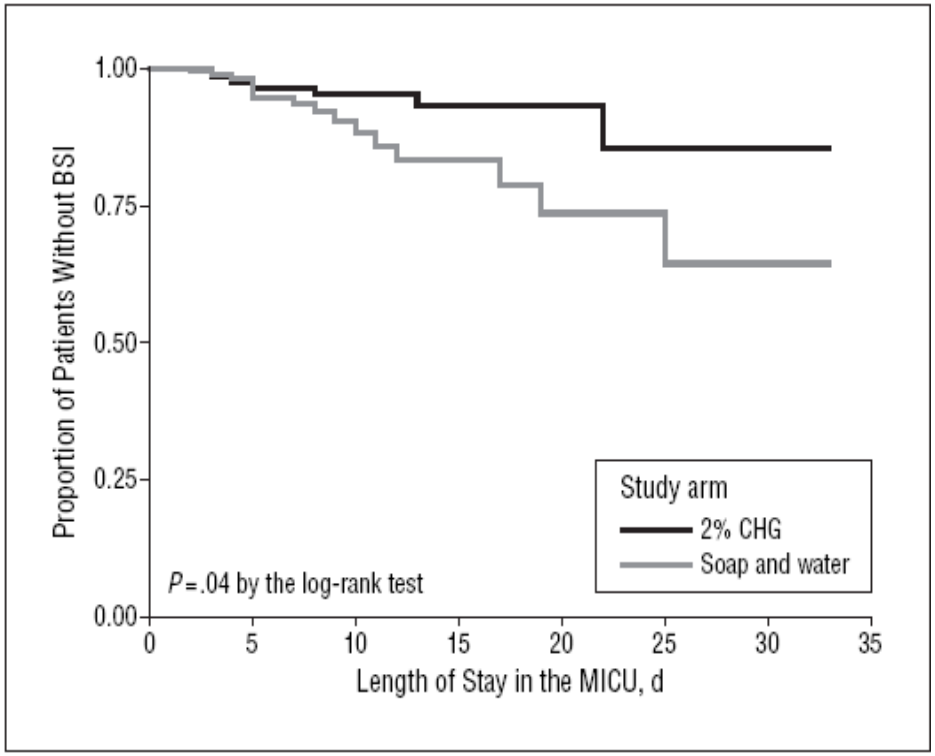
- 52 week, 2 arm, cross-over design clinical trial
- 22 bed MICU with 11 beds in 2 geographically separate areas
- 836 MICU patients
  - 1st 28 weeks: 1 hospital randomize to bathe with (commercially available 2%) CHG cloths & the other unit bathe with soap & water
  - 2 week wash out period
  - 2nd 24 weeks: methods were crossed over
- Measured: Primary outcomes: incidence of CA-BSI's & clinical sepsis. Secondary: other infections

Bleasdale SC. et al. Arch Internal Med, 2007;167(19):2073-2079

CHG Bathing Reduces CLA-BSI's (II)

Results:

- CHG arm were significantly less likely to acquire a CA-BSI 4.1 vs. 10.4 infections per 1000 patient days
- Benefit against primary CA-BSI's by CHG cleansing after 5 days in MICU
- No difference in clinical sepsis or other infections



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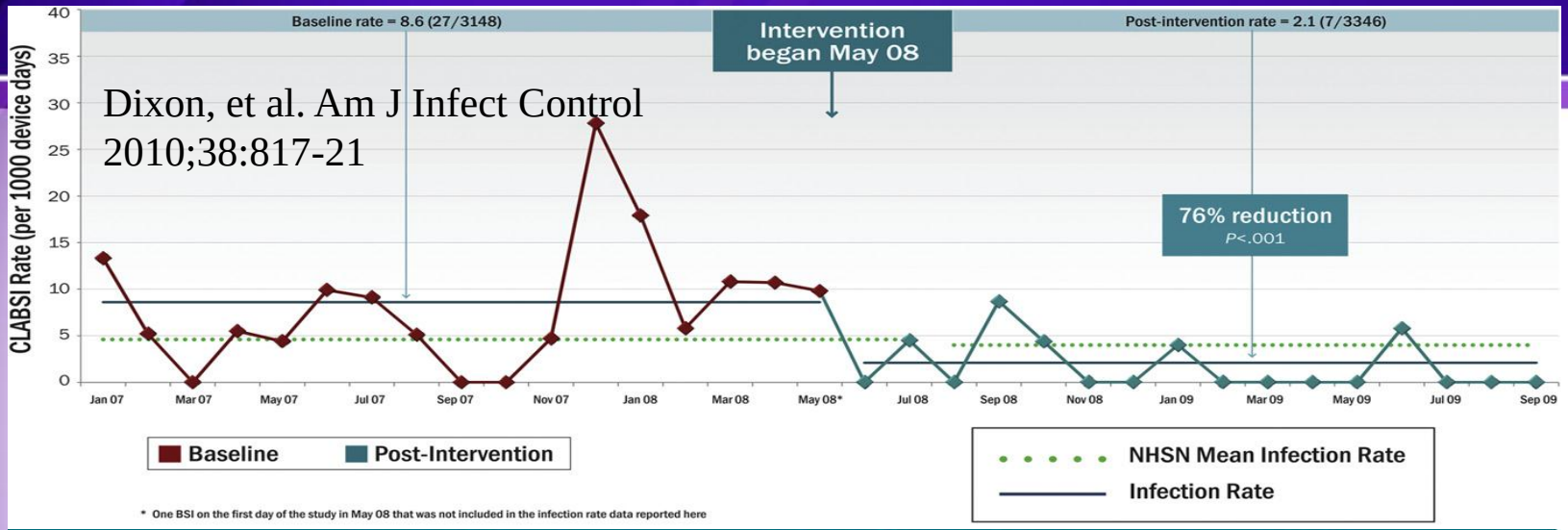
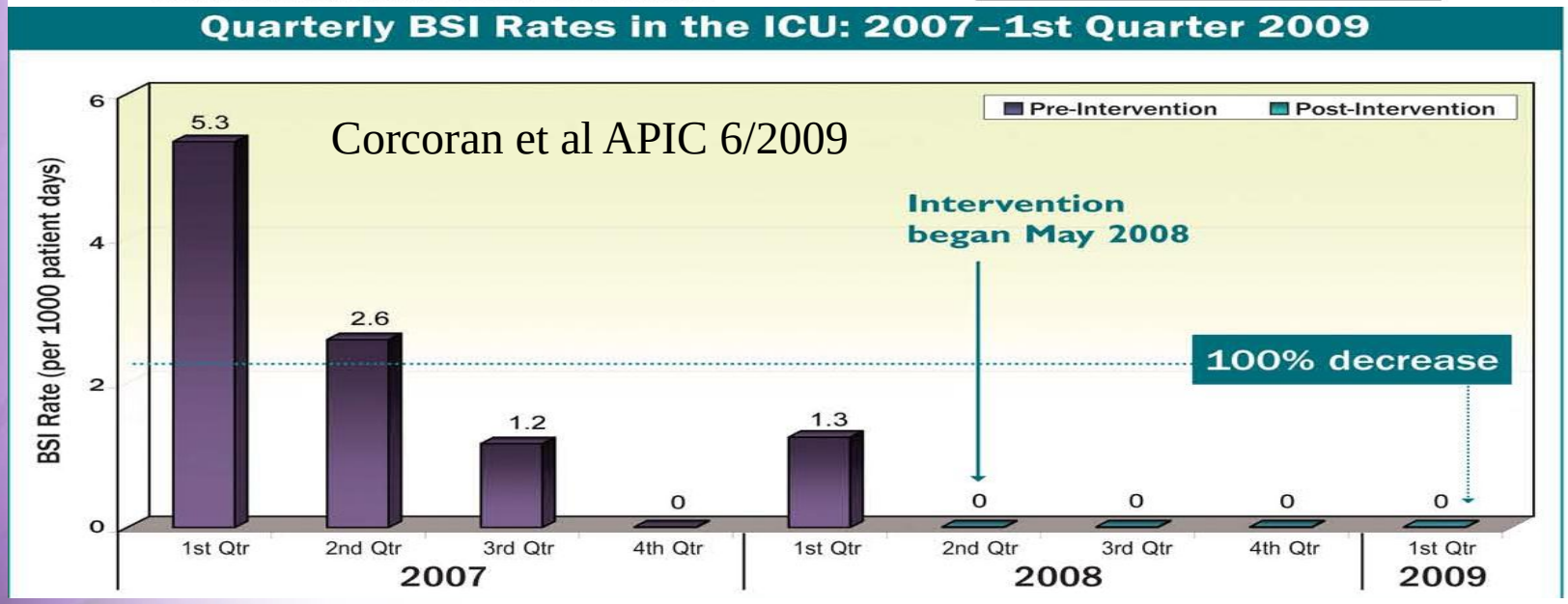
CHG Bathing: Pre & Post Intervention





Effect of Daily Chlorhexidine bathing On Hospital-Acquired Infection

Climo, M et al, NEJM February 4, 2013

- Multicenter, cluster-randomized, nonblinded crossover trial
- Evaluate the effect of daily bathing with CHG impregnated washcloths on acquisition of MDROs and the incidence of hospital acquired CLABSI
- 9 ICUs and bone marrow transplants units in 6 hospitals; 7727 patients
- Randomly assigned to bathe patients either with no-rinse 2% CHG impregnated washcloths or with nonantimicrobial washcloths for 6 months
- Measured incidence rates of acquisition of MDROs and the rates of hospital acquired CLABSI were compared between the two periods

Effect of Daily Chlorhexidine bathing On Hospital-Acquired Infection

Climo, M et al, NEJM February 4, 2013

Results:

- Overall rate of MDRO acquisition was 5.1 cases per 1000 patient days with CHG bathing versus 6.60 cases per 1000 patient days with nonantimicrobial washcloths (p=0.03) **23% reduction**
- CLABSI rate was 4.78/1000 patient days with CHG bathing versus 6.60/1000 patient days with nonantimicrobial washcloths (p=0.007) **28% reduction**
- No serious skin reactions were noted during either study period

Strategies for Bathing to Reduce Source Control & Improve Skin Defense

Basin Bath

- ↑ transmission of organisms
- ↑ time & effort
- ↑ # of supplies
- Harmful soaps
- Rough washcloths
- Cold/tepid water
- Scrubbing technique

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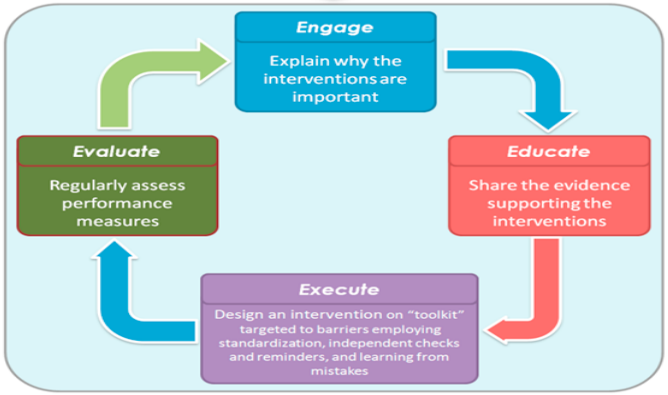
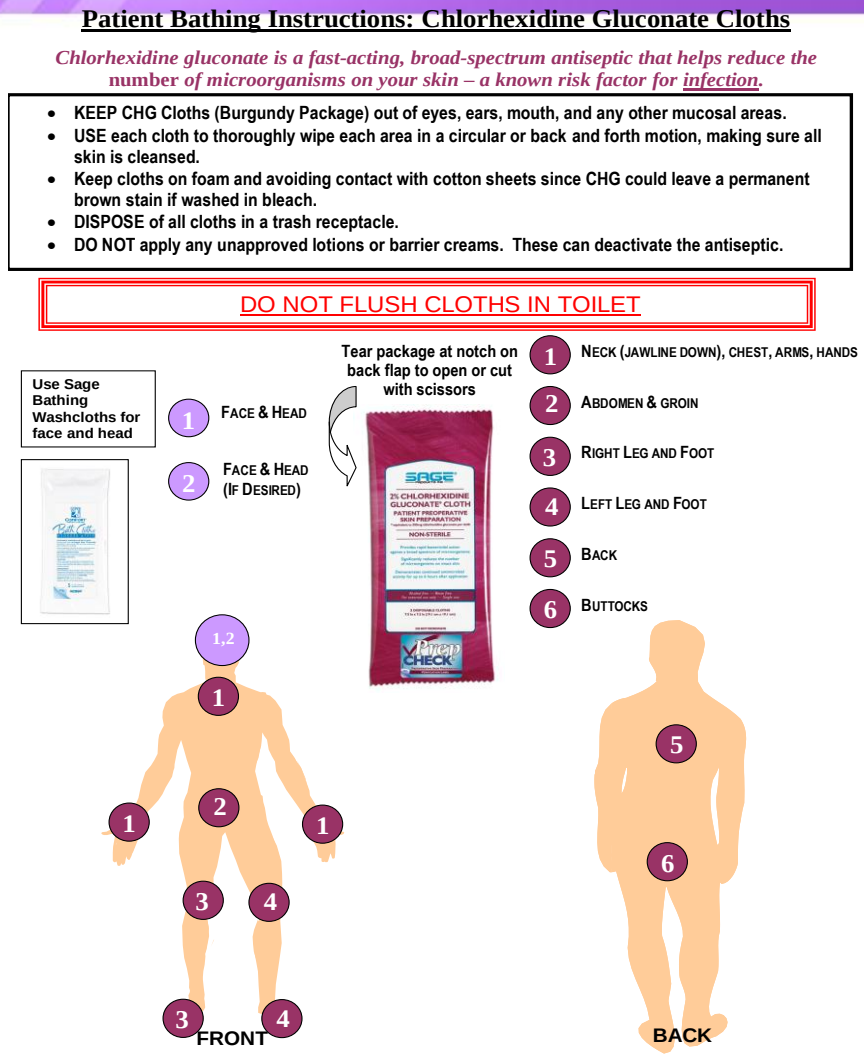


Implementation

- Define new bathing process



Implementation

- Identify barriers
  - Cost
  - Like it the current way
  - Compatibility with other skin care products
  - Are they getting clean?
- Make it easy to do the right thing
  - Equipment
  - Signs at bedside

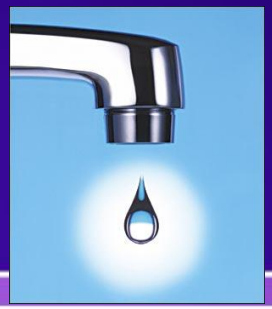
Warmer

- Packages will be used from the warmer
  - Use any baths that are flashing “Take First”
  - In no “Take First”, then select any package
- If the “Take First” is blinking, the wipes should be used in the next 24 hours or be removed from the warmer
- CHG wipes can stay in the warmer up to XX hours
  - At that time they should be removed from the warmer, allowed to cool and then can be rewarmed
- Warmers are equipped with a protective device that turns the unit off if it overheats
- Warmers will be maintained with 3 inch clearance on each side and one inch on the top

Compatible Products

- Comfort Shield Incontinence Wipes—Has a built in skin barrier
- Keri Lotion
- Aquaphor Original Formula Ointment
- Lubriderm Dry Skin Care Lotion
- Eucerin Original Lotion
- Vaseline 100% Pure Petroleum Jelly
- Alcohol foams or rubs
- Keri Oil
- Pro Shield Ointment
- Pro Shield spray

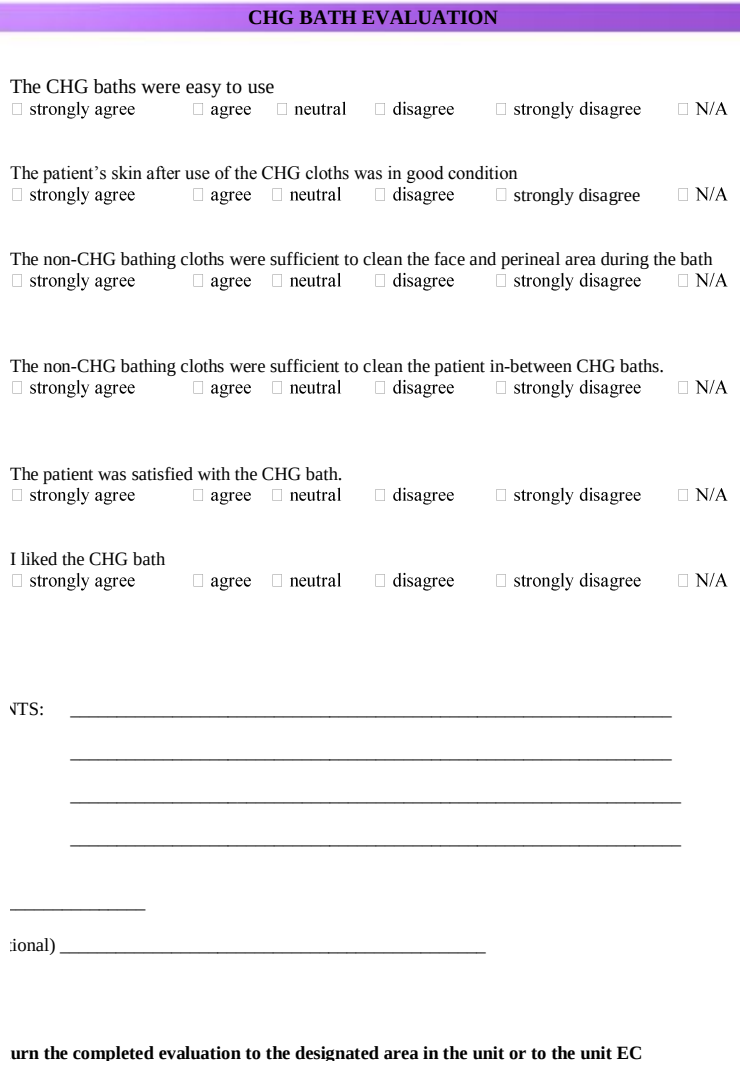
Incompatible Products



- Any other brand name lotion/bath products (ex: Bath and Body Works, Suave, etc)
- Dial Soap: Can be used just prior to CHG bath, but not again within 24 hours—Do not reuse basins
- All deodorants
- Tap Water

Measure Performance and Ensure all Patients get the Evidence

- Ease of Use
- Impact on CLABSI
  - Rate decreased from 0.9/1000 catheter days to 0.7/1000 catheter days
- Audit use of product
- Discuss issues with compliance at team meetings
- Unit nursing and medical leadership accountability



CHG BATH EVALUATION

The CHG baths were easy to use
☐ strongly agree ☐ agree ☐ neutral ☐ disagree ☐ strongly disagree ☐ N/A

The patient's skin after use of the CHG cloths was in good condition
☐ strongly agree ☐ agree ☐ neutral ☐ disagree ☐ strongly disagree ☐ N/A

The non-CHG bathing cloths were sufficient to clean the face and perineal area during the bath
☐ strongly agree ☐ agree ☐ neutral ☐ disagree ☐ strongly disagree ☐ N/A

The non-CHG bathing cloths were sufficient to clean the patient in-between CHG baths.
☐ strongly agree ☐ agree ☐ neutral ☐ disagree ☐ strongly disagree ☐ N/A

The patient was satisfied with the CHG bath.
☐ strongly agree ☐ agree ☐ neutral ☐ disagree ☐ strongly disagree ☐ N/A

I liked the CHG bath
☐ strongly agree ☐ agree ☐ neutral ☐ disagree ☐ strongly disagree ☐ N/A

NTS: _____

_____

_____

_____

_____

ional) _____

urn the completed evaluation to the designated area in the unit or to the unit EC

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Interventions	**Insertion Bundle**				**CHG baths**	**Maintenance bundle**	**Biopatch**	**IPA impregnated disinfection cap**	

No CLABSI in 12 months in all 3 ICUs.
Only 1 CLABSI in past 18 months in 3 ICUs

CHG-Impregnated Sponges for Prevention of CLA-BSI (IB)

Methodology:

- Multi-center, randomized controlled trial
- 7 ICUs participated
- Included all patients who required arterial or central venous catheter for 48 hours or longer
- Use of CHG dsg vs standard dsg
- Already using maximal barrier precautions, try and use subclavian site for central line, use alcohol/povidone-iodine prep solution (not CHG)
- Looked at 3 day vs. seven day dressing change (but changed when dsg was loose, soiled or damp in all groups)

Timsit JF, et al. JAMA 2009;301:1231-1241

CHG-Impregnated Sponges for Prevention of CLABSI (IB)

Results:

- 1636 patients (3778 catheters, 28,931 catheter days)
- Median duration of catheter insertions 6 days (4-10)
- Use of CHG dressing decreased the CLA-BSI rate from:
  - 1.3 per 1000 catheter days to 0.4 per 1000 catheter days
- Use of CHG dressing not associated with greater resistance of bacteria in skin samples at removal
- 8 episodes of contact dermatitis with patch (817 pts)
- No difference in site colonization between dressing changes at 3 days or 7 days

Prevented 1 Major CLA-BSI per 117 Catheters

Timsit JF, et al. JAMA 2009;301:1231-1241

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Learn from a Defect

- **Select a specific defect**
  - What happened?
  - Why did it happen (system lenses) ?
  - What could you do to reduce risk ?
  - How do you know risk was reduced ?

Each CLABSI is considered a DEFECT, and we tried to learn from each one

Implementing Disinfection Caps

- Identified defect:
  - inconsistency of ‘scrubbing the hub’
- Literature/evidence review of potential strategies
- Recognizing impact of human factors
- Presentation to value analysis team
- 4 E’s
  - Engage
  - Educate
  - Execute
  - Evaluate
    - Measurement
    - Continual learning and refinement

4 E's: Implementation Framework Implementing Disinfection Caps

	Frontline Staff	Team Leaders	Senior Executives
Engage	Ask, *how does this make the world a better place?* – CLABSI rate not at zero; preventable harm – Business case		
Educate	*What do I need to do?* – Review all of the evidence and that even with scrubbing the hub—not all bugs gone – Convert evidence into behaviors: put caps on all ports during admission process		
Execute	*How can I do it?* – Listen to resisters: why won't this work – Standardize: all possible ports—peripheral and central lines – create independent checks: discuss at huddles, techs rounding – Make it easy to do the right thing: stock bedsides and next to pyxis, add cap with flush – Learn from mistakes: investigate when compliance not achieved		
Evaluate	*How do I know we made a difference?* – *Define measures: compliance >75%* – *Regularly assess measures: monthly*		

Continuous passive disinfection of catheter hubs prevents contamination and bloodstream infection

Wright, M et al American Journal of Infection Control, Jan, 2013

- 3-phased, multifacility, quasi-experimental study
- 3 periods
  - Period 1 (P1) baseline: standard disinfection of hub before accessing
  - Period 2 (P2): passive disinfection cap on all central lines
  - Period 3 (P3): standard disinfection of hub before accessing
- Assessed intraluminal contamination in PICC patients only, with PICC lines in > 5days
- CAUTI used as a concurrent control
- Results:
  - Period 1: 12.7% contamination
  - Period 2: 6 .8 % contamination*
  - Period 2: CLA-BSI rates ↓ from 2.24 to .49 per 1000 cath days in 4months (p = 0.08)
  - 4th hospital CLA-BSI rates ↓ from 1.35 to .30 per 1000 cath days in 5 months

*P=0.05

Wrights MC et al. SHEA, 2011

Continuous passive disinfection of catheter hubs prevents contamination and bloodstream infection

Wright, M et al American Journal of Infection Control, Jan, 2013

Results:

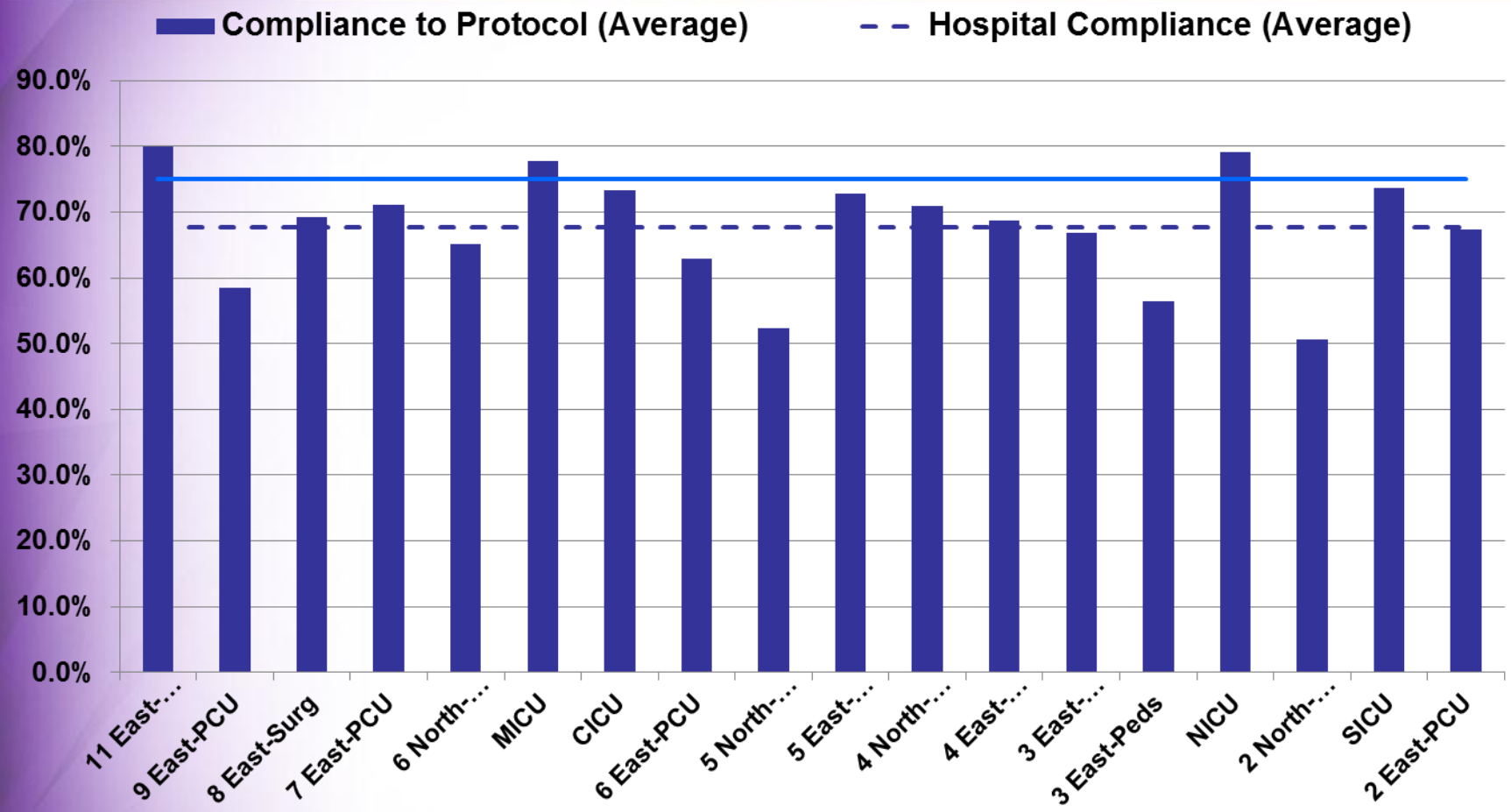
- Contamination:
  - P1: 12.7%
  - P2: 5.
  - P3: 1
- CLABSI r
  - P1: 1.4
  - P2: 0.6
  - P3: 1.3
- CAUTI rates
  - P1: 1.42 /1000 urinary catheter days
  - P2: 1.41/1000 urinary catheter days
  - P3: 1.04/1000 urinary catheter days (p= 0.03)

Use of a cap resulted in a 40% reduction in CLA-BSI's

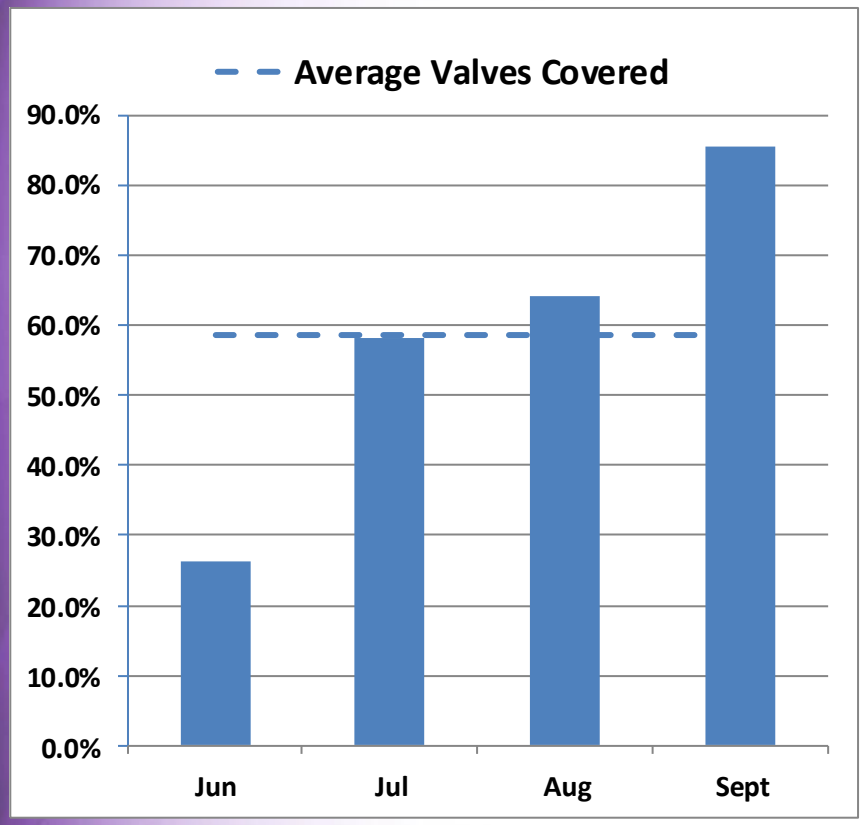
*P=0.05

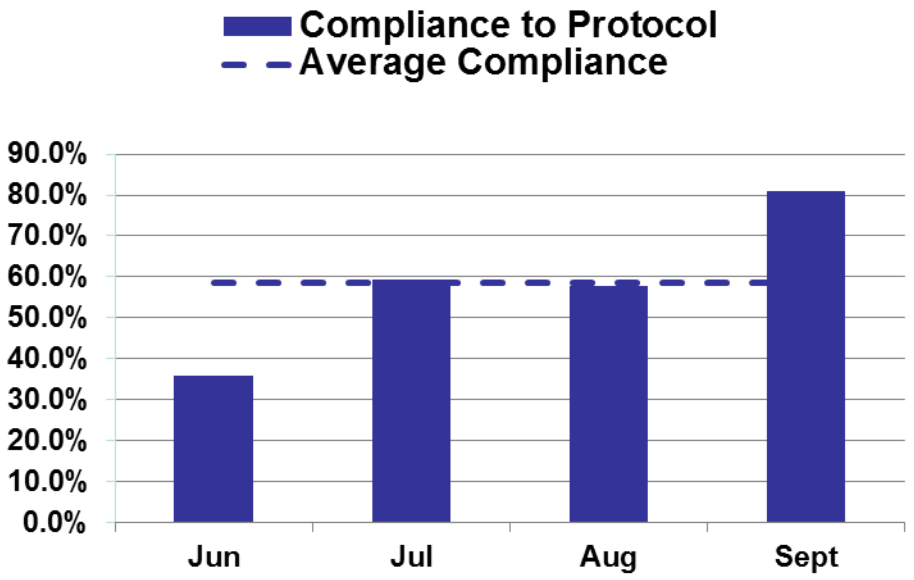
Wrights MC et al. SHEA, 2011

Measurement
September, 2012



9E PCU


Average Valves Covered
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
Jun
Jul
Aug
Sept


Compliance to Protocol
Average Compliance
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
Jun
Jul
Aug
Sept

Drilling down to the details

Room #	Patients - If just one **patient in room, please indicate with letter A. If more than one in room,, continue to indicate with B, C, etc….**	**Total Unused Valves (# of valves not connected to cont/intermit IV. Include peripheral, central**, continuous lines)	**Total Unused Valves w/disinfection caps - (# of disinfection caps placed on available valves)**	**% of disinfection caps being used**	**Compliant?**		**Comments**
					YES- 100% of available valves covered with DCs - Indicate with an X	**NO- Less than 100% of available valves covered** with DC - Indicate with an x	
901	A	2	0	0.0%		X	PIV-Ysites not covered
903	A	1	1	100.0%	X		PIV-Saline lk
904	A	1	1	100.0%	X		PIV-Saline lk
906	A	1	1	100.0%	X		PIV-Saline lk
907	A	1	1	100.0%	X		PIV-Saline lk
908	A	1	1	100.0%	X		PIV-Saline lk
909	A	1	1	100.0%	X		PIV-Saline lk
911	A	1	1	100.0%	X		PIV-Saline lk
912	A	1	1	100.0%	X		Saline lk
913	A	1	1	100.0%	X		Saline lk
914	A	3	3	100.0%	X		PIV-Ysites
915	A	5	5	100.0%	X		PICC
916	A	3	2	66.7%		X	PIV-Ysite
917	A	1	1	100.0%	X		IJ
918	A	2	1	50.0%		X	1 Saline lk
919	A	2	2	100.0%	X		PICC-double lumen
920	A	3	3	100.0%	X		All Ysites covered
921	A	1	0	0.0%		X	Saline lk
922	A	1	0	0.0%		X	Saline lk
923	A	1	1	100.0%	X		Saline lk
924	A	3	3	100.0%	X		All Ysites covered
925	A	1	1	100.0%	X		Saline lk
927	A	1	1	100.0%	X		PICC
928	A	1	1	100.0%	X		Saline lk
931	A	1	1	100.0%	X		Saline lk
932	A	1	1	100.0%	X		Saline lk

Continuous Improvement and Sustainability

- Measurement
- Learn from defects
- Review literature
- Tests of change

What to Measure and How Often?

- Outcome measure: CLABSI rate
- Process measures:
  - Insertion bundle
    - Collect the Insertion checklist and summarize compliance. Share data at team meetings and with all staff
    - Deal real time with compliance issues----chain of command
  - Maintenance bundle
    - Audit line care: dressings dated and time; occlusive; CHG dressing as appropriate
- Frequency of measurement

Process Measures

- Insertion bundle
  - % of line insertions with 100% complaince
- Maintenance bundle
  - Dressing intact
  - Dressing time and dated
  - Dressing changed per policy-every 7 days or if soiled or loose
  - Central line anchored properly
  - CHG dressing for femoral or PICC lines
  - All open ports capped with disinfection caps
  - All IV tubing changed per policy (every 96 hours, except for TPN, lipids or propofol)

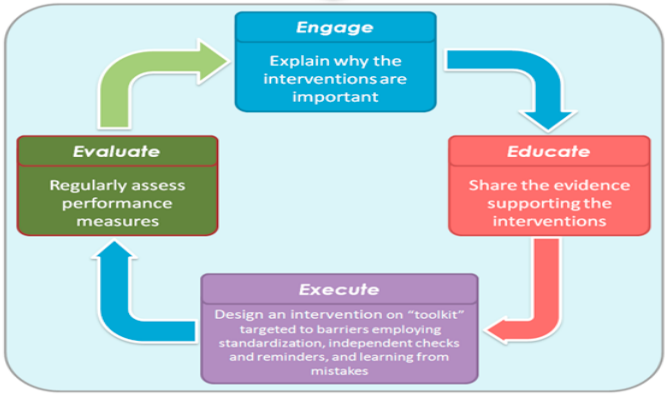
Spread to the Non-ICU

Translating Evidence into Practice (Johns Hopkins model)

Translating Evidence into Practice

- Envision the problem within the larger health care system
- Engage Collaborative multi-disciplinary teams centrally (stages 1,2 & 3) and locally (stage 4)

1. Summarize the Evidence
   - Identify Interventions associated with improved outcomes
   - Select interventions with the largest benefits and lowest barriers to use
   - Convert interventions to behaviors
2. Identify local barriers to implementation: understand the process and context of work
   - Observe staff performing the interventions
   - "Walk the process" to identify defects in each step of intervention implementation
   - Enlist all stakeholders to share concerns and identify potential gains / losses associated with intervention implementation
3. Measure Performance
   - Select Measures (Process and/or outcome)
   - Develop and pilot test measures
   - Measure Baseline Performance
4. Ensure all patients receive the interventions



4 E's: Implementation Framework

	Frontline Staff	Team Leaders	Senior Executives
Engage	Ask, *how does this make the world a better place?* – Help staff understand the preventable harm – Share stories about patients affected – Estimate number of patients harmed – Develop a business case		
CLABSI	➢ **Overview with staff that CLABSI are preventable** ➢ **Review incidence of CLABSI** ➢ **Share CLABSI rate with team and frontline staff** ➢ **Share stories of individual cases of CLABSI from this hospital or unit and impact on the patient**	➢ **Also share P4P measures**	➢ **Define business case— what does each CLABSI cost our institution**

Pre-Procedure Briefing Steps:

- Make introductions
- Discuss patient information and procedure
- Agree upon a time for line insertion
- Review best practice for line insertion(if necessary)
- Nurse defines their role to physician: provide equipment, monitor patient, provide patient comfort, observe for compliance with best practices and STOP procedure if sterile process compromised
  - Establish communication expectation for sterile procedure breaks
  - Examples include: your sleeve has touched the IV pole, the guidewire touched the headboard

Pre-Procedure Briefing Steps:

- Identify any special supply or procedural needs
- Discuss any special patient issues (ie: patient confused, patient awake)
- Answer any additional questions

TIME OUT: RIGHT PATIENT
RIGHT PROCEDURE

4 E's: Implementation Framework

	➢ Frontline Staff	➢ Team Leaders	➢ Senior Executives
Educate	➢ *What do I need to do?* ➢ Convert evidence into behaviors; ➢ evaluate awareness and agreement		
CLABSI	➢ **Convert evidence into behaviors** ➢ **Insertion bundle** ➢ **Maintenance bundle** ➢ **Empower nurses to stop line insertion if best practice not followed** ➢ **Create/update central line policies** ➢ **Educate medical staff/residents/mid-level providers on proper insertion techniques** ➢ **Simulation** ➢ **Credentialing**	➢ **Define their role** ➢ **Get medical leadership support for stopping line insertion**	➢ **Ask executives if need assistance with getting products or support from medical staff**

4 E's: Implementation Framework

	Frontline Staff	Team Leaders	Senior Executives
Execute	*How can I do it?* – Listen to resisters – Standardize, create independent checks – Make it easy to do the right thing – Learn from mistakes		
CLABSI	➢ **Create central line bags** ➢ **Develop line insertion checklist** ➢ **Ensure nurse in room during line insertion to complete checklist** ➢ **Establish pre-procedure briefing process** ➢ **Add to multidisciplinary rounds—can this line be removed** ➢ **Learn from each defect---each CLABSI**	➢ **Hold staff accountable for new process**	➢ **Remove barriers** ➢ **Support checklist**

4 E's: Implementation Framework

	Frontline Staff	Team Leaders	Senior Executives
Evaluate	*How do I know we made a difference?* – *Define measures* – *Regularly assess measures*		
CLABSI	➢ **Measure CLABSI rate monthly and share with staff** ➢ **Measure compliance with insertion and maintenance bundles** ➢ **Learn from each defect—review each CLABSI with team and staff**	➢ **Share at staff meetings** ➢ **Support staff in LFDs**	➢ **Ask for performance measures** ➢ **Share with board**

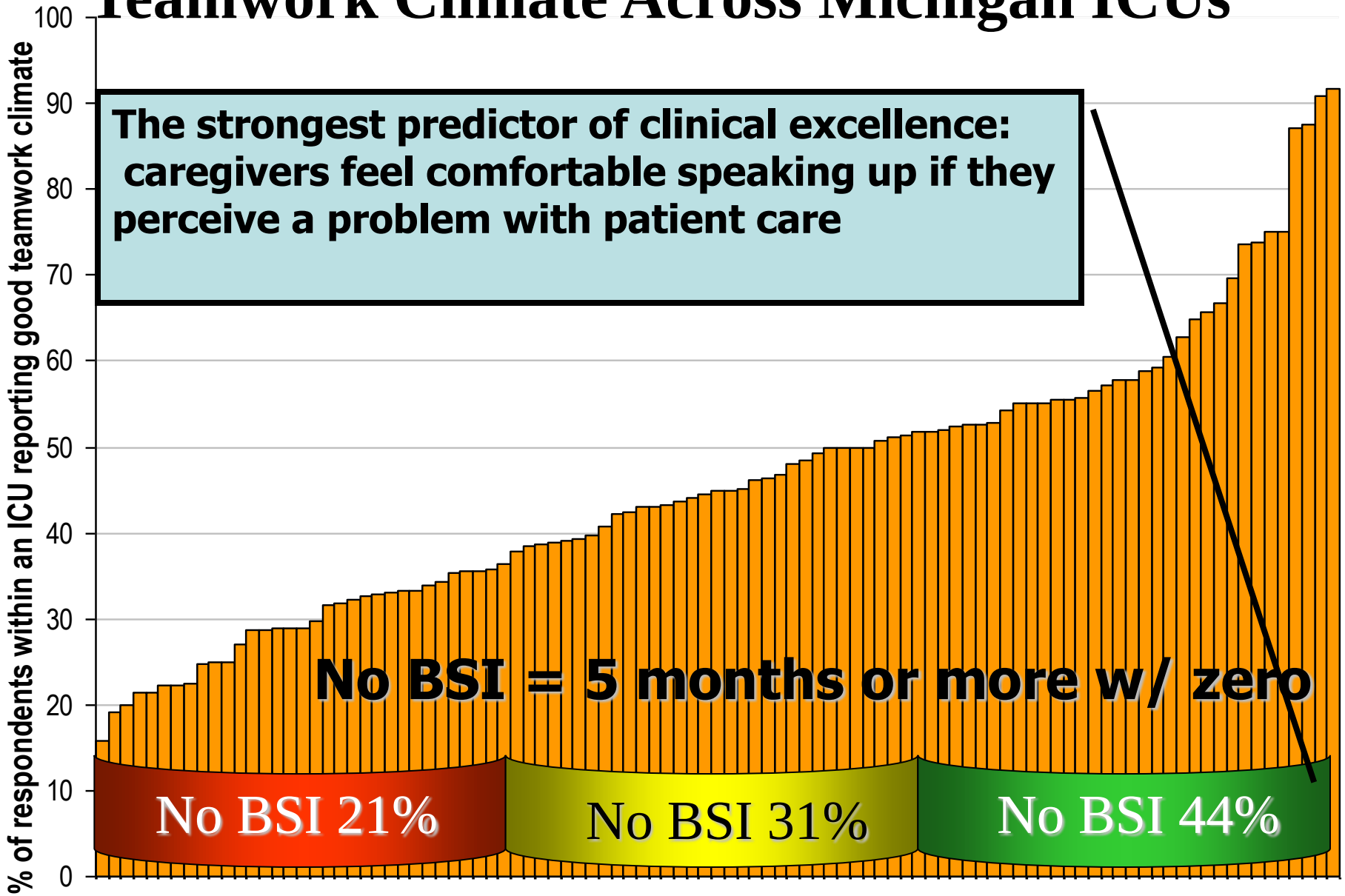
Intervention to Decrease CLA-BSI Statewide Collaborative-Keystone ICU

- 103 ICU's in state of Michigan reported data
- Examine 375,757 catheter days
- Implementation of the BSI Bundle/checklist
- **Results**
  - Median rate of CLA-BSI per 1000 catheter days went 2.7 to 0 at 3 months ((p<0.002)
  - Mean rate of CLA-BSI's per 1000 catheter days went 7.7 to 1.4 at 18 month follow up (p<0.002)
  - ↓in mortality when compared to other mid-west states

36 Months Post Initial Implementation: 90 of original 103 ICU's evaluated
Results: Mean rate 1.1 per 1000 catheter days/ Median: Zero
2009: mean .88 per 1000 catheter days (personal communication)

Pronovost P et al, N Engl J Med;2006;355:2725-2732
Pronovost P et al. BMJ, 2010;340:309
Liptiz-Snyderman A, et al. BMJ, 2011;342:219

Teamwork Climate Across Michigan ICUs



Health Services Research, 2006;41(4 Part II):1599.

On the CUSP: Stop BSI
A National Initiative

- AHRQ government funded 3 year initiative
- HRET and American Hospital Association
- John Hopkins Quality & Safety Research Group
- MHA's Keystone Center for Patient Safety & Quality
- Goals:
  - Eliminate CLA-BSI: <1/1000 catheter days, median 0
  - Improve safety culture by 50%
  - Learn from 1 defect a month
- Build an infrastructure for future efforts
- Baseline and monthly CLA-BSI rate, hospital survey on patient safety & monthly survey on teamwork barriers

http://www.onthecuspstophai.org/

On the CUSP: Stop CLA-BSI Final Report

- 44 state hospital associations recruited 1100 hospital teams over a 4 year period
- Hospital participating in this project reduced the rate nationally from 1.903 infections per 1,000 catheter days to 1.137 infections per 1,000 catheter days: **a 40 percent reduction**
  - Preventing more than 2,000 CLABSIs
  - Saving more than 500 lives
  - Avoiding more than $34 million in health care costs
- < 20% of US hospitals are participating

http://www.onthecuspstophai.org/
http:/blogs.wsj/health/2011/04/05/progress-on-reducing-bloodstream-infections/

Implementation Framework
2 more E's

	Frontline Staff	Team Leaders	Senior Executives
Embed	*Has this become business as usual?* *How do I know it will last?* Make policies and procedures, train new people, walk the process Learn from each defect		
Expand	*Who else needs to know this?* *What's next?* Pass it on to other units Identify and address your next challenges		

Potential Barriers

- Perception of lack of time or the importance
- Lack of evidence based education…just do it!!!!
- Absence of a define protocol/procedure
- Staff turnover/Replacement staff
- Inaccessibility of needed supplies
- No real clinical lead on the unit
- Lack of feedback on progress
- Lack of accountability/responsibility

O'keefe-McCarthy S, et al. Worldviews on Evidence Based Nursing, 2008:193-204
Abott CA, et al. Worldviews on Evidence Based Nursing:2008:193-204

Interventions To Ensure Patient Receive Evidence & Sustain Benefit

- Education…to all caregivers…it works*
- Ask Daily if line is needed
- Checklist, nurse
- Empower nurses
- Products/Processes that make it easy for the frontline caregiver to provide the care
- Measurement/Feedback**
- Setting targets/Celebrating successes
- Placement of new practice/education in orientation
- Simulation training of residents reduced CLABSI's.***

Fuchs MA, et al. J Nurs Care Qual, 2011;26:101-109
Nolan SC, et al. JONA, 2010:40(9):374-383

* Parra AP, etal. Infect Control Hosp Epidemiol 2010;31(9):964-967
**Westwall S. Nursing in Critical Care, 2008;13(4):203-207
*** Barsuk JH, et al. Arch Intern Med, 2009;169:1420-1423

Can we change practice through process improvement alone?

OR

Will successful change require an altering of the value structure within the unit?

Be Courageous

We all are responsible for the safety of our patients……Own the Issues

- “If not this, then what??”
- “If not now, then when?”
- “If not me, then who??”