


IHI Campaign to Save 100,000 Lives

Pediatric Node Presents:
Preventing Central Line Infections

July 27, 2005


2:00 PM - 3:30 PM (ET)
1:00 PM - 2:30 PM (CT)
12:00 PM - 1:30 PM (MT)
11:00 AM - 12:30PM (PT)

PHONE NUMBER CHANGE
888-793-1722
No passcode required



Pre-Game Housekeeping



- Phone lines have been muted to reduce background noise
- 66 to unmute
- 63 to mute
- Please do not put your phone on “hold”
- 30 minutes for Q & A at the conclusion of the presentations
- Session is being recorded and will be available on CHCA, NACHRI, NICHQ and IHI Websites



IHI Campaign to Save 100,000 Lives

Pediatric Node Presents: Preventing Central Line Infection

Moderator:
Uma Kotagal, MBBS, MSc
 Vice President, Quality and Transformation
 Director, Health Policy and Clinical Effectiveness
 Cincinnati Children's Hospital Medical Center
 Professor, Pediatrics, Obstetrics and Gynecology
 University of Cincinnati Medical Center

“Pediatric Node” Leadership Team

- **CHCA: David Bertoch, Jeff Brandon**
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IHI Campaign to Save 100K Lives

Launched: December 2004

Pediatric Node Launched: January 2005

5 Initiatives Relevant to Pediatrics:

- **Prevention of Adverse Drug Events using Reconciliation of Medications (6/15/05)**
 - 82 hospitals; 354 individuals participated in Webcast
- **Deployment of Rapid Response Teams (6/22/05)**
 - 86 hospitals; 345 individuals participated in Webcast
- **Prevention of Ventilator-Associated Pneumonia (7/20/05)**
 - 95 hospitals; 312 individuals participated in Webcast
- **Prevention of Central Line Infections (7/27/05)**
- **Prevention of Surgical Site Infections (8/17/05)**
 - Note time change (12:00N-1:30PM ET) this session only

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IHI Campaign Objectives

- Save 100K lives through the introduction of six proven health care improvement interventions over 18 months. (End date 6/14/06 at 9AM.)
- Enroll a minimum of 1600 hospitals to join IHI in this work. (To date, over 2500 hospitals have signed on to the Campaign.)

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Key Campaign Principles

- Some is not a number; soon is not a time.
- Get the “hard count.”
- Welcome anyone at any level.
- We will do this together.

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IHI 100K Campaign Central Line Bundle

- Hand hygiene
- Maximal barrier precautions
- Chlorhexidine skin antisepsis
- Optimal catheter site selection
- Daily review of line necessity

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IHI Campaign Pediatric Node

- Commitment of 3 major pediatric leadership organizations to convene learning collaboratives (Summer Series Webcasts) featuring experts in the field.
- First ever learning initiative involving the whole pediatric community (FREE).
- CHCA, NACHRI, and NICHQ applaud the experts and their respective organizations for their willingness to share their expertise with the whole pediatric community.
- CHCA, NACHRI and NICHQ applaud the whole pediatric community for their commitment and hard work in creating high quality healthcare for children.

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Additional Resources on the 100K Campaign

- www.chca.com
- www.childrenshospitals.net
- www.nichq.org
- www.ihc.org
- For information on Campaign data submission, go to www.ihc.org.

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Other Resources Available

“Things that Work: Hot Topics in Pediatric Patient Safety”

- American Academy of Pediatrics conference call series
- www.aap.org/visit/thingsthatworkcall.htm


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Central Line Infection Faculty

- Arkansas Children’s Hospital
 - **Craig H. Gilliam, BSMT, (ASCP) CIC**
Epidemiologist, Director of Infection Control
- Johns Hopkins Children’s Center
 - **Marlene R. Miller, MD, MSc**
Director of Quality and Safety Initiatives
- Mayo Eugenio Litta Children’s Hospital
 - **W. Charles Huskins, MD, MS**
Hospital Epidemiologist, Consultant in
Pediatric Infectious Diseases, Mayo Clinic



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Prevention of Catheter-related Blood Stream Infections

Marlene R. Miller, M.D., M.Sc.
Christopher T. McKee, DO
Ivor Berkowitz, M.D.
Claire Beers, R.N., M.S.N.

Johns Hopkins Children's Center
Hospital Epidemiology and Infection Control
Center for Innovations in Quality Patient Care



The Game Begins

- Initiative Goals:
 - Elimination of pediatric catheter-related blood stream infections
 - Evaluation of tailoring of successful BSI efforts to pediatric care
- Started: January 2004
- Why it was started: Nosocomial infections are clear cases of preventable harm and proven strategies to reduce BSI in adults were available

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Critical Starting Steps

- What was the beginning point: Series of meetings with ICU leadership, quality/safety leadership, Infection Control in Children's Center to review trends and evidence; worked together to identify goals, tailor intervention to pediatrics, and develop realistic timeframes
- What intervention to try: proven BSI intervention in adult ICUs at Johns Hopkins (Berenholtz SM, Pronovost PJ, et al. *Crit Care Med* 2004;32:2014-20)

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Pediatric BSI Intervention

- Education on 'best practices', pediatric-tailored
 - Wash your hands or use waterless hand cleaners
 - Use sterile technique and maximal barrier precautions when placing central lines
 - Use chlorhexidine for line insertion and dressing changes
 - Use femoral site if possible
 - Don't put in lines that are not needed and take out lines that are not needed
- "Line cart"
- Nursing check list for CL insertion
- Empowerment of nurses to stop procedures if best practices breached

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Challenges

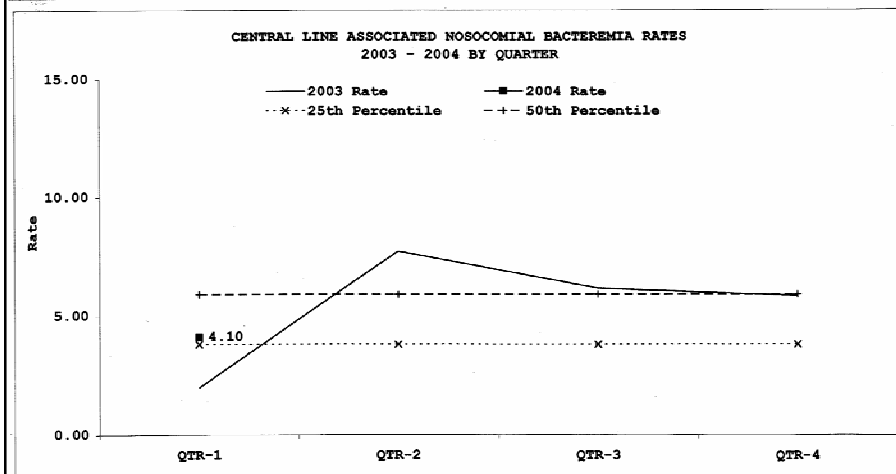
- Challenges encountered:
 - Our PICU rates were “low”
 - Disconnect at times between CDC definitions and clinical care
 - Consideration of Oncology/BMT, burn patients, CFU
- Remedies:
 - Adult ICU data, positive safety culture, senior leadership focus on BSI with weekly real-time JHH-wide data
 - ICU clinical leadership and quality/safety leadership review all BSI cases by CDC definitions with an evaluation toward actual clinical preventability

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JHH CENTRAL LINE ASSOCIATED NOSOCOMIAL BACTEREMIA RATES
1st QUARTER 2004 REPORT
PICU

QUARTER	2003		2004	
	NUMBER	RATE PER 1000 CL-DAYS	NUMBER	RATE PER 1000 CL-DAYS
QTR-1	1	1.98	2	4.10
QTR-2	4	7.72		
QTR-3	3	6.16		
QTR-4	3	5.84		
TOTAL	11	5.44	2	4.10

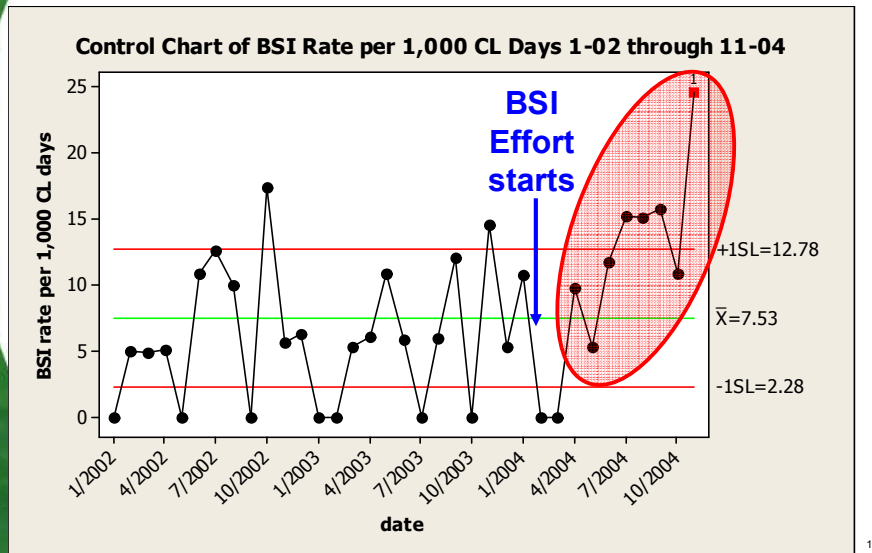
NNIS 25th Percentile:
3.8* per 1000 Central Line Days
NNIS 50th Percentile:
5.9* per 1000 Central Line Days



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Initial BSI Outcomes



What Was Going On???

- Re-evaluation of pediatric-tailored BSI intervention and its use
- Discussions with staff to identify any new practices or procedures
- Thorough chart reviews of all CR-BSI cases
 - to ensure proper identification of cases
 - evaluate for any unique patient-related underlying factors
- Review of types of organisms to see trends



What Was Going On???

- Based on preliminary data presented at a national Infection Control meeting in Fall 2004 and the concerns raised by bedside nursing staff in our routine Safety Rounds in the PICU, we began to focus our efforts on the positive displacement mechanical valve (PDMV) IV port used on our central lines throughout the institution
- New PDMV had been introduced in April 2004

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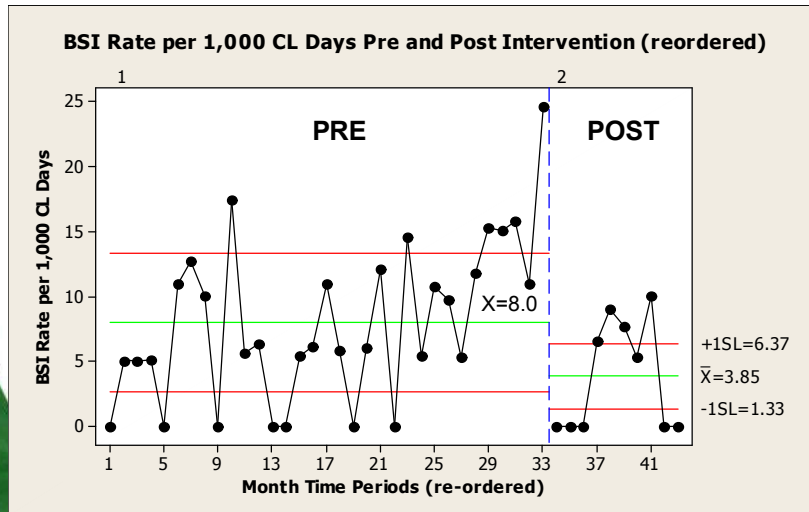
Critical Next Steps

- With this sense of potential issue with PDMV, we systematically removed the valves from entire Children's Center 12/6/2004 and returned to using the 'old' mechanical valve
- BSI intervention remained intact throughout this time period

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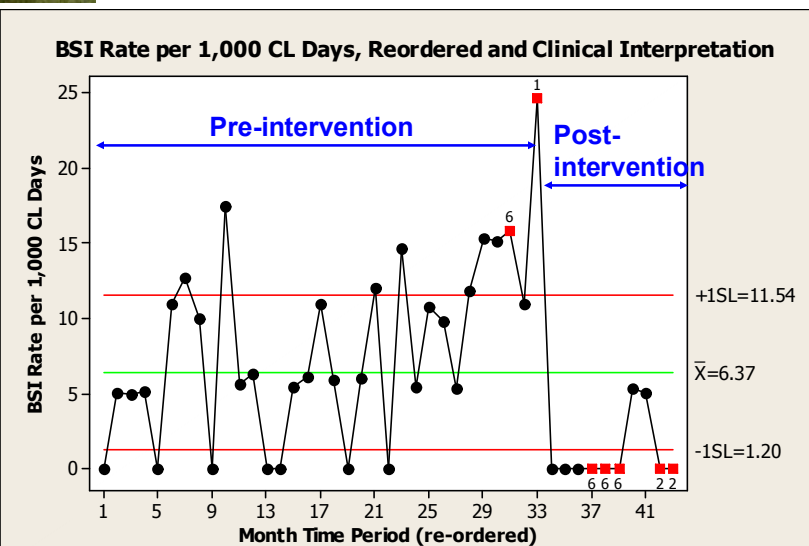
Subsequent BSI Outcomes



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Clinical Interpretation of BSI Rates



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Clinical Interpretation Issues

- Burn Patient (30% 2nd and 3rd degree)
- Onc Patient with WBC = 540
- CL break by family
- AoV abscess but no intraop culture
- Post-op with heavy Enterococcus Fecalis in NP and urine

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Shared Learning

- What have you discovered that could be easily transferred to other organizations?
 - ***BSI Intervention coupled with 'line cart' and team building/nurse empowerment appears to work in children to reduce BSI and is low-cost***
 - Education on 'best practices', pediatric-tailored
 - "Line cart"
 - Nursing check list for CL insertion
 - Empowerment of nurses to stop procedures if best practices breached
 - ***Despite best efforts, vigilance needs to occur since other factors may introduce risks***


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Reducing Catheter-associated Bloodstream Infections through Repeated Rapid Cycle Improvement

...the next step

Craig H Gilliam - Infection Control
Jerril Green - PICU
Arkansas Children's Hospital



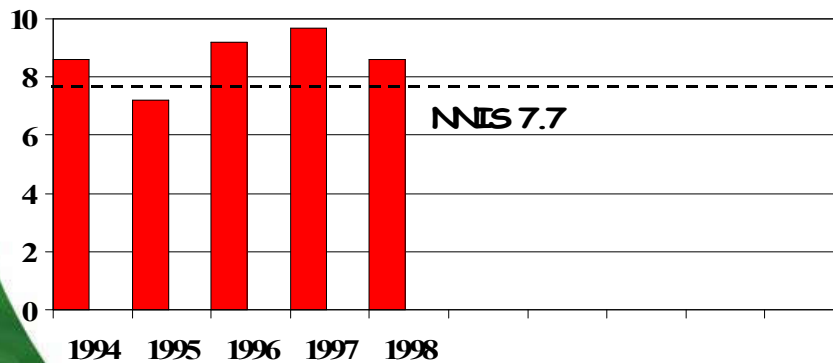
Catheter associated Bloodstream Infection -“the problem”

- Bloodstream infections account for 30% of all health care associated infections in pediatrics according to the CDC.
- 78% of Bloodstream infections are related to catheters in our facility.

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CABSI Rate/1000 CVC days 1994-1998



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Catheter Associated Bloodstream Infection - "the problem"

- In December 1997, the new Chief of Critical Care Medicine surfaced the issue with PICU.
- "to prevent at least 30% (if not 100%) of our catheter related infections."
- He suggested we begin a process to implement CDC recommendations for CVC placement and compare to NACHRI database.
- Organize an ad hoc group to constantly work on this process

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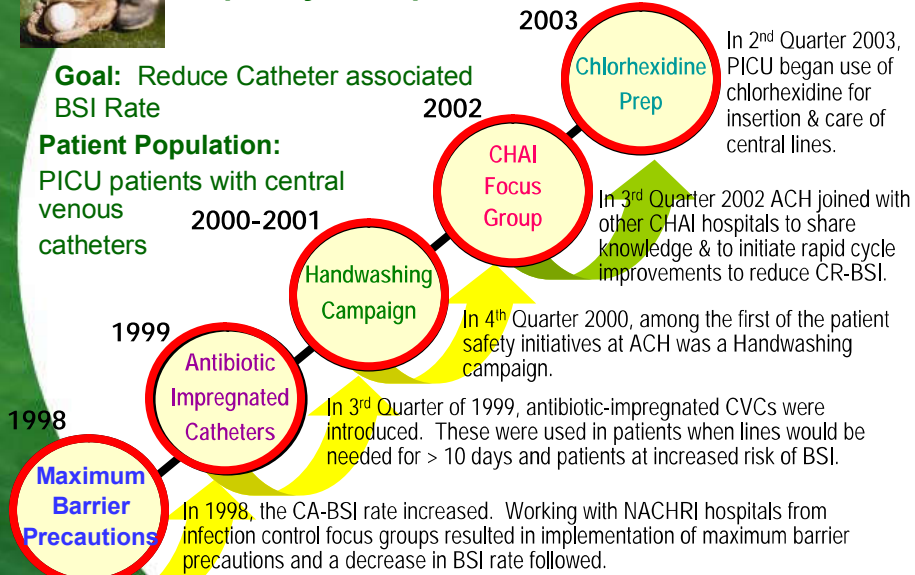


Rapid Cycle Improvements in PICU

Goal: Reduce Catheter associated BSI Rate

Patient Population:

PICU patients with central venous catheters
2000-2001



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Catheter Associated Bloodstream Infection - Increasing number of CVC & decline in CVC associated BSI

■ 1998	242 CVC	34 BSI	14%
■ 2002	273 CVC	17 BSI	6.2%
■ 2003	343 CVC	15 BSI	4.4%
■ 2004	353 CVC	8 BSI	2.3%

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Catheter Associated Bloodstream Infection - PICU & IC Priority Interventions

- 1998 4q Maximum barrier precautions during insertion of CVC
- 1999 2q Antibiotic impregnated CVC
- 2001 1q Hand Hygiene observations
- 2002 3q New ICP joined department
- 2002 4q Joined CHAI project on BSI prevention
- 2003 3q 2% chlorhexidine for skin prep
- 2004 1q Hand Hygiene observations
- 2004 3q Nursing Orientation emphasis on BSI prevention
- 2005 1q Joined CHCA collaborative for reduction in catheter BSI

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Overcoming Barriers

Barrier: Ownership of the project?

- Infection Control QI/Performance Improvement
- PICU Nursing Critical Care Division
- Surgery Division Interventional Radiology

Solution: This must become a facility wide initiative. The selection of the team members demonstrates the importance by the hospital and provides for applicability to other units/services.

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Overcoming Barriers

Barrier:

- Necessary observations during insertion and weekly dressing changes of CVC

Solution:

- The study personnel must receive acceptance by unit staff. In addition they provide training for observers plus commitment to assist with observations.

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Overcoming Barriers

Barrier:

- How can we compare our PICU experience and rates to other hospitals?
- Do all hospitals collect the same data?

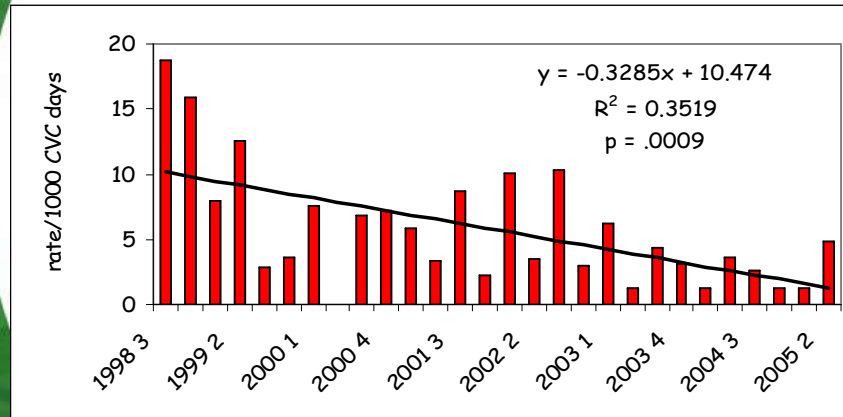
Solution:

- From IHI faculty member “The bundles are not ready-made clinical protocols for individual hospitals, but should be used as templates to develop paths to fit the needs & care patterns of each hospital”.

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Catheter BSI – PICU 3q 1998 – 2q 2005



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Collaborative Profile for Arkansas Children's Hospital: Team Members

- Craig Gilliam, Infection Control - Team Leader
- Jerril Green, PICU Intensivist – Team Leader
- Bonnie Taylor, Medical Director – Senior Leader
- Patti Higginbotham, Quality Improvement – System Leader
- Jennifer Harper, PICU - Front Line Leader
- Kim White, PICU – Front Line Leader
- Michele Honeycutt, Infection Control – Front Line Leader

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Our Aim Statement

To reduce bloodstream infections associated with catheters to **1.4 per 1,000** catheter days in the PICU population by year end 2005 so that we achieve the following goals:

- 95% of patients receiving the insertion central line bundle; and
- 95% of patients with a CVC were assessed daily for necessity of retaining the CVC.

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Prevention of Catheter BSI Means:

- Hand hygiene prior to insertion of line, before weekly dressing changes & before each manipulation of catheter or stopcocks.
- Appropriate catheter site selection risk vs. benefit of jugular-femoral-subclavian.
- Chlorhexidine for prep & care of catheter site
- Maximal barrier precautions during insertion
- Daily review of necessity of catheter.

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Central Line Bundle Compliance PICU – 4 months observation

Insertion compliance	80%
Maintenance (dressing change) compliance	69%
Daily assessment of need	51%

Data: IC surveillance

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Baseline Data – What we Learned?

- Maximum barrier precautions are practiced, however room in the PICU is not sufficient to bring the procedure table into the room and staff walk back and forth.
- Staff use trash cans as a “mayo stand”.
- Observing entire process is difficult: Arriving at beginning of a maintenance or insertion process is often difficult.
- When asked staff assure us that they disinfect hands prior to dressing change...in practice this may not be the case therefore observations are important feedback.

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Strategies for Success

- Teams to develop a plan
 - How do you keep leadership engaged?
 - Incremental improvement
 - Outcomes must be individualized
 - Make results visible throughout the organization


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Primary Objectives of this Learning Session


- Teams need an example for successful intervention
 - Do you have a passion for this issue?
 - Use the storyboard template to build the case
 - Plan for leveraging this project's success to other units
 - Use past successes as a way to continue harvesting motivation and support to keep going.

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100,000 Lives Campaign Bloodstream Infection

W. Charles Huskins, MD, M.Sc.
Mayo Eugenio Litta Children's Hospital



The Game Begins

- The initiative began in 2002 as an institution-wide effort to improve & standardize practices for insertion & care of CVCs
- Motivated by a decision not to start using antibiotic / antiseptic coated CVCs until all other practices had been optimized
- Extended in June 2004 as a part of an Institute for Clinical Systems Improvement (ICSI) *Safest in America* campaign
- Expanded in winter / spring of 2005 as part of IHI 100K Lives Campaign

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Putting on Our “Game Face”

- Motivated initially by interest in standardizing & improving practice
- Evolved into desire to reduce BSI rates of beyond historic lows – to eliminate CVC-associated BSIs in ICUs
- Energized by regional & national campaigns
- Supported by leadership
- Recognized that public reporting of nosocomial infection rates may be required in the future

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Critical Starting Steps

- Reviewed the HICPAC guideline, identified interventions not fully optimized
 - Chlorhexidine / alcohol skin antiseptic prep for catheter insertion
 - Maximal sterile barrier precautions during catheter insertion
 - Subclavian vein as preferred insertion site
 - Change dressing once a week

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Critical Starting Steps

- Coordinated with critical care committees and received buy-in
 - Chlorhexidine / alcohol for insertion & dressing change
 - Use of maximal sterile barrier precautions
 - Change dressings every week

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Critical Starting Steps

- Multidisciplinary team
 - Adult & pediatric ID / IC physician
 - IC nurse
 - Clinical nurse specialists
 - Respiratory therapy
- Attached new antiseptic to insertion & dressing change kits
- Subsequently, antiseptic incorporated into insertion & dressing change kits
- Educational efforts of critical care, anesthesiology, nursing

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Challenges

- Changing antiseptic was not easy
 - Swab attached to kit discarded
 - Use of >1 swab
 - Circular application instead of back / forth scrub
 - Difficult to see where prep had been completed
 - Many months until swab included in kit
- Existing dressing did not stay in place for 1 week => trial of a new dressing, approval for use of new dressing

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Challenges

- Coordinating practice change across multiple groups
- Need to revise procedures, review & approval of new procedures
- Applying a bundle designed for adults for use with children
 - Site selection recommendation not appropriate
 - Use of new antiseptic in neonates
- Optimizing hand hygiene still a challenge
- Developing approach for daily assessment of need

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Vermont Oxford IHI NICU Bundle Developed for the Vermont Oxford Network iNICQ Internet Infection Collaborative

- CVL insertion
 - Hand hygiene
 - Maximal sterile barrier precautions
 - Antiseptic prep as per hospital protocol
 - ≥2 months of age: chlorhexidine / alcohol
 - <2 months of age: per hospital protocol
- Hub / connection care
 - Alcohol wipe prior to accessing or reconnecting
 - Disconnected tubing placed on a sterile surface
- Daily assessment of need
 - CVC; if not needed, remove within 8 hours
 - IV lipids; if not needed, d/c within 8 hours

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Central Line Bundle

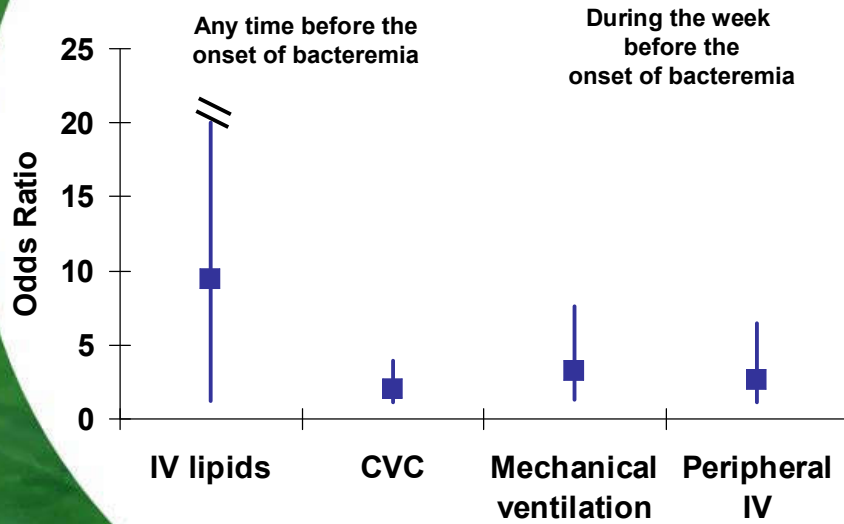
When	What	Who
Catheter insertion	Hand hygiene Appropriate antiseptic Maximal sterile barriers	MD
Hub / connector care	Hand hygiene Wipe hub /connector with alcohol Place disconnected tubing on sterile drape	RN
Daily rounds	Assess need for CVC; if not needed remove promptly Assess need for IV lipid; if not needed discontinue promptly	MD & RN

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Risk Factors for Coagulase-Negative Staphylococcal Bacteremia in VLBW Infants

Avila C, et al. *Pediatr Infect Dis J* 1998;17:10-7



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Risk Factors for Coagulase-Negative Staphylococcal Bacteremia in VLBW Infants

Avila C, et al. *Pediatr Infect Dis* 1998;17:10-7

Duration of Exposure in Weeks

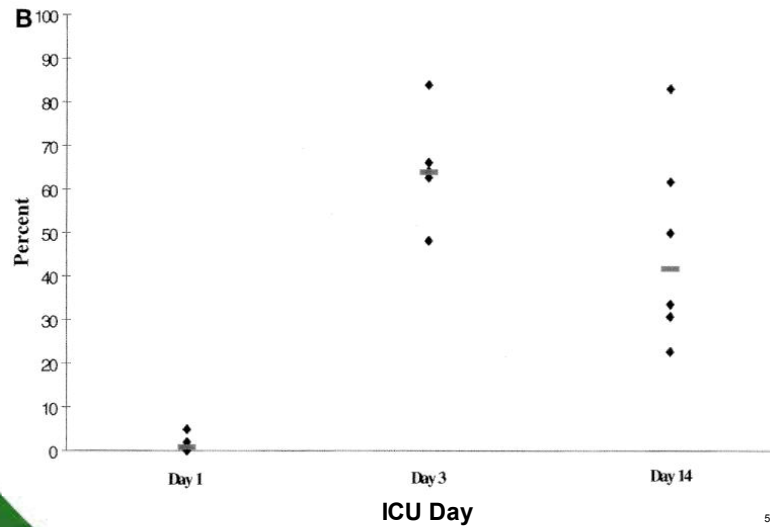
	None	1	2	≥3
IV lipids	1.0	3.0	3.1	4.9
Any CVC	1.0	1.3	3.8	4.4
IV protein	1.0	1.7	2.2	2.4
Mechanical ventilation	1.0	1.5	1.7	2.1

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Nosocomial Bloodstream Infection in 6 NICUs

Brodie SB, et al. *Pediatr Infect Dis* 2000;19:56-65



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Next Steps

- Hand hygiene
 - education & promotion program
 - observations of hand hygiene practice
- Monitor performance on the bundle
 - Insertion
 - Checklist
 - Electronic procedure note with documentation of key steps
 - Observations of hub / connector care
 - Daily assessment of need for catheter & IV lipid
 - Reduce line manipulation for blood draws

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Is BSI Preventable Among Premature Infants?

Aly H, et al. Pediatrics 2005;114:1513-8

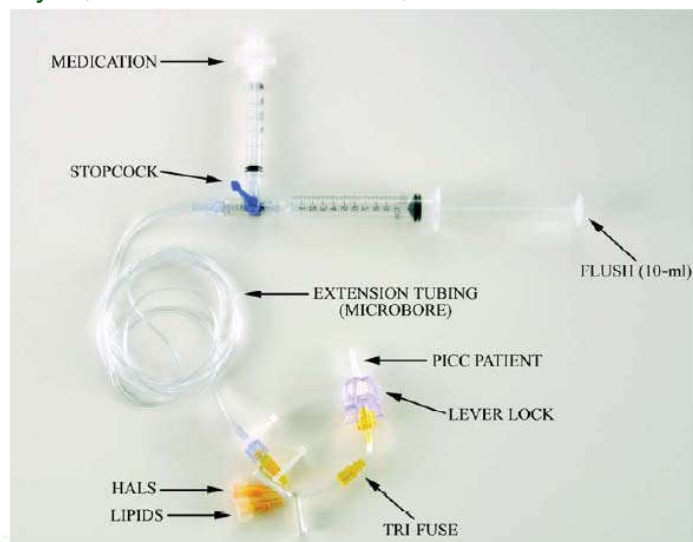
- George Washington Hospital implemented practices used for CVCs at Connecticut Children's Medical Center
- Practices implemented in Jan 2001
 - Closed medication system
 - Procedure for care of PICCs
 - Sterile technique for tubing changes
 - Sterile technique for dressing changes
- Analyzed BSI rates in infants during 1998-2000 vs. 2001-03, with adjustment for patient-level risk factors

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System for Administering Medications through a CVC

Aly H, et al. Pediatrics 2005;114:1513-8



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Annual Rates of Central-Line Associated BSI, 1998 – 2003

Aly H, et al. Pediatrics 2005;114:1513-8

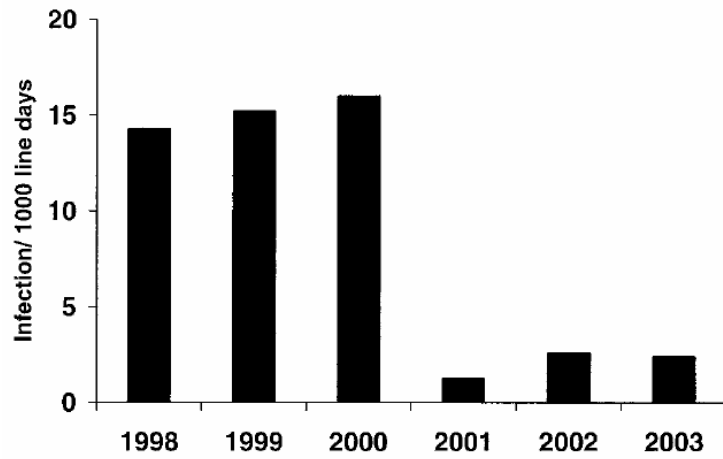


Fig 2. Annual rates of central line-related BSIs at George Washington University Hospital.

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QUESTIONS AND DISCUSSION

NACHRI
National Association of
Children's Hospitals
and Related Institutions

NICE
National Institute for
Clinical Excellence

100K Zero Campaign
100K ZERO CAMPAIGN
100K ZERO CAMPAIGN

GI



Speaker Bios: Craig H. Gilliam, BSMT, (ASCP) CIC

Craig H Gilliam, BSMT, (ASCP) C.I.C. is Director of Infection Control at Arkansas Children's Hospital. He serves on the Infection Control, Patient Safety and Safety Committees at the hospital.

Mr. Gilliam is a member of the Association for Professionals in Infection Control and Epidemiology, Inc. (APIC). He has served as a Board Director for APIC and as President of the APIC Research Foundation in 2004. In addition, he has served as a member of the APIC Nominating, Membership and Annual Conference Committees. Mr. Gilliam has presented at numerous state and national conferences, with an emphasis on catheter related bloodstream infections and investigations of infections in the NICU.

Arkansas Children's Hospital was the recipient of RACE for Results by the Child Health Corporation of America (CHCA) in 2004. Mr. Gilliam delivered the oral presentation of this award-winning work, Reducing Catheter Related Bloodstream Infections through Repeated Rapid Cycle Improvements, at the Spring meeting of CHCA.

Mr. Gilliam received a Bachelor of Science in Medical Technology from the University of Arkansas for Medical Sciences.

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Speaker Bios: W. Charles Huskins, MD, MS

W. Charles Huskins, MD, MSc is a specialist in pediatric infectious diseases with expertise in infection control and hospital epidemiology. He serves as Consultant in Pediatric Infectious Diseases in the Department of Pediatrics and Adolescent Medicine at the Mayo Clinic and Hospital Epidemiologist at Mayo Eugenio Litta Children's Hospital in Rochester, MN. He is Assistant Professor of Pediatrics at the Mayo Clinic College of Medicine.

Dr. Huskins received his MD from the University of Minnesota Medical School. He completed his pediatrics and pediatric infectious diseases training at Children's Hospital in Boston and was on staff there for eight years prior to joining the Mayo Clinic in 2000. His research interests are in the treatment and prevention of healthcare acquired infections caused by antimicrobial resistant bacteria.

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Speaker Bios: Uma Kotagal, MBBS, MSc

Uma Kotagal, MBBS, MSc is Vice President, Quality and Transformation at Cincinnati Children's Hospital Medical Center. She also is Director of Health Policy and Clinical Effectiveness at the Children's Hospital Medical Center, where she oversees the development of disease management teams and the development and institution of evidence based practice guidelines. Dr. Kotagal is Professor of Pediatrics, Obstetrics and Gynecology. She is a practicing neonatologist and was director of the NICU's at the University Hospital and at Cincinnati Children's Hospital Medical Center for several years.

Dr. Kotagal has published extensively in the field of health services and neonatal outcomes research, including the first landmark paper on early discharge programs in the NICU setting. She has served as Principal Investigator/Program Director for several projects, including the Pursuing Perfection in Health Care program, for which CCHMC was selected from a highly competitive field.

Dr. Kotagal received her Master of Science Degree in Clinical Epidemiology and Clinical Effectiveness from the Harvard School of Public Health. She received additional training in the field of decision analysis and cost effectiveness analysis at Tufts New England Medical Center where she was a visiting professor in the Division of Clinical Decision-Making. She recently was a visiting scholar at the Center for Risk Analysis at the Harvard School of Public Health.

Dr. Kotagal received her undergraduate and M.B.B.S. degrees from the University of Bombay and completed her residency at the Children's Hospital of Michigan. She completed a fellowship in Neonatology at Children's Hospital of Michigan and a fellowship in neonatal physiology at the University of Cincinnati. She is board-certified in Pediatrics and Neonatal-Perinatal Medicine.

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Speaker Bios: Marlene Miller, MD, MSc

Marlene Miller, MD, MSc is Director of Quality and Safety Initiatives at Johns Hopkins Children's Center, where she develops and leads initiatives and research to improve and foster a culture of quality of safety within the integrated deliver system of the Children's Center and the Institution. She is Director of the Josie King Safety Program. Dr. Miller is an Associate Professor in the Department of Pediatrics at the School of Medicine and an Associate Professor in the Bloomberg School of Public Health at Johns Hopkins University.

Prior to her current roles, Dr. Miller served as Medical Officer and Acting Director in the Center for Quality Improvement and Patient Safety at the Agency for Healthcare Research and Quality. Dr. Miller has published numerous articles focused on patient safety, quality measurement and outcomes research. Her work on the impact of potentially preventable events on cost, length of stay and mortality resulted in the Article of the Year Award by AHRQ.

Dr. Miller has presented at multiple national conferences and symposia, most recently serving as organizer and chair for an educational workshop on patient safety at the Pediatric Academic Societies meeting in May 2005. She serves on numerous committees and advisory groups at the institutional and national level.

Dr. Miller received her MD from Case Western Reserve University and her Master of Science in Clinical Investigation from the Johns Hopkins School of Hygiene and Public Health. She received Lean Sigma black belt training in quality improvement and was a participant in the Harvard University John F. Kennedy School of Government Leadership Strategies for Senior Executives series.

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Past Broadcasts

Materials from past Web casts (Medication Reconciliation, Rapid Response Teams, Preventing Ventilator Associated Pneumonia) are available.

Materials from today's session will be available soon.

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 - david.bertoch@chca.com
- NACHRI: www.childrenshospitals.net
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- NICHQ: www.nichq.org
 - ccganser@nichq.org
 - ecrites@nichq.org
 - pkurtin@chsd.org

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Future Broadcasts

- August 17: Surgical Site Infection
 - 12:00 pm ET
 - 11:00 am CT
 - 10:00 am MT
 - 9:00 am PT
- To register: e-mail webcasts@chca.com

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