

Reducing MRSA Infections

The Kids' Campaign 2007 Pediatric Webcast Series



Wednesday, July 25, 2007

(12:00 noon Eastern; 11:00 a.m. Central; 10:00 a.m. Mountain; 9:00 a.m. Pacific)

<https://www115.livemeeting.com/cc/chca/join>

Meeting ID: 5MLives072507 (case sensitive)

Audio Conferencing (Toll-free): +1 (866) 436-9172

Participant Code: 18408566



Housekeeping

- Phone lines have been muted to reduce background noise
- For operator assistance, press *0
- Question and answer session at the conclusion of the presentation
- Session is being recorded and will be available on the AAP, CHCA, NACHRI, NICHQ and IHI websites

About The Kids' Campaign

The Kids' Campaign is coordinated by the Pediatric "Affinity" Node of the 5 Million Lives Campaign, which includes AAP, CHCA, NACHRI and NICHQ working together with IHI and leadership hospitals to build a robust knowledge exchange and help pediatric organizations eliminate preventable harm.



Introductions



Glenn F. Billman, M.D.,
Director of Patient Safety,
Children's Hospitals and Clinics of Minnesota



Craig H. Gilliam, BSMT, (ASCP) CIC,
Epidemiologist, Director of Infection Control,
Arkansas Children's Hospital

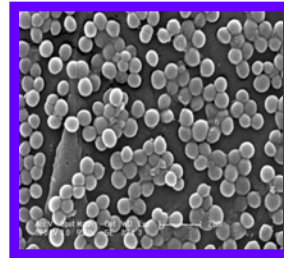


Aaron Milstone, M.D.,
Assistant Professor Pediatric Infectious Diseases,
Johns Hopkins University

What the heck is MRSA?

Staphylococcus aureus is found on the mucous membranes and the skin of around a third of the population, and it is extremely adaptable to antibiotic pressure.

Methicillin-resistant *Staphylococcus aureus* (MRSA) are isolates of the bacterium that have acquired genes encoding for antibiotic resistance to all penicillins, including methicillin.



What the heck is MRSA?

- MRSA was first detected in Britain in 1961 but is now "quite common" in hospitals and roughly half of all *S. aureus* infections in the US are resistant to penicillin, methicillin, tetracycline and erythromycin.
- Hospital Associated MRSA (HA-MRSA) emerged first (1980) and Community-acquired MRSA (CA-MRSA) followed (2000).
- CA-MRSA apparently did not evolve de novo in the community, but represents a hybrid between MRSA which escaped from the hospital environment and the once easily treatable community organisms. (different genetics, susceptibilities, virulence)
- In the United States, 95 million carry *S. aureus* in their noses; of these 2.5 million (2.6% of carriers) carry MRSA. When identified, most MRSA isolates are associated with clinically relevant infections, and 23% of patients required hospitalization.

Staphylococcus aureus Infections

Skin and soft tissue infection

- Cellulitis
- Abscess
- Impetigo
- Furunculosis

Deep seated and severe infection

- Osteomyelitis, septic arthritis
- Pyomyositis
- Septic thrombophlebitis
- Pneumonia
- Toxic Shock Syndrome



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Human and Financial Costs Are Large

- Over 126,000 hospitalized persons infected annually
 - 3.95 MRSA infections per 1,000 hospital discharges
- Over 5,000 patients die as a result of these infections
 - 4% excess in-hospital mortality
- On average, each patient with MRSA infection has:
 - 9.1 days excess length of stay (LOS)
 - Over \$20,000 excess cost per case (range \$7,000 - \$32,000)
- Over \$2.5 billion excess health care costs attributable to MRSA infections

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A Vision for the Future?



SUPERBUG
'TO KILL
150,000'

SUNDAY EXPRESS CRUSADE
CLEAN UP OUR KILLER WARDS

Minister orders his health chief: Solve deadly NHS crisis

EXCLUSIVE
By Lucy Johnston and Michael Knapp

URGENT action to combat the killer hospital bug MRSA was demanded last night by Health Secretary John Reid. He acted as a leading expert warned the infection could kill 150,000 patients over the next two years. Dr Reid asked the Chief Medical Officer, Sir Liam Donaldson, to bring forward publication of his report into the spread of MRSA, as a matter of urgency. The report is expected to heavily criticise hospital hygiene standards and call for a major shake-up in the way wards are cleaned. The move comes as Professor Hugh Pennington.

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A Vision for the Future?

Community-Acquired Methicillin-Resistant *Staphylococcus aureus* in Children With No Identified Predisposing Risk

Betsy C. Herold, MD; Lilly C. Immergluck, MD; Melinda C. Maranan, MD; Diane S. Lauderdale, PhD; Ryan E. Gaskin; Susan Boyle-Vavra, PhD; Cindy D. Leitch; Robert S. Daum, MD

JAMA, February 25, 1998—Vol 279, No. 8

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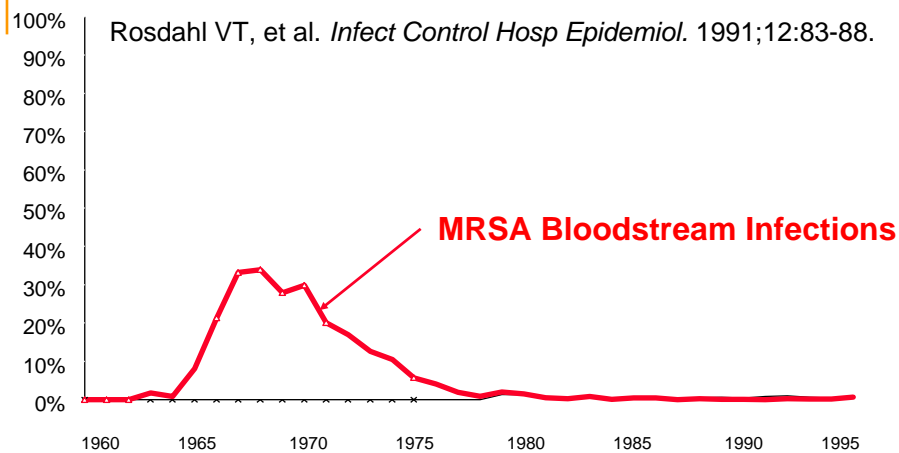
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A Vision for the Future?

Emergence of Community-Associated Methicillin-Resistant *Staphylococcus aureus* USA300 Genotype as a Major Cause of Health Care-Associated Blood Stream Infections

Seybold et al. CID. 2006; 42: 647-56.

A Better Vision for the Future!



The Goal



Reduce methicillin-resistant *Staphylococcus aureus* (MRSA) infection by December 2008.

Expert Input

- Association for Professionals in Infection Control and Epidemiology (APIC)
- Centers for Disease Control and Prevention (CDC)
- Society for Healthcare Epidemiology of America (SHEA)
- Experts published in literature
- Other Campaign partners

Strategies

- Prevent
- Identify and Mitigate
- Correct / Redesign

Five Key Interventions

1. Hand hygiene
2. Decontamination of the environment and equipment
3. Active surveillance cultures (ASCs)
4. Contact precautions for infected and colonized patients
5. Compliance with Central Venous Catheter and Ventilator Bundles

Control and reduction of MRSA in the NICU

Craig H Gilliam, BSMT, CIC
Director of Infection Control

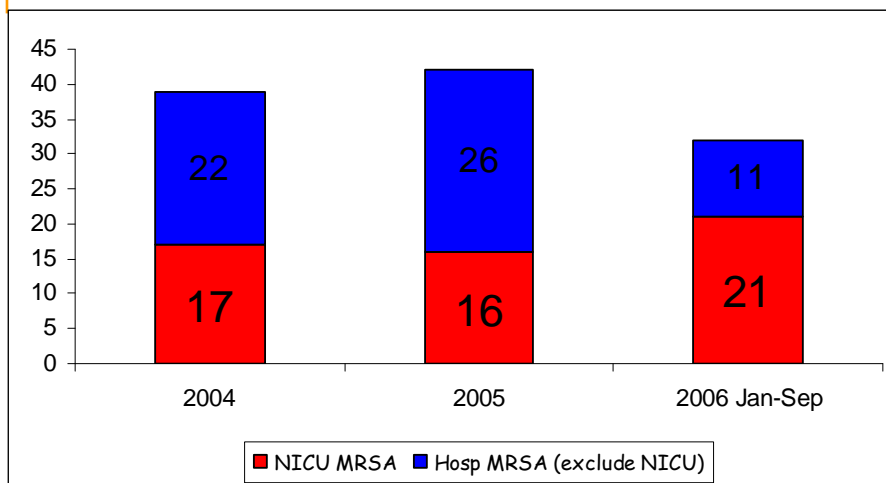


Arkansas Children's Hospital

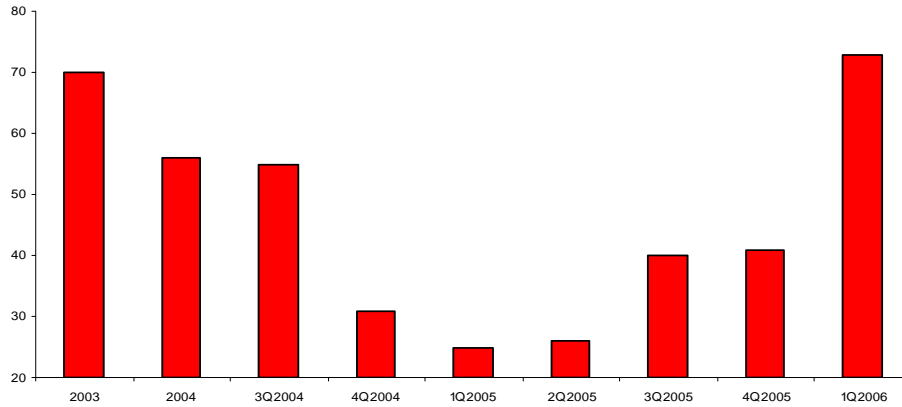
- 292 bed pediatric hospital in Little Rock
- 65 bed (normal census > 70 neonates) Level IV Neonatal Intensive Care Unit
- There are 700 Admissions annually
- Admissions to unit for respiratory distress in premature newborn and surgical services such as neurosurgery, cardiac and general surgery
- Admitted patients are transferred from other hospitals
- Average length of stay is 22 days

- Neonates are especially vulnerable to severe disease caused by MRSA
- Outbreaks due to MRSA in the NICU can be prolonged and difficult to control and eradicate the isolate from the unit
- MRSA is the most common antibiotic resistant pathogen in our NICU
- In summer of 2006 – average census of 10 patients with MRSA daily

MRSA hospital infections by location



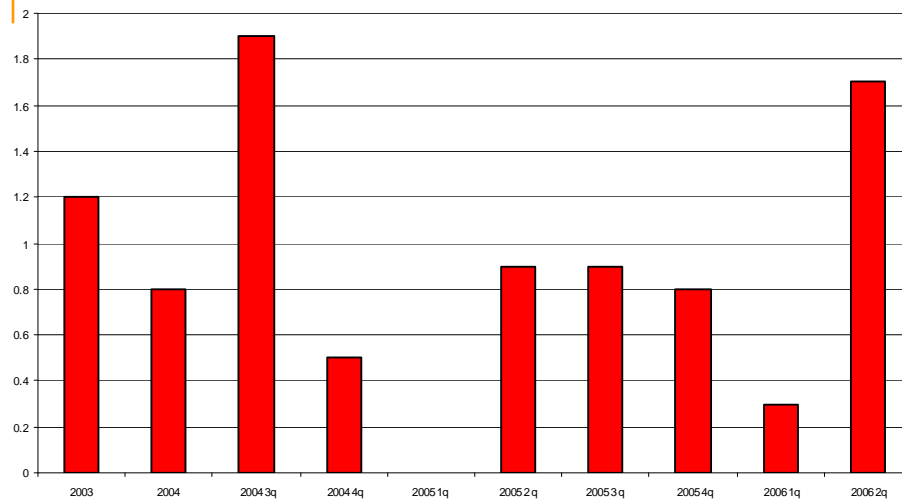
% of Staphylococcus aureus that are MRSA



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MRSA infection rate/1000 NICU days



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- The goal was to reduce the colonization rate of MRSA to less than 30% in a quarter and
 - To reduce the infection rate to less than 0.5/1000 NICU days in a quarter.
 - Success equals less than one new MRSA infection per month
 - These goals are to be accomplished by 4th quarter 2007.

Resources and Project Team

- Commitment from Medical and Nursing leadership
- Use of surveillance data to determine scope of problem and success of interventions
- Commitment from Microbiology laboratory to increased workload

Resources and Project Team

- NICU Interdisciplinary Practice and Safety “NIPS” Team – Team Leader is clinical instructor, medical director & nursing director of NICU, infection control, staff nursing and respiratory care, social work, patient care techs, environmental services, OT/PT and neonatologist working on patient safety issues

MRSA control recommendations – Brainstorming list in October 2006

1. Continue to cohort infected or colonized patients on gown/glove isolation
2. Optimal use of hand hygiene – mentoring by nursing and physician leadership
3. Use of scrub brushes for staff upon start of shift
4. Culture upon admission anterior nares or NP or skin
5. Bathe weekly (if medically acceptable) with chlorhexidine or other acceptable solution
6. Use mupirocin in the anterior nares for 3 days on culture positive
7. Require 2 negative cultures before discontinuing isolation
8. Monthly point prevalence culture to determine status of MRSA
9. Ask Radiology, OT, PT, other services to round last on MRSA group
10. Monthly move at least half the POD area with MRSA to clean

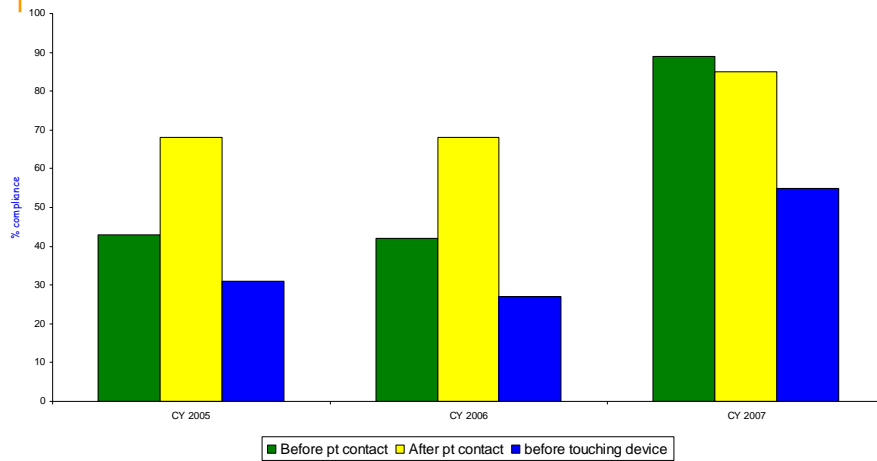
MRSA control efforts

1. Continue to cohort infected and colonized patients with gown/glove isolation - **patients are kept on one section of the NICU POD 8**
2. Optimal use of hand hygiene – mentoring by nursing and physician leadership - **feedback in winter of NICU compliance with hand hygiene observations, new products introduced – soap, alcohol foam and gel plus compatible lotion**
3. Active Surveillance culture upon admission from anterior nares or NP or skin - **Less than 2% of admissions are MRSA positive; Microbiology department has \$25,000 in charges in 8 months**
4. Cleaning the patient area and removing all supplies when patient is discharged or transferred from isolation.

Five Key Interventions – rank order in NICU

1. Contact precautions for infected and colonized patients
2. Hand hygiene
3. Active surveillance cultures
4. Decontamination of the environment and equipment
5. Compliance with Central Venous Catheter and Ventilator Bundles

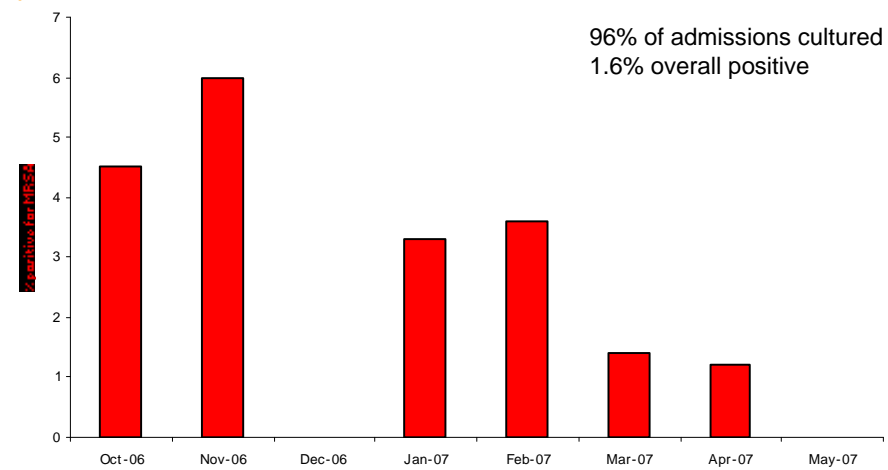
Hand Hygiene Compliance



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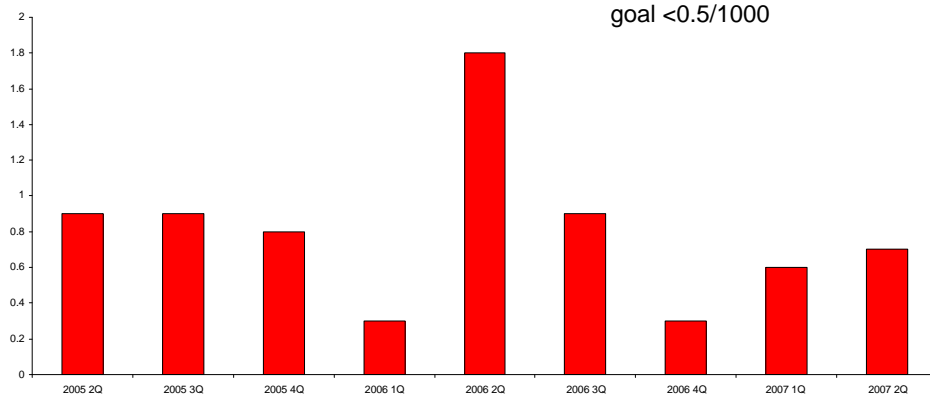
MRSA admission culture October 06 - May 07



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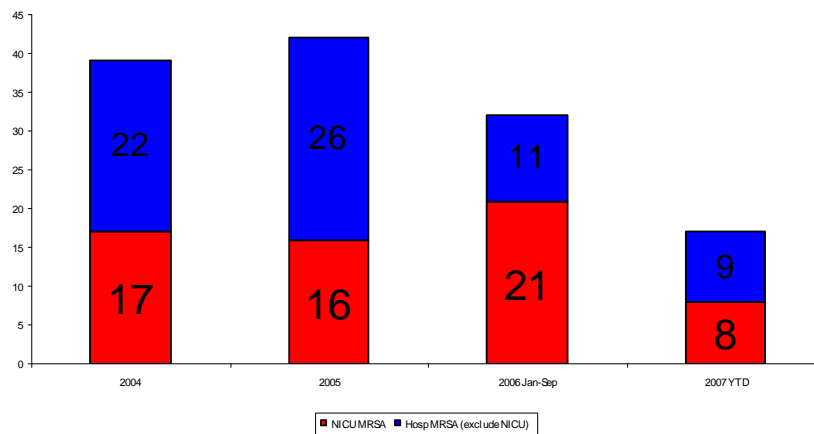
MRSA infection rate/1000 NICU days



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MRSA hospital infections by location



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Acknowledgements

- NIPS Team Leadership – Dana Fugitt, Lisa Adams, Rob Lyle and Tonya Marotti
- Michele Honeycutt infection control
- Toni May and ACH microbiology laboratory staff
- NIPS Team

MRSA in the Pediatric Intensive Care Unit: the tip of the iceberg

Aaron Milstone, M.D.

Assistant Professor

Johns Hopkins University School of Medicine



About Us

- Johns Hopkins Hospital – 1000 beds
 - Embedded 175 bed Children's Center
 - 26 bed PICU
 - >1600 admissions per year
 - Surgical and medical patients
 - Average length of stay ~3.5 days

Why this project?

- There is a paucity of literature on the epidemiology of MRSA carriage and infections in hospitalized children
- Routine active surveillance cultures enable early identification and isolation of MRSA carriers
- Many children's hospitals estimate MRSA prevalence and incidence rates using results from routine clinical cultures in the absence of surveillance cultures

Project Aim

- To determine the burden of MRSA in our PICU
- To determine if clinical cultures reflect the MRSA reservoir in the PICU
- To evaluate whether performing active surveillance cultures for MRSA significantly improves detection of MRSA carriers in the PICU

Key Resources and Project Team

- Nursing Staff
 - Champion to help ensure cultures were obtained
- Microbiology laboratory
 - Accommodated additional work load
 - Ensured adequate materials

Initial Screening

- Obtained monthly nasal surveillance cultures from all patients in the PICU
- Compared 2001 and 2006 data
 - 4 fold increase in MRSA prevalence

Changes Tested and Implemented

- Weekly nasal surveillance cultures of all patients in the PICU
- 16 week pilot
- 98% compliance

Results – MRSA rates

	Clinical cultures	Clinical and surveillance cultures	Rate Ratios (95% CI)
Prevalence per 1000 patient days	4.7	8.6	0.55 (0.24-1.2)
Incidence per 1000 patient days	2.1	6.4	0.33 (0.09-0.96)

Milstone et al. SHEA 2007

Results – Isolation Days

	MRSA
Newly identified patients	10
Total isolation days during study period	246
# additional isolation days resulting from positive surveillance culture	59 (mean 5.9 range 0-14)
Percent increase in isolation days resulting from positive surveillance culture	24%

Milstone et al. SHEA 2007

Results

- Prevalence rates of MRSA in the PICU are increasing
- Clinical cultures may significantly underestimate the burden of MRSA in the PICU

Lessons Learned

- Surveillance on some capacity is important to identify and control the problem and to evaluate interventions
- Need support from:
 - Unit staff
 - Microbiology laboratory
 - Administration

Sustaining Results

- Need a unit champion
- Feedback the data

Considerations

- Important to know your local MRSA epidemiology
- Lack of data in children
- NICU
 - Prolonged length of stay
 - Known impact of MRSA
- PICU
 - Potentially high admission prevalence
 - Undefined impact of MRSA

Five Key Interventions

1. Hand hygiene (standard precautions)
2. Contact precautions for infected and colonized patients
3. Active surveillance cultures (ASCs) (frequency?)
4. Decontamination of the environment and equipment
5. Compliance with Central Venous Catheter and Ventilator Bundles

Acknowledgements

- Co-authors : Xiaoyan Song PhD, Claire Beers RN, Ivor Berkowitz MD, Trish Perl MD MSc
- Karen Carroll MD and JHH microbiology laboratory
- Tim Townsend MD
- Alex Shangraw MPH, Kathleen Speck MPH, and the JHH HEIC group

Questions & Discussion

Press 01 (zero one) to ask a question

If your question has been asked, or to remove yourself from the queue, press 02 (zero two)

Resources

Visit www.aap.org, www.chca.com,
www.childrenshospitals.net, www.nichq.org or
www.ihl.org for copies of today's:

- Webcast Recording
 - Presentation
 - How-to Guides
- Pediatric Supplements
- Speaker Biography

To learn more about The Kids' Campaign and the 2007 Pediatric Webcast Series including information on upcoming topics and how you can share your success stories contact: Deborah Boetig at 913-262-1436 (ext 198) or deborah.boetig@chca.com.

2007 Pediatric Webcast Series

- *July 11 - Preventing Harm from High-Alert Meds*
- *July 25 - Reducing MRSA Infections*
- *August 8 - Getting Boards on Board*
- *August 22 - Reducing Surgical Complications/Surgical Site Infections*
- *September 5 - Preventing Pressure Ulcers*
- *September 26 - Deploy Rapid Response Teams*
- *October 3 - Prevent Adverse Drug Events*
- *October 17 - Prevent Ventilator-Associated Pneumonia*
- *October 31 - Prevent Central Line Infections*

All calls are scheduled at noon eastern; 11am central; 10am mountain; 9am pacific

Speakers' Bio & Contact Info

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- Craig Gilliam received his Bachelor of Science in Medical Technology from the University of Arkansas for Medical Sciences. He is Director of Infection Control at Arkansas Children's Hospital. He has worked in infection control for 25 years with an emphasis on strategies to reduce catheter bloodstream infections in critical care units. In 2004, he was team leader when ACH was recognized by Child Health Corporation of America (CHCA) as recipient for RACE for Results: REDUCING CATHETER RELATED BLOODSTREAM INFECTIONS THROUGH REPEATED RAPID CYCLE IMPROVEMENTS.

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- Aaron Milstone graduated from Washington University in St. Louis with a B.A. in Political Science. After receiving his medical degree from Yale School of Medicine, he continued his training in pediatrics at Children's Hospital of Philadelphia. He came to Johns Hopkins University in 2004 to complete a fellowship in Pediatric Infectious Diseases, and he recently joined the faculty. His interests in healthcare epidemiology and infection control led him to pursue clinical research targeting healthcare-associated infections in children. His current research interests include the epidemiology of MRSA and VRE in the hospitalized children, focusing on novel interventions to prevent healthcare-associated transmission, and modifiable risk factors for pediatric surgical site infections.

Speakers' Bio & Contact Info

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- Glenn Billman completed a combined Bachelors/Masters program of study at Stanford University in 1979, and received an M.D. degree from the University of California at San Diego in 1983. His postgraduate training in Anatomic and Clinical Pathology was also received at UCSD. In 1986, He joined the pathology faculty at Children's Hospital and Health Center in San Diego where he held the position of Associate Director of Pathology for 14 years. In 2000, he was accepted as a fellow at CHHC's Center For Child Health Outcomes. In 2001, after the completion of this fellowship, he served as CHHC's Medical Safety Officer. In 2004 – Glenn became the Director of Patient Safety at Children's Hospitals and Clinics of Minnesota. As the Director of Patient Safety he is responsible for both the strategic and operational activities of the Office of Patient Safety.