Safety, standardization lower CLABSI rates

Hospital reduces central line infection rate by 65 percent

Standardized practice and new safety measures have reduced hospital-wide central line-associated bloodstream infection rates at Le Bonheur Children’s by 65 percent from 2011 to 2012. The improvements have helped protect children in the hospital’s Pediatric Intensive Care Unit and Cardiovascular Intensive Care Unit from central line-associated bloodstream infections for more than one year. Other inpatient units saw additional reductions in infections.

Infectious Disease Specialist Steve Buckingham, MD, says many things contribute to the reduction in CLABSIs, the most important being a culture change.

“At one time, CLABSIs were considered unfortunate but inevitable in seriously ill patients. Today, attitudes are different, and hospital-acquired infections, including CLABSIs, are largely considered both unacceptable and preventable. This cultural change has been gradually instilled through the ongoing, ‘behind-the-scenes’ interventions of our Quality Improvement and Infection Prevention departments and through the determined efforts of medical staff and other hospital leaders to eliminate this problem,” Buckingham said.

The hospital had a 1.03 CLABSI rate for 2012 (central line per 1,000 line days); Le Bonheur’s PICU and CVICU achieved a rate of 0.44 against a national benchmark of 1.85.

Le Bonheur physicians and clinicians attribute much of the success in CLABSI reduction to a handful of standardized practices and measures, including:

- Initiated daily line real-time insertion checklist
- Initiated daily line assessment with measurements and reporting mechanism
- Standardized line care
- Daily line necessity review
- Reinforced pristine dressings
- Root cause analysis and event timelines for all CLABSIs
- Antibiotic Stewardship Program
- Standardized “scrubbing the hub” at each use with 70 percent alcohol

Le Bonheur Children’s intra-operative MRI (iMRI) is credited with helping neurosurgeons reduce returns to the operating room for residual tumor by 84 percent in two years. The iMRI, which can provide structural brain images without moving the patient from the surgical table, opened in the hospital’s neurosurgical suite in February 2011.

Rates improved from a baseline of 6.98 per 100 cases in 2010 to 1.29 per 100 cases in 2012.

Le Bonheur is home to the nation’s largest pediatric surgical brain tumor program. The program — a partnership between Le Bonheur and St. Jude Children’s Research Hospital — has grown 48 percent in the past two years. In 2012, 155 children underwent brain tumor surgery at Le Bonheur.

“iMRI is an invaluable tool for me,” said Paul Klimo, chief of the Division of Pediatric Neurosurgery at Le Bonheur Children’s and the University of Tennessee Health Science Center. “We are now able to leave the OR with the knowledge of whether a tumor was completely resected or not. If not, then it is because what remained was deemed unresectable. Almost all of my tumor operations are done using it. I’ve also used it to demonstrate complete resection of arteriovenous malformation (AVM) and in tumor biopsies.”

In 2012, 47 percent of Le Bonheur’s brain tumor surgeries were performed using iMRI – and none of those surgeries required returns to the OR for residual tumor. In addition, the iMRI also eliminates the need, in many cases, for additional sedation or additional surgeries.

Dr. Klimo and Chairman of the Department of Neurosurgery Rick Boop, MD, also attributes Le Bonheur’s high level of care to the brain tumor team – from caregivers in the pre-operative area to those in the new Neurosurgical Intensive Care Unit.

“Dr. Boop and I couldn’t do what we do in the OR without having a great team outside the OR,” Klimo said. “That extends to our colleagues at St. Jude [Children’s Research Hospital] – radiologists, medical oncologists, radiation oncologists,” Klimo said.
Physicians work to establish best practices for patient safety

Children's hospital collaborative works to improve care

Le Bonheur physicians are developing best practices that will improve patient safety at the hospital and in other hospitals across the country.

Physician leaders, and their nursing and ancillary colleagues, are focused on reducing hospital-acquired conditions in nine key areas, including:
- Adverse drug events
- Catheter-associated urinary tract infections
- Central line-associated blood stream infections
- Injuries from falls and immobility
- Pressure ulcers
- Venous thromboembolism
- Ventilator-associated pneumonia
- Surgical site infections
- Serious safety events

As part of the Ohio Children's Hospitals' Solutions for Patient Safety (OCHSPS) Foundation, the physician leaders are able to share data and identify best practices to prevent hospital-acquired conditions. Leaders can then modify Le Bonheur’s task bundles to improve safety for patients.

“We want to give the best care possible to our patients and families. It is our intent to return them home happy and healed,” said Cynthia Cross, MD, who serves as the physician co-leader at preventing injuries from falls. “Working with other children's hospitals will help us learn from the successes and shortcomings of children's hospitals on a great scale.”

I am excited about this opportunity for us all to become even better by working together.”

OCHSPS started as eight pediatric hospitals working to decrease hospital-acquired conditions. The group received a Centers for Medicare and Medicaid Services' Hospital Engagement grant to expand the effort across the country. Le Bonheur hopes to reduce hospital-acquired conditions by 20 percent and preventable readmissions by 10 percent in 2013.

Le Bonheur is also working alongside other Tennessee children's hospitals to address quality issues.

“The most important thing we can do is no harm,” said Le Bonheur President Meri Armour.

“The work we're doing will hopefully take away all harm.”

Study examines functional connectivity in TSC patients

Preliminary findings of a recent Le Bonheur study suggest functional brain connectivity analysis could be used to predict which Tuberous Sclerosis Complex (TSC) patients are likely to develop autism spectrum disorder (ASD). The study's preliminary findings have been accepted for publication in the Journal of Pediatric Neurology.

“Because we can’t see any physical differences in MRI images between children with Tuberous Sclerosis and Autism and children with Tuberous Sclerosis without Autism, we looked for differences in the way different parts of the brains of children in the two groups are interconnected functionally, that is, in what patterns they are wired together,” said Andrew C. Papanicolaou, PhD, co-director of the Neuroscience Institute.

Using magnetoencephalography (MEG), researchers examined functional brain connectivity of TSC patients in three groups: TSC patients with ASD, TSC patients with no signs of ASD and typically developing children. Analyses so far suggest that patterns of resting brain activation, in the form of connectivity networks, may possess the characteristics of neurophysiological markers that could differentiate between typically developing children, TSC, and TSC/ASD patients.

Roozbeh Rezaie, PhD, Asim F. Choudhri, MD, James W. Whelless, MD, Katherine Van Poppel, MD, and Nancy R. Clanton, PhD, also of the Neuroscience Institute, were part of the research team.
A new study published in the March issue of *Autism Research* from the University of Tennessee Health Science Center (UTHSC) and Le Bonheur researchers is making the genetic connections between autism and Chromosome 15q Duplication Syndrome (Dup15q). The Memphis researchers determined that the maternal derived or inherited duplications of the region inclusive of the UBE3A gene (also known as the Angelman/Prader-Willi syndrome locus) are sufficient to produce a phenotype on the autism spectrum in all ten maternal duplication subjects. (N. Urraca, J. Cleary, V. Brewer, E.K. Pivnick, K. McVicar, R. L. Thibert, N.C. Schanen, C. Esmer, D. Lampot, L.T. Reiter. “The Interstitial Duplication 15q11.2–q13 Syndrome Includes Autism, Mild Facial Anomalies and a Characteristic EEG Signature.” *Autism Res.* 2013 Mar 14.)

The number of subjects was too small to determine if parental duplications do not cause autism. The team assembled the largest single cohort of interstitial 15q duplication subjects for phenotype/genotype analysis of the autism component of the syndrome.

Chromosome 15q Duplication Syndrome (Dup15q) results from duplications of chromosome 15q11–q13. Duplications that are maternal in origin often result in developmental problems. The larger 15q duplication syndrome, which includes individuals with i(15q), manifests itself in a wide range of developmental disabilities including autism spectrum disorders; motor, cognitive and speech/language delays; and seizure disorders among others. While there is no specific treatment plan, therapies are available to address or manage symptoms.

Previous research suggests that as many as 1,000 genes may contribute to autism phenotypes, but as much as 1–3 percent of all autism spectrum disorder cases may be a result of 15q11–q13 duplication alone.

The researchers also found through EEG evaluations a pattern that looks like the type of signal you see when individuals take GABA promoting drugs (benzodiazepines). The lead researcher on this study, Lawrence T. Reiter, PhD, says this signal gives clinicians a clue about what types of anti-seizure medication may be most useful in children with 15q duplications.

Reiter says genetic testing can help families connect to resources, like the Dup15q Alliance. Reiter is an associate professor in the Department of Neurology with an adjunct appointment in Pediatrics at UTHSC.

“If a pediatrician suspects autism due to hypotonia and developmental delay, I highly recommend they order an arrayCGH test. Duplication 15q is the second most common duplication in autism. The test will help families in future treatments specific to this sub-type of autism,” he said.

Nora Urraca, MD, PhD, was the lead author on the study. Neurologist Kathryn McVicar, MD, and Geneticist Eniko K. Pivnick, MD, were part of the research team. The study was funded by the Herbert and Mary Shainberg Neuroscience Fund.
Researchers study bed alarms for nocturnal seizures

Seizures that occur during sleep are particularly concerning to parents of children with epilepsy. The risk of death can be decreased with nighttime monitoring or supervision. Several products are available that claim to reliably detect seizure activity without frequent false alarms.

Le Bonheur’s Neuroscience Institute is the only center to review all three of the bed alarms on the market for home use. Two of the studies are complete, and the third is underway. Patients in Le Bonheur’s Epilepsy Monitoring Unit were enrolled in the studies.

“With all of the seizure alarms on the market, it may be difficult for families to decide which one would fit their needs. The goal of evaluating the available models is to provide more information to families who have children with epilepsy. They should then be equipped to make an educated decision on which alarm would be best for their children,” said Neurologist Stephen Fulton, MD.

The first study was “Prospective Study of 2 Bed Alarms for Detection of Nocturnal Seizures,” which was published in the Journal of Child Neurology in October 2012. This study reviewed two models of the Medpage bed alarm. The researchers, led by Fulton, found that these products do not adequately detect nocturnal seizures.

The second study, “Prospective Study of the Emfit Movement Monitor,” was accepted for publication in the Journal of Child Neurology. In this research, the Emfit movement monitor proved to perform better than the Medpage bed alarms. The Emfit detected 84 percent of nocturnal tonic-clonic seizures. The team, led by Kate Van Poppel, MD, added that advancements in these alarms to detect respiration or heart rate may improve the ability to detect seizure events.

The third study that is now underway involves the Smart Watch, which uses a watch-like device to detect excessive and repetitive movement and signal a family member’s Android smart phone.