

# Central Line Associated Blood Stream Infection Reduction in the NICU

## A Tennessee Initiative for Perinatal Quality Care Collaborative Inter-institutional Improvement Project

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CLABSI Reduction in the NICU:  
A TIPQC Inter-institutional Improvement Project Toolkit

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CPQCC HAI Bundle\*\*

\*Available to TIPQC teams as part of the project package.

\*\*Available on the CPQCC website at:

[http://www.cpqcc.org/quality\\_improvement/qi\\_toolkits/hospital\\_acquired\\_infection\\_prevention\\_rev\\_march\\_2008](http://www.cpqcc.org/quality_improvement/qi_toolkits/hospital_acquired_infection_prevention_rev_march_2008)

### Note on the 3/31/11 version:

This is a pdf of the toolkit used in the TIPQC CLABSI Reduction project that started statewide spread in January 2010. Participating teams achieved their aggregate Aim of 50% reduction in CLABSI episodes in mid 2010. Control limits have been modified downward as the aggregate CLABSI rate improved. The most current publicly released data is available at:

<http://www.tipqc.org/projects/clabsi-project/progress-report/>

During the course of pilot testing and statewide implementation a number of modifications were made. These have been added in italics and annotated with a version date in the pdf that follows. The membership of TIPQC would again like to recognize and thank CPQCC for their extraordinary toolkit, and for their help in launching TIPQC in 2008. We are pleased to share our minor additions to their bundle and modifications in approach in the same collaborative spirit that they have shared with us.

This toolkit is not intended as medical practice guideline or as a description of a standard of care. Rather it is compilation of evidence-based practices and implementation approaches that may assist teams in their ongoing efforts to improve care for infants and mothers. As with all such efforts, individual teams are responsible for carefully monitoring their own outcome and balancing measures as they seek improvement.

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## Executive Summary

Central Line Associated Blood Stream Infections are a recognized source of excess morbidity, mortality, costs, and length of stay. Multiple reports have described successful reduction in CLABSI rates in adult and pediatric ICUs by systematic application of evidence-based practice in the context of a collaborative, multi-center quality improvement project. Similar success has yet to be demonstrated in the neonatal ICU. (*No longer, see Pediatrics March 2011, v3.31.11*)

While the NICU patient is not “sicker,” this population inherently presents additional challenges that make reduction in CLABSI rates more difficult. Foremost among these challenges are the immaturity of the neonatal gut and immune system, the frequency of maternal infection as an antecedent contributor to NICU admission, and the duration of central line dependence. Daunting though these additional challenges are, reduction in CLABSI episode frequency has been demonstrated in Tennessee NICUs (see Forward from East Tennessee Children’s.) This TIPQC toolkit is designed to facilitate the spread of successful strategies employed at ETCH and other contributing NICUs in order to minimize CLABSI frequency statewide.

The experienced Infection Control and Quality Improvement Professional will see little that is new in this toolkit. However a number of points from this toolkit warrant highlighting:

- Focusing on malleable measures with proven motivational value to end-users is essential
- Incorporating balancing and safety measures addressing specific neonatal risks reduces provider resistance to participation
- Successful efforts uniformly have high-level unit and hospital support to rapidly execute changes identified by end-users as needed to support success

The full TIPQC toolkit is available for your review online at [www.tipqc.org](http://www.tipqc.org). The toolkit is based on the California Perinatal Quality Collaborative HAI Reduction Bundle which was reviewed by the TIPQC expert committee and modified based on input and experience from the 4 TIPQC Pilot Centers. Without question, this project is a team effort, and we need your participation.

Substantial improvements in CLABSI rates are possible in this challenging population, especially when we share what works. The members of TIPQC look forward to adding your center’s energy, enthusiasm and expertise to this important statewide effort to improve outcomes for infants in Tennessee.

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Version 4/8/11

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Visit <http://www.tipqc.org/projects/clabsi-project/> for updates.

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## Forward

The Hippocratic oath has us promise one fundamental objective, "Above all, do no harm." It is the foundation from which we practice medicine every day, right? I invite you to think about this for a moment. Advances in medical technologies are allowing us to save tinier and more critically ill newborns than ever before. For each and every lifesaving action there is the risk of a potentially lifelong side effect. Our patients are absolutely defenseless and unable to protect themselves. Newborn are the only humans that enter into the healthcare system never having established an immune system. In the case of the extremely premature infant the integumentary system is not developed enough to provide a first line of defense. The intestinal tract is also significantly lacking in its ability to provide protective enzymes to support the immune system. These factors alone allow us to justify that a nosocomial infection, although undesirable, is somewhat unpreventable. Unfortunately, that's the cost of doing business. This is where I challenge you to look inside your practice and ask if this attitude is really one of, "... do no harm?"

Let's look at the cost in reference to the Central Line Associated Blood Stream Infection (CLABSI). There are huge costs to the individual, the families, the institution, and the health care system. The average cost of a blood stream infection is \$39,219\$ per case. (Elward et al.; 2005) According to the Children's Health Corporation of America there are an estimated 200,000 CLABSIs in the United States annually. That's a staggering 7,843,800,000 health care dollars annually. There are other costs as well.

There are the physical, mental, and emotional costs to the family. A CLABSI and associated morbidities can further strain the already fragile relationship between the family and the medical team. Time and trust are lost. Most importantly, is the potential cost to the baby. Potential for barotrauma from ventilator support, vascular and cellular damage from oxygen toxicity, and potential for auditory and organ damage from antibiotic therapy. There may be setbacks in the feeding process that further compromise the immune system and threaten brain growth. A CLABSI presents more than just the immediate expense; it presents an expense the infant may be paying for the rest of its life. We must, as health care providers, challenge ourselves everyday to reach beyond the immediate life saving practices and look toward the outcomes.

One real way to improve outcomes is to eliminate the occurrence of catheter related blood stream infections. Impossible? Maybe. We cannot and do not successfully resuscitate every patient every time. Does this mean we don't try? At East Tennessee Children's Hospital we decided we were no longer going to accept a Central Line Associated Blood Stream Infection as the cost of doing business. So began our journey on "*The Road to Zero*", a lofty goal to eliminate all Central Line Associated Blood Stream Infections. Why zero? Well, have you heard the saying, "Shoot for the Moon, even if you miss you will land among the Stars?"

Navigating the *Road to Zero* infection rates can be as exciting and daunting as a cross-country trip from Main to Southern California. It is a huge undertaking, time consuming, with lots of stops on the way. As with any long journey the key is to do your research, have a plan, and be prepared. When we started our journey down the *Road to Zero* I would say it was more like the Beverly Hillbillies jumping in the old wagon with a map no one knew how to read. Yet somehow despite ourselves we still made it to Beverly Hills. This toolkit is designed to be your trip planner with the extensively researched and evidenced based California Perinatal Quality Care (CPQCC) toolkit, your road map.

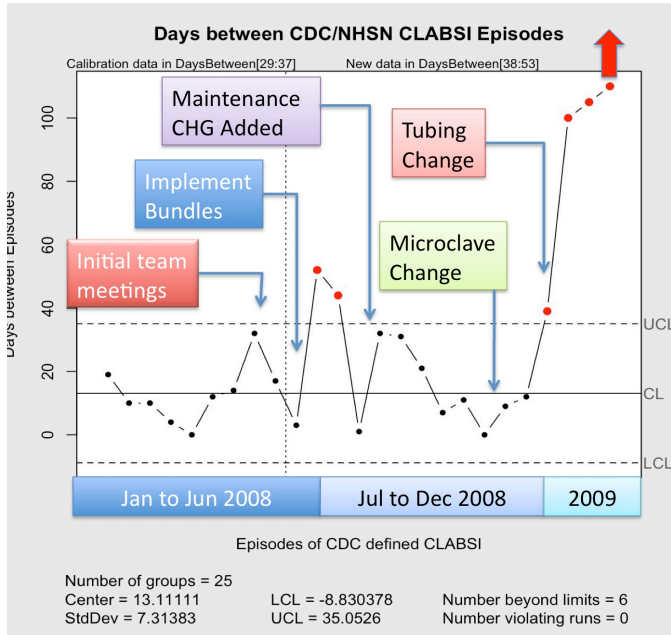
Our journey began in October 2007. The state mandated that all hospitals must add daily assessment of necessity for central lines. There was push back from our physician group. Over the next two months our Critical Care Director, Sheri Smith, searched for supportive rationale to convince the physicians that the state was not trying to control them but rather help them provide better care. This is how she stumbled across the CPQCC toolkit. In January 2008 she took two others from administration, the Infection Control director and the Director of Quality Management, to the kickoff for The Tennessee Hospital Association (THA) Patient Safety Center. This is where they first heard Dr. Peter Pronovost speak, and the quest began. In March, she paved the way for several others including nursing management, frontline staff, and myself to attend another TN Patient Safety Center regional meeting. This is where I became engaged. Although it was mostly adult in focus we were intrigued with one ICU who had sustained no Central Line infections over a 2-year period. The seed was planted. Why can't we do this in the NICU? So we sent a larger group, mostly frontline staff, to the TN Patient Safety Center State meeting. After hearing Dr. Pronovost and Mrs. Sorrell King speak, the passion was ignited. This group of fired up frontline staff went home to spread the word and sit down to work. We held weekly multidisciplinary meetings, which included the presence of our Critical Care Director. This brought further importance and visible support from our hospital's administration. RNs, LPNs, RTs, (from both shifts) NNPs, Infection Control, and nursing management were all included. We partnered with our PICU who was already making practice changes. In our attempt not to be left behind, mass chaos ensued. We were forced to stop, back up, and read the road signs. It turns out that although the PICU and NICU were headed to the same destination, there were different routes we needed to take. So, we sat down with our maps, the CDC and NHSN guidelines and the CPQCC toolkit, and began to find our way.

Let me preface by explaining what kind of vehicle we are driving. We are not the biggest NICU (stretch limousine) and we are not associated with a prestigious teaching institution (Ferrari). Indeed we are more like the family mini van. We are a not-for-profit forty-four bed level III NICU in a stand alone Children's Hospital. We average 600 admissions a year with an average daily census of thirty-six. Employing nearly 200 staff members in the NICU lead by a medical team of seven neonatologists and four neonatal nurse practitioners. All of our babies are out born with over 50% coming from a regional perinatal referral center across the street. The rest of our babies come from within a two-hour radius and are transported by our specialized NICU transport team and ambulance. We keep all babies from the 23-week micro preemie to the general surgical and neuro surgical infants. The only children we transport out are cardiac surgeries. The majority of our families are dependent on the government for health care assistance. There are a large number of high-risk mothers including teens, substance use, those with limited resources, and no prenatal care.

In 2008 we had 609 central lines placed for 3859 line days with 20 central line infections. The initiative began in June of 2008. Many changes were made at once and mass chaos followed. Much like starting on a trip and never reading

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the map. We missed turns, had to back track, and often times turn around and ask for directions. (CDC, NHSN, and the CPQCC toolkit) However, by December 2008 we were headed in the right direction. The entire time we kept track of the days between line infections with a white board in the middle of the NICU. This proved to be fuel to keep the passion fire burning. Now the staff was taking it to heart. Everyone could see it, staff, parents, consultants, and administration. It expressed our willingness to improve. Never underestimate the power of true transparency.



**Figure 1 Days between CLABSI Episodes. Episodes based on 2008 CDC/NHSN definition. Higher numbers indicate improvement.**

disciplines that might come in contact with your central line. Traveling many miles without further incident we reached our "100 day" mark and celebrated with a big party! We set off on the next leg of our trip feeling confident and moving toward the "200 day" mark when after 126 days we ran into a detour in the form of our next CLABSI. It was an old term post gastrochisis infant with short gut syndrome who encountered an E-coli infection in a 96-day-old broviac located near her ostomy site. In a moment of "are we there yet" boredom she found entertainment in ripping off her ostomy bag and then grabbing her broviac. (Talk about your unruly children in the car.) Lesson learned: Placement in the car is everything. Broviacs and ostomy sites do not play well together, keep them separated. Our most recent CLABSI came 48hrs after a sentinel event involving a broviac. This has been as emotionally devastating to our team as having a major motor vehicle accident. We have had to stop, look around, survey the damage, and discover what part we played that led to the accident. It was a humbling process to say the least. Lesson learned: Never get distracted while driving.

I am happy to report we are back on track with renewed hope and energy. The vehicle has been examined and necessary repairs have been made. Our trip so far has included greatest distance between CLABSI events of 126 days. We have reduced infections by nearly 70% since the start of our initiative. Most importantly the attitude in the car has changed. The culture in our NICU is now one of change for positive outcomes. Staff are engaged and interested in taking a good hard look at our outcomes and then looking at what we can do to improve them. A second project has already been launched. It is a comprehensive Oxygen Management protocol to reduce Retinopathy of Prematurity and other potential long-term side effects of hyperoxemia. This has gone as smoothly as a trip across town despite the major roadblock of having to deconstruct the way in which people have viewed oxygen use. The reason? We learned from our mistakes.

Undoubtedly the single most important factor for success is the willingness to be transparent. We must sit down together as a multidisciplinary team and look at what responsibility we each own and then admit we can do better. We must be willing to share our data within a group, within a community, across the state, and across the country. Reject the idea that complications are the "cost of doing business". We must reduce that cost, whatever the cost.

It's not just about saving lives; it's about improving outcomes.

If an infection occurred we held a focus group within 48hrs. Staff from both shifts that cared for that infant 48hrs prior to the infection was invited to attend. At first they were scared and thought it was punitive in nature. Quickly they realized this was a problem solving meeting to see where we could and should make changes. These focus groups proved to be golden. Staff began to open up and feel safe to state the problems. Quintessential to this process was follow-up. We took immediate action to fix problems, provide clarification, and provide support. The staff began to feel empowered. I sent out weekly emails of support, praise, and gratitude for all their hard work. I would give updates on how we were doing and when we faltered I would encourage them to never give up. The teamwork was unbelievable.

From January through July 2009 we have placed 249 central lines for 1870 line days with 3 CLABSIs or 1.6/1000 line days. The first case was a 595gm 24wk micro preemie twin with umbilical lines and a PICC. The infant under went a PDA ligation in the NICU due to severe cardio respiratory instability. During this time the baby was in the surgical team's care and they were not educated on the initiative. Lesson learned: Make sure all potential drivers have read the map. Involve and educate all

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## Toolkit

This toolkit is a collection of evidence based practices based on the California Perinatal Quality Collaborative's HAI Reduction Bundle- March 2008 Revision ([www.CPQCC.org](http://www.CPQCC.org)). TIPQC gratefully acknowledges the collaborative work of CPQCC in developing and revising this remarkable detailed work, and CPQCC's willingness to share this resource. Any success realized from this toolkit is in part due to the generosity and collaborative spirit of CPQCC.

To CPQCC's bundle, the 4 pilot centers have added a wealth of practical experience in implementing these practices in Tennessee. All 4 stand ready to assist your unit in implementing this toolkit, asking only that you in turn agree to share your experience with other units who are likewise working to improve their portion of our statewide perinatal healthcare delivery system.

This toolkit is intended for application in conjunction with a series of statewide learning sessions and at TIPQC regional meetings and webinars. Like our admission temperature project, we recognize our members have a broad range of needs and existing resources dedicated to reducing hospital acquired infections. Accordingly, this toolkit is presented as a menu of potential changes for participating units to consider in the context of the local needs, culture, and resources. The toolkit can be implemented as a bundle where all interventions are undertaken simultaneously. Alternatively, many units may find they are already implementing a substantial number of these interventions, and may therefore find a selective menu selection approach is more appropriate. The TIPQC office is available to discuss local implementation strategy with project leaders/champions as needed.

Unlike the TIPQC Admission Temperature project, the CLABSI reduction project also provides web-based data entry through REDCAP. REDCAP data entry will help each center organize data entry and easily generate on-demand run charts and control charts of your data once entered. Additionally, as all centers participate, automated on-demand comparison to the most current project wide aggregate will be possible. Again, we recognize there are a variety of needs and existing resources to address each unit's data requirements for this project. Full implementation will provide end users with the ability to follow daily clinical trends to manage project implementation while automatically generating key project outcome and balancing measures and reports. Partial implementation may be an optimal strategy for units with existing data structures and processes that meet the units data needs to manage project implementation. Minimal implementation may be an appropriate strategy for units who currently have very low CLABSI rates, and whose existing data collection strategies are sufficient to provide the minimal data required for participation in statewide data aggregation. Balancing the cost vs. value of data collection in a QI effort is challenging and the TIPQC office is available for consultation as units consider this decision.

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## TIPQC CLABSI Reduction Project

**Aim:** The aim of this project is to eliminate central line associated blood stream infections in participating NICU's. At present, it is unknown whether complete elimination is possible, however reduction in CLABSI episode frequency is clearly possible, and the immediate aim of this project is to reduce the frequency of CLABSI episodes in participating NICUs by 50% within the first year.

**Charter:** Multiple groups have demonstrated that a substantial reduction in CLABSI frequency is possible in adult and pediatric ICUs. The cost in morbidity and mortality of these episodes is well documented. Accordingly, stakeholders represented at the March 2009 TIPQC State Meeting voted to develop a data-driven toolkit to support a statewide perinatal quality improvement project aimed at reducing CLABSI rates in Tennessee NICUs.

### Measures:

CLABSI/1000 line days (unit wide and by CDC birthweight groups)

Days between CLABSI events (unit wide)

Standardized Infection Ratio (CDC/NHSN as calculated by TN DOH, normalized to *unit* reporting period preceding TIPQC project implementation.) (This measure was utilized as an independent external measure of project outcome and is reported by the DOH HAI section. V3.31.11)

Mean dwell time all catheters (Not yet released. V3.31.11)

Mean dwell time prior to CLABSI (Not yet released. V3.31.11)

Successful Central Lines (Central lines without associated infection) (Eliminated by Pilot Group. V3.31.11)

Successful Central Line Days (Total central line days without CLABSI) (Divided into two measures by participants at Statewide kickoff, CDC/NHSN line days between episodes, and all line days between episodes (Mark Anderson, UT Knoxville). V3.31.11)

### Balancing Measures:

Non-CLABSI BSI rate

Necrotizing Enterocolitis rate (radiographic pneumatosis or exploratory laparotomy)

Cholestasis (D bili>2.0) rate

Osteopenia of Prematurity rate

Growth velocity (gm/kg/day) over catheter dwell time (Not yet released. V3.31.11)

### Definitions agreed to by the pilot centers August 11, 2009:

CLABSI: blood culture meeting the CDC/NHSN definitions (August 2009)

BSI: any positive blood culture

Central Line: CDC/NHSN definitions (August 2009) based on location of line tip (Pilot centers recognized the use of so-called midlines or deep peripheral catheters. These vascular devices do not meet the CDC/NHSN definition, however they are used like Central Lines. Infection associated with midlines can be captured under infection, non-CLABSI.)

Target population for reduction in CLABSI: Infants admitted to the NICU who develop positive cultures at greater than 48 hours of age. (Rational: In the first

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48 hours of life, distinguishing between maternal transmission, intrapartum transmission and nosocomial transmission is not possible with current techniques.)

## TIPQC CLABSI Reduction Toolkit: Getting Started

The first step is an institutional decision to support the NICU in a systematic effort to reduce CLABSI episodes. Early identification of a clinical project champion to lead the change team and an administrative project champion who will publicly sponsor the effort is a critical demonstration of a core commitment to improve outcomes.

Once a project leader or clinical champion is identified, the next step is formation of the primary improvement team consisting of 5-7 end-users and stakeholders. Team members may include RN's, NNPs, ICPs, physicians, family members and other stakeholders as appropriate. This group needs to be supported to commit to frequent meetings, at least weekly at first, though once implementation is in progress meetings may only be needed monthly to review progress. This group also needs a clear administrative charter to study and improve upon the existing system that is responsible for current results. This charge is usually best delivered by an administrative champion who meets periodically with the improvement team, to reiterate the institution's commitment to the project, provide resources, and ensure accountability as work progresses.

Successful data-driven projects usually require the improvement team to gather baseline data on current processes and outcomes before implementing changes. Once existing process performance and outcome are quantified, the team is prepared to make a data-driven decision on which change to implement first. Upon review of the TIPQC toolkit and CPQCC bundle, many teams will find their unit already incorporates many items from the menu of evidence-based changes to consider (below). Additionally, analysis of baseline data often reveals substantial variation in the execution of existing practices. Thus TIPQC recommends strongly that improvement teams consider the menu of potential changes from the toolkit in the context of a data-driven analysis of existing system performance.

Following review of the toolkit and study of baseline data characteristics, improvement teams will be ready to design their first PDSA cycle. Many units will find it necessary to focus the first PDSA cycle on improving the consistency of current practices with the goal of the first cycle being reduction in process variation. Once a stable baseline is achieved, the team should evaluate their data to select additional interventions. More detailed discussions of the techniques and considerations involved in initiating and successfully executing a data-driven QI project can be found in the CPQCC bundle, on the TIPQC website, and from a host of other sources. Additionally, this topic will be addressed in the previously mentioned learning sessions and participating centers will have access to a secure project forum on the TIPQC website where participants can discuss challenges encountered during start-up and implementation. At a minimum, we recommend that all improvement teams

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review the TIPQC toolkit, and the CPQCC bundle, and have time and resources set-aside to fully participate in weekly team meetings and monthly TIPQC project webinars.

One notable opportunity for accelerated improvement in CLABSI rates has been noted in the CPQCC bundle and has been highlighted by the TIPQC Expert Review Team. The need for central lines in the NICUs is driven by the developmental immaturity of intestinal and immune function in the neonatal population. Accordingly, the key benefit derived from daily reassessing the necessity of a central line will only be realized when there is a simultaneous effort to optimize the introduction and advance of enteral feedings. At the March 2009 TIPQC meeting, members voted to also develop an independent QI project to improve the use of human milk in introductory feeds. Though challenging to execute, simultaneous implementation of both the CLABSI reduction and Human Breast Milk projects should provide substantial synergy, and optimizing processes in both domains may be required to reduce CLABSI rates in the most vulnerable patient populations within the NICU.

(Notes: Though not fully reflected in the toolkit, this project was implemented in the context of an ongoing educational effort aimed to increase unit level Quality Improvement capacity. In addition to the annual state meeting and the project kick-off meeting, two additional regional learning sessions were held each year, and monthly statewide webinars were held. Discussion of statewide aggregate data as well as center data using SPC charts was a central part of the improvement and educational efforts. TIPQC also launched an on-demand internet based QI training tool, the JIT modules, to address the perennial problem of local team members who could not attend training sessions or who joined the local team after the start of the project. These are available at <http://www.tipqc.org/jit> V3.31.11)

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## Data

The data collection forms and reports for this project were designed with three goals in mind:

1. Provide a mechanism to capture, and aggregate data that successful centers have identified as essential to success.
2. Use captured data to provide participants with reports that are readily available, interpretable and actionable by bed-side end users.
3. Collect the minimum data set necessary to drive change in a format that is readily adaptable across workflow patterns.

As is often the case, balancing the potential benefit of collecting more detailed data with the costs associated with more robust data sets is challenging. Based on input from pilot centers, 3 data forms will be used to support the central project.

1. **Patient Information:** This form contains basic demographic information- 6 fields on admission, and 2 additional fields if a transfer. Identifying information entered is only visible at the entering center. RedCAP assigns a TIPQC number, and converts dates to project weeks. When TIPQC data is queried from TIPQC, only the TIPQC number and project week are visible. At discharge 5 additional fields are added. The discharge function may be moved to a separate form depending on end user feedback. (During further pilot testing, the analysis was moved to project month, and a separate discharge entry form was added. V3.31.11)
2. **Central Line Information:** For each central line, 3 data fields are entered when the line is placed, and 4 data fields are entered when the line is removed. Balancing measures and preliminary CLABSI episodes are identified in the Central Line Information Form and in the discharge portion of the patient information form.
3. **CLABSI event form:** When a CLABSI episode is *confirmed* based on local practice, 5 fields are completed, and a pick-list of 10 possible associated conditions is completed. An optional field allowing entry of the line placement proceduralist is available. This field, like the patient identifiers, will only be visible locally and will not be transmitted to TIPQC. An optional Hospital Acquired Infection (HAI) Review Form to assist team leaders in conducting a standardized post-episode review will be available. This form will also provide a standardized HAI clinical registry to capture clinical information and systems analysis from attending **physicians**. (During the pilot phase, these two forms were streamlined into a single CLABSI episode form, and pilot centers emphasized using this form as a starting point for team debriefings following confirmation of a BSI as a CLABSI. V3.31.11)

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### Full vs. Partial vs. Minimal Implementation

Full implementation envisions collecting all RedCAP fields to allow full report generation. Partial implementation could be achieved by foregoing entry of balancing measures, and using the preliminary CLABSI episode identifier to define confirmed CLABSI episodes. This would eliminate completion of the CLABSI event report, but would require the unit opting for partial implementation to provide an alternate system for monitoring balancing measures. Minimal implementation could be accomplished for units who are satisfied with their current CLABSI performance and will not be implementing changes in their practice but only wish to provide the minimum data for inclusion into the state aggregate report. The TIPQC office is available for consultation as change teams consider which approach is best for their situation. (Though less than full implementation was offered as an option at the outset, all participants eventually adopted full implementation. V3.31.11)

### Reports:

In the RedCAP system, considerable flexibility exists around report generation. 3 automated reports are available with access governed by the data sharing agreement.

1. **Daily Rounding Report:** This report will be generated on the local level for each participating center. The report will reflect current days since last CLABSI episode recorded in the RedCAP database as well as lines currently in use in the local unit. The report presents an opportunity for presenting units to review the status of lines in use in their unit and to ensure that the RedCAP data is current. Access to this report is local only and is password protected.
2. **CLABSI Frequency Report:** This report will be generated on the local level for each participating center and will reflect changes in CLABSI frequency during the project. The report will be automated and will be available on-demand through the RedCAP system based on the most current local data available. This report includes statistical process control analysis of outcome measures. Other institution specific reports may be generated from RedCAP data as the QI project progress.
3. **CLABSI Statewide Report.** This report will be generated from aggregated de-identified data from all participating units by TIPQC. No individual units performance will be identifiable. The report reflects collaborative wide experience during the project and may be derived from RedCAP data and/or external data sources including CDC/NHSN, State Department of Health or administrative data sets. Endpoints include all points in the CLABSI Frequency Report, however all center data is aggregated and analyzed as a single statewide NICU. An extended report is also created that analyzes additional measures. Access to statewide aggregate reports is limited to the TIPQC medical director and TIPQC biostatistician and is

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password protected. Sharing of individual unit performance (CLABSI Frequency Report) will be at the discretion of the individual unit.

Data Entry, System Access, and Report Receipt

Training on data entry, standardized definitions and integration of the data collection system will be provided by TIPQC during planned project learning sessions. Individual teams will need to decide who will be responsible for the collection of which data, as well as who will have access to daily reports and collaborative project reports.

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Menu of Potentially Better Practices

Insertion:

- Hand hygiene (back to basics)
- Maximum barrier precautions
- Insertion checklist
- Central-line cart/kit (right tools, and only the right tools)
- Optimal site selection
- Site preparation – CHG or Providone Iodine
- Designated insertion teams
- Dressing (gauze, BioPatch, Algidex, Tegaderm)

Maintenance

- Hand hygiene
- Dressing (gauze, Biopatch, Algidex, Tegaderm)
- Hub care (scrub the hub; CHG or alcohol)
- Surveillance of site/dressing and line (daily)
- Daily assessment of line necessity (risk/benefit)
- Sterile tubing changes
- Sterile dressing changes
- Routine Audits
- 

Project Implementation

- Care and Feeding of the Project Team
- Unit Education
- Create a Culture of Safety
- Transparency
- Audit processes
- Focus groups
- Empower Parents
- Celebrate Success
-

## Links to CPQCC & other references for menu items

Pilot centers noted a major challenge in getting started was locating the relevant text for a specific intervention in the CPQCC bundle. (Link available in References below.) The list that follows is not intended to be exhaustive, but is provided by the pilot centers to help expedite initial team discussions. (Note: Numbers refer to page number of CPQCC HAI Bundle 2008 revision pdf file. Keyword searching in your pdf document reader may also be helpful.) Additional resources are listed in the following outline and at the end of the TIPQC toolkit. *Centers who find other helpful references or information are encouraged to share via the CLABSI project forum on the TIPQC website.*

### **Insertion:**

Insertion procedure p11 - 13

Hand Hygiene p8 - 11

Maximum Barrier Protection p14

Central line cart/kit pp22 - 27, 35, 36

Site preparation Key Aspect of Care #2: pp 2,14-16

Designated insertion teams-Key Aspect of Care #2: pp 2,28,47

Dressing-Key Aspect of Care #2: pp 2,18-21

Maintenance: Key Aspect of Care #2: pp 3, 11, 27, 35-39, 41, 45-47

### **Maintenance**

Hand Hygiene: Key Aspect of Care #1 & Key Aspect of Care #2 pp 2, 8-11

Dressing - Key Aspect of Care #2: pp 2,18-21

Hub care-Key Aspect of Care #2 pp 39, 41-43

Surveillance

- Site: p5-8, 34, 35
- Dressing: p. 18-21
- Daily assessment of line necessity p35
- Replacement/removal of intravascular catheters p 14, 28-32
- Replacement of administration sets\*, needleless systems, and parenteral fluids p35, 37-39

### **Implementation**

Care and “feeding” of the project team p5, 6, 16

Unit Education pp1-15

Create a culture of Safety

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Transparency

Audit Processes: Analyzing your practices section 6 appendix pp. 1-14

Focus Group: CLABSI Episode Review Process section 7 appendix pp. 1-13

Empower parents:

Develop Patient Education Information Sheets section 7 appendix p10-11

CLABSI Reduction in the NICU:  
A TIPQC Inter-institutional Improvement Project Toolkit

Celebrate Success

Act to Hold the Gain: Now that improvements are made, how will the team ensure that new systems and behaviors are permanent section 7 appendix p15

**Additional Helpful References:**

- **CDC NHSN**  
[http://www.cdc.gov/nhsn/PDFs/pscManual/pscManual\\_current.pdf](http://www.cdc.gov/nhsn/PDFs/pscManual/pscManual_current.pdf)
- **CPQCC**  
[http://www.cpqcc.org/quality\\_improvement/cpqcc\\_ccs\\_healthcare\\_associated\\_infection\\_hai\\_collaborative](http://www.cpqcc.org/quality_improvement/cpqcc_ccs_healthcare_associated_infection_hai_collaborative)  
[http://www.cpqcc.org/quality\\_improvement/qi\\_toolkits/hospital\\_acquired\\_infection\\_prevention\\_rev\\_march\\_2008](http://www.cpqcc.org/quality_improvement/qi_toolkits/hospital_acquired_infection_prevention_rev_march_2008)
- **AHRQ Culture survey tool**  
<http://www.ahrq.gov/qual/patientsafetyculture/>
- **PQCNC**  
<http://www.pqcnc.org/?q=node/79>
- **OPQC**  
<http://www.opqc.net/opqc-toolkit>
- **IHI**  
[www.ih.org](http://www.ih.org)
- **CCS-CCHA Neonatal CLABSI**  
<http://www.dhcs.ca.gov/ProvGovPart/initiatives/nqi/Pages/default.aspx>
- **Safer Care website (Peter Provonost)**  
[http://safercare.net/Training\\_Modules/Training\\_Modules.html](http://safercare.net/Training_Modules/Training_Modules.html)
- **THA**  
<http://www.tnpatientsafety.com/>
- **SHEA**  
<http://www.journals.uchicago.edu/doi/full/10.1086/591059?cookieSet=1>
- **"Create a culture of safety" Joint Commission**  
[http://www.jointcommission.org/SentinelEvents/SentinelEventAlert/sea\\_43.htm](http://www.jointcommission.org/SentinelEvents/SentinelEventAlert/sea_43.htm)