How to use this guide
This guide gives actions and resources for creating and sustaining safe practices for CLABSI. In it, you’ll find:

- Executive Summary ................................................................. 2
- Leadership Checklist ............................................................... 3
- Clinical Workflow Infographic ............................................... 4
- Performance Improvement Plan ............................................. 5
- What We Know About Central Line-associated Bloodstream Infections (CLABSI) .... 7
- Education for Patients and Family Members .......................... 10
- Measuring Outcomes ............................................................. 11
- Endnotes .................................................................................. 13
Executive Summary

The Problem
A Central Line-associated Bloodstream Infection (CLABSI) in one patient can result in as much as $56,000 for payers, due to a mortality rate of 14-40% and an average prolonged length of stay of between 7.5 and 25 days (Ranji et al., 2007). Researchers estimate that process change and the use of technology to reduce CLABSI can save up to $2.7 billion per year while significantly improving quality and safety (Scott, 2009). Implementation of a CLABSI bundle has been shown to reduce cases by up to 74% (IHI, 2012).

The Cost
With between three and five million central venous catheters placed into patients in the US and approximately 250,000 placed in the UK annually, the potential disease burden of CLABSI is significant (Ranji et al., 2007; The Joint Commission, 2012). Annually, this translates to approximately 80,000 ICU CLABSI cases and 250,000 total cases with over 25,000 related deaths in the US alone (Herzer et al., 2014; The Joint Commission, 2012). These preventable bloodstream infections extend hospitalization by approximately seven days (IHI, 2012).

The Solution
Many healthcare organizations have successfully implemented and sustained improvements and reduced death from CLABSI. These organizations have focused on implementing a CLABSI “bundle” for all patients.

This document provides a blueprint that outlines the actionable steps your organization should take to successfully reduce CLABSI and summarizes the available evidence-based practice protocols. This document is revised annually and is always available free of charge on our website. Hospitals who make a formal commitment to improve CLABSI and share their success on the PSMF website have access to an additional level of consulting services.
Leadership Checklist

On a monthly basis, or more frequently if a problem exists, the executive team should review all healthcare associated infection trends. Use this checklist as a guide to determine whether current evidence-based guidelines are being followed in your organization:

- Measure and report CLABSI incidence monthly (a laboratory-confirmed bloodstream infection based on CDC NHSN definitions (CDC, 2020)/device days or patient days). Note trends in areas with high incidence and prevalence. Routinely reassess outcomes.
- If CLABSI rates indicate room for improvement, initiate a PI (performance improvement) project. If a problem is not indicated, routinely reassess to identify gaps, and ensure integrity of the data collected.
- Ensure frontline involvement in CLABSI improvement activities. Maintain their engagement and remove barriers to progress.
- If a PI plan is put in place, measure the associated process outcomes.
- Ensure that CLABSI protocols are embedded into clinical workflows, whether electronic or paper.
- Ensure there are enough staff to effectively manage necessary preventive care.
- Ensure adequate training and documentation of CLABSI competencies and skills.
- Eliminate barriers to making rapid changes to documentation templates and order sets.
- Debrief on a regular basis to solicit team feedback about barriers to sustained compliance. Adjust the plan quickly and nimbly as needed.
- Hold staff accountable for providing the standard of care and reward success.
- Ensure that leaders have a simple process to oversee CLABSI improvement work while also considering how it aligns with other initiatives across the organization.
DAILY CARE

Upon Admission

• If a central line is present on admission, a thorough assessment should be conducted. Check site for signs of infection and document. Determine necessity of removal or insertion of new line. Assess for necessity, right location, and line type. Adhere to aseptic technique when accessing, including scrubbing the hub for at least 10 seconds with a 20-second dry time.

• If it is determined that a central line is needed, the proper technique for insertion should be followed.
  o Identify the right location and line type.
  o Observe insertion using Central Line Insertion Practice (CLIP) Checklist.
  o Adhere to appropriate hand hygiene prior to insertion and manipulation.
  o Choose the optimal insertion site, avoiding the femoral site, if possible.
  o Use inclusive catheter kits and ultrasound guidance.
  o Employ maximum barrier precautions and cover patients with a sterile drape.
  o Prepare skin properly with 0.5% chlorhexidine, if not contraindicated.
  o Use appropriate dressing for insertion site.
  o Position patient in the Trendelenburg position.
  o Check patency and function.
  o Educate and communicate with the patient and family members on CLABSI prevention during the insertion process.

• Communication with family members, the patient, and other healthcare providers is crucial to ensure timely and accurate information is shared. Involve the patient in the decision-making process whenever possible.

• The consistent and frequent reevaluation of the central line necessity should be a point of focus in routine care. Promptly remove line if no longer necessary. Have daily discussions of line necessity, functionality, and utilization including patient, family members, and care team members. Record decision in the electronic health record (EHR) daily.

• Adherence to sterile guidelines during routine care is key to CLABSI prevention.
  o Ensure appropriate nursing ratios.
  o Practice hand hygiene.
  o Use maximal barrier precautions.
  o Clean skin with 0.5% chlorhexidine, if not contraindicated.
  o Change tubing no more frequently than every 72 hours.
  o Change tubing for blood products and lipids every 24 hours.
  o Conduct daily assessment of central line insertion site dressing to ensure it is clean, dry, and occlusive.
  o Replace catheter site dressing immediately if the dressing becomes damp, loosened, or visibly soiled.
  o Document date dressing/cap/tubing was changed and is due for change.
  o Perform daily chlorhexidine (CHG) bathing and linen changes.
  o Change gauze at least every two days.

In addition to monitoring for signs of CLABSI, the patient should always be monitored for signs of sepsis in response to CLABSI to prompt early recognition and avoid deterioration (see APSS #9A).
Performance Improvement Plan

Follow this checklist if the leadership team has determined that a performance improvement project is necessary:

- **Gather the right project team.** Be sure to involve the right people on the team. You'll want two teams: an oversight team that is broad in scope, has 10-15 members, and includes the executive sponsor to validate outcomes, remove barriers, and facilitate spread. The actual project team consists of 5-7 representatives who are most impacted by the process. Whether a discipline should be on the advisory team or the project team depends upon the needs of the organization. Patients and family members should be involved in all improvement projects, as there are many ways they can contribute to safer care.

<table>
<thead>
<tr>
<th>RECOMMENDED CLABSI IMPROVEMENT TEAM</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Nurses</td>
</tr>
<tr>
<td>• Pharmacists</td>
</tr>
<tr>
<td>• Physicians</td>
</tr>
<tr>
<td>• Physical and occupational therapists</td>
</tr>
<tr>
<td>• Environmental service staff</td>
</tr>
<tr>
<td>• Central suppliers</td>
</tr>
<tr>
<td>• Infection control specialists</td>
</tr>
<tr>
<td>• Clinical educators</td>
</tr>
<tr>
<td>• Information technology</td>
</tr>
<tr>
<td>• Patient/family members</td>
</tr>
<tr>
<td>• Admitting and registration staff</td>
</tr>
<tr>
<td>• Quality and safety specialists</td>
</tr>
</tbody>
</table>

Table 1: Understanding the necessary disciplines for a CLABSI project improvement team

- **Understand what is currently happening and why.** Reviewing objective data and trends is a good place to start to understand the current state, and teams should spend a good amount of time analyzing data (and validating the sources), but the most important action here is to go to the point of care and observe. Even if team members work in the area daily, examining existing processes from every angle is generally an eye-opening experience. The team should ask questions of the frontline during the observations that allow them to understand each step in the process and identify the people, supplies, or other resources needed to improve patient outcomes.

<table>
<thead>
<tr>
<th>CLABSI PROCESSES TO CONSIDER ASSESSING</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Hand hygiene</td>
</tr>
<tr>
<td>• Environmental cleaning</td>
</tr>
<tr>
<td>• Daily discussion of continued need for central line</td>
</tr>
<tr>
<td>• Use of sterile precautions and chlorhexidine</td>
</tr>
<tr>
<td>• Equipment disinfection</td>
</tr>
<tr>
<td>• Patient positioning</td>
</tr>
<tr>
<td>• Patient and family education</td>
</tr>
<tr>
<td>• Frequency of gauze change</td>
</tr>
<tr>
<td>• Line removal</td>
</tr>
<tr>
<td>• Maintenance of the exit site post-removal</td>
</tr>
<tr>
<td>• Sepsis monitoring</td>
</tr>
</tbody>
</table>

Table 2: Consider assessing these processes to understand where the barriers contributing to CLABSI may be in your organization
Prioritize the gaps to be addressed and develop an action plan. Consider the cost effectiveness, time, potential outcomes, and realistic possibilities of each gap identified. Determine which are a priority for the organization to focus on. Be sure that the advisory team supports moving forward with the project plan so they can continue to remove barriers. Design an experiment to be trialed in one small area for a short period of time and create an action plan for implementation.

**TYPICAL GAPS IDENTIFIED IN CLABSI**

- Lack of accountability
- Lack of leadership oversight
- Lack of a granular, easily understood process
- Inconsistent communication of CLABSI prevention updates
- Lack of encouragement of daily central line necessity discussions
- Lack of user-friendly documentation space in EHR
- Inconsistent education of new protocols
- Lack of comprehensive, routine daily assessment of central line necessity
- Complex work environment with many distractions
- New or visiting staff members
- Lack of protocol around optimal insertion site
- Lack of fully-stocked equipment carts
- Staffing needs
- Emergent patient needs
- Touching of the insertion site by patient or others
- Lack of adequate supplies
- Environmental cleaning
- Prevention protocols not woven into care team routine

*Table 3: By identifying the gaps in CLABSI prevention compliance, organizations can tailor their project improvement efforts more effectively*

Evaluate outcomes, celebrate wins, and adjust the plan when necessary. Measure both process and outcome metrics. Outcome metrics include the rates outlined in the leadership checklist. Process metrics will depend upon the workflow you are trying to improve and are generally expressed in terms of compliance with workflow changes. Compare your outcomes against other related metrics your organization is tracking. Routinely review all metrics and trends with both the advisory and project teams and discuss what is going well and what is not. Identify barriers to completion of action plans, and adjust the plan if necessary. Once you have the desired outcomes in the trial area, consider spreading to other areas (IHI, 2006).

It is important to be nimble and move quickly to keep team momentum going, and so that people can see the results of their labor. At the same time, don’t move so quickly that you don’t consider the larger, organizational ramifications of a change in your plan. Be sure to have a good understanding of the other, similar improvement projects that are taking place so that your efforts are not duplicated or inefficient.

**CLABSI COMPARATIVE OUTCOMES**

- Hand hygiene compliance
- ICU LOS
- Dwell time
- Catheter days
- Sepsis cases

*Table 4: Consider evaluating related metrics to better understand CLABSI presence and contributing factors*
Central Line-associated Bloodstream Infections (CLABSI)

CLABSI is a laboratory-confirmed bloodstream infection in a patient with a central line at the time of (or within 48-hours prior to) the onset of symptoms and the infection is not related to an infection from another site (California Department of Public Health, 2020). Central lines differ from standard IVs, which are used to administer medications into a vein on the skin’s surface for a minimal amount of time. Central lines often remain in for weeks, with some patients receiving several treatments per day, and are commonly placed in the ICU. Central venous catheters may be used to (CDC, 2019):

- Give medicines for treatment of pain, infection, or other medical issues (e.g., cancer or heart problems)
- Provide fluids for nutrition
- Help conduct certain medical tests

Epidemiology

CLABSI can occur due to (Mermel et al., 1991):

- Heavy bacterial colonization at the insertion site
- Catheter placement in the arm or leg rather than the chest
- Duration of catheterization over 3 days
- Catheter insertion with less stringent barrier precautions

Pathogens associated with CLABSI include gram-positive organisms such as Gram-positive organisms coagulase-negative staphylococci, enterococci, and Staphylococcus aureus, accounting for 34.1%, 16%, and 9.9% of CLABSI incidents, respectively (Haddadin, Annamaraju, & Regunath, 2020).

Signs and Symptoms

A patient with a CLABSI will likely have a fever, experience chills, or show redness around the catheter insertion site. When a bloodstream infection is confirmed by a positive blood culture, and the central line is the only mechanism for possible infection, then the infection is associated with the central line and is thus deemed a CLABSI.

Clinical Implications

Between three and five million central venous catheters placed into patients in the US annually, the potential disease burden of CLABSI is significant (Ranji et al., 2007; The Joint Commission, 2012). 3-7% of infections are directly attributable to the colonization of bacteria on the internal surface of the catheter device. Per year in the US, this translates to approximately 80,000 ICU CLABSI and 250,000 total cases, with over 25,000 related deaths (Herzer et al., 2014; The Joint Commission, 2012).

CLABSI can also lead to related complications including arterial injury, cardiac and pulmonary harm, bleeding, and hematoma (Kornbau, Lee, Hughes & Firstenberg, 2015).

Financial Implications

It is estimated that CLABSI results in an absolute increase in mortality of 10-30% for patients in the ICU and a financial burden of between $300 million and $2 billion annually in the US (Ranji et al., 2007). An infection in one patient can result in as much as $56,000 for payers, due to a mortality rate of 14-40% and an average prolonged length of stay of between 7.5 and 25 days (Ranji et al., 2007).

In response to the increasing use of central lines outside of the ICU setting, in 2008, the Centers for Medicare and Medicaid Services (CMS) implemented a policy of reduced reimbursement for reasonably preventable hospital-acquired conditions, including CLABSI (Centers for Medicare and Medicaid Services, 2020). This policy change can represent a significant financial burden to hospitals, as the payment responsibility for a patient with CLABSI is no longer covered under insurance. Instead, the payment the payment expectation and responsibility shifts solely to the hospitals (Scott, 2009).

Researchers estimate that the use of process change and technology to reduce CLABSI can save up to $2.7 billion per year while significantly improving quality and safety (Scott, 2009).

National and International Burden

In the US, between three and five million central line catheters are inserted annually. In the UK, this number hovers around
Current State of CLABSI Prevention Efforts

Despite an extensive body of literature outlining evidence-based methods to prevent CLABSI, hospitals are still underperforming in adherence. In addition to the gaps in routine clinical care performance, CLABSI incidents may be underreported due to misinterpretation of the definition or purposeful misclassification (Woodward & Umberger, 2016). While purposeful avoidance of CLABSI classification as a HAI is rare, this practice still puts patients at risk.

CLABSI is recognized globally as a priority for healthcare intervention:
- Australia: Australian Guidelines for the Prevention and Control of Infection in Healthcare

Best Prevention Strategies

CLABSIs and other HAIs are preventable. Interventions have witnessed reductions ranging from 38% to 71% (Pronovost et al., 2006). In one study, researchers observed a 66% decrease in CLABSIs after implementing a multi-component intervention in the ICUs of 67 Michigan hospitals (Pronovost et al., 2006). Other studies have shown similar reductions in CLABSIs, saving lives and dramatically reducing costs (Rosenthal et al., 2012; Hong et al., 2013; Gozu, Clay & Younus, 2011).

A variety of guidelines and recommendations have been identified to prevent CLABSIs including those published by:
- The Healthcare Infection Control Practices Advisory Committee (O’Grady et al., 2011)
- The Institute for Healthcare Improvement (IHI, 2012)
- Centers for Disease Control and Prevention (CDC, 2011)

For the most part, these bundles share the following overarching priority components to prevent CLABSIs:
- Hand hygiene
- Maximal barrier precautions
- Chlorhexidine skin antisepsis
- Optimal site selection
- Daily review of necessity

Additionally, the following components are often recommended for consideration at an organizational level:
- Implementation of a method to detect the true incidence of CLABSI, such as information technology to collect and calculate catheter days
- Measurement of unit-specific occurrence of CLABSIs as part of performance evaluations
- Implementation of an insertion checklist as part of the electronic medical record
- Standardization of a central line insertion kit or line cart that contains all needed supplies (Fenik et al., 2013)

Selection and Preparation of Insertion Site

While there is mixed evidence regarding optimal vein selection, it is widely recommended to avoid the femoral site in favor of the subclavian site based on risk for infection (IHI, 2012). However, other factors, such as the risk for stenosis, should be considered upon site selection for a holistic benefits perspective.

Prepare clean skin with a 0.5% chlorhexidine preparation with alcohol before central venous catheter and peripheral arterial catheter insertion and during dressing changes. If there is a contraindication to chlorhexidine, tincture of iodine, an iodophor, or 70% alcohol can be used as alternatives (Hermoni & Lepor, 2009; Hicks & Lopez, 2020). Do not use iodoine ointment. Do not use topical antibiotic ointment or creams on insertion sites, except for dialysis catheters due to the potential to promote fungal infections and antimicrobial resistance.

Insertion

Adhere to aseptic techniques. Prepare site with chlorhexidine solution (Ling et al., 2016) and do not palpate the insertion site after the application of antiseptic, unless an aseptic technique is maintained (O’Grady et al., 2002). Perform hand hygiene before and after palpating catheter insertion sites, as well as before and after inserting, replacing, accessing, repairing, or dressing an intravascular catheter (CDC, 2002). Use maximum sterile barrier precautions, including cap, mask, sterile gown, sterile gloves, and a sterile full body drape, for the insertion of CVCs, PICCs, or guidewire exchange. Cover patients with a sterile drape, except for a very small hole for the central line.

Ensure best patient position and utilize the most effective equipment available in the situation. Use ultrasound guidance for all non-emergent central line placements (Sabado & Pittiruti, 2020). For directly inserted central lines, opt for veins in chest before veins in arm and leg to avoid infection. Position patient in the Trendelenburg position (Androes & Heffner, 2020).
Perform daily assessments of need for line and remove immediately when no longer needed (Brown, 2013). Have daily discussion of line necessity, functionality, and utilization including patient, family, and care team members:

- Document that the discussion occurred in the patient’s medical record.
- A central line should be removed if the patient is stable, if administration of potent IV drugs is no longer required, if the catheter has exceeded dwell time, if the catheter is damaged, or in the case of an infection (Brown, 2013).

The central line should be clean and dry at all times. Conduct daily assessment of dressing to assure clean/dry/occlusive. Replace catheter site dressing immediately if the dressing becomes damp, loosened, or visibly soiled. Perform daily CHG bathing and linen changes. Change gauze at least every two days (CDC, 2011).

Send monthly data to team and leadership.

- Celebrate successes.
- Perform in-depth case reviews when infections do occur.
  - Identify the risks that could’ve been avoided and modifications needed moving forward, if any.
- Use a systematic approach to review all hospital-acquired CLABSIs.

Removal

Central lines may be removed in the case of an infection, end of treatment, excessive dwell time, fractured device, thrombosis, or occlusion (Drewett, 2000).

For further removal information, view:

- “Central Venous Catheter Removal, Procedures and Rationale” for a thorough overview of stepwise removal techniques for a variety of lines and information to avoid potential complications.
- “Central Venous Catheter Removal Checklist” for an actionable checklist outlining each step that should be completed in the central line removal process in the form of a printable worksheet.

Regardless of the type of line, below are common considerations that should always be followed upon removal:

- Obtain physician orders for removal
- Perform hand hygiene and use proper PPE
- Perform aseptic technique and prepare the site
- Place the patient in Trendelenburg or supine position
- Disconnect infusions
- Inspect catheter for completeness and lack of fracture
- Apply sterile, dry dressing to the exit site
- Maintain air tight dressing for at least 48 hours

Potential complications of catheter removal include air embolism, catheter fracture or embolism, dislodgement of thrombus, hemorrhage, and/or arterial complications (Brown, 2013).

Resources

- CDC: Checklist for Prevention of CLABSI
- The Joint Commission: Preventing Catheter-associated Bloodstream Infections
- Association for Professionals in Infection Control and Epidemiology: Guide to Preventing CLABSI
- AHRQ: Purpose and Use of CLABSI Tools
- Summary of Recommendations: Guidelines for the Prevention of Intravascular Catheter-related Infections
- Chicago School of Medicine: Checklist for Central Line Removal
- Central Venous Catheter Removal, Procedures and Rationale

For hospital project improvement teams for general improvement:

- CMS: Hospital Improvement Innovation Networks
- IHI: A Framework for the Spread of Innovation
- The Joint Commission: Leaders Facilitating Change Workshop
- IHI: Quality Improvement Essentials Toolkit
- SIPOC Example and Template for Download
- SIPOC Description and Example
**Education for Patients and Family Members**

The outline below illustrates all of the information that should be conveyed to the patient and family member by someone on the care team in a consistent and understandable manner (CDC, n.d.; The Joint Commission, 2012).

**Explain why a central line is needed.** Patients and their families should understand the basic clinical overview of the central line to ensure their active involvement and engagement in maintenance and prevention of infection. Such education should include the following:

- Steps that health care personnel will take during the insertion of the central line to prevent infection.
- Reasons behind the decision for ongoing central line needs and expected duration.
- Importance of speaking up if they do not see health care personnel clean their hands or if they observe breaches in aseptic technique.
- Importance in notifying a health care personnel if the central line dressing becomes wet, dirty, or removed, or if the area around the central line is red, sore, or draining.
- Instructions for taking care of the central line if they go home with it in place, as well as the signs and symptoms of infection they should watch for.

**Indicate what to watch out for.** Family members can serve as an extra pair of eyes and ears and can alert medical staff if something might be wrong. Family members should have an understanding of what to look for that may indicate deterioration, such as redness or pain at the site. Additionally, family members should know exactly when to call for help, where to go for help, and with whom they should speak.

Instead of employing a directive conversation style, an active, engaging conversation should take place, leaving capacity for questions and repeat-back strategies. When patients and family members understand the signs and symptoms that could be indicative of a problem, they are able to serve as an extra set of eyes in order to elevate this concern as early as possible.

**Describe what can be anticipated.** In addition to explaining when to call for help in the case of a potential emergency, healthcare providers should also thoroughly explain the treatment that can be expected. By engaging in these conversations before a problem arises, family members can be prepared in the circumstance of necessary treatment and will have an understanding of where to go to find out more information about their loved one’s condition.

**Evaluate what they can do.** Patients and family members should understand that they should:

- Speak up about any concerns.
- Ask a healthcare provider if the central line is absolutely necessary. If so, they should feel comfortable asking them to explain the need and duration.
- Pay attention to the bandage and the area around it. If the bandage comes off or if the bandage or area around it is wet or dirty, the patient or family member should tell a healthcare worker right away.
- Tell a healthcare worker if the area around the catheter is sore or red or if the patient has a fever or chills.
- Avoid getting the central line insertion site wet.
- Not let any visitors touch the catheter or tubing.

**Explore next steps.** Planning for life after the hospital, whether in assisted living, returning home, or another option, should begin as early as possible between the healthcare providers and the patient and family.

- Ensure thorough explanation of necessary post-discharge appointments, therapies, medications, and potential complications.
- Provide patients and family members resources, resources, including direct contact phone numbers to the hospital, for post-discharge questions.

**Resources for Patients and Family Members:**

- Johns Hopkins: CLABSI
- The story of Nora Bostrom, daughter of Claire McCormick and Thomas Bostrom, is an inspiring story about a CLABSI
- CMS: Resources around CLABSI
- American Thoracic Society: Patient Education for Central Venous Catheter
Measuring outcomes

Topic:

Central line-associated bloodstream infections (CLABSI)
Rate of CLABSI (healthcare-associated primary bloodstream infection (BSI)) in a patient that had a central line within the 2 calendar days before the development of the BSI and that is not related to an infection at another site.

Outcome measure formula (CLABSI Rate):
Numerator: A laboratory-confirmed bloodstream infection based on the above CDC NHSN definition (CDC, 2016)
Denominator: Device days or patient days
Rate is typically displayed as CLABSI/1000 Line days

Metric recommendations

Indirect Impact:
Any patient with a peripheral or central line will benefit from several of the interventions being instituted

Direct Impact:
All patients that require a central line

Lives Spared Harm:
\[ \text{Lives} = (\text{CLABSI Rate}_{\text{baseline}} - \text{CLABSI Rate}_{\text{measurement}}) \times \text{Line days}_{\text{baseline}} \times |\text{Patient Days}_{\text{baseline}} | \]

Lives Saved:
\[ \text{Lives Saved} = \text{Lives Spared Harm} \times \text{Mortality Rate} \]

Quality process measures and metrics

- Complete documentation elements
  o Number of operator attempts per line placement
  o % of patients with site disinfection per protocol
  o % insertion with completed checklist
- Bundle compliance - insertion and maintenance to be measured separately
  o % of line insertions following all bundle components
  o Hospitals can choose to include additional bundle components. Including more than 5 may confuse and overwhelm providers.
- Patient education
  o % of patients/families educated about infection prevention
- Repetitive patterns, trends, or variables
  o Complication rate
  o PICC v. Central Lines
  o Insertion site choice
- Perform a minimum of 20 audits per month. If procedures are fewer than 20, then include all procedures.

Notes:
To meet the NHSN definitions, infections must be validated using the hospital acquired infection (HAI) standards (CDC, 2016). Infection rates can be stratified by unit types further defined by CDC. Infections that were present on admission (POA) are not considered HAIs and not counted.

Data collection
CLABSI and Line days can be collected through surveillance (at least once per month) or gathered through electronic documentation. Denominators documented electronically must match manual counts (+/- 5%) for a 3-month validation period.

CLABSI can be displayed as a Standardized Infection Ratios (SIR) using the following formula:
\[ \text{SIR} = \frac{\text{Observed CLABSI}}{\text{Expected CLABSI}} \]
Expected infections are calculated by NHSN and available by location (unit type) from the baseline period.

Mortality (will be calculated by the Patient Safety Movement Foundation):
The PSMF, when available, will use the mortality rates associated with Hospital Acquired Conditions targeted in the Partnership...
for Patient’s grant funded Hospital Engagement Networks (HEN). The program targeted 10 hospital acquired conditions to reduce medical harm and costs of care. “At the outset of the PIP initiative, HHS agencies contributed their expertise to developing a measurement strategy by which to track national progress in patient safety—both in general and specifically related to the preventable HACs being addressed by the PIP. In conjunction with CMS’s overall leadership of the PIP, AHRQ has helped coordinate development and use of the national measurement strategy. The results using this national measurement strategy have been referred to as the “AHRQ National Scorecard,” which provides summary data on the national HAC rate (AHRQ, 2015). Central Line associated bloodstream infections was included in this work with published metric specifications. This is the most current and comprehensive study to date. Based on these data the estimated additional inpatient mortality for Central Associated Bloodstream Infection Events is 0.185 (185 per 1000 events).
Conflicts of Interest Disclosure

The Patient Safety Movement Foundation partners with as many stakeholders as possible to focus on how to address patient safety challenges. The recommendations in the APSS are developed by workgroups that may include patient safety experts, healthcare technology professionals, hospital leaders, patient advocates, and medical technology industry volunteers. Workgroup members are required to disclose any potential conflicts of interest.

Workgroup
Chair
Ebony Talley
Kaiser Permanente Woodland Hills Medical Center

Current Members
Paul Alper
Next Level Strategies, LLC
Dian Baker
Sutter Health
Steven Barker
Patient Safety Movement Foundation; Masimo
Naomi Bishop
Human-Centered Healthcare Design
Alicia Cole
Alliance for Safety Awareness for Patients (ASAP)
Helen Haskell
Mothers Against Medical Error
Sarah Knowles
University Hospitals Geauga Medical Center
Jerika Lam
Chapman University School of Pharmacy
Emily Leathers
Parrish Medical Center
Lori Lioce
Global Network for Simulation In Healthcare
Edwin Loftin
Parrish Medical Center
Ariana Longley
Patient Safety Movement Foundation
Olivia Lounsbury
Patient Safety Movement Foundation
Kaelie Marquez
Chapman University
Carole Moss
Founder of Nile’s Project
Shannon Munro
Veteran’s Health Administration
Armando Nahum
Safe Care Campaign
Brent NiBarger
BioVigil
Donna Prosser
Patient Safety Movement Foundation
Kathy Puri
Fitsi Health
Caroline Puri Mitchell
Fitsi Health
Barbara Quinn
Sutter Health
Kellie Quinn
Patient Advocate
Sundary Sankaran
Kaiser Permanente
Rena Zhu
University of California, Irvine

Metrics Integrity
Robin Betts
Kaiser Permanente, Northern California Region

Past Members
This list represents all additional contributors to this document since inception of the Actionable Patient Safety Solutions
Michel Bennett
Patient Safety Movement Foundation
Jonathan Coe
Prescient Surgical
Peter Cox
SickKids
Maria Daniela DaCosta Pires
Geneva University Hospitals
Todd Fletcher
Resources Global Professionals
Kate Garrett
Ciel Medical
Brook Hossfeld
Sodexo
Mert Iseri
SwipeSense
Terry Kuzma-Gotttron
Avadim Technologies
Gabriela Leontez
Gresmex
Christian John Lillis
Peggy Lillis Foundation
Jacob Lopez
Patient Safety Movement Foundation
Betsy McCaughey
The Committee to Reduce Infection Deaths
Derek Monk
Poiesis Medical
Neesha Nair
Advocate
Anna Noonan
University of Vermont Medical Center
Kate O’Neill
iCareQuality
Julia Rasooly
PuraCath Medical
Judith Riess
Advocate
Yisrael Safeek
SafeCare Group
Steve Spaanbroek
MSL Healthcare Partners, Inc.
Philip Stahel
Patient Safety Movement Foundation
Jeanine Thomas
MRSA Survivors Network
Greg Wiita
Poiesis Medical


