In evaluating the elements that were critical to quality, the team confirmed that a significant opportunity for improvement existed. Patients wanted their samples properly collected, labeled and processed with accurate results delivered as soon as possible. Collectors wanted access to proper collection kits and supplies. Physicians and care providers wanted ease of ordering, access to pre-analytical and post-analytical laboratory data, consultation and results at the earliest opportunity. Laboratory staff wanted properly labeled samples of sufficient volume, ordered appropriately and sent immediately after collection. The cumulative elements depicted a sampling system free of contamination, which required a “right the first time” approach in all facets to complete the task properly in a reasonable amount of time.

After developing the elements that were critical to quality, the key performance indicators (KPIs) were finalized by the team and customers to provide evidence of long-term value. Multiple KPIs were developed, including a number of TAT measures, utilization rate, overall contamination rate, labeling defects and call response metrics.

**Measure**

Initial KPI targets were set as follows:

- Overall contamination rate (5 percent or less)
- Utilization rate (17-21 percent)
- Positive culture calls completed within 60 minutes (greater than 90 percent)
- Average positive culture call time (less than 60 minutes)
- Collect to login TAT (less than 120 minutes, target of less than 105)
- Login to call TAT (less than 8 hours)
- Call to final TAT (less than 24 hours)
- Collect to final TAT (less than 132 hours)
- Labeling defects (reduce unspecified collections by 15 percent)

Blood culture contamination rates have been tracked by the institution for more than 20 years. Monitoring and measurement demonstrated that contamination rates within the emergency department varied, ranging between 5 percent and 11 percent annually, as detailed in Figure 2. Despite various training interventions and programs that showed initial improvement in reducing problems, gains were never maintained.

Previously, this was attributed to relatively high staffing turnover found in the emergency department. This is not an uncommon finding by other institutions that have studied root causes of high contamination rates within emergency centers.

In 2011, three years before the black belt team tackled the problem, the hospital had yet again renewed emphasis on training. This effort yielded short-term improvement for blood culture collections. Still, unacceptably high levels of contamination returned, creeping above 6 percent annually.

The American Society for Microbiology targets 1 percent as a best practice threshold for contamination, with zero contamination as the true goal. The Navicent Health Six Sigma black belt team was determined to make sustainable and significant improvements.

In 2014, the facility had collected more than 24,000 blood culture samples with 936 contaminants, representing an overall 3.89 percent institutional contamination rate. During the pre-implementation evaluation period of Jan. 1, 2014, through Oct. 31, 2014, the emergency department collected 10,124 blood cultures, with 9,447 meeting acceptability metrics. Defects per million opportunities (DPMO) was 66,871 with a Sigma level of 1.5 and a yield of 93.32 percent. The staggering discovery was that contaminated draws originating from the emergency department accounted for 82.4 percent of all the contaminants isolated in 2014.

Analysis of the 677 contaminated specimens drawn in the pre-implementation evaluation period were plotted across...