Lab Quality Confab
PROCESS IMPROVEMENT INSTITUTE
Pursuing Excellence in Continuous Improvement

How We Reduced Hemolyzed Specimens Throughout Our Hospital

And

What We Do to Sustain Those Gains

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Your Story Tellers

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Sarasota Memorial Health Care System

806-bed regional medical center, is the second largest acute care public health systems in Florida. With more than 4,000 staff and 1,000 volunteers, it is one of Sarasota County's largest employers. A community hospital founded in 1925, Sarasota Memorial is governed by the nine-member elected Sarasota County Public Hospital Board. It is a full-service health system, with specialized expertise in heart, vascular, cancer, and neuroscience services, as well as a network of outpatient centers, long-term care and rehabilitation among its many programs. Sarasota Memorial is the only provider of obstetrical services and Level II neonatal intensive care in Sarasota County.

Comprehensive Stroke Center

One of 5 hospitals nationally 5 yrs in a row

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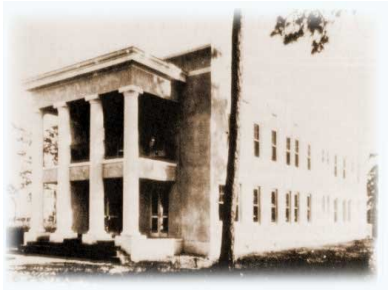
Sarasota Memorial Hospital



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Main Campus

Cape Surgery Center

Waldemere Medical Plaza

Bayside Behavioral Center

SARASOTA MEMORIAL HEART & VASCULAR INSTITUTE

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Care Centers

Nursing and Rehab Center

University Parkway

Heritage Harbor

Stickney Point

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Ambulatory Sites

Institute for Advanced Medicine

North Port Emergency Care Center

Blackburn Point Patient Center

University Parkway Patient Center

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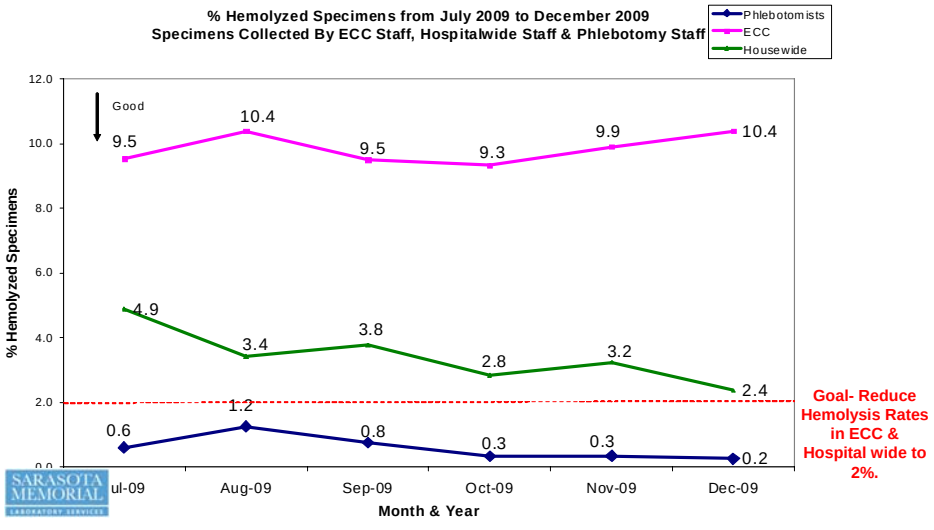
Define

Blood specimens collected in the Emergency Care Center (ECC) and hospital wide have higher hemolysis rates than specimens collected by phlebotomy staff. The highest percentage of hemolyzed specimens are collected in the ECC. Hemolyzed specimens cause increased lab turnaround time and patient dissatisfaction due to re-collection.



Goal- Reduce Hemolysis Rates in ECC & Hospital wide to 2%.

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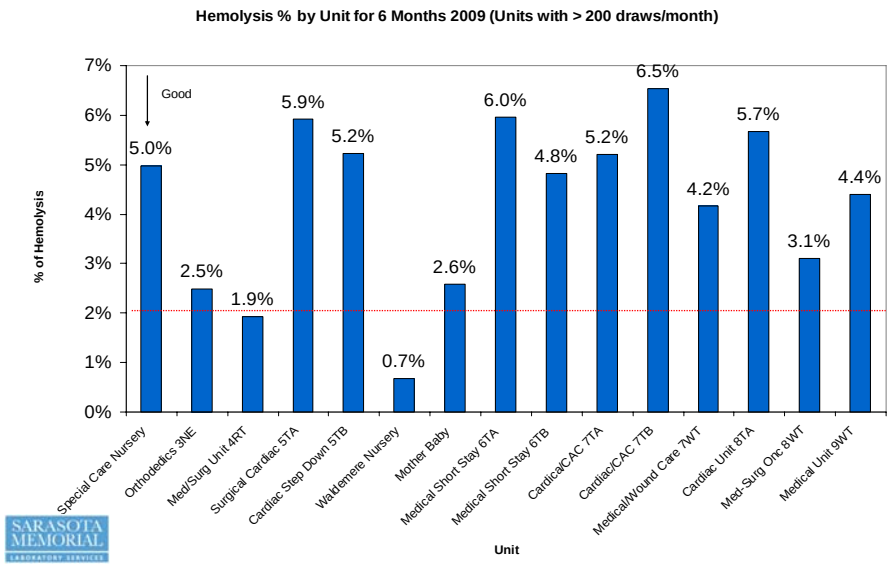
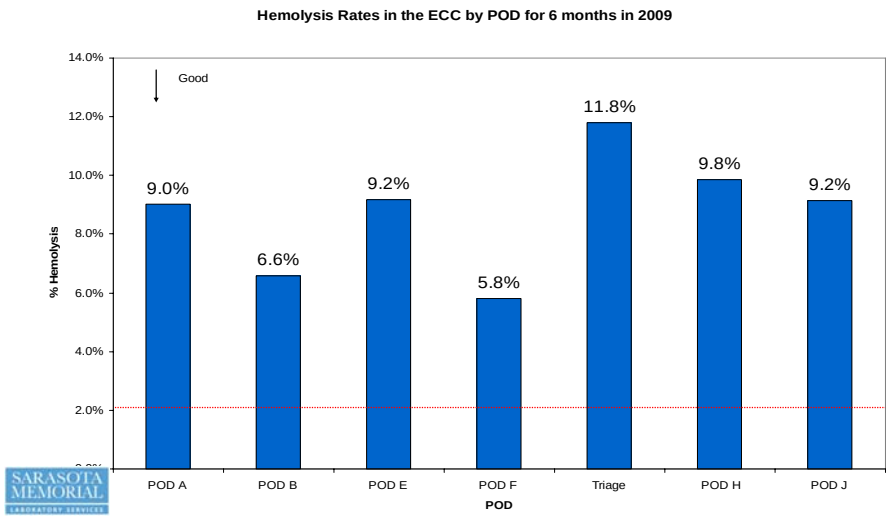
Measure

When hemolysis was measured by nursing unit, only 2 of 18 units were meeting the 2% goal.



Measure

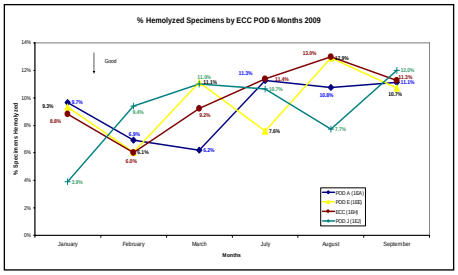
When hemolysis was measured by ECC PODS to determine a significant contributor, all PODs were well over the 2% hemolysis goal and 5 out of 7 PODs had higher hemolysis rates than the highest nursing unit.



Analyze

In late December 2009, observations and inquiries were performed by BD Consultants in the ECC and Hospital wide.

Nurses, phlebotomists and technologists were individually asked to explain the blood collection process and to show the types of blood collection supplies used



Observations uncovered the following ECC blood collection issues:

•There were several different procedures used for collecting blood specimens

•Most blood specimens were collected using an IV catheter, 18-20g depending on preference.

• When collecting blood from the catheter, most attached a multi-sample luer adapter and Single Use Holder.

•In some instances, blood was collected off the catheter using a syringe, then transferred into tubes using a straight needle.

•Most blood collections were not performed following the CLSI guidelines

• Specimens for repeat tests were sometimes collected by flushing the catheter and then drawing blood from the catheter.

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Improve

Based on BD's recommendations, the following solutions were implemented:

- **Nursing education and laboratory developed a standardized protocol for blood collection using "Best Practice" processes which include:**
  - **Ensure alcohol is dry before inserting the needle**
  - **Reduce tourniquet time to less than 1 minute**
  - **Follow the CLSI order of draw and fill tubes to the correct blood to additive ratio**
  - **Gently invert tubes to mix the blood with additives**
  - **Use a separate blood collection site when doing a re-draw to comply with INS standards**
- **For a more effective draw through an IV Catheter, in place of the Multi-sample Luer Adapter, the laboratory stocked, the BD Vacutainer® Luer-Lok™ Access Device with extension set. A BD blood transfer device was also stocked to ensure tubes are filled with the correct blood to additive ratio.**
- **A step-by-step Tip Sheet was created and disseminated throughout the ECC and all Nursing Units, that illustrates "Best Practice" process steps for blood collection and order of draw.**
- **Correct blood collection techniques were ingrained as the "Always" way.**
  - **Performed one on one demonstrations of correct blood collection practices house wide and in the ECC to ensure understanding of the blood collection policy and "Best Practice" methodology**

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Improve

The tip sheet below is posted near blood collection supplies on the nursing units.

Tips to Prevent HEMOLYSIS

Drawing Blood from an IV

- Blood drawing from peripheral lines is ***ONLY*** to be done ***at the time of insertion***. Use a peripheral vein to recollect an unacceptable sample or to draw additional tubes of blood.

Hemolysis: breakage of red blood cells' membranes, causing release of hemoglobin and other internal components into surrounding fluid.

Alcohol and/or Chloraprep® Drying Time

- Allow the cleansed site to ***dry thoroughly*** (~30 seconds).

Tourniquet Time

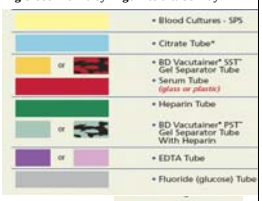
- ***Do not leave the tourniquet on for more than 1 minute***. **Longer tourniquet time causes the interstitial fluid to leak into tissue, causing hemolysis.**

Syringe Draw

- *Pulling the plunger back too far* **during blood collection while using a large bore needle, may create enough pressure to cause hemolysis.**
- *Pushing the plunger too forcefully* **when transferring blood from a syringe into a tube may also cause hemolysis.**

Order of Draw for Multiple Tube Collections

- To prevent cross contamination of anticoagulant or other tube additive, ***collect tubes following the order of draw***. *(See image to the right - order is top to bottom.)*

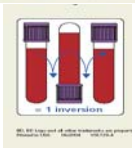


Volume per Tube

- Fill each tube with the ***correct blood volume*** to ensure sufficient specimen is available for testing and to ensure the proper ratio of tube additive to blood. Fill volume is especially critical for the blue-top Citrate tubes used for coagulation studies.

Mixing Tubes

- ***Gently rotate each tube 6-8 times*** as they are removed from the Vacutainer holder and before engaging the next tube. Vigorous mixing or shaking of the tubes may cause hemolysis.



Specimen Transport

- *Mechanical trauma during transport* **may occur in a pneumatic tube system, resulting in hemolysis. Tubes not filled with enough blood have more air space within the tube for blood to move back and forth during tube transport.**

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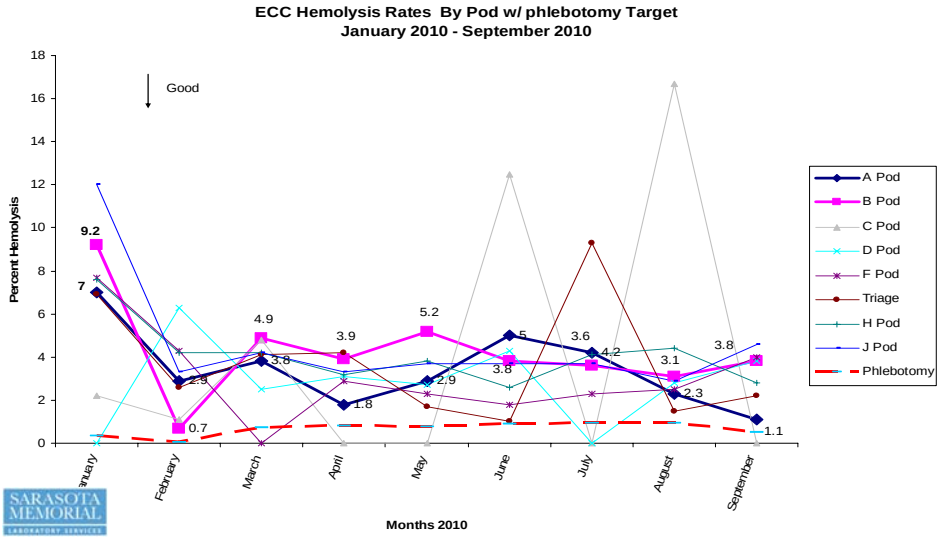
Improve

Adoption of best practices reduced ECC hemolysis by 67%. However, they still had not met the overall ECC goal of 2% hemolysis. There was more work to be done.



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Improve

An ECC pilot project was initiated

- The ECC in cooperation with the laboratory, assigned a phlebotomist to do all blood collections in two ECC PODS. The pilot project began in POD A in October and was expanded to POD B in November.
- The goal was to see if a phlebotomist in a fast paced ER environment could reduce hemolysis rates to the level of phlebotomist collections within the hospital (<1%).

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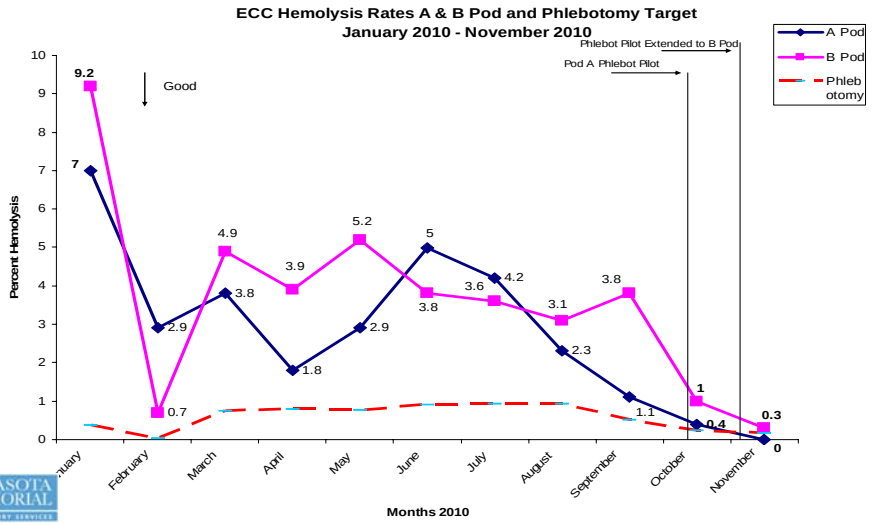
Improve

The results of the pilot were significant. A and B PODS achieved hemolysis rates equivalent to phlebotomist rates. Hemolysis in the other pods remained at 3.2%



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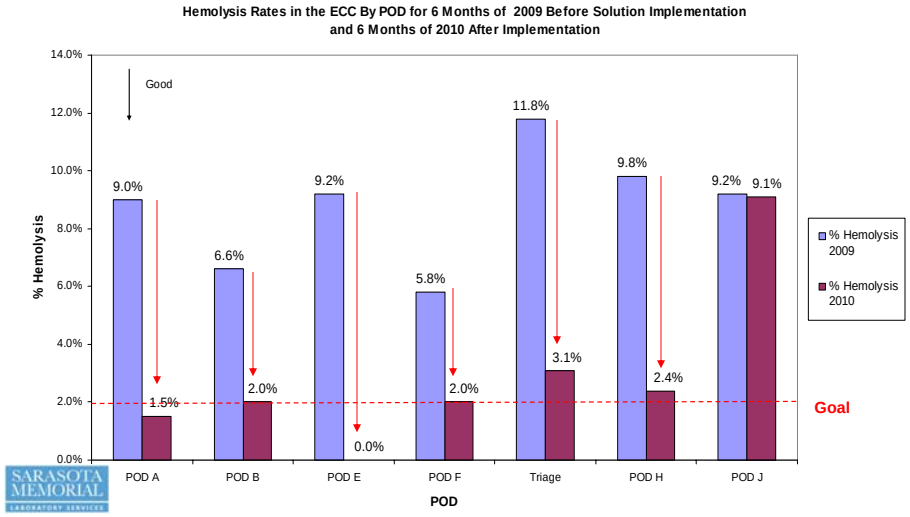
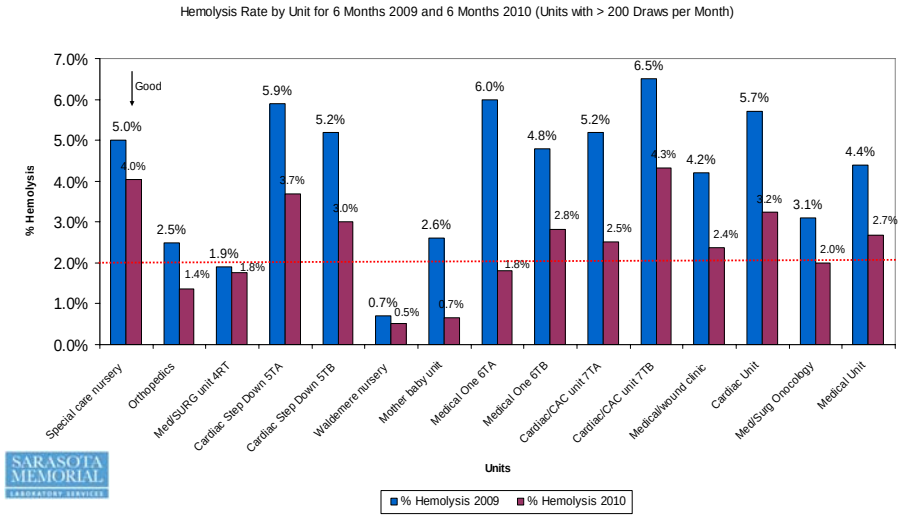
Improve

Again, the ECC results were significant. After implementation of new blood collection policies, best practice techniques and training. 6 of the 7 PODS had reductions of 65% or greater and 4 of 7 pods met the 2% goal.



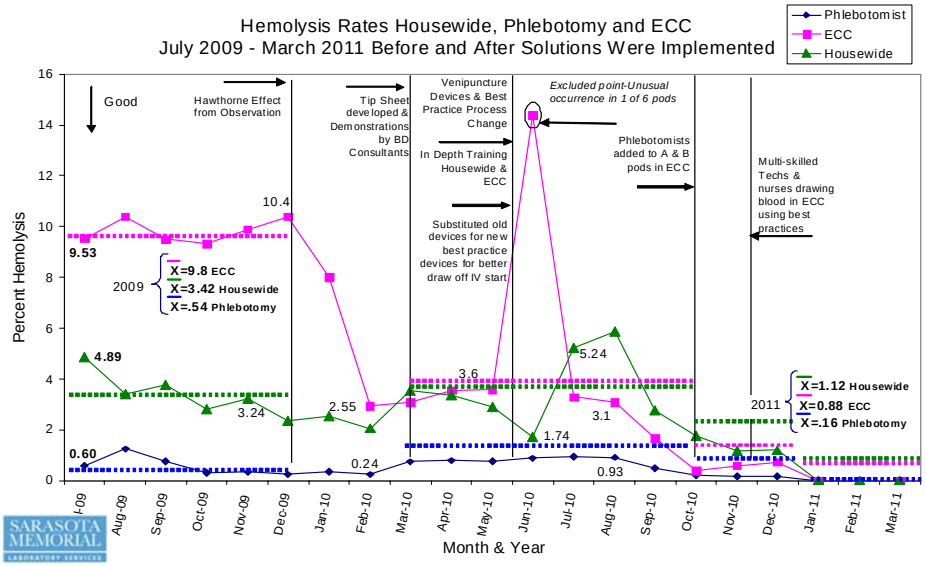
Improve

Although the improvement plan focused on the ECC, after several of the implementation strategies were presented to the nursing units, all 15 units also reduced their hemolysis rates.



Improve

Hemolysis rates in the ECC were reduced by 93% from June 2009 to March 2011. Housewide hemolysis improved by 67%. Phlebotomists improved by 70%.



Improve

Hemolysis rates continue to be at low levels

From April 2011 to September 2011 the average hemolysis rates are as follows:

- **ECC = .88%**
- **Housewide = .86%**
- **Phlebotomy .13%**

Control

- **Lessons learned**
  - Culture and process change do not happen overnight
  - Education about hemolysis needs to include the how, what, and why
  - Need total support from all departments and process improvement needs to be collaborative
  - Evaluation showed lack of a consistent process within and between departments
  - Educational process updates require multiple training sessions and ongoing feedback
  - ECC area thought they were saving the patient from a second venipuncture by obtaining blood from the IV startup. They learned that this is only true when they use best practice collection procedures and appropriate products
  - ECC pilot showed the staff that quick and efficient blood collection by venipuncture can save time- demonstration works.
  - ECC learned that better use of blood collection best practices and products for line draws improved specimen quality which resulted in fewer patient delays and better turn-around times
  - Nursing staff became more aware of their role in reducing hemolysis when data was shared each month

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Control

- **Lessons learned Continued**
  - Before implementation of best practices to reduce hemolysis could take place, the laboratory had to perform Myth Busting education.
    - **Myth One**: We are saving the patient a venipuncture if we draw from the IV start.

      Myth Buster: If hemolysis occurs the patient has a longer wait and the patient must have a venipuncture anyway.
    - **Myth Two**: Collecting blood at the time of IV start before the test order is in the computer, saves time.

      Myth Buster: Actual data showed that collecting blood before a test order is placed, increased turn around time for blood test results by 30 minutes and more blood was collected than needed.
    - **Myth Three**: Nurses are as good or more skilled than phlebotomists for blood collection.

      Myth Buster: Hemolysis rates of specimens collected by phlebotomists are consistently below 1% in all settings. Phlebotomists are trained for all types of blood collection even the most difficult ones. After phlebotomists worked in the ECC, nurses respected their ability and called on them to help with difficult sticks.

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Control

- **Future Plans**
  - Continue to track the % hemolysis by location each month.
  - Continue to share the information with all hospital locations
  - Integrate laboratory and nursing competencies to standardize consistent use of policies on blood collection process
  - Continue to encourage more blood collection by venipuncture
  - Continue ongoing analysis for continuous process improvement thereby ensuring the highest quality of care for our patients.
  - Use BD Consultants as a continual resource for introduction to best practices and state of the art products.

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Cost of Poor Quality-Economic Model

- Frost & Sullivan healthcare economists, in conjunction with BD, created a model to help hospitals understand the impact of poor specimen quality.
- The model is populated with hospital/laboratory operational statistics and empirical data collected through physician interviews.
- The model calculates the impact in terms of cost, lost time, and patient shortfall.
- Breakdown by cost category helps to understand where greatest impact occurs.
- Benchmarks are available to compare to peers.
  - Cost per PAE (preanalytical error)
  - PAE cost as a percent of total hospital budget

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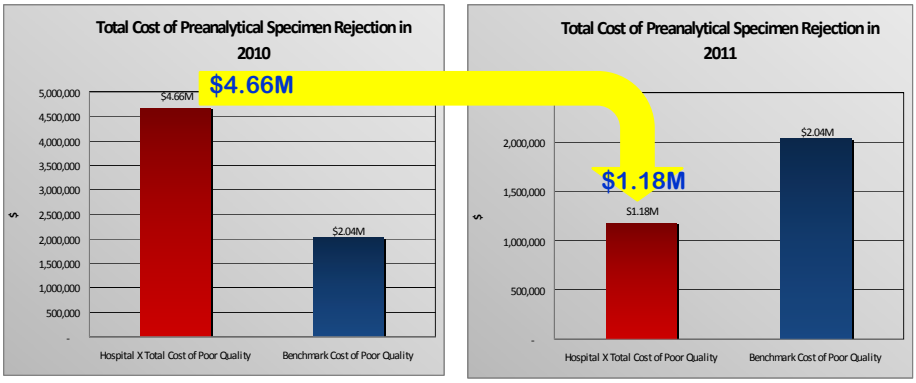
Cost of Poor Quality

A **reduction/avoidance of $3.5M** in cost is estimated from improvements in specimen collection quality.



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Unexpected Organization Benefits

- Opened dialogue with emergency room
  - ❖ Barcoded specimen identification
  - ❖ ECC Working Group
- Opened dialogue with floor nursing staff
  - ❖ Incorporation into Nursing orientation
  - ❖ Coordinated phlebotomy procedures
- Decrease in blood culture contamination
- CLMA ThinkLab'11 poster
- National quality award

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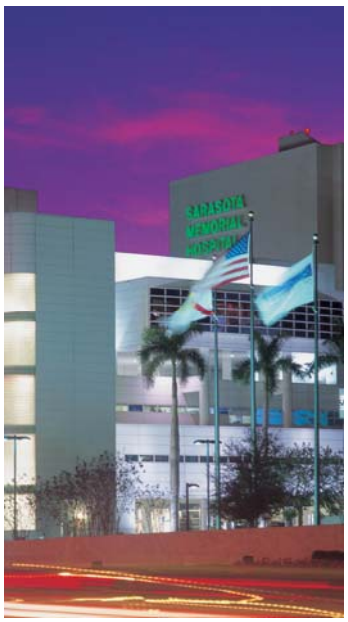
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