

American Board of Pediatrics MOC – Quality Improvement Project Application

Project Name: Reducing the Frequency and Duration of Empiric Antibiotic courses at birth in Newborns admitted to the NICU

Sponsoring Organization: Newborn Specialists of Tulsa

Project Status: Completed

INTRODUCTION

1. *Why did you start this project?* In 2006, approximately 75% of all newborns admitted to the NICU were started on an empiric course of antibiotics at the discretion of the admitting physician. Of the infants started on antibiotics, approximately 21% or about 15% of all admissions were treated empirically based on laboratory studies, radiographs or clinical factors that compelled the physician to prolong treatment most often in the face of negative blood cultures and improving or normalizing physiologic parameters, radiographs and laboratory studies. The rationale for undertaking this project was to reduce the number of infants treated empirically with antibiotics on admission based on risk factors, by at least 25% and to reduce the length of treatment in 50% of the infants treated for more than 3 days.

2. *What was your current knowledge about this practice?* The current practice at the time of inception of the project was not evidenced based but of contemporary opinion. But we thought it would be safe to reduce the number of empirically treated infants and reduce the length of treatment without adverse outcomes.

3. *AIM – aim statement you used to guide this improvement.* To develop an antibiotic stewardship program that would reduce the absolute number of doses of antibiotics given in the NICU

4. *Setting and Participants:* Saint Francis Hospital NICU. We are an urban hospital that has recently added a Children's hospital. The NICU has increased beds from 40-65 in this new Level III-D NICU. We are a multidisciplinary team including neonatologists, NNPs, nurses, respiratory therapists. The patient population during the project period included all infants admitted to NICU. For purposes of analysis, this group was divided into four groups: Patients with antibiotics started on admission, Patients given more than 3 days but less than 7 days of antibiotics, Patients with antibiotics given 3 days or less and Patients with antibiotics given 2 days or less.

5. *What is the estimated number of physicians participating in this effort?* Ten Board certified neonatologists. All physicians practicing in the NICU participated in the project. Seven physicians seeking MOC credit.

6. Please indicate the Institutes of Medicine quality dimensions addressed by the project?

SAFETY: The actual incidence of neonatal sepsis is very low and the infant will be in a NICU environment under intensive monitoring with repeat testing as needed.

TIMELINESS: This intervention can be implemented immediately

EFFECTIVENESS: This project should reduce the length of hospital stay, the potential for antibiotic dosing error, the potential for opportunistic infections secondary to prolonged antibiotic courses and should not result in missed sepsis diagnosis.

EFFICIENCY: This intervention can be done with no additional staffing or testing above previous routine. An automated pharmacy report is generated each morning for report detailing the infants who are on antibiotics, which agents are being given, and the date and time started.

EQUITY: All infants are treated in the same manner

PATIENT CENTERED: With shorter antibiotic courses, less intravenous access is needed and more time can be spent with parents holding their baby.

METHODS: *What did you do?*

Based on an average of 850 admissions to the NICU per calendar year, approximately 640 newborns were treated with antibiotics on admission, and of that group, 135 newborns were treated for 3 to 7 days empirically. Confirmed congenital sepsis rate being 8 infants per year or (0.02) per 1000 live births.

1. Analysis you undertook to inform the changes you made. We looked at real-time control charts from the infection control offices which were reconciled and reported out for one month each quarter. Current state of care is a drastic reduction in the use and length of use of antibiotics in comparison to the prior to initiating this intervention. The factors, for our patient population, that would most likely influence improvement was changing the mindset of the physicians about empiric antibiotic use. Identifying specific criteria to follow in the aid of deciding when and if starting antibiotics is appropriate. Education on therapy and length of therapy depending on screening processes. Adherence to all these changes was pertinent to the success of the project secondary to the fact that previous to the start of the intervention, the use of antibiotics and course at the time of admission was at the discretion of the admitting physician.

2. Potential Best Practices (PBP's and/or key research) that guided the change. Key research came from Antimicrobial Stewardship Guidelines • CID 2007:44 (15 January) • 159-77 by Timothy H. Dellit, et al. Other research and best practice included the revised guidelines for the prevention of early onset GBS infection. Decreasing antibiotic overuse in neonatal intensive care units: quality improvement research Cody Arnold, MD, MPH, MSc. Guidelines for the Prevention of Antimicrobial Resistance in Hospitals, Shales, et al. Infection Control and Hospital Epidemiology, Vol 18:4 p 275 (4/1997).

Antibiotic days in hospital increases healthcare costs separates parents from their newborn infants, subjects newborns to antibiotic dosing errors as well as multiple catheter insertions or central line placements, and can contribute to the development of antibiotic resistant organisms residing in the NICU.

3. Mechanism(s) that predicted would create improvement. These mechanisms included In-services to the physicians, resident staff, nurses, respiratory therapists and pharmacists and feedback. Feedback included daily antibiotic use reports, quarterly control charts reviewed with staff and in multidisciplinary meetings.

4. List the changes made, PDSA cycles:

- A. Revision of the screening criteria to include risk factors such as: prolonged rupture of membranes, chorioamnionitis, maternal fever, respiratory distress, persistent tachycardia, and hypotension.
- B. Simplifying the screening diagnostic testing to a complete blood count with differential on admission or within 4 hours of admission, a blood culture obtained from a peripheral site or from a newly inserted sterile catheter, and a chest radiograph.
- C. Multiple in-services for personnel including physicians.
- D. Printing of control charts quarterly
- E. Feedback reviewed with staff.

5. Measurement Method: how did you measure process and/or outcomes?

Name of Measure	Purpose	Source	Calculation	Data source	Data collection	Performance Benchmark	Performance target	Data Quality	Analysis
Patients with antibiotics started on admission	Track and decrease unnecessary antibiotic administration	SHEA Society for Healthcare Epidemiology of America	Numerator: total # of admissions with antibiotics started Denominator: total # of admissions	Patient chart	Hospital Infection Control Daily review of new admission charts. One month each quarter	Reduce # of infants treated with antibiotics by 25% and the length of treatment in 50% of the infants treated for more than 3 days	1 calendar year and sustained over a 3 year period.	Excellent Actual review of charts, no subjective data. Only relied on quantitative data, no qualitative data.	Control charts over time
Patients given more than 3 days but less than 7 days of antibiotic	Track and decrease unnecessary antibiotic administration	SHEA Society for Healthcare Epidemiology of America	Numerator: Total # of patients with antibiotics for 4-6 d Denominator: total # of admissions with antibiotics started	Patient chart	Hospital Infection Control Daily review of new admission charts. One month each quarter	Reduce # of infants treated with antibiotics by 25% and the length of treatment in 50% of the infants treated for more than 3 days	1 calendar year and sustained over a 3 year period.	Excellent Actual review of charts, no subjective data. Only relied on quantitative data, no qualitative data.	Control charts over time

Patients with antibiotics given 3 days or less	Track and decrease unnecessary antibiotic administration	SHEA Society for Healthcare Epidemiology of America	Numerator: total # of patients with antibiotics started for 3 days or less (includes patients counted in last category 2 days or less Denominator: total # of admissions with antibiotics started	Patient chart	Hospital Infection Control Daily review of new admission charts. One month each quarter	Reduce # of infants treated with antibiotics by 25% and the length of treatment in 50% of the infants treated for more than 3 days	1 calendar year and sustained over a 3 year period.	Excellent Actual review of charts, no subjective data. Only relied on quantitative data, no qualitative data.	Control charts over time
Patients with antibiotics given 2 days or less	Track and decrease unnecessary antibiotic administration	SHEA Society for Healthcare Epidemiology of America	Numerator: total # of patients with antibiotics started for 2 days or less Denominator: total # of admissions with antibiotics started	Patient chart	Hospital Infection Control Daily review of new admission charts. One month each quarter	Reduce # of infants treated with antibiotics by 25% and the length of treatment in 50% of the infants treated for more than 3 days	1 calendar year and sustained over a 3 year period.	Excellent Actual review of charts, no subjective data. Only relied on quantitative data, no qualitative data.	Control charts over time

6. Describe how you met requirements of regulations that apply to the project: HIPPA regulations were followed during data presentation. No patient information was revealed.

RESULTS: What did you find?

1. Show graphs of measurement over time (run charts, control charts) annotated with changes made.

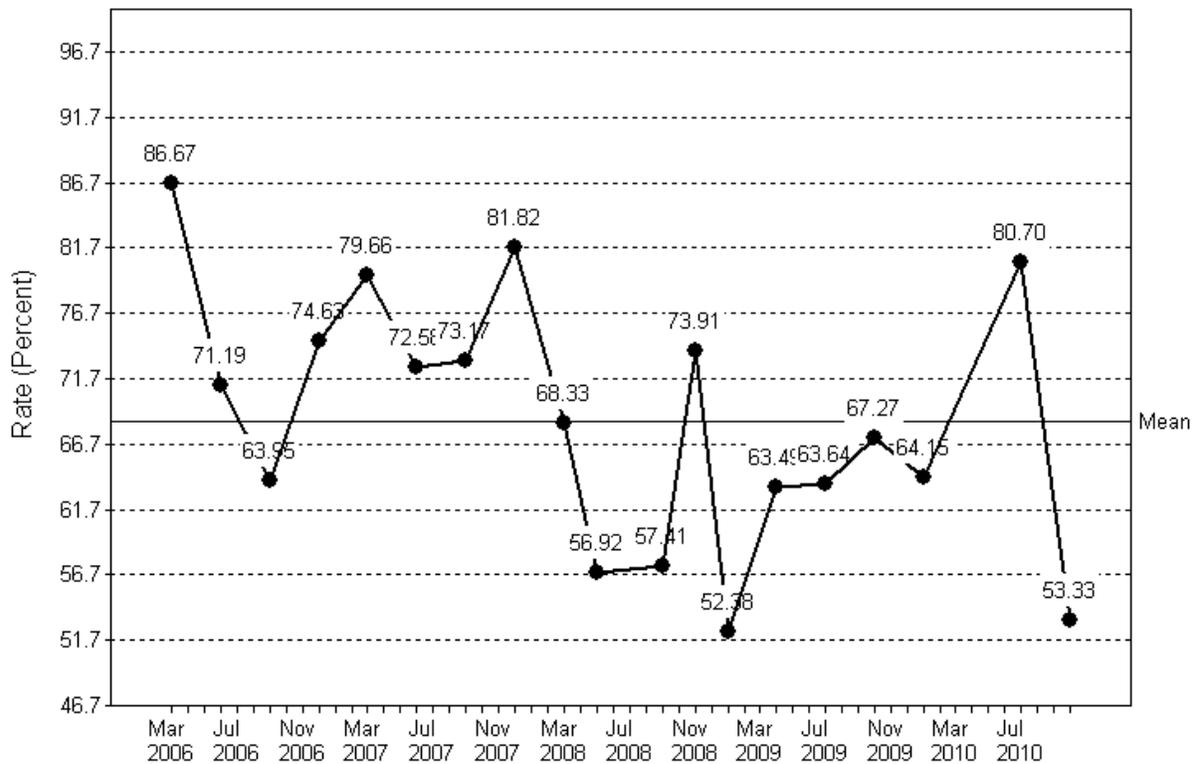
EOPC

(Eastern Oklahoma Perinatal Center)

Patients With Antibiotics Started on Admission

(data points = one month per quarter)

SAINT FRANCIS HOSPITAL - TULSA, OK
March 2006 - October 2010



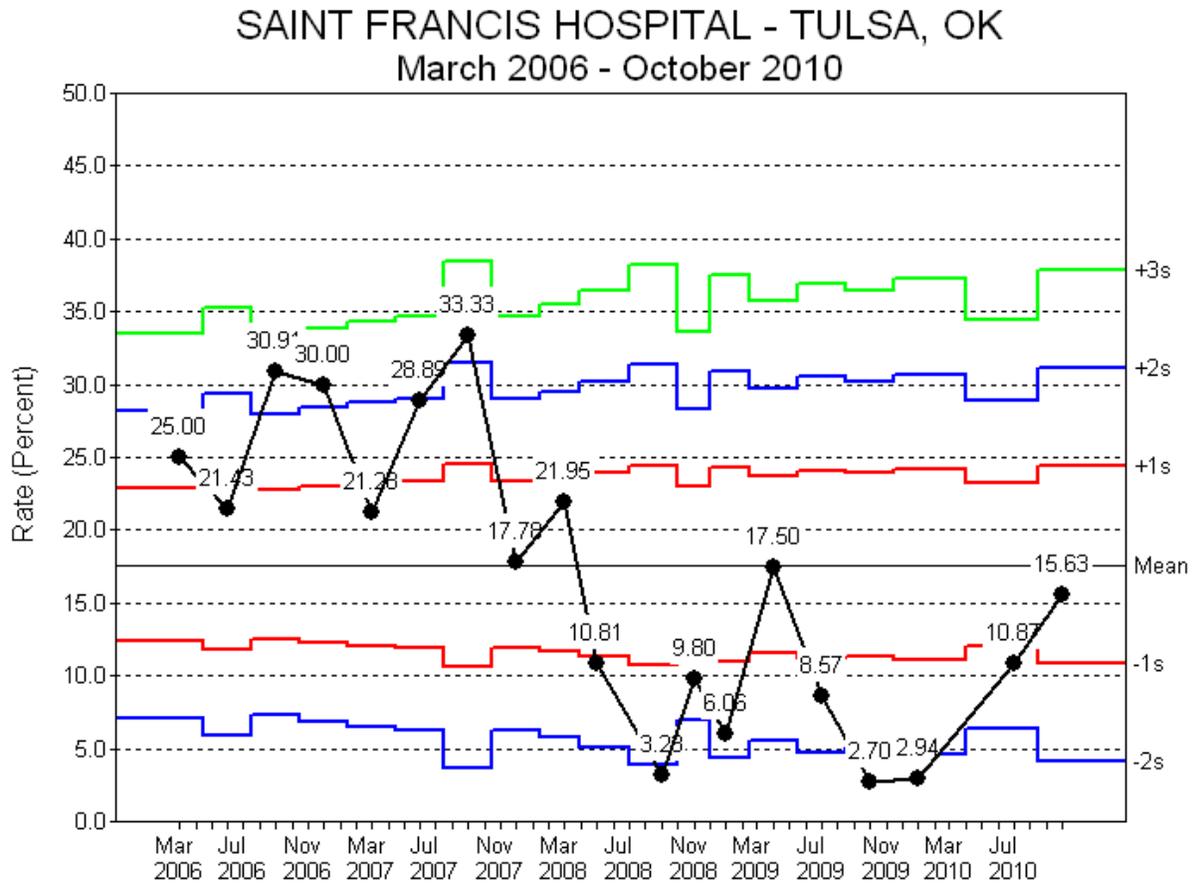
N:Connie Reports:EOPC Pts with abx started on admit

EOPC

(Eastern Oklahoma Perinatal Center)

Antibiotics Given More than 3 Days but Less than 7 Days

(data points = one month per quarter)



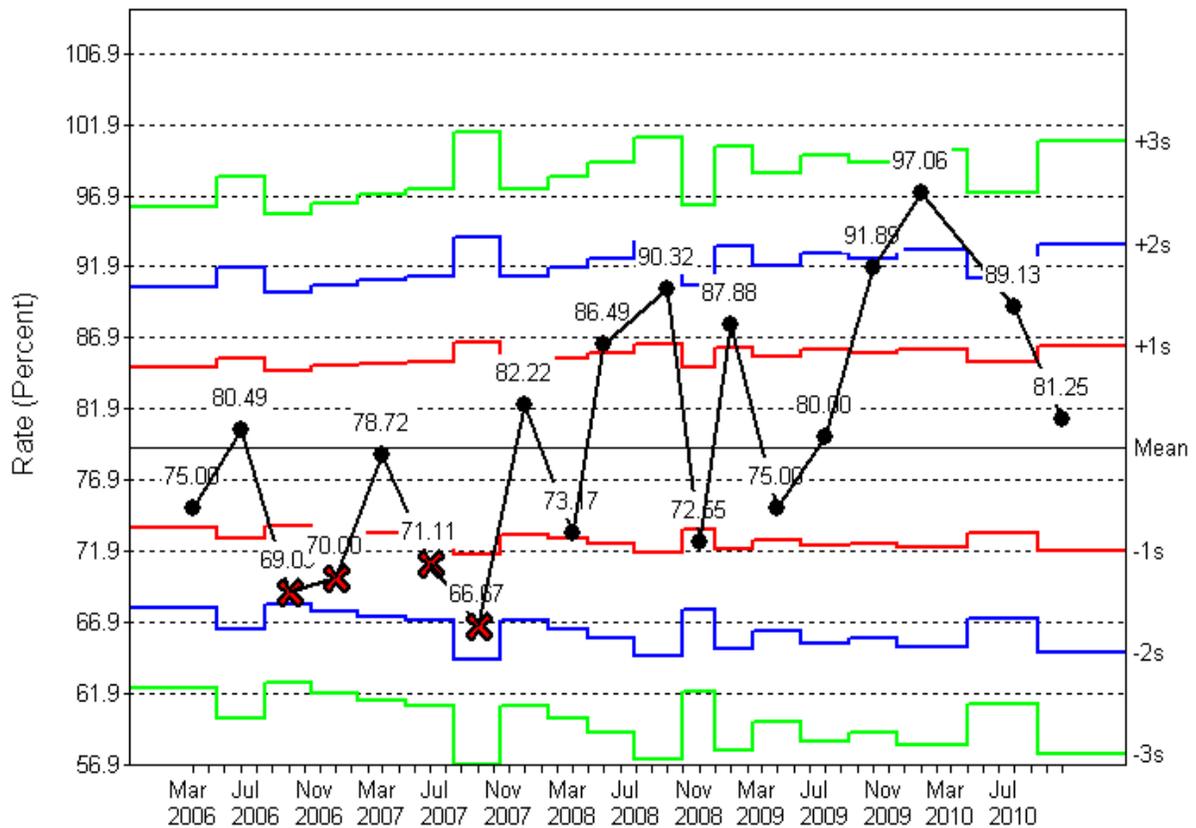
EOPC

(Eastern Oklahoma Perinatal Center)

Patients With Antibiotics Given 3 Days or Less

(data points = one month per quarter)

SAINT FRANCIS HOSPITAL - TULSA, OK March 2006 - October 2010



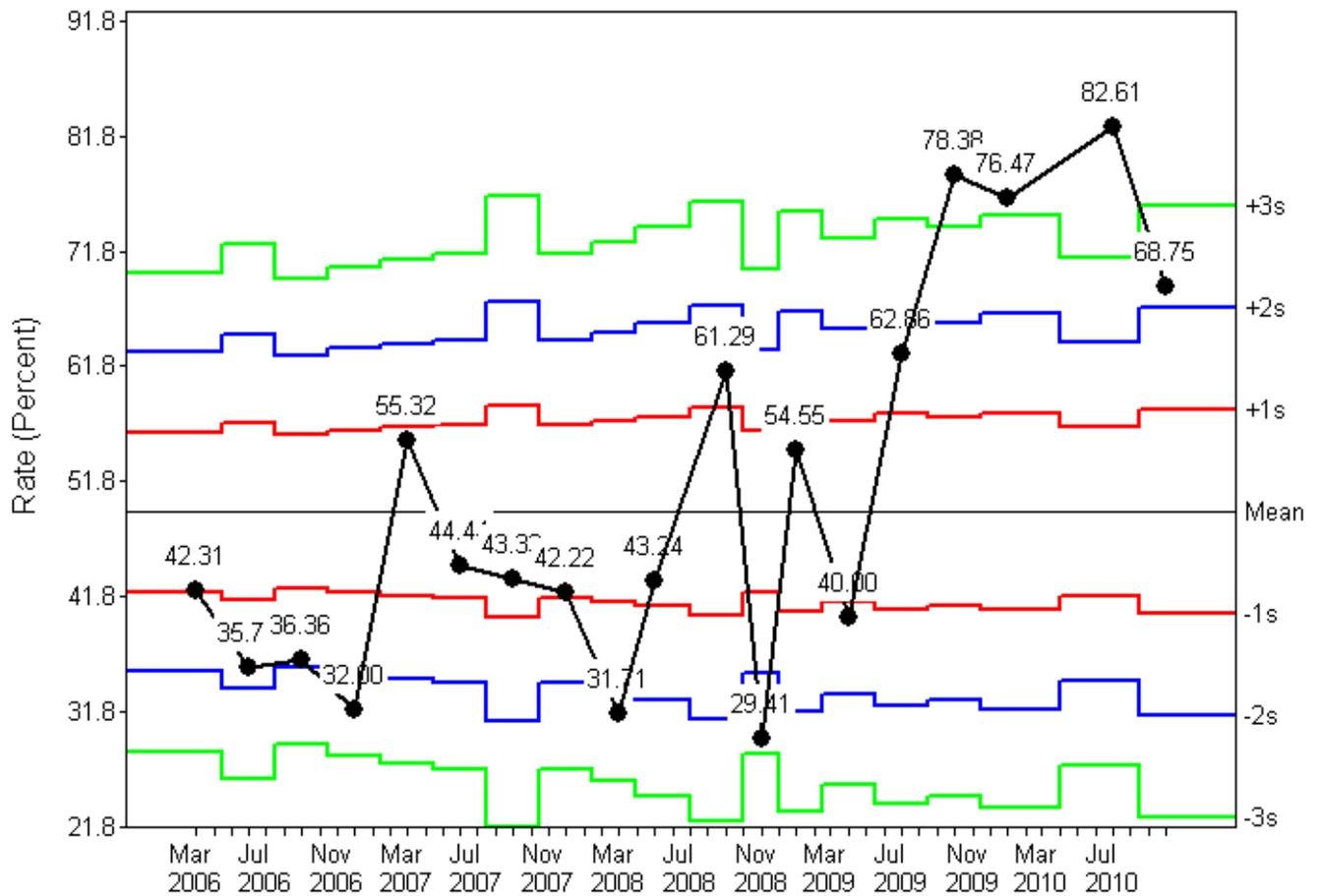
EOPC

(Eastern Oklahoma Perinatal Center)

Patients With Antibiotics Given 2 Days or Less

(data points = one month per quarter)

SAINT FRANCIS HOSPITAL - TULSA, OK March 2006 - October 2010



2. *What were your observations of the changes that occurred.*

Overall ~33% decrease in the number of infants receiving antibiotics on admission

Even though there was only a 9% decrease from beginning to end of the project for antibiotic courses of 4-6 days; the trend line is downward for shorter courses of antibiotics. The highest to lowest decrease during the project period was actually 30.63%.

From beginning to the end of the project period, there was a 6% rise in administration of antibiotics for 3 days or less. The trend line for this area of project also was rising throughout the project. The lowest to highest achievement during the project period was ultimately a 30.4% increase in a shorter course of antibiotics for 3 days or less.

From beginning to the end of the project period there was an increase of 26% in using antibiotics for 2 days or less. The lowest to highest achievement for this parameter was 53.2% increase for courses of antibiotics of 2 days or less.

Shorter courses of antibiotics were not associated with increased evidence of missed sepsis diagnosis.

3. *What is the project's score on the IHI Assessment Scale for Collaboratives. Our score was a 4.5, and we scored 43 on the ABP scorecard.*

Discussion: *What does your experience mean?*

The experience with this project showed our group that infant's could be well taken care of without the use of excessive amounts of antibiotics as well as long term periods of antibiotic use. It was shown that shorter courses of antibiotics did not increase our numbers of missed sepsis diagnosis.

1. *What do the project results indicate?* We entered the project with diverse opinions and our results indicated that evidence based approach to change can change opinion and practice.

2. *How did the results compare to what was expected?* Our goal was to reduce the use of antibiotics on admission based on risk factors by 25% and to reduce the length of treatment in 50% of the infants treated for more than 3 days.

Our rate of starting antibiotics on admission went from 86.67% down to 53.33% at the completion of the project. This is a 33.34% decrease in the start of antibiotics based on risk factors. Our goal was 25% and we achieved and superseded our goal by the end of the second year and by the end of the fourth year decreased had been maintained. We did have some

periods of increase but decrease was regained in the number of patients started on antibiotics at admission.

The second part of our aim was to decrease the length of treatment in 50% of the patients treated for more than 3 days. Our data showed that we were able to decrease our maximum number of patients continued on antibiotics for greater than 3 days from 17 patients down to 3 patients, at the end of the project. We decreased the total number of patients treated for greater than 3 days by 82%, far exceeding our goal.

3. *How did the context for these changes aid or impede results expected?*

Changing our criteria for starting antibiotics greatly aided our success and far exceeded our expectations of our goals.

4. *What were key success factors, difficulties and limitations?*

- Our key success factors included education of staff and getting the physicians on board.
- The use of automated pharmacy reports generated every morning was a great visual aid to our physicians. This report made sure everyone knew each morning who was on antibiotics and for how long.
- During our inservices, we emphasized that antibiotic days in the hospital increases healthcare costs, separates parents from their newborns and subjected infants to antibiotic dosing error. Those points made a big difference in the mindset of our prescribers.
- Finally, positive feedback given to clinicians was the reinforcement needed to keep the project on track.

5. *Are there unanswered questions?* No unanswered questions.

6. *What future actions are planned?* Future actions include continuing to use less antibiotics and for shorter periods of time.

7. *What were the generalizable lessons learned?*

- Administration of fewer and shorter courses of antibiotics does not increase the risk of missed sepsis diagnosis.
- Administration of less antibiotics and for shorter periods of time decreases the risk of adverse effects from too much antibiotic use in our patients.

- In our preterm infants using antibiotics less and shorter courses decreases their risk of opportunistic infections and the risk of NEC.
- Using less antibiotics also decreases the risk of medication errors.
- This project also reduced the length of stay for our patients which meant the infants spent more time with their parents.

8. *What advice would you offer others undertaking a similar project?*

When addressing this issue in other places:

- The key is to educate physicians and staff on the benefits of using antibiotics less.
- Emphasize that the benefits far out way the risk.
- Once they can enlist the support of physicians, the project is almost guaranteed to succeed.

9. *How do you plan to share the project results and what you learned with others.*

With our staff: graphs and charts

Outside our facility: VON NICQpedia.

Physician Involvement: *Please describe specifically the requirements each physician must satisfy to qualify for MOC credit for this project(including how long they must participate)*

- Each physician must participate in this project for at least 1 year
- Each physician must have participated in the project during their MOC cycle
- Each physician must have participated in the PDSA cycles for the project
- Each physician was responsible for some QI and education to other staff