Decrease in the Time to Administration of First Dose of Gentamicin with the Addition of Gentamicin to the AcuDose-Rx in the Stahlman NICU
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Background

- The combination of ampicillin and gentamicin is used for initial broad-spectrum therapy in neonates at risk for sepsis at delivery in the Stahlman NICU, a 16-bed Unit located adjacent to Labor & Delivery in the Vanderbilt University Medical Center.
- The Tennessee Initiative for Perinatal Quality Care (TIPQC), an independent membership organization funded by the Tennessee Department of Health promotes collaborative statewide inter-institutional quality improvement projects. This is one such collaboration.
- The “Golden Hour” initiative tracked the administration of the admission dose of antibiotics in those infants admitted to the Stahlman NICU. The initial data was the time for ampicillin. In March of 2013, having recognized that ampicillin is almost always given within the hour and gentamicin almost never was, we began tracking gentamicin.
- Ampicillin was available on the unit and administered by the bedside nurse. Gentamicin however, was prepared in the Children’s Hospital Pharmacy.
- Our goal was to make gentamicin available on the unit for more timely administration.

Methods

- As a member of the TIPQC “Golden Hour” project, data was collected on paper form in real time, then entered into a Redcap Database maintained by TIPQC. Missing data was collected from the electronic medical record when possible.
- These quality improvement projects are based on systematic implementation of evidence-based toolkits using a data-driven approach to monitor implementation.

Measures

- The 4 data points from the initial form: time of birth, (TOB); antibiotics ordered yes or no; time gentamicin was administered; and time in minutes from birth to administration.
- Evaluation involved comparing data collected prior to the availability of gentamicin in the AcuDose-Rx system and data collected after that time.
- When time to administration exceeded 120 minutes an attempt was made to determine the reason for this delay. If extenuating circumstances could be identified the patient was excluded.

Objectives

- Collect baseline data on the time of administration of the first dose of Gentamicin.
- Make gentamicin available on admission to the unit in the AcuDose Rx automated system.
- Evaluate improvement in administration times based on the new availability.
- Have gentamicin administered within the first 60 minutes after birth.

Results

- Mean administration time for March-June 2013, March-May 2014, (pre-change) and June-September 2014 (post-change).

![Graph showing monthly mean time to administration](image)

- Prior to March 2013 the data point, “administration of antibiotics (age in minutes)” was the time to administration of the admission dose of ampicillin. This change in data collection was made by the Vanderbilt team only.

Discussion

- Our assumption was that unit-based preparation of gentamicin would decrease first-dose administration time to that of ampicillin. While not included here, the mean time to ampicillin first dose continues to be below gentamicin.
- The cause(s) of delay in gentamicin administration are as yet unidentified, however there is a dose calculation not needed with ampicillin. Exceeding circumstances such as difficulty in access, delay in starting antibiotics until the screening CBC is evaluated, or change in clinical condition prompting antibiotics result in a later antibiotic start time.

Conclusion

- Implementation of this change required extensive evaluation by clinical staff from multiple disciplines. There were significant delays that were not anticipated at the outset.
- A nursing education plan was vital for the safe, successful implementation of this change.
- With the implementation of this change the mean time to administration of the admission dose of gentamicin has decreased from 110 minutes in April, 2013 to 82 minutes in September of 2014.
- There continue to be delays in the administration of gentamicin within the first 60 minutes after birth.
- Our investigation of this continues, and will include capturing time of order to time of administration.

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- To the entire nursing staff in the Stahlman NICU who have and do complete the TIPQC data forms while diligently caring for our tiny patients.
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The antibiotic combination of ampicillin and gentamicin has long been used for initial broad-spectrum therapy in neonates deemed at risk for sepsis at delivery.

The Tennessee Initiative for Perinatal Quality Care (TIPQC) is an independent membership organization funded by the Tennessee Department of Health to promote collaborative statewide inter-institutional quality improvement projects. These quality improvement projects are based on the systematic implementation of evidence-based toolkits using a data-driven approach to monitor toolkit implementation.

The Stahlman NICU is a 16-bed Unit located adjacent to Labor & Delivery in the Vanderbilt University Medical Center. As part of the TIPQC “Golden Hour” quality initiative, we gathered data on the administration time of the first dose of antibiotics in those infants admitted to the Stahlman NICU from the delivery setting who had antibiotics in their admission orders. The initial data was the time for ampicillin. In March of 2013, having recognized that ampicillin is almost always given during the hour after birth and gentamicin almost never was, we began recording the time of gentamicin administration.

Ampicillin was available on the unit and was prepared from its powdered form and administered by the bedside nurse. Gentamicin however, was prepared in the Children’s Hospital Pharmacy and delivered to the Stahlman NICU by tube system. Our goal was to make gentamicin available in the AcuDose-Rx Dispensing Cabinet (McKesson) for more timely administration.
• Collect data on the initial first-dose administration time of gentamicin.
• Implement education to prepare staff for the change in gentamicin administration.
• Have gentamicin moved to the AcuDose-Rx (McKesson) in the NICU directly available for administration on patient admission.
• Collect data on first dose administration times with the change in availability.
• Collect data on the initial first-dose administration time of gentamicin.
• Implement education to prepare staff for the change in gentamicin administration.
• Have gentamicin moved to the AcuDose-Rx (McKesson) in the NICU directly available for administration on patient admission.
• Collect data on first dose administration times with the change in availability.
As a member of the Tennessee Perinatal Initiative for Perinatal Quality Care (TIPQC) “Golden Hour” project, data was gathered on a standardized paper form at delivery and on admission. The data was then entered into a Redcap Database maintained by TIPQC by one of our team members. Where possible, missing data was collected from the electronic medical record. An attempt was made to determine the cause for delay in all doses given greater than 120 minutes after birth once Gentamicin was made available on the Unit.
The evaluation for this study involved the usage of data points on the initial form: 1) time of birth, (TOB); 2) antibiotics ordered yes or no; 3) time gentamicin was administered and 4) the number of minutes from TOB to administration of gentamicin. The goal was administration of gentamicin within the first 60 minutes after birth.

This study compared data collected prior to the availability of gentamicin in the AccuDose Rx in the Stahlman NICU and data collected after that time.

When time to administration exceeded 120 minutes after birth in our outcome data an attempt was made to determine the reason for delay. If the reason for delay was identified as an extenuating circumstance that data point was removed from analysis.
So much to do...
one Golden Hour
Monthly Mean Time to Administration
All Gentamicin Data
3/13-6/13 and 3/14-9/14
At the outset the assumption was made that unit-based preparation of gentamicin would decrease gentamicin first-dose administration time to approximate that of ampicillin. While not included here, the mean time to ampicillin first dose continues to be below gentamicin.

Extemating circumstances such as difficulty in obtaining access, intentional delay in starting antibiotics until the screening CBC with differential can be evaluated, and change in clinical condition prompting antibiotics in an infant initially judged at low-risk for infection, result in a later antibiotic start time. The cause(s) of delay in gentamicin alone are as yet unidentified.
Timeline to Implementation

• 11/22/12: Data collection for TIPQC “Golden Hour” began.
• 4/1/2013: Team began collecting the time to the first dose of gentamicin.
• 1/24/14: Friday Update first includes information about upcoming change.
• 1/30/14: Roll out is put on hold because of necessary changes to the NICU infusion pumps. (Pump maintenance is next due in April.)
• 3/27/14: Email to staff and jump start to disseminate gentamicin information.
• 3/28/14: Friday Update includes information for roll out.
• 4/14/14: Medfusion pumps are updated.
• 5/5/14: Distribution of “badge buddies” to staff with information on how to draw up gentamicin and ampicillin.
• 5/9/14: Friday Update with roll out date of 5/13 for the move to admission dose of gentamicin from the Stahlman AcuDose-Rx.
• 5/13/14: Roll out.