Umbilical Cord Blood as an Alternative for Infant Blood in the Neonatal Sepsis Evaluation for Group B Streptococcus (GBS)

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Objective

- The overall goal of this study is to evaluate reliability of umbilical cord blood sampling for CBC and blood cultures compared to the infant’s blood from a peripheral site for the purpose of GBS sepsis screening.
Background and Significance

• Persons of all ages can be colonized with GBS without having any symptoms

• Infants contract GBS infection from the mother during labor (Ohlsson & Shah, 2009).
Background and Significance

- Early onset GBS sepsis is a leading cause of potentially preventable neonatal morbidity and mortality in the U.S.
- Early precise detection is an essential part of decreasing morbidity and mortality in newborns
- Long term sequelae are frequently encountered in survivors of GBS sepsis.

Background and Significance

• Sepsis evaluation has become the most common cause for triage admission to the nursery.

• Between 324,000 and 608,000 newborns require a sepsis evaluation in the U.S. annually.

(Hansen, Forbes & Buck, 2005)
Background and Significance

• The incidence of early onset sepsis, particularly GBS, varies from 1 to 4 cases per 1,000 live births.

• Early onset GBS sepsis occurs in approximately one neonate per 100 to 200 GBS colonized women.
2007 CDC Recommendations for GBS intrapartum chemoprophylaxis

- **Culture based approach**
- **Risk factor based approach**
  - Maternal Fever $>100.4$ °F.
  - Prolonged rupture of membranes $>18$ hours.
  - Premature labor or rupture of membranes at $<37$ weeks.
  - History of an infant with GBS sepsis from a previous pregnancy.
  - Presence of positive urine or genital cultures for GBS during the present pregnancy.

(CDC, 2007)
2007 CDC Recommendations for GBS management

- Two doses of penicillin intrapartum is considered adequate prophylaxis.
- Infants born at <35 weeks or > 35 weeks to at risk mothers who received <2 doses are considered "At Risk Infants" for GBS sepsis.
- As per CDC guidelines, CBC and blood culture should be obtained on "At Risk Infants".

(CDC, 2007)
Optimal GBS management

- Earliest possible identification of infants at risk for GBS
- Rapid and accurate detection
- Early initiation of antibiotic therapy (Awaiting clinical emergence of sepsis before beginning treatment diminishes successful outcome).

(Polin et al, 1981)
How many sepsis evaluations are done?

- During the years 1999-2007, approximately 250-300 infants a year had sepsis evaluations at Scott and White Hospital.
- These are the infants that can potentially benefit from umbilical cord blood sampling.
Incidence

• Based on surveillance data by the Active Bacterial Core surveillance system, the annual incidence of early onset GBS disease in infants aged 0-6 days was 33% lower as a result of implementation of CDC guidelines

• Continued surveillance needed to guide further interventions

(CDC, 2007)
Methods

- IRB approved prospective study.
- 200 “At Risk Infants” for GBS sepsis will be enrolled in this study.
Methods: Blood sampling

- A CBC and 1 blood culture will be obtained from the umbilical cord of “At Risk Infants” in a sterile manner.

- A CBC and 1 blood culture will be obtained via peripheral blood from the “At Risk Infants” in a sterile manner.
Methods: Data Collection

- Maternal history (risk factors/antibiotics)
- Birth weight, gestational age, gender
- Type of resuscitation required at delivery
- Time & site of neonatal blood sampling
- Time & site of umbilical blood sampling
- Blood volume of each sample
- CBC results
- Blood culture results
## Budget

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<th>Clinical</th>
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<td>Blood culture</td>
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<table>
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| Total Cost | $73,840.00 |
Summary

• Neonatal group B streptococcus can be fatal if undetected and untreated.

• Reduction of painful procedures, inconveniences, and expenses for infants, parents, health care system is essential.

• Helps facilitate drive to improve efficiency and family-centered care.
In Conclusion...

- Providing significant correlation of lab results between umbilical cord blood (UCB) and infant blood (IB) would allow use of UCB as an alternative to infant phlebotomy.
In Conclusion...

- Substitution of UCB for IB to detect neonatal bacteremia could:
  - avoid pain and trauma to the neonate
  - avoid anxiety for the family
  - save significant time of the skilled professionals
  - obtain larger volumes of blood from cord
  - save the costs of supplies
Cord Blood vs. Infant Blood

Bonding

NICU
References:

References:

There are two ways to live your life.
One is as though nothing is a miracle.
The other is as though everything is a miracle.

Albert Einstein (1879–1955)