THE UTILITY OF MICROSCALE POINT OF CARE C-REACTIVE PROTEIN IN THE NICU

Scott O Guthrie, MD [1,2] , Sharon D Wadley, BSN [2], and James L Wynn, MD [3]

Vanderbilt University, Nashville, TN (Department of Pediatrics)[1]Jackson Madison County General Hospital (Department of Neonatology)[2], University of Florida, Gainesville, FL (Department of Pediatrics)[3]

BACKGROUND

Serial measurement of C-reactive protein (CRP) has excellent negative predictive value for blood stream infection in neonates.[1] A return of CRP to baseline has shown promise in previous studies to safely reduce and/or customize the length of antibiotic therapy for infected neonates.[2] This approach has great potential in preterm neonates, who experience the highest rate of treatment for infection and also have the greatest limitation on blood for laboratory studies. The volume required for a single CRP (500 µl whole blood) has in the past been the limiting factor for daily measurement in possibly infected preterm infants receiving antimicrobials. Currently available microscale point-of-care testing (POCT) platforms can measure CRP in 20 µl of whole blood in < 5 minutes. This may prove to be a valuable tool in customizing antibiotic regimens in infants with suspected infection and limiting antibiotic exposure.

OBJECTIVES

Compare results of CRP from the hospital laboratory (Vitros 4600) with an available POCT and determine if CRP normalizes before the clinician-determined treatment is stopped.

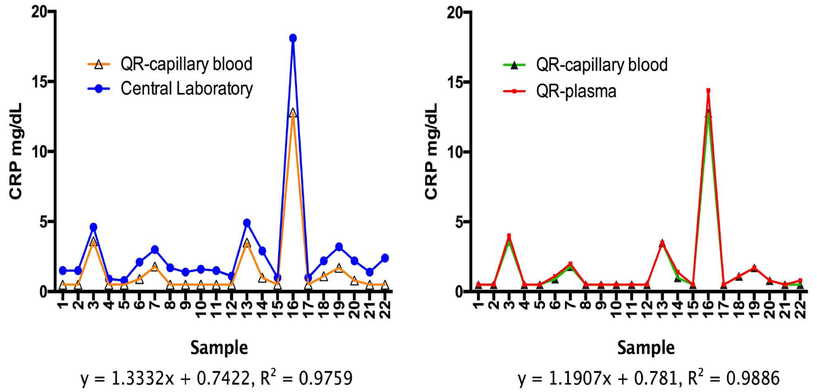
METHODS

All infants hospitalized in a Level III NICU without known or suspected congenital anomalies were eligible after clinician decision to continue antimicrobial treatment for >48 hours. All patients had an elevated CRP (> 1 mg/dl per central laboratory measurement) documented within 48 hours of clinical presentation; patients with confirmed blood stream infection were excluded. Daily CRP was measured by an available POCT platform (QuikRead go®, Orion Diagnostica) while receiving antimicrobials and for an additional 3 days post treatment. The duration of treatment was clinician determined. Providers were blinded to POC CRP results. Orion Diagnostica was not involved in the study design and provided no financial support for the work.

RESULTS

PHASE 1: Is the POCT accurate?

Figure 1: CRP measured in plasma or capillary blood correlates well with central lab platform (Vitros*).



*Due to the methodology of the Vitros system, CRP results are consistently 1.5 times higher when compared to other methods.[3]

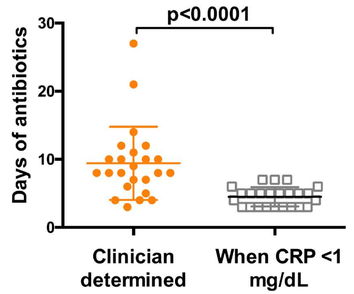
PHASE 2: When does CRP normalize?

Table 1: Infants received antimicrobial treatment therapy for a mean of 9.4 days. The mean time for normalization of the POCT CRP (<1.0 mg/dl) was 4.5 days.

Level III Neonatal ICU - Jackson, Tennessee
January 2015 - August 2015

N = 24 (58% Male)	Mean	Q1	Q3
Gestational Age	32	26.4	38.1
Birth Weight	2091	773	3188
Days of Antibiotics	9	6	10
Day CRP < 1 mg/dl	5	3	5

Figure 2: Clinician-determined antimicrobial length of treatment exceeds resolution of abnormal CRP by several days.



CONCLUSIONS

- **The POCT platform is as accurate as the central laboratory platform and uses 25-fold less blood.**
- **The POCT platform is easy to use at the bedside and easily aligns with capillary blood sampling.**
- **CRP normalization occurs on average 4 days before clinician-determined antibiotic therapy ends.**
- **POCT daily CRP testing may allow for a safe reduction in over usage of antibiotics and the associated complications in the common condition of culture negative "sepsis."**



The QuikRead go® CRP system was used as an investigational device for this study. Since this study was completed it has received FDA 510(k) Premarket Notification for whole blood, plasma and serum samples in clinical laboratory use.

REFERENCES

1. Benitz WE1, Han MY, Madan A, Ramachandra P. Serial serum C-reactive protein levels in the diagnosis of neonatal infection. Pediatrics. 1998 Oct;102(4):E41.
2. Ehl S, Gering B, Bartmann P, Högel J, Pohlandt F. C-reactive protein is a useful marker for guiding duration of antibiotic therapy in suspected neonatal bacterial infection. Pediatrics. 1997 Feb;99(2):216-21.
3. Elabiad MT, Arheart KL, Korones SB, Pourcyrous M. Adjusting for bias in C-reactive protein levels when using a vitros slide method in infants. American Journal of Perinatology. 2014 Nov;31(10):851-4. doi: 10.1055/s-0033-1361938. Epub 2014 Feb 25

Printed by Call4Posters™