Remarkable Decline in Pneumococcal Infection in Children with Sickle Cell Disease at Children’s & Women’s Hospital

Abdul Hafeez Siddiqui, MD
University of South Alabama, Children’s & Women’s Hospital
Division of Hematology/Oncology

Multiple factors have played a role in reducing the rate of pneumococcal infections in children with sickle cell disease. A large clinical trial conducted in 1986, concluded that penicillin prophylaxis for children younger than 6 years, with sickle cell disease, was protective. In addition, Pneumovax (a vaccine against 23 varieties of pneumococcal infections) which is administered at 2 and 5 years of age, plays a key role in reducing the infection rate. This vaccine was previously shown not to be effective in children younger than 2 years. In 2000, a new vaccine called PCV7 was introduced and was administered to all children at 2, 4, 6 and 12-15 months of ages. It is called PCV7 because it protects against 7 different varieties of pneumococcal bacteria. More recently, in 2010, the 13-valent pneumococcal polysaccharide conjugate vaccine (PCV13) was introduced to replace the PCV7 for all children.

see “Decline” on page 4

Visit the Comprehensive Sickle Cell Center website at: http://www.usahealthsystem.com/sicklecellcenter
The narrative was written to address attitudes commonly reflected in healthcare settings.

Written by
Johnson Haynes, Jr., MD

Note: The characters in this narrative, “One Bad Apple Doesn’t Spoil the Whole Barrel” are fictional. The narrative was written to address attitudes commonly reflected in healthcare settings.
Sickle Cell Disease and Hydroxyurea: Yesterday, Today, and Tomorrow

Submitted by
Ardie Pack-Mabien, CRNP

Mandatory newborn screening in the United States has resulted in early identification and medical access by those newborns affected with sickle cell disease (SCD). The addition of penicillin prophylaxis and pneumococcal immunizations as preventive measures, technological advancements in the development of diagnostics and screening tools and innovative medical management of the pediatric population have resulted in decreased morbidity and mortality for individuals living with SCD. The improvement in survivorship from childhood to adulthood has been estimated at 94% for individuals with HbSS and HbS\textsuperscript{+}Thalassemia and 98% for individuals with HbSC and HbS\textsuperscript{+}Thalassemia (Quinn, et al., 2010).

What role has hydroxyurea played in the medical management of individuals with SCD? The utilization of hydroxyurea as a potentially useful drug therapy in the management of individuals with SCD was first reported in 1984. Additional multi-center studies sponsored by the National Institutes of Health were conducted and found that hydroxyurea reduced the frequency and severity of sickle cell related pain crisis, number of acute chest syndrome episodes, frequency and number of red blood cell transfusions, and decreased end organ damage (Platt et al., 1984, Charache et al., 1992, Charache et al., 1994). Hydroxyurea was approved by the U.S. Food and Drug Administration for the treatment of adults with sickle cell anemia (HbSS) and HbS\textsuperscript{+}null Thalassemia in 1998 but has not been FDA approved for children with SCD. Since its approval, \textasciitilde 40% of the adult population and 10% of the pediatric population at the University of South Alabama Comprehensive Sickle Cell Center are currently taking hydroxyurea for the management of their disease. What we have learned over the last decades is that hydroxyurea reduces morbidity and mortality for children and adults with sickle cell anemia and it is cost effective. It has been shown to reduce emergency room visits and hospital admissions, and the need for red blood cell transfusions. Hydroxyurea is well tolerated without significant short term toxicities or long term safety concerns. Its efficacy in SCD has been demonstrated in a large body of evidence-based research, and based on disease severity, should be considered as a possible disease modifying therapy in all patients with SCD (McGann & Ware, 2011). Hankins et al. 2005, have previously reported that infants treated with hydroxyurea therapy have improved splenic function and growth rates, tolerated prolonged hydroxyurea therapy with hematological benefits, fewer acute chest syndrome episodes, and possibly preserved organ function. Safety remains a concern for health care providers, patients, and parents of children, thus individuals taking hydroxyurea therapy should be followed by their hematologist or sickle cell specialist in conjunction with their primary care provider for routine clinical evaluation and laboratory tests to monitor for potential side effects on a regular scheduled basis.

While evidence has mounted over the last decades supporting the long-term safety and efficacy of hydroxyurea therapy as a standard of care for patients with SCD (McGann & Ware, 2011), the question remains, at what point should hydroxyurea be considered the standard of care for all individuals with SCD (HbSS, HbS\textsuperscript{+}thalassemia, and HbSC disease).

References continued on page 6


“Decline” continued from page 1

Between January 2006 and June 2012, a study led by Dr. Abdul Hafeez Siddiqui was conducted at the University of South Alabama Children’s and Women’s Hospital which reviewed 456 hospitalizations in 133 children with sickle cell disease admitted with fever. Of the 456 blood samples drawn, 19(4%) grew bacteria and all of these patients were successfully treated with appropriate antibiotics. Only 2 (0.4%) cases of blood stream infection from Pneumococcus were seen. Interestingly, both these infections occurred before 2010 which marks the introduction of PCV13 vaccine. In other words, there has not been a single case of pneumococcal infection since the start of PCV13. In the past, over 10% of children became infected with the Pneumococcal bacteria and more than a third of them died before their 5th birthday. This study marks a dramatic drop in blood stream infection due to Pneumococcus in children with sickle cell disease in our institution when compared to previous reports.

In this study it was also discovered that the blood culture in almost all of the patients with a blood stream infection turned positive within the first 24 hours of collection. Based on this finding, selected patients are now discharged home after 24 hours of hospitalization with close follow up, instead of 48 hours. Among other causes of fever, a fourth of the patients presenting with fever either had pneumonia or acute chest syndrome. About 13% of these patients tested positive for viruses and Influenza (flu virus) was the most common culprit.

The results of this study were presented at the annual meeting of the American Society of Hematology (ASH) in Atlanta, GA held in December, 2012 and the manuscript was published in the Journal of Pediatric Hematology and Oncology, 30:432-436, 2013. 

Doctors at the University of South Alabama Comprehensive Sickle Cell Center Pediatric Clinic, held at Children’s and Women’s Hospital, are vigilant in assuring strict adherence to the recommended immunization schedule and penicillin prophylaxis. In addition, the parents are educated to watch their children closely for fevers. If the body temperature rises above 101F, parents are advised to bring their child immediately to the emergency room. In the emergency room blood cultures are drawn and patients are admitted to the hospital for antibiotics through veins for at least 48 hours. Further management is decided based on the results of blood cultures and clinical assessment. With this approach and the parents’ cooperation, a remarkable decline in blood stream infection due to the Pneumococcus bacteria in children with sickle cell disease has been realized.