

Transcranial Doppler (TCD) Ultrasonography Screening for Children with Sickle Cell Disease

Appropriate Antibiotic Prophylaxis for Children with Sickle Cell Disease

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Numerator	Denominator	Exclusions	Data Source(s)
Transcranial Doppler (TCD) Ultrasonography Screening for Children with Sickle Cell Disease (SCD)			
The number of children 2 through 15 years of age with SCD who were continuously enrolled in Medicaid and who received TCD ultrasonography during the measurement year.	The number of children 2 through 15 years of age with SCD who were continuously enrolled in Medicaid during the measurement year.	None.	Claims data.
Appropriate Antibiotic Prophylaxis for Children with Sickle Cell Disease			
The number of children ages 3 months through 4 years with SCD, who were continuously enrolled in Medicaid and during the measurement year received preventive antibiotics for (1) at least 300 days and (2) at least 350 days.	The number of children ages 3 months through 4 years with SCD, who were continuously enrolled in Medicaid during the measurement year.	None.	Claims data.

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Measure Importance

Sickle cell disease (SCD) is one of the most common genetic disorders in the United States.[1] The National Heart, Lung and Blood Institute (NHLBI) estimates that 2,000 infants are born with SCD in the United States each year.[2] SCD affects 70,000-100,000 children and adults in the United States, predominantly those of African and Hispanic descent.[3] The condition is chronic, lifelong, and associated with a decreased lifespan. There are multiple subtypes of SCD; the subtype conferring the most clinical risk is sickle cell anemia (SCA).

Without intervention, 11 percent of children with SCA experience a stroke by 20 years of age. TCD ultrasonography measures the blood velocities within the cerebral vessels; high blood velocities are strongly associated with an elevated stroke risk. Initiation of chronic blood transfusions reduces the risk of stroke by 92 percent among children at the highest risk of stroke as identified through TCD screening.[4]

Infection is the primary cause of death in children with SCA; the incidence of invasive Streptococcus pneumoniae infection is 20-100 times higher in affected children as compared to their peers with normal hemoglobin. Initiation and consistent use of antibiotic prophylaxis reduces the incidence of pneumococcal infection by 84 percent among children with SCA, resulting in increased survival rates among these high-risk children.[2, 5]

Evidence Base for Focus of the Measures

TCD ultrasonography can assess the risk of stroke by detecting abnormally high blood flow in the brain, but only 45 percent to 68 percent of eligible children receive annual screening.[6] NHLBI recommends that all children with SCA receive yearly TCD screenings from ages 2 through 15.[2]

Prompt and consistent use of antibiotics in young children with SCD prevents overwhelming bacterial infections. NHLBI recommends that infants with SCA be started on twice-daily penicillin as early as possible and remain on preventive antibiotics until age 5.[2]

Advantages of the Measures

- These measures fill a gap in pediatric quality measurement.[7] There are no existing quality measures for diagnosis, assessment, or treatment of pediatric SCA.
- Measuring TCD screening and receipt of antibiotic prescriptions are both feasible using existing data systems.
- These measures are publicly available for noncommercial use.

Levels of Aggregation Applicable to the Measures[8]

These measures are intended for aggregation and comparison of performance at the State or health plan level.

Reliability and Validity of the Measures

- The face validity of these measures was ranked high by nationally recognized technical experts (8.5 on a 9-point scale).
- These measures were tested using claims drawn from 5 consecutive years of Medicaid Analytic eXtract (MAX) administrative claims data from six States with a moderate to high prevalence of SCD.
- This measure was also tested using administrative claims acquired directly from the respective Medicaid programs of two States.
- A subset of cases was identified from the Michigan Medicaid claims data (CHAMPS), and a chart audit was conducted by trained medical record abstractors to compare administrative claims data with corresponding medical records data.
- Sensitivity was high for identifying TCD screening using Medicaid administrative claims data; 94 percent (47/50) of TCD screenings from the medical record review had a Medicaid administrative claim in the medical record. The positive predictive value of a Medicaid claim for TCD screening was 100 percent (47/47).
- Sensitivity was high for identifying antibiotic prescription events using Medicaid administrative claims data; 88 percent (30/34) antibiotic prescriptions from the medical record review had a Medicaid administrative claim for an antibiotic within 1 month of the prescription date in the medical record. The positive predictive value of a Medicaid claim for an antibiotic prescription event was 100 percent (30/30).

Measure Development and Testing

These measures were tested in six States using 5 years of Medicaid Analytic Extract (MAX) data, and in Michigan using 5 years of Medicaid claims data (2005–2009 for each). A technical expert panel reviewed concepts and draft measures to ensure the measures' importance and validity.

Selected Results from Tests of the Measures

- According to Medicaid Analytic Extract (MAX) data from six States, overall, TCD screening increased over the 5 years of data reviewed (from 21 percent to 36 percent overall from 2005 through 2009).
- Between States, the rates of TCD screening varied from 6 percent to 50 percent.
- Between States, the rates of prescriptions for antibiotics varied from 5 percent to 33 percent.
- Preventive antibiotic use declined over the same period for five States, which may indicate completeness issues with MAX data in later years.

Caveats

These measures are based on administrative claims; incomplete reporting of claims or SCD diagnosis codes may understate the proportions for this measure.

More Information:

- AHRQ: CHIPRAqualitymeasures@ahrq.hhs.gov
- Q-METRIC: http://chear.org/qmetric
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- Coming soon: Link to measure details on the AHRQ Web site.

For more information about the PQMP, visit www.ahrq.gov/chipra.

Notes

[1]Kavanagh PL, Sprinz PG, Vinci SR, Bauchner H, Wang CJ. Management of children with sickle cell disease: a comprehensive review of the literature. Pediatrics 2011; 128(6):e1552-1574.

[2]National Heart, Lung and Blood Institute. The Management of Sickle Cell Disease. In: National Institutes of Health, ed. Bethesda, MD, 2002; NO. 02-2117.

[3]Hassell KL. Population estimates of sickle cell disease in the U.S. Am J Prev Med 2010; 38(4 Suppl):S512-521.

[4]Adams RJ, McKie VC, Hsu L, et al. Prevention of a first stroke by transfusions in children with sickle cell anemia and abnormal results on transcranial Doppler ultrasonography. N Engl J Med 1998; 339(1):5-11.

[5]Gaston MH, Verter JI, Woods G, et al. Prophylaxis with oral penicillin in children with sickle cell anemia. A randomized trial. N Engl J Med 1986; 314(25):1593-1599.

[6]Raphael JL, Shetty PB, Liu H, et al. A critical assessment of transcranial Doppler screening rates in a large pediatric sickle cell center: opportunities to improve health care quality. Pediatr Blood Cancer 2008; 51(5); 647-651.

[7]Dougherty D, Schiff J, Mangione-Smith R. The Children's Health Insurance Program Reauthorization Act quality measures initiatives: moving forward to improve measurement, care, and child and adolescent outcomes. Acad Pediatr. 2011 May-Jun;11 (3Suppl): S1-S10.

[8]The Children's Health Insurance Program Reauthorization Act required measures developed under this program to "permit comparison of quality and data at a State, plan, and provider level". The measure developer identified the intended levels of aggregation and comparison as reported here.

The Children's Health Insurance Program Reauthorization Act (CHIPRA) called for establishment of a Pediatric Quality Measures Program (PQMP) as a followup to identifying the initial core set of children's health care quality measures. This measure fact sheet was produced by the Agency for Healthcare Research and Quality, based on information provided by the AHRQ-CMS CHIPRA Quality Measurement, Evaluation, Testing, Review, and Implementation Consortium (Q-METRIC), University of Michigan, which was funded by an AHRQ-CMS award. A listing of all submitted CHIPRA Centers of Excellence measures can be found at www.ahrq.gov/chipra. All CHIPRA COE-developed measures are publicly available for noncommercial use.

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