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Introduction

Children with sickle cell disease (SCD) are at an increased risk for stroke.^{1,2} Annual Transcranial Doppler (TCD) imaging (Figure 1) is encouraged³⁻⁵ to discern the level of stroke risk⁶ and—for those identified as high-risk—enable them to obtain blood transfusions, which may reduce the incidence of stroke.⁷ Past studies indicate that such prevention is underutilized.⁸⁻¹⁰

Objective

To assess whether the mailing of an intervention letter to parents of Maryland Medicaid-insured children with SCD and their primary care physician (PCP) improved TCD screening rates.

Methods

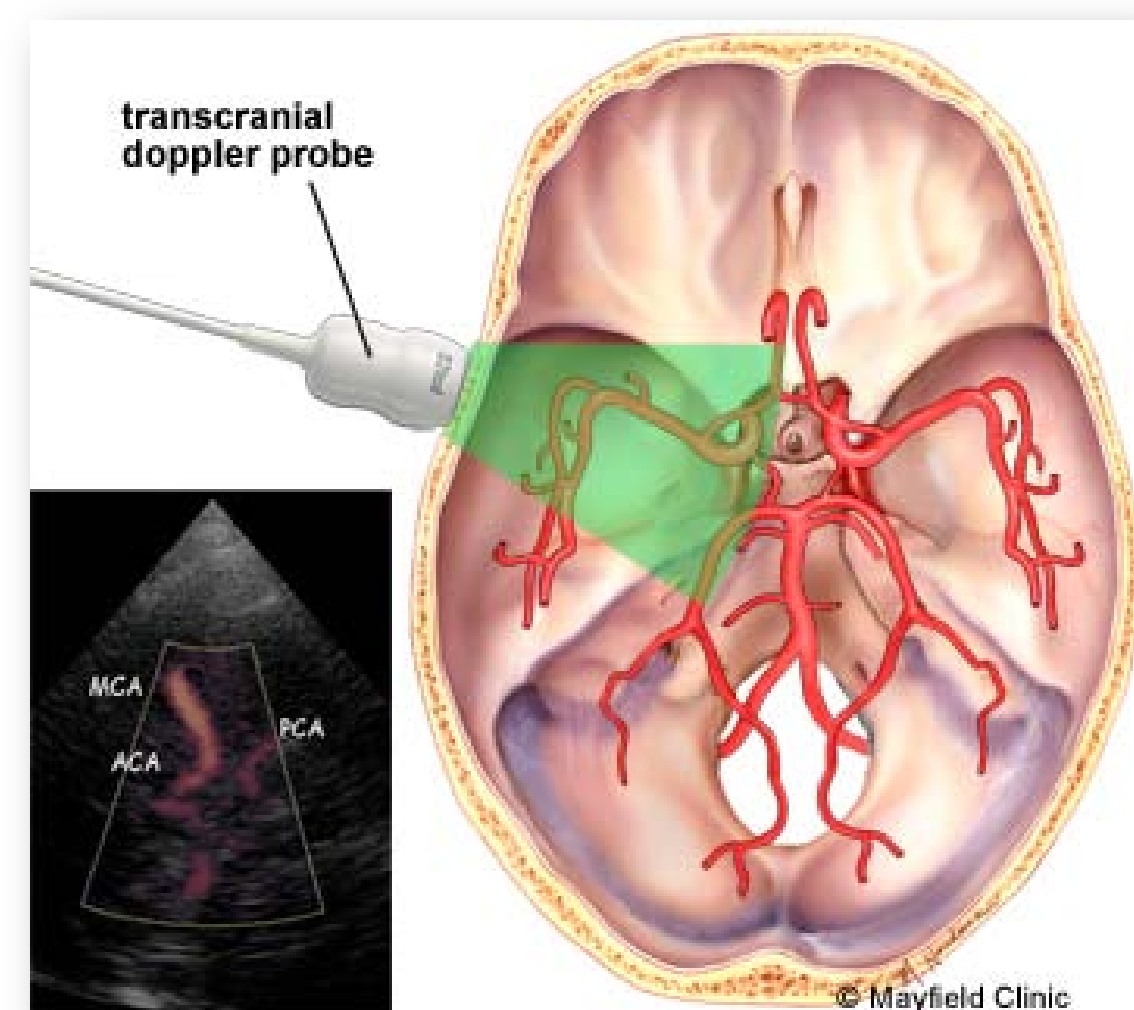
Subjects of this study:

- Were Maryland Medicaid enrollees from November 2010 to October 2011 (**baseline period**)
- Had a primary diagnosis of SCD (ICD-9: 282.41, 282.42, 282.6, 282.60, 282.61, 282.62, 282.63, 282.64, 282.68, 282.69)
- Were aged 2 to 16 years
- Were enrolled in a Maryland Medicaid managed care organization (MCO)

Those without TCD in one Maryland Medicaid MCO were targeted by the mailing from November 1 to 15, 2011. An additional month was given to allow those mailings to take effect (**intervention period**). Those in the other 6 MCOs were used as controls.

Outcomes resulting from the mailing were considered for a 6.5-month **follow-up period** concluding June 30, 2012.

Figure 1. Transcranial Doppler Imaging

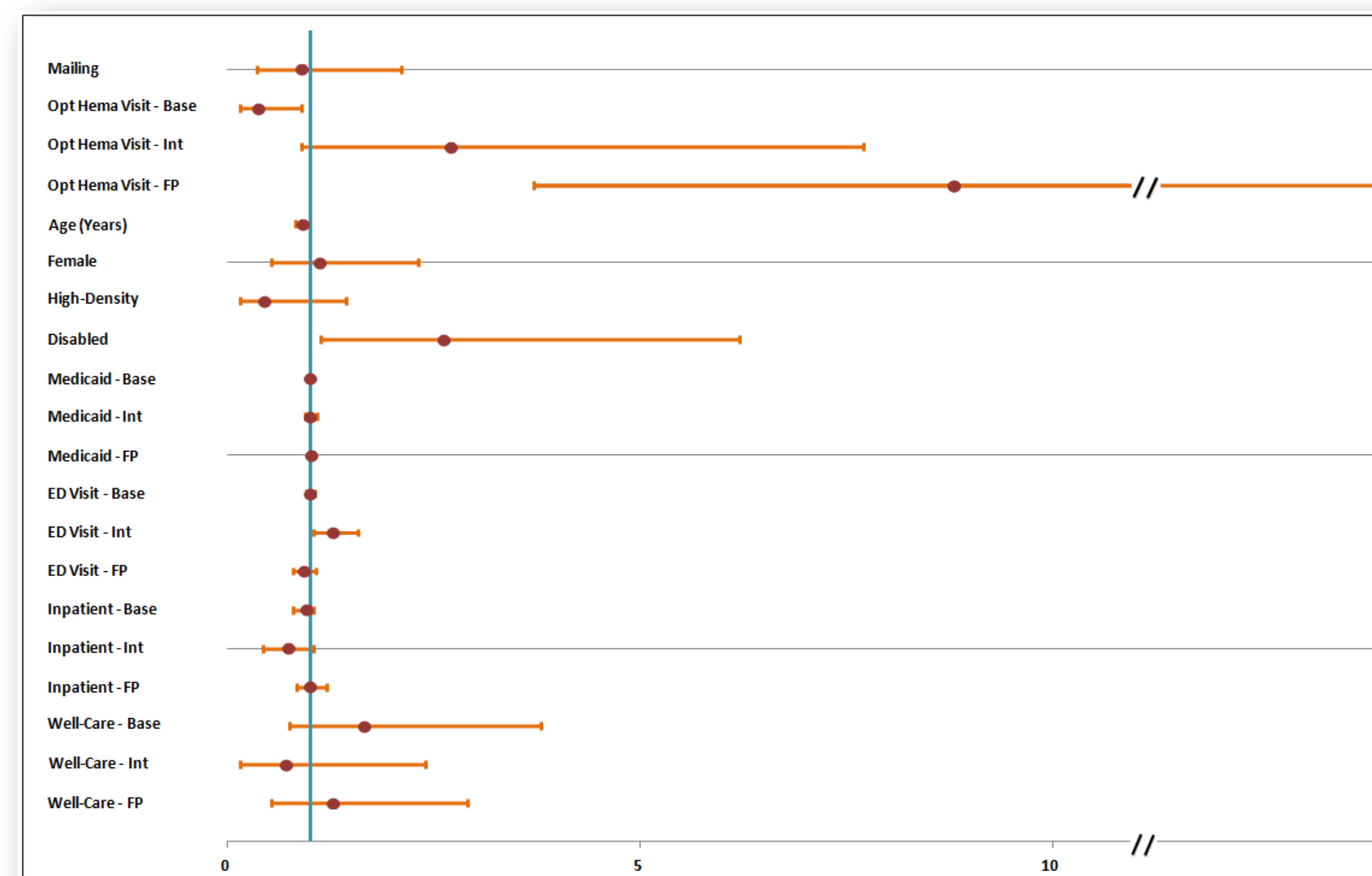


Source: Mayfield Clinic. (2013). *Subarachnoid hemorrhage*. Retrieved from http://www.mayfieldclinic.com/PE-SAH.HTM#_U3urN_IdVLI

Descriptive Statistics

	Intervention MCO (N=117)	Controls (N=433)	P-value
Transcranial Doppler Imaging Receipt			
Baseline Period (Base)	23% (N=192)	24% (N=637)	0.77
Intervention Period (Int)	2.9% (N=136)	2.8% (N=435)	0.91
Follow-Up Period (FP)	7.2%	8.6%	0.61
Demographics			
Mean Age (Years)	8.0 ± 3.9	8.5 ± 3.9	0.15
Female	52%	49%	0.54
High-Density Residential Region	77%	94%	<0.0001
Disabled Medicaid Category	24%	25%	0.74
Medicaid Enrollment (Days)			
Baseline Period	322 ± 62	326 ± 59	0.60
Intervention Period	43 ± 5.3	44 ± 4.6	0.10
Follow-Up Period	175 ± 33	173 ± 40	0.57
Health Services Use			
Emergency Department (ED) Visits			
Baseline Period	4.8 ± 9.6	4.0 ± 6.4	0.37
Intervention Period	0.60 ± 1.8	0.44 ± 1.3	0.39
Follow-Up Period	1.9 ± 3.5	1.5 ± 3.0	0.25
Inpatient Days			
Baseline Period	1.2 ± 2.5	1.7 ± 8.0	0.22
Intervention Period	0.19 ± 0.75	0.22 ± 1.2	0.75
Follow-Up Period	0.43 ± 1.2	0.63 ± 1.4	0.18
Outpatient Hematologist Contact			
Baseline Period	56%	44%	0.02
Intervention Period	8.6%	8.6%	1.00
Follow-Up Period	33%	21%	0.01
Well-Care Visit, at least 1			
Baseline Period	63%	56%	0.02
Intervention Period	14%	8.8%	0.11
Follow-Up Period	20%	19%	0.86

Figure 2. Adjusted Odds of Receiving TCD Screening during Follow-Up Period



Adjusted-R2 = 0.27; X2 = 66, df = 20, p < 0.0001, receiver operator curve area = 0.78; Hosmer-Lemeshow goodness-of-fit test: X2 = 6.8, df = 8, p = 0.59

Results

Logistic regression showed:

- The mailing had no significant impact: Adjusted odds-ratio (AOR) = .89, 95% Confidence Interval (CI) = .35, 2.1.
- Disability increased odds of TCD screening: AOR = 2.62; CI = 1.12, 6.2.
- During follow-up, hematology visits markedly increased TCD: AOR = 8.8; CI = 3.7-22.
- Baseline hematology visits correlated with decreased TCD in follow-up: AOR = .37; CI = .14, .89.

Summary statistics indicated:

- ~23% of all SCD subjects originally selected (n=829) received TCD in baseline period. Among those unscreened in baseline (n=571), 2.8% were screened during the 1.5-month intervention period.
- During follow-up period, 7.2% of the intervention group received TCD, compared to 8.6% of the controls (p = .61).
- The control and intervention groups were unbalanced (77% vs. 94% high-density) regarding region because the intervention MCO serves proportionally more persons in rural areas of Maryland.
- Inpatient days during follow-up were significantly higher among controls (0.63 vs. 0.44 days per subject).
- Both hematology and well-care visits were significantly more prevalent in the intervention group during baseline period; for hematology visits, that same significant difference was evident in follow-up.

Discussion

- One-time mailing had little apparent impact.
- Link between TCD screening rates and hematologist visits suggests that the procedure is often specialist-driven.
- Link between disability status and TCD screening rates suggests that the procedure is more frequent in higher morbidity cases. Studies from Tennessee and Texas point to specialized SCD centers achieving higher TCD screening rates.^{8,9}

Limitations

- Non-randomized design.
- Administrative data cannot differentiate between children with Hgb⁰ SCD (TCD recommended) and children with Hgb⁺ (TCD not recommended).
- Families and PCPs may have mistrusted, ignored, or simply failed to act in response to this one-time mailing. Such communications are more effective when coupled with additional patient and provider support.^{11, 12}

Conclusions and Next Steps

- Revising the letter to emphasize a “seek this expert” as opposed to “seek this treatment” message may result in greater positive effect on TCD screening rates.
- Design surveys or other instruments to directly elucidate reasons for avoiding screenings.
- Conduct similar studies with more sustained and broader interventions (reminders, calls, etc.)

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