

# Ability of the Area Deprivation Index to Predict Idiopathic Clubfoot Recurrence

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## INTRODUCTION:

Recurrences following initial successful correction of clubfoot deformity by the Ponseti method are high due to the need for strict brace compliance. Previous studies have shown numerous parent-related socioeconomic factors associated with poor brace compliance and eventual clubfoot recurrence. Development of a method for identifying families at high risk for recurrence could lead to early targeted instruction aimed at improving brace compliance and decreasing recurrence. We aim to evaluate a published socioeconomic scoring system to assess its ability to predict clubfoot recurrence.

## METHODS:

A retrospective review was conducted for idiopathic clubfoot patients treated at a single institution from 2011-2018, allowing for at least 4 years follow up. Patient demographics and treatment data were abstracted. Recurrence of clubfoot deformity was defined as deformity requiring repeat treatment (PT, recasting, or surgery) after initial treatment was concluded. Patient socioeconomic scoring was assessed using the Area Deprivation Index (ADI), a measure created at the University of Wisconsin based on Health Resources and Service Administration data that allows for a ranking of neighborhoods by socio-economic disadvantage in a region of interest. The ADI for each patient was assessed for their state decile (1-10) with a higher score indicating worse area disadvantage.

## RESULTS:

In total, 204 patients treated by 9 different pediatric orthopaedic surgeons were evaluated. The patients were an average age of 17 days old (range, 10 – 28) at the start of treatment, averaged 5.6 casts, with 82.4% requiring an initial tenotomy, and 91 patients (44.6%) requiring subsequent treatment for recurrent deformity (Table). Overall, patients with recurrence had a higher, but nonsignificant state ADI compared to patients without recurrence (4.8 vs. 4.2,  $p=0.065$ ). When assessed using multivariate analysis for each 1 unit increase in state ADI, the risk of recurrence increased by 10% ( $p=0.034$ ). When the ADI was assessed categorically, patients with a state ADI of 8-10 had a 2.3 times higher risk of recurrence ( $p=0.007$ ), with recurrence occurring at a significantly shorter time interval (32 vs. 67 months,  $p=0.01$ , figure).

## DISCUSSION AND CONCLUSION:

State ADI appears to be a good predictor of patients at risk for clubfoot recurrence following Ponseti treatment. Patients with a state ADI of 8-10 should be considered as significantly higher risk of recurrence, and early interventions should be targeted to improve brace compliance and hence prevent recurrence.

Using the state ADI to identify patients at higher risk for clubfoot recurrence at the start of treatment may help with targeted education to lower this risk of recurrence.

Parameter	Level	Mean	SD	Min	Max	Median	Q1	Q3	P-value
Age at treatment	Initial	17.1	5.1	10	28	17	12	21	0.100
	Subsequent	17.1	5.1	10	28	17	12	21	0.100
Number of casts	Initial	5.6	1.2	3	8	5	4	6	0.001
	Subsequent	5.6	1.2	3	8	5	4	6	0.001
Number of recasts	Initial	0.2	0.4	0	2	0	0	0	0.001
	Subsequent	0.2	0.4	0	2	0	0	0	0.001
Number of surgeries	Initial	0.1	0.3	0	1	0	0	0	0.001
	Subsequent	0.1	0.3	0	1	0	0	0	0.001
Number of recastings	Initial	0.1	0.3	0	1	0	0	0	0.001
	Subsequent	0.1	0.3	0	1	0	0	0	0.001
Number of recastings	Initial	0.1	0.3	0	1	0	0	0	0.001
	Subsequent	0.1	0.3	0	1	0	0	0	0.001
Number of recastings	Initial	0.1	0.3	0	1	0	0	0	0.001
	Subsequent	0.1	0.3	0	1	0	0	0	0.001
Number of recastings	Initial	0.1	0.3	0	1	0	0	0	0.001
	Subsequent	0.1	0.3	0	1	0	0	0	0.001
Number of recastings	Initial	0.1	0.3	0	1	0	0	0	0.001
	Subsequent	0.1	0.3	0	1	0	0	0	0.001
Number of recastings	Initial	0.1	0.3	0	1	0	0	0	0.001
	Subsequent	0.1	0.3	0	1	0	0	0	0.001

