



Socioeconomic Risk Factors for Poor Outcomes of Developmental Dysplasia of the Hip

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Objective To examine the relationship between socioeconomic factors and outcomes of developmental dysplasia of the hip (DDH).

Study design A retrospective review of patients with DDH at a tertiary pediatric hospital from 2003 to 2012 with 2 years minimum follow-up was conducted. The relationship between socioeconomic factors with late presentation, treatment, and outcomes was examined. Socioeconomic factors included insurance status, language, and ethnicity.

Results In total, 188 patients met criteria. Patients with late presentations were more likely to be Hispanic ($P = .02$). However, public insurance and a non-English language were not associated with late presentation. Hispanic patients ($P = .01$) and patients with a non-English language ($P = .01$) had a lower nonoperative treatment success rate. Hispanic patients had more surgical procedures performed than non-Hispanic patients ($P = .04$). Patients with range of motion limitations were more likely to have public insurance ($P = .05$) and be Hispanic ($P = .04$). On multiple logistic regression analysis controlling for late presentation, patients with public insurance had increased odds of range of motion limitations (OR 2.22, $P = .04$). Patients with public insurance (OR 0.44, $P = .04$), a non-English primary language (OR 0.30, $P < .01$), and Hispanic ethnicity (OR 0.37, $P = .01$) had decreased odds of successful nonoperative treatment.

Conclusions Public insurance, a non-English language, and Hispanic ethnicity are risk factors for inferior outcomes for DDH. When controlling for late presentation, these were significant risk factors for nonoperative treatment failure. (*J Pediatr* 2019;211:159-63).

Developmental dysplasia of the hip (DDH) is a spectrum of anatomic abnormalities ranging from acetabular dysplasia with mild instability to dislocation.¹ The condition is common with an estimated incidence of 5 per 1000 hips.² Although mild dysplasia and instability typically resolve spontaneously, leaving patients with subluxation or dislocation untreated can have severe consequences. These patients are at risk for developing gait abnormalities, limited hip abduction, and leg length discrepancies.³ These abnormalities may lead to the development of premature degenerative arthritis of the hips, lower back, and knees. A study of the Norwegian Arthroplasty Register found DDH to be responsible for one-third of hip replacements in patients under age 65 years.⁴

Early recognition and treatment of this condition is essential. Early treatment has been shown to increase the success rate of nonoperative Pavlik harness treatment and decrease the rate of avascular necrosis following its use.^{5,6} It has also been shown to decrease the need for future surgery following open reduction through improved remodeling.⁷ Furthermore, treatment of DDH at a later age is associated with worse functional outcomes.⁸ The American Academy of Pediatrics, the Pediatric Orthopedic Society of North America, and the American Academy of Orthopedic Surgeons all recommend screening for DDH with newborn and periodic surveillance physical examinations until walking age because of the importance of early diagnosis. However, screening methods remain controversial, and late presentations of DDH continue to occur.³

Understanding the factors that contribute to poor outcomes of DDH is essential to more accurately identify and monitor patients at risk. A previous study found that significant risk factors for late diagnosed DDH were those that influenced the screening program including low birth weight, birth in a rural setting, and early hospital discharge following delivery.⁹ Another study found that patients with late presentations of DDH were more likely to be non-white, non-English speaking, from lower income areas, and hold public insurance.¹⁰ Understanding this relationship is crucial to determine if screening programs are sufficient for the prevention of adverse outcomes in populations at risk for late diagnosed DDH. The purpose of this study was to examine the relationship between patient and family socioeconomic factors and the treatment and outcomes of patients with DDH.

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DDH Developmental dysplasia of the hip

Methods

A retrospective review of patients diagnosed with DDH at a tertiary pediatric hospital from 2003 to 2012 was conducted. Patients were excluded if they did not have a minimum of 2 years of follow-up. A total of 324 patients were treated for DDH during the study period. Of these patients, 58% were followed for over 2 years with 136 patients excluded for inadequate follow-up. There were 188 patients who met inclusion criteria. Patients were identified using *International Classification of Diseases, Ninth Revision* codes from billing records.

Medical records were queried for patient demographic data. Insurance type was categorized as public for all types of Medicaid and private for all other insurance plans. Ethnicity was categorized as Hispanic or non-Hispanic. Primary language spoken at home was categorized as English or non-English.

Medical records were also reviewed for timing of presentation, treatment type, functional outcomes, and radiographic outcomes. Late presentation was defined as presentation after 3 months of age in accordance with previous studies.^{9,11} Treatment variables included nonoperative treatment success, total number of surgical procedures, and treatment complications. Nonoperative treatment success was defined as successful treatment of dysplasia without the need for surgery. Total number of surgical procedures was defined as the number of trips to the operating room. Final follow-up examinations were reviewed for the presence of pain, limp, range of motion limitations, and activity limitations. Pain was defined based on parental perception of patient pain as documented in the encounter note. Final radiographs were reviewed for the presence of an elevated acetabular index, an intact Shenton's line, and a pseudoacetabulum. Data were collected and managed using the Research Electronic Database Capture. Institutional review board approval was obtained for this study.

The relationship between ethnicity (Hispanic vs non-Hispanic), primary language spoken (English vs non-English), insurance status (public vs private), and outcome variables was examined. χ^2 tests were used for categorical variables, and *t* tests were used for quantitative variables. A multiple logistic regression was performed to control for late presentation. Statistical significance was determined with *P* value of $\leq .05$. Statistical analysis was performed using STATA/1C 14.0 (Stata Statistical Software Release v 14, 2015; SataCorp LP, College Station, Texas).

Results

A total of 188 patients (78.7% female) met inclusion criteria; 64.5% of patients had public insurance, 62.2% of patients were Hispanic, and 59.7% of patients had English as their primary language.

There was no significant difference in the proportion of late presentations between patients with public and private

insurance (57.6% [68 of 118] vs 50.8% [33 of 65], *P* = .37). However, patients with public insurance were more likely to have range of motion limitations at final follow-up than patients with private insurance (32.5% [38 of 117] vs 18.8% [12 of 64], *P* = .05). Patients with public insurance were also more likely to have pain at final follow-up than patients with private insurance (8.6% [10 of 116] vs 0% [0 of 65], *P* = .02) (Table I).

There was no significant difference in the proportion of late presentations between patients of non-English and English speaking families (58.3% [42 of 72] vs 53.7% [58 of 108], *P* = .54). However, patients of non-English speaking families had a lower rate of successful nonoperative treatment than patients of English speaking families (26.4% [14 of 53] vs 50.0% [44 of 88], *P* = .01) (Table II).

There was a larger proportion of late presentations in Hispanic patients than non-Hispanic patients (61.5% [72 of 117] vs 44.3% [31 of 70], *P* = .02). Hispanic patients had a lower rate of successful nonoperative treatment than non-Hispanic patients (32.6% [28 of 86] vs 54.1% [33 of 61], *P* = .01). Furthermore, Hispanic patients had more surgical procedures performed than non-Hispanic patients (1.35 ± 1.12 vs 0.99 ± 1.27 ; *P* = .04). At final follow-up, Hispanic patients were more likely to have range of motion limitations than non-Hispanic patients (32.8% [38 of 116] vs 18.8% [13 of 69], *P* = .04) (Table III).

A multiple logistic regression was performed to control for late presentation. On multiple logistic regression analysis, patients with public insurance had increased odds of range of motion limitations at final follow-up (OR 2.22, *P* = .04). Patients with public insurance (OR 0.44, *P* = .04), a non-English primary language (OR = 0.30, *P* < .01), and Hispanic patients (OR 0.37, *P* = .01) had decreased odds of successful nonoperative treatment (Tables I-III).

Insurance status, primary language spoken, and ethnicity were not found to be significantly associated with limp, activity limitation, treatment complications, or final radiographic outcomes.

Discussion

Screening for DDH is important because early detection allows for more effective treatment and improved outcomes.⁵⁻⁷ However, evidence-based literature to support current practice is lacking, resulting in heterogeneous screening programs and techniques.³ Recent research has established an association between patient socioeconomic factors and delayed diagnosis of DDH.¹⁰ What remains to be determined is the impact that patient socioeconomic factors have on the outcomes of DDH. Understanding this relationship is critical to developing more effective screening and outreach. This study identified public insurance, a non-English language, and Hispanic ethnicity as risk factors for inferior functional outcomes and decreased non-operative treatment success for DDH. A significant proportion of patients presenting to this institution have these risk factors.

Table I. Outcome variables for patients with public insurance and private insurance

Outcome variables	Public (%)	Private (%)	Crude OR* (95% CI)	P value	aOR [†] (95% CI)	P value
Late diagnosis	57.6	50.8	1.32 (0.73-2.42)	.37		
Successful nonoperative treatment	36.3	51.9	0.53 (0.26-1.05)	.07	0.44 (0.2-0.96)	.04 [‡]
ROM limitation	32.5	18.8	2.08 (1.00-4.36)	.05 [‡]	2.22 (1.03-4.78)	.04 [‡]
Pain	8.6	0.0		.02 [‡]		
Limp	13.2	4.9	2.93 (0.81-10.55)	.10	2.93 (0.81-10.55)	.10
Activity limitation	6.9	7.8	0.87 (0.27-2.79)	.82	0.88 (0.27-2.82)	.83
Complications	39.8	30.6	1.50 (0.77-2.91)	.23	1.53 (0.77-3.06)	.23
Elevated acetabular index	19.0	14.8	1.35 (0.58-3.15)	.49	1.36 (0.58-3.17)	.48
Intact Shenton line	88.5	95.2	0.39 (0.11-1.41)	.15	0.38 (0.1-1.40)	.15
Pseudoacetabulum	4.7	3.4	1.41 (0.27-7.51)	.69	1.45 (0.27-7.80)	.67
Outcome variables	Public (mean ± SD)	Private (mean ± SD)	P value			
Total surgical procedures	1.28 ± 1.12	1.06 ± 1.31	.24			

ROM, range of motion

*Bivariate analysis.

†Multivariable analysis.

‡Indicates significance at the $P \leq .05$ level.

At this institution, 63% of patients are Hispanic, 60% are non-English speaking, and 46% have public insurance.

Delayed diagnosis of DDH in patients demographically at risk may contribute to the inferior outcomes observed in these patient populations. In this study, late diagnosis of DDH was defined as presentation after 3 months of age. It is assumed that a diagnosis of DDH after 3 months of age increases the risk for irreversible damage to the acetabulum, which often necessitates more invasive treatment.⁹ Lindberg et al found that patients with late presentations of DDH were more likely to be non-white, non-English speaking, from lower income areas, and hold public insurance.¹⁰ In our study, Hispanic ethnicity was a significant risk factor for late presentation. Although a larger proportion of patients with public insurance and a non-English language presented late, these were not significant risk factors for late presentation. Treatment of DDH at a later age is associated with worse functional outcomes.⁸ In our study, patients who were Hispanic or had public health insurance were more likely to have range of motion limitations at final follow-up. Also, pa-

tients with public insurance were more likely to have pain at final follow-up. Previous studies have established an association between older age at Pavlik harness treatment initiation and decreased treatment success.^{6,12} Thus, delayed treatment initiation may contribute to the decreased success rate of nonoperative treatment observed in patients who were Hispanic or had public health insurance. Luhmann et al found a greater than 2-fold increase in secondary reconstructive procedures in patients who underwent reduction of a hip for DDH after 6 months of age.⁷ In our study, we found that Hispanic patients had more surgical procedures performed than non-Hispanic patients. Promoting enhanced screening and outreach in patient populations at increased risk for having their DDH undetected may improve outcomes.

The quality of the screening that patients receive is highly dependent on the skill of their examiner. Current American Academy of Orthopedic Surgeons evidence-based guidelines recommend that primary care physicians perform serial physical examinations on infants up to 6 months of age for DDH surveillance.¹¹ However, the American Academy of

Table II. Outcome variables for patients with a non-English primary language and an English primary language

Outcome variables	Non-English (%)	English (%)	Crude OR* (95% CI)	P value	aOR [†] (95% CI)	P value
Late diagnosis	58.3	53.7	1.21 (0.66-2.20)	.54		
Successful nonoperative treatment	26.4	50.0	0.36 (0.17 - 0.75)	.01 [‡]	0.3 (0.13-0.68)	<.011 [‡]
ROM limitation	33.8	23.4	1.68 (0.86-3.26)	.13	1.66 (0.83 - 3.34)	.15
Pain	8.3	3.7	2.34 (0.64-8.61)	.20	2.33 (0.62-8.73)	.21
Limp	11.6	8.7	1.37 (0.50-3.74)	.54	1.37 (0.50-3.74)	.54
Activity limitation	8.6	6.5	1.34 (0.43-4.17)	.61	1.31 (0.42-4.09)	.64
Complications	37.3	35.3	1.09 (0.58-2.07)	.79	1.03 (0.53-2.03)	.92
Elevated acetabular index	24.3	14.3	1.93 (0.89-4.17)	.10	1.94 (0.89-4.21)	.09
Intact Shenton line	91.5	90.3	1.17 (0.40-3.36)	.78	1.61 (0.40-3.36)	.78
Pseudoacetabulum	2.9	4.2	.70 (.12-3.92)	.68	0.69 (0.12-3.89)	.67
Outcome variables	Non-English (mean ± SD)	English (mean ± SD)	P value			
Total surgical procedures	1.41 ± 1.14	1.20 ± 1.22	.09			

*Bivariate analysis.

†Multivariable analysis.

‡Indicates significance at the $P \leq .05$ level.

Table III. Outcome variables for Hispanic patients and non-Hispanic patients

Outcome variables	Hispanic (%)	Non-Hispanic (%)	Crude OR* (95% CI)	P value	aOR† (95% CI)	P value
Late diagnosis	61.5	44.3	2.01 (1.10-3.67)	.02‡		
Successful nonoperative treatment	32.6	54.1	0.41 (0.21-0.81)	.01‡	0.37 (0.17-0.80)	.01‡
ROM limitation	32.8	18.8	2.10 (1.02-4.3)	.04‡	1.88 (0.89-3.96)	.10
Pain	7.8	1.4	5.80 (0.72-46.83)	.10	5.05 (0.62-41.25)	.13
Limp	11.4	7.7	1.55 (0.53-4.55)	.43	1.56 (0.53-4.61)	.42
Activity limitation	6.1	8.6	0.70 (0.23-2.17)	.53	0.64 (0.20-2.01)	.44
Complications	12.8	11.3	0.97 (0.51-1.84)	.92	0.88 (0.44-1.73)	.70
Elevated acetabular index	20.2	13.2	1.66 (0.72-3.83)	.24	1.56 (0.67-3.64)	.30
Intact Shenton line	89.4	94.0	0.53 (0.17-1.73)	.30	0.57 (0.17-1.84)	.34
Pseudoacetabulum	3.7	4.9	0.73 (0.16-3.40)	.70	0.67 (0.14-3.13)	.61
Outcome variables	Hispanic (mean ± SD)	Non-Hispanic (mean ± SD)	P value			
Total surgical procedures	1.35 ± 1.12	0.99 ± 1.27	.04‡			

*Bivariate analysis.

†Multivariable analysis.

‡Indicates significance at the $P \leq .05$ level.

Pediatrics recommends that questionable physical examination findings, pediatrician or parental concern, and infants with risk factors for DDH are relative indications for referral to an orthopedist.³ A recent study found that clinical examination by general practitioners did not reliably detect radiographically identified DDH. None of the clinical findings made by a general practitioner had a sensitivity of over 46.2% for DDH detection.¹³ This may be due to inadequate musculoskeletal education for primary care providers. Lynch et al found that the majority of primary care providers tested at a large academic primary care institution failed to demonstrate adequate musculoskeletal knowledge.¹⁴ Matzkin et al found similar results with a test administered to medical students and nonorthopedic residents and physicians.¹⁵ Under-served patients are more likely to receive care from nonphysician primary care clinicians.¹⁶ Nonphysician primary care clinicians, including nurse practitioners and physician assistants, may not be well equipped to perform musculoskeletal examinations either. Benham et al concluded that the majority of nurse practitioners lack adequate preparation to manage musculoskeletal problems.¹⁷ A recent AAP clinical report suggests that all children with unstable or dislocated hips and limited hip abduction or asymmetric hip abduction should be referred to an orthopedist. In addition, the report recommends that all treatment be performed by an orthopedist.³ Therefore, access to specialty orthopedist care is likely an important determinant of screening efficacy and treatment outcome for DDH.

Disparities in access to pediatric orthopedic specialty care may also contribute to the difference in outcomes observed in at risk patient populations. In a nationwide survey of orthopedic surgeon's offices, Skaggs et al found that children with Medicaid insurance had limited access to orthopedic care and that Medicaid physician reimbursement correlated significantly with patient access to care.¹⁸ Furthermore, Medicaid insurance status is associated with longer wait times for outpatient orthopedic appointments and further travel to receive outpatient orthopedic care in adult pa-

tients.^{19,20} Ethnicity and family income have also been shown to impact access to pediatric orthopedic care. In a study of children who underwent treatment for femoral shaft fractures, Dodwell et al found that patients were more likely to undergo implant removal if they were white or lived in neighborhoods with less poverty. Disparities in access to care and variations in reimbursement were cited as possible causes of this difference.²¹

Although Hispanic ethnicity was a significant risk factor for late presentation, public insurance and a non-English language were not. When controlling for late presentation, public insurance, a non-English language, and Hispanic ethnicity were significant risk factors for nonoperative treatment failure. This suggests that other factors likely contribute to the inferior outcomes observed in these patients. Lindberg et al found public insurance and a non-English language to be significant risk factors for late presentation of DDH.¹⁰ However, their study was conducted in a different state. Demographic composition and policy initiatives vary between cities and may impact outcomes for DDH. In California, the state in which this institution is located, patients with congenital hip dislocations are eligible for the California Children's Services program. This state program provides diagnostic and treatment services, physical and occupational therapy, and medical case management to children with eligible medical conditions. In this study cohort, 65% of patients presenting to our department with DDH had public insurance. This is significantly higher than the overall proportion of patients presenting to our institution's orthopedic department; only 46% had public insurance. The California Children's Services program may contribute to the higher proportion of patients with DDH having public insurance.

There are limitations to our study. It was conducted at a tertiary pediatric hospital, introducing a possible selection bias. This study cohort was likely to have a higher incidence of late diagnosed DDH and include more severe cases of DDH than a study conducted at a lower volume center. However, the goal of this study was to elucidate the relationship

between patient socioeconomic factors and outcomes of DDH rather than determine their incidence. Performing this study at a high volume center allows for a more demographically diverse patient population. This study identifies public insurance, a non-English primary language, and Hispanic ethnicity as possible risk factors for poorer outcomes for DDH. However, these variables are often related, decreasing the likelihood that any one factor is an independent predictor for poor outcomes of DDH. Still, all 3 of these risk factors for poor outcomes of DDH are relevant to the promotion of improved screening, diagnosis, and treatment in at risk patient populations.

Overall, this study identified public health insurance, a non-English primary language, and Hispanic ethnicity as risk factors for inferior outcomes of DDH. Although it may not be feasible to dramatically increase access to specialty care in these patient populations, understanding which patients are at greatest risk will allow for improved targeting of these populations. Improved training of the personnel who perform clinical examinations may also enhance screening for patients who are demographically at risk. Public insurance and a non-English primary language were not significant risk factors for late presentation, despite the inferior outcomes observed in these patients. Furthermore, public insurance, a non-English language, and Hispanic ethnicity were significant risk factors for nonoperative treatment failure even when controlling for late presentation.

This study suggests that factors other than diagnostic delay may contribute to inferior outcomes observed in these patients. Future studies are needed to further elucidate the relationship between socioeconomic factors and treatment outcomes. Understanding how these risk factors influence patient outcomes is important for the reduction of long-term patient disability and healthcare costs. ■

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Data statement

Data sharing statement available at www.jpeds.com.

References

1. Alsalem M, Set KK, Saadeh L. Developmental dysplasia of hip: a review. *Clin Pediatr* 2015;54:921-8.
2. Bialik V, Bialik GM, Blazer S, Sujov P, Wiener F, Berant M. Developmental dysplasia of the hip: a new approach to incidence. *Pediatrics* 1999;103:93-9.
3. Shaw BA, Segal LS. Evaluation and referral for developmental dysplasia of the hip in infants. *Pediatrics* 2016;138:e20163107.
4. Furnes O, Lie SA, Espehaug B, Vollset SE, Engesaeter LB, Havelin LI. Hip disease and the prognosis of total hip replacements. A review of 53 698 primary total hip replacements reported to the Norwegian Arthroplasty Register 1987-99. *J Bone Joint Surg Br* 2001;83:579-86.
5. Senaran H, Bowen JR, Harcke HT. Avascular necrosis rate in early reduction after failed Pavlik harness treatment of developmental dysplasia of the hip. *J Pediatr Orthoped* 2007;27:192-7.
6. Atalar H, Sayli U, Yavuz OY, Uras I, Dogruel H. Indicators of successful use of the Pavlik harness in infants with developmental dysplasia of the hip. *Int Orthopaed* 2007;31:145-50.
7. Luhmann SJ, Bassett GS, Gordon JE, Schootman M, Schoenecker PL. Reduction of a dislocation of the hip due to developmental dysplasia. Implications for the need for future surgery. *J Bone Joint Surg Am* 2003;85-a:239-43.
8. Kotlarsky P, Haber R, Bialik V, Eidelman M. Developmental dysplasia of the hip: what has changed in the last 20 years? *World J Orthoped* 2015;6:886-901.
9. Azzopardi T, Van Essen P, Cundy PJ, Tucker G, Chan A. Late diagnosis of developmental dysplasia of the hip: an analysis of risk factors. *J Pediatr Orthop B* 2011;20:1-7.
10. Lindberg AW, Bompadre V, Satchell EK, Larson ACR, White KK. Patient factors associated with delayed diagnosis of developmental dysplasia of the hip. *J Child Orthopaed* 2017;11:223-8.
11. Mulpuri K, Song KM, Goldberg MJ, Sevarino K. Detection and nonoperative management of pediatric developmental dysplasia of the hip in infants up to six months of age. *J Am Acad Orthopaed Surg* 2015;23:202-5.
12. Inoue T, Naito M, Nomiya H. Treatment of developmental dysplasia of the hip with the Pavlik harness: factors for predicting unsuccessful reduction. *J Pediatr Orthoped Part B* 2001;10:186-91.
13. Groarke PJ, McLoughlin L, Whitla L, Lennon P, Curtin W, Kelly PM. Retrospective multicenter analysis of the accuracy of clinical examination by community physicians in diagnosing developmental dysplasia of the hip. *J Pediatr* 2017;181:163-6.e1.
14. Lynch JR, Schmale GA, Schaad DC, Leopold SS. Important demographic variables impact the musculoskeletal knowledge and confidence of academic primary care physicians. *J Bone Joint Surg Am* 2006;88:1589-95.
15. Matzkin E, Smith EL, Freccero D, Richardson AB. Adequacy of education in musculoskeletal medicine. *J Bone Joint Surg Am* 2005;87:310-4.
16. Grumbach K, Hart LG, Mertz E, Coffman J, Palazzo L. Who is caring for the underserved? A comparison of primary care physicians and nonphysician clinicians in California and Washington. *Ann Fam Med* 2003;1:97-104.
17. Benham AJ, Geier KA, Salmond S. How well are nurse practitioners prepared to treat common musculoskeletal conditions? *Orthoped Nurs* 2016;35:325-9.
18. Skaggs DL, Lehmann CL, Rice C, Killelea BK, Bauer RM, Kay RM, et al. Access to orthopaedic care for children with medicaid versus private insurance: results of a national survey. *J Pediatr Orthoped* 2006;26:400-4.
19. Froelich JM, Beck R, Novicoff WM, Saleh KJ. Effect of health insurance type on access to care. *Orthopedics* 2013;36:e1272-6.
20. Wiznia DH, Nwachuku E, Roth A, Kim CY, Save A, Anandasivam NS, et al. The influence of medical insurance on patient access to orthopaedic surgery sports medicine appointments under the Affordable Care Act. *Orthopaed J Sports Med* 2017;5:2325967117714140.
21. Dodwell E, Wright J, Widmann R, Edobor-Osula F, Pan TJ, Lyman S. Socioeconomic factors are associated with trends in treatment of pediatric femoral shaft fractures, and subsequent implant removal in New York State. *J Pediatr Orthoped* 2016;36:459-64.