

Risk Factors for Noncompliance with Orthopaedic Follow Up after Emergency Department Visits for Foot and Ankle Fractures

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INTRODUCTION:

Appropriate orthopaedic follow up is critical for patients seen in the emergency department for foot and ankle fractures in order to ensure healing, maintenance of reduction, and to monitor for possible complications. Various barriers to follow up exist, including but not limited to, demographic factors, socioeconomic factors, and insurance issues. The purpose of this study was to identify which factors play a significant role in patients who do not follow up and those that have delayed follow up.

METHODS:

A retrospective observational study was performed of 733 patients who were seen in the emergency department (ED) with a diagnosis of a foot or ankle fracture at a single institution from July 2015 to February 2023. Only patients directed to follow up with an orthopaedic provider after ED discharge were included. Demographics, including age, BMI, sex, race and ethnicity, insurance type, details about the fracture type, and follow-up patterns were extracted from the electronic health record. The CDC Social Vulnerability Index (SVI) was used to quantify socioeconomic disadvantage based on patients' zip code of residence. Overall SVI scores, as well as the four dimensions of the SVI – socioeconomic status, household characteristics, racial and ethnic minority status, and household type and transportation – were evaluated. Higher scores on the SVI represent greater levels of social vulnerability. Patients were divided into two groups, orthopaedic follow up and no orthopaedic follow up, and univariate analysis was used to determine differences between groups. The follow-up group was then further divided into delayed follow up (greater than 7 days from ED visit) or no delayed follow up and univariate analysis was again used to determine differences between groups. Multivariate analysis was then used to identify independent predictors of seeking follow-up care.

RESULTS:

Two-hundred-thirty-three (31.8%) patients had ankle fractures, 49 (6.6%) patients had hindfoot fractures, 265 (36.2%) patients had mid- or forefoot fractures, and 186 (25.4%) patients had phalangeal fractures. One-hundred-two (13.9%) patients had orthopaedic consultation in the ED, and 530 (72.3%) patients had a subsequent follow-up visit at the orthopaedic clinic.

In univariate analysis, patients who had private insurance were more likely to attend orthopaedic follow up (72.8 vs. 64.5%, $p=.034$) and patients who had Medicaid (3.4 vs. 9.4%, $p=.002$) or workers compensation (1.9 vs. 4.9%, $p=.045$) insurance were less likely to attend orthopaedic follow up. Patients with ankle fractures (36.0 vs. 20.7%, $p<.001$) were more likely to attend orthopaedic follow up, and patients with phalangeal fractures (19.1 vs. 41.9%, $p<.001$) were less likely to attend orthopaedic follow up. Patients who had an orthopaedic consultation in the ED (15.8 vs. 8.9%, $p=.020$) were more likely to follow up. Patients who were less vulnerable on the SVI scale overall (0.30 vs. 0.35, $p=.007$) and in the socioeconomic (0.24 vs. 0.28, $p=.017$) and household type and transportation (0.41 vs. 0.46, $p=.012$) dimensions were more likely to follow up.

In multivariate analysis the following insurance characteristics were independently predictive of follow up: Medicaid (OR=0.34, $p=.002$), workers' compensation (OR=0.37, $p=.029$), and private (OR=1.47, $p=.028$) insurance. Patients with ankle fractures (OR=2.16, $p<.001$) and phalangeal fractures (OR 0.33, $p<.001$) were independently predictive of follow up, along with orthopaedic consultation in ED (OR=1.94, $p=.016$). Overall SVI (OR=0.39, $p=.007$), socioeconomic status (OR=0.41, $p=.014$) and household type and transportation (OR=0.41, $p=.012$) dimensions were also independent predictors of follow up.

When examining patients that followed up for factors that influenced delayed follow up, the only significant difference between groups was private insurance; patients with private insurance were less likely to experience delayed follow up (74.3 vs. 56.8%, $p=.021$).

DISCUSSION AND CONCLUSION:

Fracture type, having Medicaid, workers' compensation, or private insurance, and SVI scores are all independent predictors of failing to follow up at the orthopaedic clinic after being seen in the ED for a foot or ankle fracture. Patients with private insurance were less likely to have delayed follow-up care. Orthopaedic consultation in the ED was associated with a higher rate of follow up. This information may be useful in identifying patients that are at risk for noncompliance and establishing tools to intervene and reduce barriers to care.

Table 1: Overall Patient Demographics, Social Vulnerability, Insurance Type, Fracture Details and Follow-up Patterns

	All Patients (n=753)
Demographics	
Age	37.50 ± 23.37
BMI	26.71 ± 7.14
Female	412 (56.2)
Non-White Race	187 (28.1)
Hispanic	64 (8.7)
Social Vulnerability	
Socioeconomic Status	0.25 ± 0.22
Household Characteristics	0.39 ± 0.24
Racial & Ethnic Minority Status	0.43 ± 0.26
Household Type & Transportation	0.42 ± 0.24
Overall	0.31 ± 0.24
Insurance Type	
Uninsured	31 (4.2)
Medicaid	37 (5.0)
Medicare	100 (13.6)
Workers Compensation	20 (2.7)
MVA	2 (0.3)
Private	117 (17.5)
Fracture Details	
Ankle	233 (31.8)
Hand/foot	49 (6.6)
Mid/Foot/foot	265 (36.2)
Phalanges	186 (25.4)
Orthopedics Consulted in ER	102 (13.9)
Follow Up Patterns	
Followed up with our institution	150 (21.2)
Days to Follow Up	3.79 ± 9.28
Delayed Follow Up (>7 Days)	44 (6.3)

Table 2: Patient Demographics, Social Vulnerability, Insurance Type, Fracture Details and Follow Up Patterns by Follow Up Status

	No Follow Up (n=203)	Follow Up (n=550)	P-Value
Demographics			
Age	37.3 ± 22.3	37.3 ± 23.7	0.982
BMI	27.3 ± 6.87	26.5 ± 7.28	0.095
Female	108 (53.2)	304 (57.4)	0.351
Non-White Race	47 (23.2)	100 (18.9)	0.240
Hispanic	16 (7.9)	48 (9.1)	0.320
Social Vulnerability			
Socioeconomic Status	0.24 ± 0.23	0.24 ± 0.22	0.617
Household Characteristics	0.41 ± 0.24	0.38 ± 0.24	0.089
Racial & Ethnic Minority Status	0.46 ± 0.25	0.42 ± 0.26	0.101
Household Type & Transportation	0.45 ± 0.24	0.41 ± 0.24	0.012
Overall	0.37 ± 0.24	0.39 ± 0.24	0.007
Insurance Type			
Uninsured	13 (6.4)	18 (3.4)	0.108
Medicaid	19 (9.4)	18 (3.4)	0.002
Medicare	29 (14.5)	80 (15.1)	0.084
Workers Compensation	10 (4.9)	10 (1.9)	0.045
MVA	10 (4.9)	18 (3.4)	0.452
Private	131 (64.5)	386 (72.3)	0.034
Fracture Details			
Ankle	42 (20.7)	191 (36.0)	<0.001
Hand/foot	14 (6.9)	31 (6.0)	1
Mid/Foot/foot	62 (30.5)	203 (38.3)	0.061
Phalanges	83 (41.9)	101 (19.1)	<0.001
Orthopedics Consulted in ER	18 (8.9)	84 (15.3)	0.020

Table 3: Independent Predictors of Follow Up

	Odds Ratio	95% CI	P-Value
Demographics			
Age	1.00	0.99 to 1.01	0.982
BMI	0.98	0.96 to 1.00	0.110
Female	1.18	0.85 to 1.64	0.305
Non-White Race	0.77	0.52 to 1.15	0.201
Hispanic	1.27	0.72 to 2.16	0.433
Social Vulnerability			
Socioeconomic Status	0.41	0.20 to 0.83	0.014
Household Characteristics	0.56	0.28 to 1.09	0.085
Racial & Ethnic Minority Status	0.59	0.32 to 1.11	0.103
Household Type & Transportation	0.43	0.23 to 0.82	0.012
Overall	0.39	0.20 to 0.78	0.007
Insurance Type			
Uninsured	0.51	0.25 to 1.09	0.075
Medicaid	0.34	0.17 to 0.67	0.002
Medicare	1.63	0.99 to 2.80	0.066
Workers Compensation	0.37	0.15 to 0.92	0.029
MVA	0.68	0.31 to 1.53	0.336
Private	1.47	1.08 to 2.08	0.025
Fracture Details			
Ankle	2.16	1.48 to 3.20	<0.001
Hand/foot	0.95	0.51 to 1.87	0.887
Mid/Foot/foot	1.41	1.00 to 2.00	0.051
Phalanges	0.33	0.23 to 0.47	<0.001
Orthopedics Consulted in ER	1.94	1.16 to 3.21	0.016

Table 4: Patient Demographics, Social Vulnerability, Insurance Type, and Fracture Details by Time to Follow Up

	No Delayed Follow Up (n=466)	Delayed Follow Up (n=287)	P-Value
Demographics			
Age	36.7 ± 23.5	43.1 ± 25.3	0.104
BMI	26.3 ± 7.39	25.9 ± 5.96	0.509
Female	277 (57.0)	27 (9.4)	0.088
Non-White Race	90 (19.5)	10 (3.7)	0.549
Hispanic	42 (9.0)	6 (2.1)	0.369
Social Vulnerability			
Socioeconomic Status	0.23 ± 0.21	0.23 ± 0.24	0.776
Household Characteristics	0.38 ± 0.24	0.40 ± 0.25	0.659
Racial & Ethnic Minority Status	0.42 ± 0.26	0.46 ± 0.28	0.390
Household Type & Transportation	0.41 ± 0.24	0.41 ± 0.25	0.906
Overall	0.30 ± 0.23	0.31 ± 0.27	0.710
Insurance Type			
Uninsured	13 (2.1)	3 (0.8)	0.382
Medicaid	13 (2.1)	3 (0.8)	0.382
Medicare	71 (14.8)	9 (2.9)	0.424
Workers Compensation	9 (1.9)	1 (0.3)	1
MVA	15 (3.1)	3 (0.8)	0.382
Private	361 (74.3)	27 (9.6)	0.021
Fracture Details			
Ankle	179 (46.8)	12 (27.3)	0.271
Hand/foot	32 (6.6)	3 (6.8)	1
Mid/Foot/foot	180 (48.7)	15 (34.2)	0.061
Phalanges	87 (17.9)	14 (31.8)	0.040
Orthopedics Consulted in ER	73 (15.0)	11 (25.0)	0.129