Outcomes of Open Reduction and Internal Fixation (ORIF) of Lower Extremity Fractures in Homeless Patients

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INTRODUCTION:

The rise of homelessness in the United States has resulted in an alarming burden of unmet medical need. Although housing instability has been associated with increased musculoskeletal trauma, little has been done to study their outcomes following surgery. This study aims to investigate 90 day and 1 year outcomes of lower extremity open reduction and internal fixation (ORIF) in the homeless population.

METHODS:

This retrospective analysis used the large federated TriNetX database comprising data from 62 healthcare organizations to evaluate outcomes in homeless patients who underwent open reduction and internal fixation (ORIF) of lower extremity fractures. All available patients were included, with no time constraints on data retrieval. Patients were categorized by preoperative housing status, yielding 3,596 homeless and 436,540 housed individuals. A 1:1 propensity score matching was performed, adjusting for age, sex, race, ethnicity, body mass index, and comorbidities including diabetes, hypertension, chronic kidney disease, tobacco use, obesity, heart failure, liver disease, substance use disorder, and opioid dependence. Postoperative outcomes were assessed at 90 days and 1 year. Risk ratios (RR) and p-values were calculated.

RESULTS:

Following matching, 3,589 patients were included in each cohort. At 90 days, homeless patients had significantly higher rates of ED visits (RR 2.47, $p < 0.0001$), admissions (RR 2.49, $p < 0.0001$), opioid dependence (RR 2.48, $p = 0.001$), substance abuse (RR 2.96, $p < 0.0001$), surgical site infections (RR 2.54, $p < 0.0001$), postoperative infections (RR 1.49, $p < 0.0001$), and blood transfusions (RR 2.12, $p < 0.0001$) compared to controls. No significant differences were observed for sepsis, myocardial infarction, pulmonary embolism, deep vein thrombosis, stroke, acute kidney injury, wound disruption, pneumonia, nerve injury, or hematoma. At 365 days, homeless patients continued to demonstrate higher rates of ED visits (RR 2.62, $p < 0.0001$), admissions (RR 2.35, $p < 0.0001$), opioid dependence (RR 1.62, $p = 0.011$), and substance abuse (RR 4.00, $p < 0.0001$). Implant removal (RR 0.75, $p = 0.001$) and malunion/nonunion repair (RR 0.63, $p = 0.018$) were less frequent in homeless patients, while amputation was more common (RR 1.87, $p = 0.018$).

DISCUSSION AND CONCLUSION:

Homeless patients experience significantly higher rates of medical complications, fracture-related complications and increased opioid dependence following surgical fixation of lower extremity fractures. Further investigation into these findings and potential for perioperative medical optimization is indicated.

Table 2: 1 Year Outcomes in Propensity Matched Homeless Group vs Control Group

Condition	% Outcomes Homeless	% Outcomes Control	Risk Ratio (RR)	95% Confidence Interval (CI)	P-Value
ED visit	**26.9**	**10.3**	**2.617**	**(2.001, 3.422)**	**<0.0001**
Admission	**26.5**	**11.3**	**2.354**	**(1.958, 2.831)**	**<0.0001**
Opioid Dependence	**2.4**	**1.5**	**1.616**	**(1.114, 2.346)**	**0.011**
Substance abuse	**5.0**	**1.3**	**3.999**	**(2.755, 5.804)**	**<0.0001**
Opioid Use	2.9	2.2	1.347	(0.993, 1.827)	0.054
Implant Removal	**6.0**	**8.0**	**0.749**	**(0.630, 0.890)**	**0.001**
Malunion	0.6	0.4	1.432	(0.725, 2.831)	0.299
Nonunion	3.2	3.6	0.889	(0.691, 1.143)	0.357
Malunion/Nonunion Repair	**1.1**	**1.8**	**0.625**	**(0.422, 0.925)**	**0.018**
CRPS	0.3	0.4	0.714	(0.318, 1.606)	0.413
Amputation	**1.1**	**0.6**	**1.87**	**(1.103, 3.173)**	**0.018**
Post-traumatic Osteoarthritis	1.2	1.4	0.857	(0.569, 1.290)	0.459

CRPS = complex regional pain syndrome

Table 1: 90 Day Outcomes in Propensity Matched Homeless Group vs Control Group

Condition	% Outcomes Homeless	% Outcomes Control	Risk Ratio (RR)	95% Confidence Interval (CI)	P-Value
ED Visit	**15.9**	**6.4**	**2.469**	**(1.721, 3.542)**	**<0.0001**
Admission	**20.2**	**8.1**	**2.492**	**(1.999, 3.108)**	**<0.0001**
Sepsis	0.3	0.3	1.009	(0.420, 2.421)	0.984
MI	0.4	0.7	0.59	(0.306, 1.139)	0.112
PE	0.8	0.7	1.133	(0.655, 1.959)	0.655
DVT	2.1	2.1	0.967	(0.699, 1.338)	0.841
Stroke	0.7	0.7	1.015	(0.571, 1.806)	0.959
Opioid Dependence	**1.4**	**0.6**	**2.475**	**(1.412, 4.337)**	**0.001**
Substance Abuse	**2.5**	**0.8**	**2.955**	**(1.846, 4.732)**	**<0.0001**
AKI	2.0	2.1	0.973	(0.679, 1.393)	0.881
Wound Disruption	1.1	1.0	1.094	(0.693, 1.727)	0.7
BV Injury	**8.2**	**6.3**	**1.295**	**(1.061, 1.581)**	**0.011**
Pneumonia	1.6	2.1	0.736	(0.509, 1.066)	0.103
SSI	**1.8**	**0.7**	**2.543**	**(1.604, 4.033)**	**<0.0001**
Nerve Injury	6.6	5.7	1.158	(0.950, 1.411)	0.147
Opioid Use	**1.8**	**1.1**	**1.596**	**(1.056, 2.410)**	**0.025**
Hematoma	0.4	0.3	1.277	(0.581, 2.809)	0.542
Wound Complications	**7.4**	**6.0**	**1.218**	**(1.018, 1.459)**	**0.031**
Post Op Infection	**5.3**	**3.6**	**1.492**	**(1.193, 1.865)**	**<0.0001**
Blood Transfusion	**5.4**	**2.5**	**2.122**	**(1.643, 2.741)**	**<0.0001**

ED = emergency department, MI = myocardial infarction, PE = pulmonary embolism, DVT = deep vein thrombosis, BV = blood vessel, SSI = surgical site infection