How Have Lower Extremity Trauma Implant Prices Changed Compared to Overall Costs and Reimbursements?

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INTRODUCTION:

Lower extremity trauma is associated with high morbidity along with significant economic burden for patients. Previous studies have documented costs, reimbursements, and volumes for lower extremity trauma. However, there is limited information detailing trends in lower extremity trauma implant costs. With mounting pressure surrounding rising healthcare costs, understanding the financial trends of lower extremity trauma will be increasingly important for surgeons. Thus, the purpose of this study was to investigate how lower extremity trauma implant prices have changed compared to overall costs and reimbursements. This is the first study to evaluate trends in lower extremity implant costs and their relative impact on total costs.

METHODS: A commercial insurance claims database was queried from 2012-2022 for overall costs, hospital reimbursements, physician reimbursements, and patient out-of-pocket (OOP) costs for trauma involving femoral nail, distal femur, tibial nail, proximal tibia, and distal tibia. Average implant prices between 2012-2022 were extracted from Orthopedic Network News (ONN), the largest publicly available implant registry. All costs, reimbursements, and prices were inflation-adjusted to 2022 dollars. Trends were analyzed using linear regressions.

RESULTS:

There were 58,155 total procedures included for trauma involving femoral nail, distal femur, tibial nail, proximal tibia, and distal tibia. Between 2012 and 2022, the average price for femoral nail implants was $4,094; $5,008 for distal femur; $3,224 for tibial nail; $4,368 for proximal tibia; and $3,504 for distal tibia.

For femoral nail, there were significant decreases implant prices (-23.6% change, b=-167.1, p=0.004) and physician reimbursement (-44.4% change, b=-185.6, p=0.003). There weres no significant changes in overall costs (-18.6% change, b=-761.7, p=0.31), hospital reimbursement (-15.7% change, b=-482.4, p=0.47), or OOP patient costs ((-20.4% change, b=-11.4, p=0.60).

For distal femur, there were significant decreases in implant prices (-15.1% change, b=-131, p=0.02) and physician reimbursement (-42.2% change, b=-126.5, p=0.006). There were no significant change in overall costs (-40.6% change, b=-1742, p=0.08), hospital reimbursement (-41.2% change, b=-1547, p=0.09) or OOP patient costs (-16.6% change, b=-8.7, p=0.87).

For tibial nail, there was a significant decrease in physician reimbursement (-37.1% change, b=-128.6, p=0.001). There were no significant changes in overall costs (-7.1% change, b=94.7, p=0.78), implant price (1.1% change, b=-73.1, p=0.05), hospital reimbursement (-3.4% change, b=267.3, p=0.37), or OOP patient costs (-17.9% change, b=-15.1, p=0.54).

For proximal tibia, there were significant decreases implant price (-23.3% change, b=-139, p=0.003) and physician reimbursement (-34.8% change, b=-131.7, p=0.01). There were no significant changes in overall costs (-12.3% change, b=-352.8, p=0.43), hospital reimbursement (-7.7% change, b=-91.6, p=0.81), or OOP patient costs (-17.0% change, b=-24.6, p=0.24).

For distal tibia, there was a significant decrease in physician reimbursement (-26.0% change, b=-142.3, p=0.03). There were no significant changes in overall costs (-0.3% change, b=373, p=0.51), implant price (2.3% change, b=-44.3, p=0.21), hospital reimbursement (5.0% change, b=599.4, p=0.21), or OOP patient costs (-3.2% change, b=0.9, p=0.97).

DISCUSSION AND CONCLUSION:

Between 2012 and 2022, inflation-adjusted implant prices decreased significantly across all lower extremity fracture procedures except for tibial nails and distal tibia. Physician reimbursement decreased significantly for all lower extremity trauma procedures. In contrast, overall cost, hospital reimbursement, and OOP patient cost did not change significantly over that timeframe. Amidst an aging US population and mounting cost control pressures, these trends are important to consider in implementing future changes to clinical practice, payment, and policies.

Table 1. Characteristics and Overall Costs, Reimbursement, and Payment for Trauma Involving Femoral Nail, Distal Femur, Tibial Nail, Proximal Tibia, and Distal Tibia, 2012-2022.

	Femoral Nail	Distal Femur	Tibial Nail	Proximal Tibia	Distal Tibia
Total number of procedures	16,599	4,307	17,240	12,773	7,236
Age, mean (SD)	43.8 (26.7)	67.9 (19.9)	41.4 (18.4)	50.7 (15.8)	44.7 (17.8)
Female (%)	8,020 (48.3%)	3,224 (74.9%)	6,978 (40.5%)	6,968 (54.5%)	3,438 (47.5%)
Length of stay, mean (SD)	5.3 (5.9)	5.9 (5.1)	3.7 (4.2)	4.4 (4.7)	3.9 (4.6)
Total cost for procedure, $	$53,120	$41,872	$40,184	$40,807	$40,458
Total hospital charge, $	$45,933	$36,849	$34,583	$35,075	$34,150
Total physician payment, $	$3,782	$2,330	$3,029	$3,118	$3,619
Total OOP cost for procedure, $	$1,930	$1,066	$2,261	$1,765	$1,780
Average selling price for implant from ONN, $	$4,094	$5,008	$3,224	$4,368	$3,504

Table 2. Lower Extremity Trauma Linear Regression Trends from 2012 to 2022.

Procedure	Category	Percent Change from 2012 to 2022	Slope (95% CI)	p-value
Femoral Nail	Overall Cost	-18.6%	-761.7 (-2380 to 857.0)	0.31
	Implant Price	-23.6%	-167.1 (-264.4 to -69.71)	0.004
	Hospital Reimbursement	-15.7%	-482.4 (-1915 to 949.9)	0.47
	Physician Reimbursement	-44.4%	-185.6 (-291.5 to -79.74)	0.003
	OOP Patient Cost	-20.4%	-11.4 (-59.54 to 36.70)	0.60
Distal Femur	Overall Cost	-40.6%	-1742. (-3773 to 288.9)	0.08
	Implant Price	-15.1%	-131. (-240.2 to -21.85)	0.02
	Hospital Reimbursement	-41.2%	-1547. (-3369 to 274.4)	0.09
	Physician Reimbursement	-42.2%	-126.5 (-205.3 to -47.69)	0.006
	OOP Patient Cost	-16.6%	-8.7 (-130.1 to 112.7)	0.87
Tibial Nail	Overall Cost	-7.1%	94.7 (-637.4 to 826.7)	0.78
	Implant Price	1.1%	-73.1 (-148.1 to 1.798)	0.05
	Hospital Reimbursement	-3.4%	267.3 (-370.5 to 905.1)	0.37
	Physician Reimbursement	-37.1%	-128.6 (-187.0 to -70.30)	0.001
	OOP Patient Cost	-17.9%	-15.1 (-67.96 to 37.87)	0.54
Proximal Tibia	Overall Cost	-12.3%	-352.8 (-1322 to 616.1)	0.43
	Implant Price	-23.3%	-139. (-218.0 to -60.01)	0.003
	Hospital Reimbursement	-7.7%	-91.6 (-927.8 to 744.5)	0.81
	Physician Reimbursement	-34.8%	-131.7 (-223.1 to -40.28)	0.01
	OOP Patient Cost	-17.0%	-24.6 (-68.49 to 19.36)	0.24
Distal Tibia	Overall Cost	-0.3%	373. (-867.5 to 1613)	0.51
	Implant Price	2.3%	-44.3 (-119.1 to 30.40)	0.21
	Hospital Reimbursement	5.0%	599.4 (-414.2 to 1613)	0.21
	Physician Reimbursement	-26.0%	-142.3 (-272.1 to -12.57)	0.03
	OOP Patient Cost	-3.2%	.9 (-45.36 to 47.18)	0.97

P-values highlighted in green represent significant increases, red represent significant decreases, black represents no significant change.