

Complications and Reimbursement Among Patients with Hammertoe Surgery: A Medicare Supplemental Database Study with Two Years Follow-up

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INTRODUCTION

- Hammertoe deformities are one of the most common foot deformities that affect up to one third of the adult population for lower limb and foot
- Many intramedullary implants such as cannulated screws or absorbable pins have been designed for arthrodesis of proximal interphalangeal (PIP) joint, however the K-wire is the traditional and most utilized method
- There are no large scale studies conducted to evaluate the complications and healthcare reimbursement for patients with hammertoe surgery

OBJECTIVES

- The objectives of this study were to use United States (US) Medicare Supplemental healthcare claims data to
- Assess the rates of complications (infection, delayed healing, mechanical failure) and second surgery for hammertoe;
 - Assess the healthcare reimbursement for patients with hammertoe surgery; and
 - Determine factors associated with infection after hammertoe surgery

METHODS

- Study Design:** Retrospective, observational cohort study
- Data Source:** Health care claims from the IBM® MarketScan® Medicare Supplemental database
- Study population:**
- All patients 65 years or older with a claim for a hammertoe procedure along with a diagnosis of hammertoe in 2015-2016 were identified
 - The date of the first hammertoe procedure (using ICD and CPT codes) was defined as the index date
 - Patients with polytrauma one year prior to index were excluded from the analysis

Outcomes:

- Complications including infection, delayed healing and mechanical failure; and second surgery were determined over the two-years post hammertoe procedure
- Second surgery was defined as presence of another code for hammertoe surgery post index. The codes could not confirm reoperations because majority of them had unknown laterality
- All cause payments at index and for up to 2-years post-index were analyzed. Payments may be unrelated to hammertoe

Statistical Analysis:

- Means and standard deviations were provided for continuous variables
- Frequency counts and proportions were provided for categorical variables
- Multivariable logistic regression was conducted to determine independent factors associated with infection in hammertoe surgery

RESULTS

- A total of 4,456 patients had hammertoe surgery
- There were 75.2% females, 62.9% between 65 and 74 years of age and 64.6% had Charlson Comorbidity Index ≥1 (**Table 1**)
- The top three comorbid conditions were hypertension (68.3%), diabetes (23.3%) and hypothyroidism (23.1%) (**Table 1**)
- 99% patients received their index hammertoe surgery in the outpatient hospital settings

Table 1. Patient demographic and clinical characteristics

Characteristics		N	%
Total patients in cohort		4,456	100.0%
Gender	Male	1,106	24.8%
	Female	3,350	75.2%
Year	2015	2,419	54.3%
	2016	2,037	45.7%
Age group	65-74	2,802	62.9%
	75-84	1,359	30.5%
	85-94	283	6.4%
	95+	12	0.3%
Region	North Central	1,458	32.7%
	North East	887	19.9%
	South	1,584	35.6%
	West/Unknown	527	11.8%
Insurance plan type	Consumer Driven Health Plan	44	1.0%
	Comprehensive	1,588	35.6%
	Exclusive Provider organization	12	0.3%
	High Deductible Health Plan	11	0.3%
	Health Maintenance Organization	453	10.1%
	Point of Service (POS)	218	4.9%
	POS with capitation	90	2.0%
	Preferred Provider Organization	2,001	44.9%
	Unknown	39	0.9%

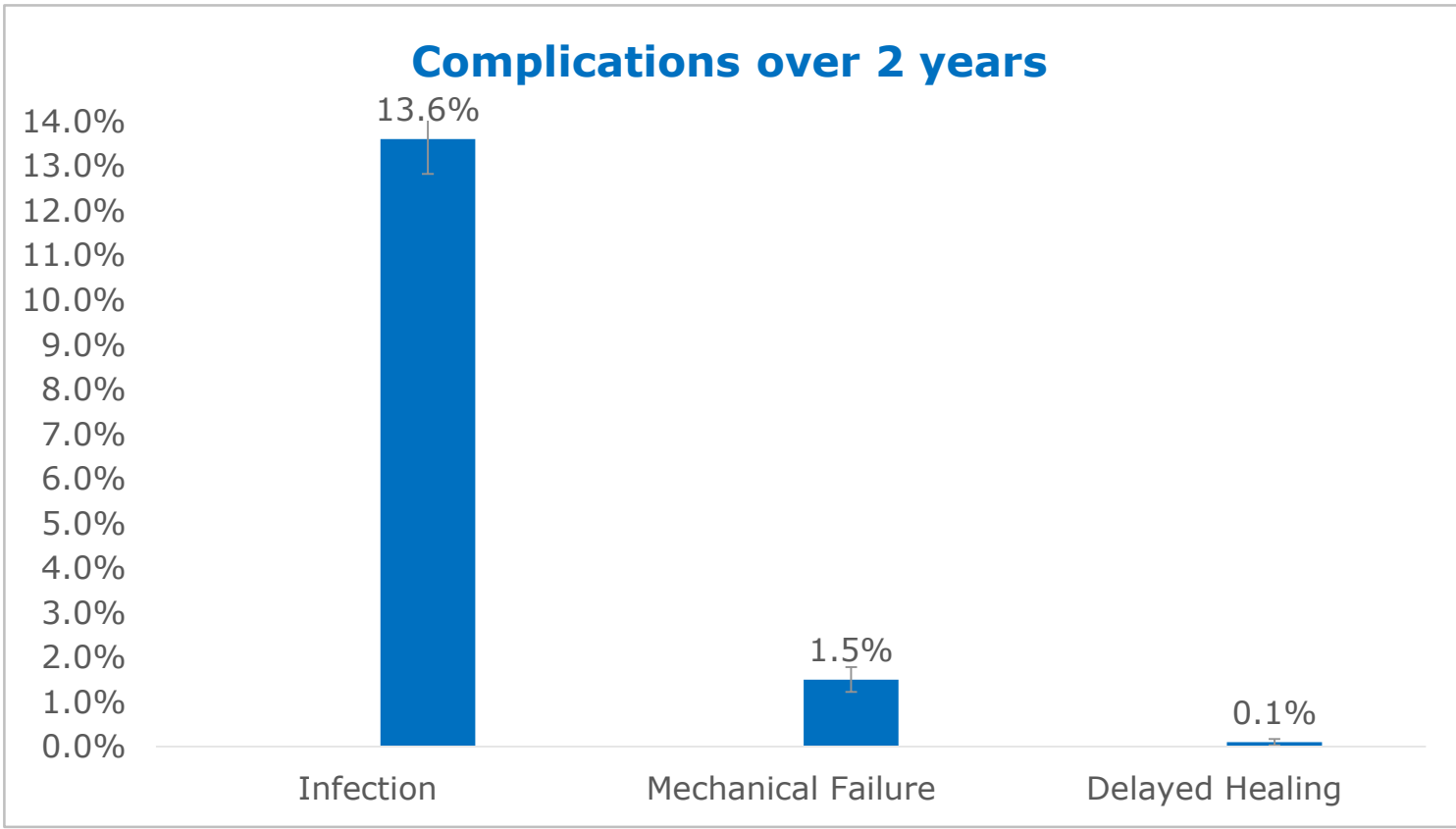
RESULTS

Table 1. Patient demographic and clinical characteristics (cont.)

Characteristics		N	%
Total patients in cohort		4,456	100.0%
Charlson Comorbidity Index	0	1,576	35.4%
	1	1,026	23.0%
	2-3	1,226	27.5%
	4-5	442	9.9%
	above 5	186	4.2%
Setting for index hammertoe surgery	Inpatient	46	1.0%
	Outpatient	4410	99.0%
Comorbidities	Hypertension Uncomplicated	3,042	68.3%
	Diabetes Uncomplicated	1,040	23.3%
	Hypothyroidisim	1,031	23.1%
	Chronic Pulmonary Disease	914	20.5%
	Peripheral Vascular Disorders	871	19.5%

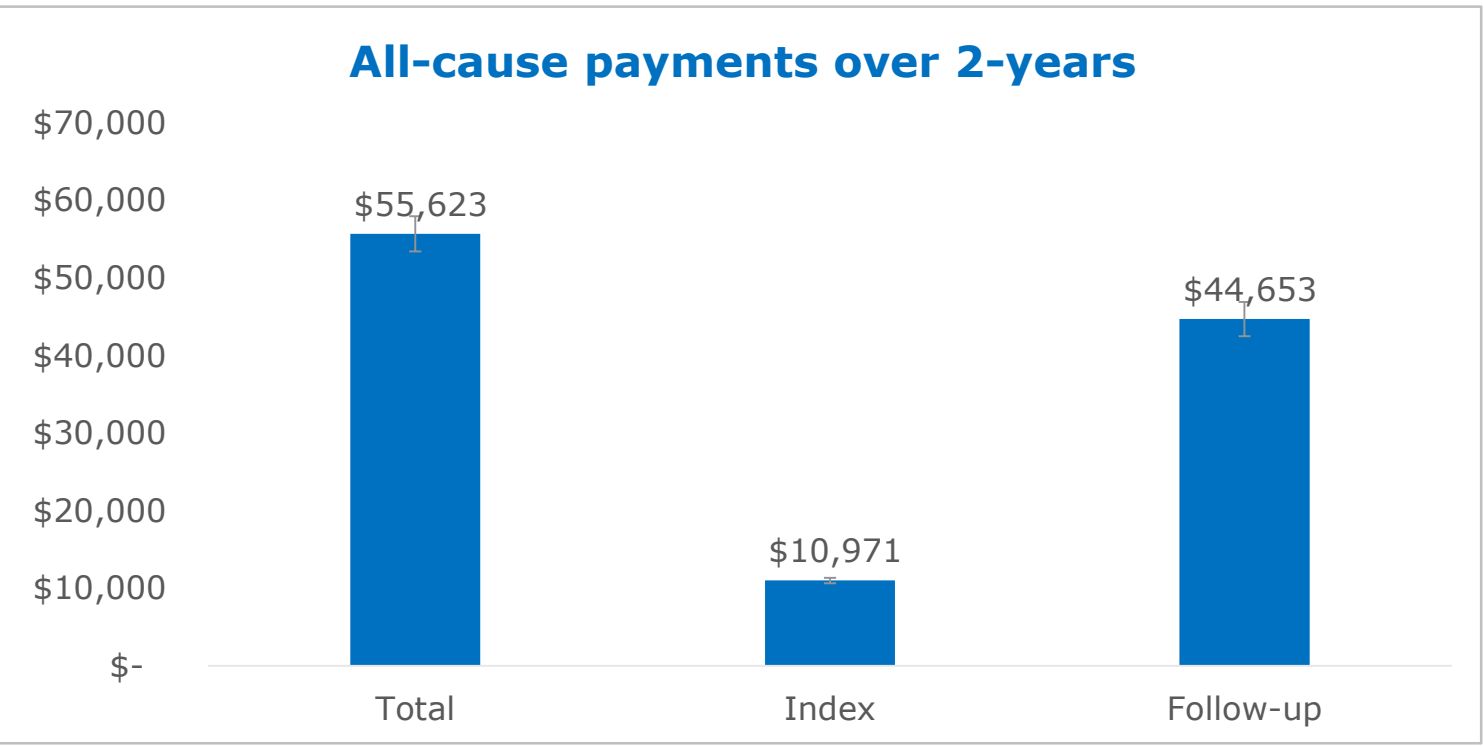
- At index, the top five procedures along with hammertoe surgery included anesthesia for open procedures on bones of lower leg and foot, metatarsophalangeal joint capsulotomy, radiology procedures for lower joints, osteotomy and decalcification procedure
- Over the 2-year post-index, the rates of infection, mechanical failure, and delayed healing were 13.6%, 1.5%, and 0.1% respectively (**Figure 1**)
- Second surgery, without accounting for laterality occurred in 12.9% patients

Figure 1. Percent of patients with complications over 2-year post hammertoe surgery



- The total all cause payments over the 2-year period was \$55,624 with \$10,971 for the index procedure and \$44,653 over the follow-up period (**Figure 2**)

Figure 2. Average all-cause payments over the 2 years follow-up



- Multivariable logistic regression showed that gender, hypertension complicated and rheumatoid arthritis were significantly associated with infection after hammertoe surgery (**Table 2**)

Table 2. Multivariable logistic regression for factors significantly associated with infection after hammertoe surgery

	Odds Ratio	95% CI values		p-value
Female vs Male	0.6188	0.4469	0.8606	0.0041
Hypertension complicated	1.6618	1.0193	2.6591	0.0375
Rheumatoid Arthritis	1.6410	1.0397	2.5455	0.0298

CONCLUSION

- Among Medicare Supplemental patients with hammertoe surgery, the rates of infection were high. The rate of second hammertoe surgery was 12.9%
- Improved surgical methods and technologies could reduce non-planned second surgery thereby reducing healthcare burden