

In-home IV Antibiotics Cost and Utilization Following Tibia Fractures

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<p>Background</p> <ul style="list-style-type: none"> • Inpatient-related infections (IRIs) is one of the most common complications for acutely injured tibia fracture patients. • IRI associated to various morbidity, such as amputation, sepsis, osteomyelitis, or death. • Early antibiotic administration is a key approach to prevent and reduce the severity of infections. However, there appears to be no specific evidence to support the administration of in-home intravenous antibiotics to this group of patients. • This nation and economic impact of in-home intravenous antibiotics. 	<p>Method</p> <p>Data This is a retrospective, observational study using the IBM Data Warehouse® Commercial Clinical Research Database.</p> <p>Patient Inclusion Criteria The included patients were associated with a tibia fracture diagnosis within the inpatient or outpatient setting between January 1, 2011, and July 1, 2017. Tibia fracture diagnosis were defined using ICD-10 codes. In-home antibiotics treatment was identified for one year after diagnosis.</p> <p>Health Care Utilization Multiple claims on the same day were considered as a single visit. The episode was defined as continuous visits within 7 days of each other. Thus, if a patient had claims on day X, and day X+8 their visits would be included as the same episode. In-home antibiotic treatments were defined by the procedure group of home health services and ICD-9 code of antibiotics occurring on the same day. Time to first in-home IV care visit was calculated as the days from discharge date to first in-home IV care visit. Length of in-home IV care was the duration of an episode, from the first visit to the last visit.</p> <p>Cost Episode and associated costs were excluded from the analysis. Costs were categorized into: four categories, total costs, antibiotic costs, in-home care costs, and other costs. Total costs were calculated as the sum of all our patient services. Other costs were calculated as the total costs, antibiotic cost and in-home costs. Negative values of price were transformed as 0. Assuming gamma distribution, the shape and scale of healthcare services cost were calculated using probability density function (PDF) as cost utilization variables.</p> <p>Analysis Demographic and patient characteristics were examined using descriptive statistics (frequency and percentage). Chi-square test was used to compare categorical in-home IV care using chi-squared tests. For utilization and cost measures, an individualistic mean, median, kurtosis and logistic regression was used to assess the relationship between in-home IV antibiotic care utilization and patient characteristics. All analyses were conducted using R version 3.2.2015.</p>	<p>Result</p> <ul style="list-style-type: none"> • Among the total of 8,553 patients, 259 patients received at least one in-home IV antibiotic within one year after tibia fracture diagnosis. <div style="text-align: center; margin: 10px 0;"> <p>N</p> <p>↓</p> <p>IRIS</p> </div> <p>Conclusion</p> <p>Patients who received in-home IV antibiotic care after tibia fracture surgery had higher healthcare payments, age, injury severity and region are associated with in-home IV antibiotic administration.</p>
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PRESENTED AT:



BACKGROUND

- Fracture-related infection (FRI) is one of the most common complications for surgically treated tibia fracture patients
- FRI can result in serious morbidities, such as amputation, sepsis, osteomyelitis, or death.
- Early antibiotics administration is a key approach to prevent and reduce the severity of infections. However, there appears to be no specific evidence to support the administration of in-home intravenous antibiotics for this group of patients.
- Utilization and economic impact of in-home intravenous antibiotics treatments remain unclear.

OBJECTIVE

To estimate utilization and costs of in-home intravenous antibiotics treatments for patients following tibia fractures, and to examine risk factors associated with receiving antibiotics treatments post-surgery.

METHOD

Data

This a retrospective, observational study using the IBM MarketScan® Commercial Claims Research Database.

Patient Inclusion Criteria

The enrollees are patients associated with a tibia fracture diagnosis in either the inpatient or outpatient settings before between January 1, 2016, and July 1, 2017. Tibia fracture diagnoses were defined using ICD-10 codes. In-home antibiotics treatment was described for one year after diagnosis.

Health Care Utilization

Multiple claims on the same day were considered as a single visit. The episode was defined as continuous visits within 7 days of each other. Thus, if a patient had claims on day X and day X+6 these would be included as the same episode.

In-home antibiotics treatments were defined by the procedure group of home health service and CPT code of antibiotics occurring on the same day. Time to first in-home IV care visit was calculated as the days from discharge date to first in-home IV care visit. Length of in-home IV care was the duration of an episode, from the first visit to the last visit.

Dialysis and cancer-related visits were excluded from the analysis.

Cost

Costs were categorized into four categories, total costs, antibiotics costs, in-home care costs, and other costs. Total costs were calculated as the sum of all out-patient services. Other costs were calculated as the total costs subtract antibiotics cost and in-home costs. Negative values of price were transformed into 0. Assuming gamma distribution, the shape and scale of health care services cost were calculated for future probabilistic sensitivity analysis (PSA) in cost-effectiveness studies.

Analysis

Demographic and patient characteristics were examined using descriptive statistics (frequencies and percentages) between patients receiving versus not receiving in-home IV care using chi-squared tests. For utilization and costs measures, we calculated the mean, median. Multivariable logistic regression was used to assess the association between In-home IV antibiotics care utilization and patient characteristics. All analyses were conducted using R version 1.2.5033.

RESULT

- Among the total of 6,553 patients, 200 patients received at least one in-home IV antibiotic within one year after tibia fracture diagnosis.

	Total	No IV	Any IV	P-value
N	6,553	6,353 (96.95%)	200 (3.05%)	
Gender				
Male	3,406 (51.98%)	3,277 (51.58%)	129 (64.50%)	0.0004
Female	3,147 (48.02%)	3,076 (48.42%)	71 (35.50%)	
Age Group				
18-35	1,789 (27.30%)	1,757 (27.66%)	32 (16.00%)	0.0006
36-50	1,898 (28.96%)	1,824 (28.71%)	74 (37.00%)	
51-65	2,866 (43.74%)	2,772 (43.63%)	94 (47.00%)	
Region				
Northeast	1,015 (15.49%)	1,000 (15.74%)	15 (7.50%)	0.0010
North Central	1,261 (19.24%)	1,210 (19.05%)	51 (25.50%)	
South	3,196 (48.77%)	3,085 (48.56%)	111 (55.50%)	
West	1,063 (16.22%)	1,040 (16.37%)	23 (11.50%)	
Unknown	18 (0.27%)	18 (0.28%)	0 (0.00%)	
Type				
Closed	6,067 (92.58%)	5,895 (92.79%)	172 (86.00%)	0.0005
Open	486 (7.42%)	458 (7.21%)	28 (14.00%)	
Severity				
Closed	6,067 (92.58%)	5,895 (92.79%)	172 (86.00%)	0.0003
Grade I/II	395 (6.03%)	375 (5.90%)	20 (10.00%)	
Grade III	91 (1.39%)	83 (1.31%)	8 (4.00%)	
Location				
Shaft	2,553 (38.96%)	2,479 (39.02%)	74 (37.00%)	0.79
Upper	3,041 (46.41%)	2,947 (46.39%)	94 (47.00%)	
Lower	959 (14.63%)	927 (14.59%)	32 (16.00%)	

- For patients receiving in-home IV care, the annual average total cost was \$43,558, including in-home IV antibiotics cost of \$6,584 (15.16%). While patients without in-home IV antibiotics had an annual total cost of \$12,784.

(N=200)	Mean	Median
Number of Antibiotic Claims	13.41	7
Number of In Home Procedure Claims	14.28	8
Number of Days with Both Types	8.69	6
Time to First In Home IV Use	102.14	73

- The average number of episodes per person was 1.95, and the average length of an episode was 11.79 days.

(N=200)	Mean	Median
Number of Episodes Per Person	1.95	2
Length of Episodes	11.79	7
Antibiotics cost per episode	1814.03	357.57
Total cost per episode	4103.03	1800.44

- The average total cost per episode was \$4,103, including \$1,814 of antibiotics cost.

Item	No IV				Any IV			
	Mean	Std.Dev	Shape	Scale	Mean	Std.Dev	Shape	Scale
Cost per year								
Total cost	12,783.74	21,515.52	0.35	36,211.45	43,557.96	38,444.28	1.28	33,930.95
In-home antibiotics cost	-	-	-	-	6,584.06	9,066.88	0.53	12,485.95

- Compared with patients aged between 18 and 35 years old, patients who were 36 to 50 and 51 to 65 years old were 2.45 and 2.08 times more likely to receive in-home IV antibiotics, respectively.
- Patients with grade I/II and grade III tibia fractures were 1.97 and 4.01 times more likely to receive in-home IV antibiotics than patients with closed fractures.

	OR (95% CI)	p-value
Age group		
36-50 yr	2.45 (1.62-3.79)	<0.0001
51-65 yr	2.08 (1.40-3.19)	0.0005
Severity		
Grade I/II	1.97 (1.18-3.10)	0.0057
Grade III	4.01 (1.75-8.06)	0.0003
Region		
North Central	2.76 (1.58-5.12)	0.0006
South	2.38 (1.42-4.27)	0.0019
West	1.47 (0.77-2.90)	0.2477

CONCLUSION

Patients who received in-home IV antibiotics after tibia fracture surgery had higher healthcare payments. Age, injury severity and region are associated with in-home IV antibiotics administration.