

Financial Impact of the Surgical Treatment of Infection on the Practice of Orthopedic Trauma

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Objectives: The treatment of bone, muscle, and joint infections has been under the purview of orthopedic surgeons for years. As care has become more specialized, orthopedic surgeons are offloading infection cases to services such as general surgery or podiatry. Orthopedics as a field has already yielded portions of spine to neurosurgery, recovery to physiatrists, and foot and ankle to podiatry. The purpose of this study was to report the financial impact of infection treatment on our group practice at a busy community Level II trauma center.

Design: Retrospective Economic Review.

Setting: Level II Trauma Center.

Patients/Participants: All patients receiving orthopedic surgical intervention at our facility from January 1, 2018 to December 31, 2018.

Intervention: Surgical treatment of bone, muscle and joint infections.

Main Outcome Measurements: Surgical Volume, Relative Value Units, Physician Charges, Physician Collections and Payer Mix.

Results: The surgical treatment of infections including irrigation and debridement, wound closure and amputations amounted to 908 out of 3700 total cases (24.5%). This included 11,405 total RVUs, 5,771 work RVUs, \$2,056,677 in charges and \$407,479 in collections over the 2018 calendar year. This was 16.8% of total RVUs, 19% of all charges, and 15% of collections for the orthopedic trauma service. The payer mix for these patients was less favorable with a collection rate of 20% compared to a 25% average for all surgical cases.

Conclusions: The treatment of orthopedic infections represents a large proportion of surgical volume for orthopedic surgeons covering hospital call. Relinquishing control of these patients will result in significant financial loss as well as a decrease in our ability to control the episode of care and patient access in the changing healthcare environment.

Level of Evidence: Therapeutic Level III.

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INTRODUCTION

The treatment of bone, muscle and joint infections has been under care of orthopedic surgeons for years. As orthopedic care has become more specialized, traumatologists have taken on an even larger proportion of call responsibilities. As orthopedic surgeons move away from private practice and enter employed positions at academic and non-academic hospitals, many surgeons are offloading infection cases to other services

such as general surgery or podiatry.^{1,2} Further, many orthopedic surgeons simply lack interest in treating these infection cases. We believe that orthopedic surgeons are best trained to treat these patients and that infection treatment represents a large revenue stream for the specialty. Orthopedics has already yielded portions of spine care to Neurosurgery, orthopedic recovery to Physical Medicine and Rehabilitation and foot and ankle surgery to Podiatry.³⁻⁸ The purpose of this study was to report the data regarding infection treatment from our large group practice at a Level II Trauma center and draw attention to the financial impact of infection treatment being triaged to other specialties.

MATERIALS AND METHODS

Following investigational review board (IRB) approval, financial and billing records for the four fellowship trained orthopedic trauma surgeons in our large group practice at a busy level II trauma center from January 1, 2018 to December 31, 2018 were reviewed. All Current Procedural Terminology (CPT) codes were included to create a complete picture of surgical work done by these four physicians. A subset of codes which involved irrigation and debridement, amputations, hematoma evacuation and wound closure were placed in a separate table for analysis. Data analysis included total surgical cases, total relative value units (tRVU), work relative value units (wRVU), total charges and total collections. Payer mix review was also performed and divided into categories of Commercial, Medicaid, Medicare, TriCare, Worker's Compensation, Private Pay and other. Data was analyzed using InfoDive software. (IntrisiQ Specialty Solutions, AmerisourceBergen Corporation)

Table 1: Case volume, relative value units, charges and collections

	Total Case Volume	Infections
Total Cases	3700	908
tRVU	67,783	11405
wRVU	33,448	5771
Total Charges	\$10,791,970	\$2,056,677
Total Payments	\$2,711,256	\$407,479
Collection Rate	25.1%	19.8%

tRVU = Total, wRVU = work

RESULTS

Financial data analysis revealed that the total surgical volume of our four trauma surgeons from January 1, 2018 to December 31, 2018 was 3,700 surgical cases, 67,783 tRVUs and 33,448 wRVUs. This amounted to total charges of \$10,791,970

and total payments were \$2,711,256. The collection rate was 25.1% (Table 1). The treatment of orthopedic infections resulted in 908 surgical cases, 11,405 total RVUs, 5,771 work RVUs, \$2,056,677 in charges and \$407,479 in collections. The collection rate for these patients was 20% (Table 1). The payer mix did vary between total surgical patients and those with infections (Table 2). Analysis of this data shows that in our practice environment, the treatment of infections amounts to 16.8% of total RVUs, 19% of all charges, and 15% of collections. The treatment of hand and upper extremity infections resulted in 3084 in tRVU and \$568,448 in charges. This was a total of \$113,560 in collections. The treatment of foot infections and amputations was responsible for 8321 in tRVU and \$1,488,229 in charges. A total of \$293,879 in collections was attributable to foot and ankle infections and amputations.

Table 2: Payer mix for trauma service compared to that of infections treated surgically.

	Full		Infection	
	Payer Mix	Collection Rate	Payer Mix	Collection Rate
Commercial	30%	30%	25%	23.9%
Medicaid	17%	20.8%	26%	17.7%
Medicare	38%	22.5%	31%	19%
Other	1%	33.2%	2%	31.6%
Private Pay	6%	9.4%	8%	2.9%
Tricare	2%	19.2%	3%	13.7%
Work Comp	4%	55.7%	5%	41.6%
Total		25.1%		19.8%

DISCUSSION

A paradigm shift in orthopedic trauma care appears to be underway. Hospital systems and insurance companies are aware that outpatient fracture care and surgery is more cost efficient and provides improved patient outcomes. Outpatient surgery centers discourage patients with infections and provide surgical care to insured healthy patients. This leaves the sick, underinsured, infected and polytraumatized patients to hospitals and their orthopedic surgeons on call. With total joint arthroplasty now approved for outpatient surgery, hospital systems are facing a grim reality; now more than ever they must provide high quality, cost effective care to an underinsured population.

In the last few decades orthopedic surgeons have relinquished control of patient populations they formerly treated exclusively. Neurosurgeons now perform large proportions of spine surgery.³⁻⁵ Physical Medicine and Rehabilitation physicians now provide many nonoperative orthopedic care options and epidural injections. Podiatry encompasses many operative and nonoperative options for foot care and in some communities perform surgical procedures of the leg and even hand.⁶⁻⁹ Specialty societies have found ways to market their

skills to increase their foothold in these treatment areas.¹⁰ The financial loss for the orthopedic community from such decisions is potentially massive.

Most orthopedic trauma surgeons chose their specialty because of the allure of complex fracture cases, variety, and the intricacies of managing the polytraumatized patient. A practice containing only these patients may have been possible in the past, however, with the continued sub-specialization in the field, orthopedic trauma has evolved into the role of an acute care hospital based surgeon. Many have little interest in treating soft tissue infections, diabetic foot infections, or amputations for infection while not fully utilizing their operating room block or trauma room. Traumatologists enable their elective orthopedic colleagues to run uninterrupted clinics and operating rooms while covering both orthopedic trauma and general orthopedic call. Many isolated fracture cases skip hospital emergency rooms and present to dedicated musculoskeletal urgent care facilities.¹¹ Many fracture cases continue to move to outpatient surgical centers. In light of these changes, decisions about the treatment of orthopedic infections will have a significant financial impact on the practice of Orthopedic Trauma.

Over the last 10 years, the number of podiatrists on hospital staff has increased around the country. In some hospital systems, they now take care of foot and ankle trauma, infections and amputations. The proportion of ankle fractures, total ankle arthroplasty, and ankle arthrodesis performed by podiatrists has continued to increase over time despite higher rates of malunion and nonunion, increased length of stay, and increased costs.^{6,7} Their presence was welcomed by many salaried staff orthopedic surgeons who felt burdened by foot infections and felt them to be less desirable cases. A recent article by Burton showed that podiatrists now perform as many as 90% of hallux valgus cases.⁸ Our data clearly shows that the surgical treatment of foot and ankle infections provides a significant income for the orthopedic trauma surgeon with only small decreases in collection rates.

Vascular surgeons are well equipped and trained to perform lower extremity amputations. Many hospitals split infection treatment between orthopedic and vascular surgeons depending on the presence of distal pulses. While both services are competent in surgical treatment of these patients, relinquishing all amputations to vascular surgery would have a significant economic impact for the orthopedic department which includes both trauma and foot and ankle orthopedic surgeons. Despite this, ACGME resident case logs demonstrate that vascular residents have been performing an increasing number of lower extremity amputations when compared to orthopaedic residents.¹²

Plastic surgeons are often utilized by hospital systems for hand call. Many facilities split call between orthopedic hand and plastic surgery departments. Both services are well trained to treat hand and upper extremity infections. Plastic surgeons may not want follow up visits for infected patients in the same waiting rooms as their elective cosmetic patients. As with

vascular surgery, plastic surgeons are competent in the treatment of hand and upper extremity infection but relinquishing all hand infection treatment would have a financial impact on the orthopedic surgeons.

This study is not without flaws. There may be a difference in practice between private practice and employed orthopedic traumatologists. Private physicians may be more likely to treat infections and perform amputations due to direct economic benefit. Salaried staff physicians do not have a financial incentive to care for this patient population unless they are bonused based on RVUs. Our data shows that relinquishing control and surgical treatment of infections could result in a 15-19% financial loss for orthopedic surgeons and their departments. Losing control of this patient population could result in loss of clinical work in addition to the large amount of surgical volume moving to outpatient centers.

Additionally, our study is focused solely on trauma surgeons and not the entire exposure of our group practice to infections and amputations. Although the majority of these do present to our on-call trauma colleagues there are some cases that are treated by our hand and foot and ankle fellowship trained partners. Nighttime call is partially covered by non-trauma partners and emergent infections and amputations are performed by these surgeons instead of semi-electively by the trauma service during the day. Our facility also has a limb preservation service staffed by foot and ankle fellowship trained orthopedic surgeons who do some proportion of foot and ankle infections. There are podiatrists in our region who may also do some infection and toe amputation cases, but their volume is unknown.

CONCLUSION

The treatment of orthopedic infections represents a large proportion of surgical volume for orthopedic surgeons covering hospital call at our facility. Relinquishing control of these patients diminishes our ability to control the episode of care and our access to patients in the changing healthcare environment. The loss could have relatively large financial repercussions to the specialty. We feel orthopedic surgeons are best trained to handle these cases and should consider the financial and patient care implications prior to passing these cases to colleagues in other specialties.

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