

# Direct Cost of Surgically-Treated Adult Traumatic Brachial Plexus Injuries

Christopher J. Dy, MD MPH<sup>1,2</sup>; Kate Peacock BS<sup>3</sup>, Margaret A. Olsen PhD MPH<sup>4</sup>;  
Andrew J. Landau, MD<sup>1</sup>; David M. Brogan, MD MSc<sup>1</sup>



1 Department of Orthopaedic Surgery, Division of Hand and Microsurgery  
2 Department of Surgery, Division of Public Health Sciences  
3 Department of Medicine, Center for Administrative Data Research  
4 Department of Internal Medicine, Division of Infectious Diseases  
Washington University School of Medicine – St. Louis, MO

WASHINGTON UNIVERSITY ORTHOPEDICS  
NATIONAL LEADERSHIP/PERSONALIZED CARE

## INTRODUCTION

- The economic implications of brachial plexus injuries (BPI) in the United States are not well understood
- Surgical treatment is generally effective at improving upper extremity function
- Many patients are off work for up to a year (or longer) while they recuperate, most patients change occupations to account for alteration in their physical abilities
- Understanding the fiscal impact of BPI is especially necessary given that it primarily affects young working-age patients whose most productive years are disrupted by the injury

## OBJECTIVES

- Quantify the direct charges associated with surgical treatment of BPI
- Demonstrate the utility of surgery in treating BPI
- Enable future study of the societal value of surgical reconstruction

## METHODS

- Using the Truven Health MarketScan® Commercial Claims database, we assembled a cohort of adult privately insured patients with surgically-treated traumatic BPI
- Patients from 2007 to 2015 in the United States (n = 189)
- We assessed direct costs of index admissions associated with BPI surgery and all paid claims (including medical, surgical, therapy, and pharmacy claims)
- All direct costs calculated for one year following surgery using appropriate CPT codes
- Both preoperative and postoperative patients were included
- Geographic distribution of patients: Northeast 12%, North Central 28%, South 44%, West 15%, unknown

To ensure accurate calculation of costs specific to BPI, we developed strict inclusion/exclusion criteria

### Inclusion criteria:

- Surgically treated traumatic BPI (2007-2015)
- Age 18-64 years
- Privately insured

### Exclusion criteria:

- Isolated peripheral nerve injury
- Surgical device complications
- Brachial neuritis
- Dislocation of shoulder
- Rib or scapula excision
- Shoulder arthroscopy with claviclectomy or decompression of subacromial space
- Cervical spine or rotator cuff disorders
- Cancer in previous 12 months
- Lack of medical/pharmacy insurance

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## RESULTS

- Among the 189 patients undergoing surgery for BPI, the median charges were \$38,816 (interquartile range [IQR]: \$18,209, \$72,411).
- The minimum and maximum charges were \$3,512 and \$732,641, respectively
- Direct charges of surgical treatment represent 4.6% of the total long-term cost of BPI
- The majority of index BPI surgical cases involved nerve grafting and/or nerve transfer (91%), while 7% incorporated free muscle transfer
- The median age of patients was 36 years (range: 18 to 64; IQR 24 to 50)
- The cohort was 70% male and 30% female

Table 1 – Economic Impact of Surgically-treated BPI

	DIRECT COST	INDIRECT COST
MEDIAN	\$38,816	\$801,723
MINIMUM	\$3,512	
MAXIMUM	\$732,641	
INTERQUARTILE RANGE	\$18,209, \$72,411	

## CONCLUSION

- The direct charges of surgical treatment represent 4.6% of the total long-term cost of BPI injury (relative to recently published data for the indirect cost of traumatic BPI [median \$801,723])
- the estimated median total (direct + indirect) economic burden of adult traumatic BPI is \$840,539 per-person
- Surgery and other interventions to maximize return to work after traumatic brachial plexus injuries in adults are beneficial to society and may be cost-saving.

## REFERENCES

1. Franzblau L, Chung KC. Psychosocial outcomes and coping after complete avulsion traumatic brachial plexus injury. Disabil Rehabil. 2015;37(2):135-143.
2. Morris M.T., Daluiski A., Dy C.J., A Thematic Analysis of Online Discussion Boards for Brachial Plexus Injury. J Hand Surg Am. 2016. 41(8): 813-8.
3. Hong TS, Tian A, Sachar R, Brogan DM, Ray WZ, Dy C.J. Indirect Cost of Traumatic Brachial Plexus Injuries in the United States. J Bone Joint Surg Am. 2019 Aug 21.



Our lab: [nerveresearch.wustl.edu](http://nerveresearch.wustl.edu) [dyc@wustl.edu](mailto:dyc@wustl.edu) @ChrisDyMD