Quantifying the Impact of Comorbidities on Length of Stay in Geriatric Fall-Related Injuries

Christopher J. McLaughlin, MD, MBA,[1] Olivia Waldron, BS,[2] Ryan M. Staszak, MD,[3] Joshua S. Gish, MD,[3] Scott B. Armen, MD[3]

[1]Department of Surgery, Penn State College of Medicine, Hershey, PA

[2]Penn State College of Medicine, Hershey, PA

[3]Division of Trauma, Acute Care, and Critical Care Surgery, Department of Surgery, Penn State Health, Hershey, PA

Introduction

Geriatric fall-related injuries constitute an increasing proportion of patients presenting to Level 1 trauma centers[1,]

Previous work identified age, injury severity score (ISS), and admission Glasgow Coma Scale (GCS) as significant predictors of length of stay (LOS) in these patients.[2]

As the population ages, inpatient management will be further scrutinized as a quality metric and cost burden to the healthcare system.[2,3]

Hypothesis: Comorbidities would significantly extend length of stay in geriatric patients admitted with fall-related injuries.

Methods

Retrospective Review of Penn State Health Trauma Databank from 2013-2019.

Age $\geq$ 65 years, admitted > 2 days, fall mechanism

SPSS Statistics v28.0, p < 0.05

Results

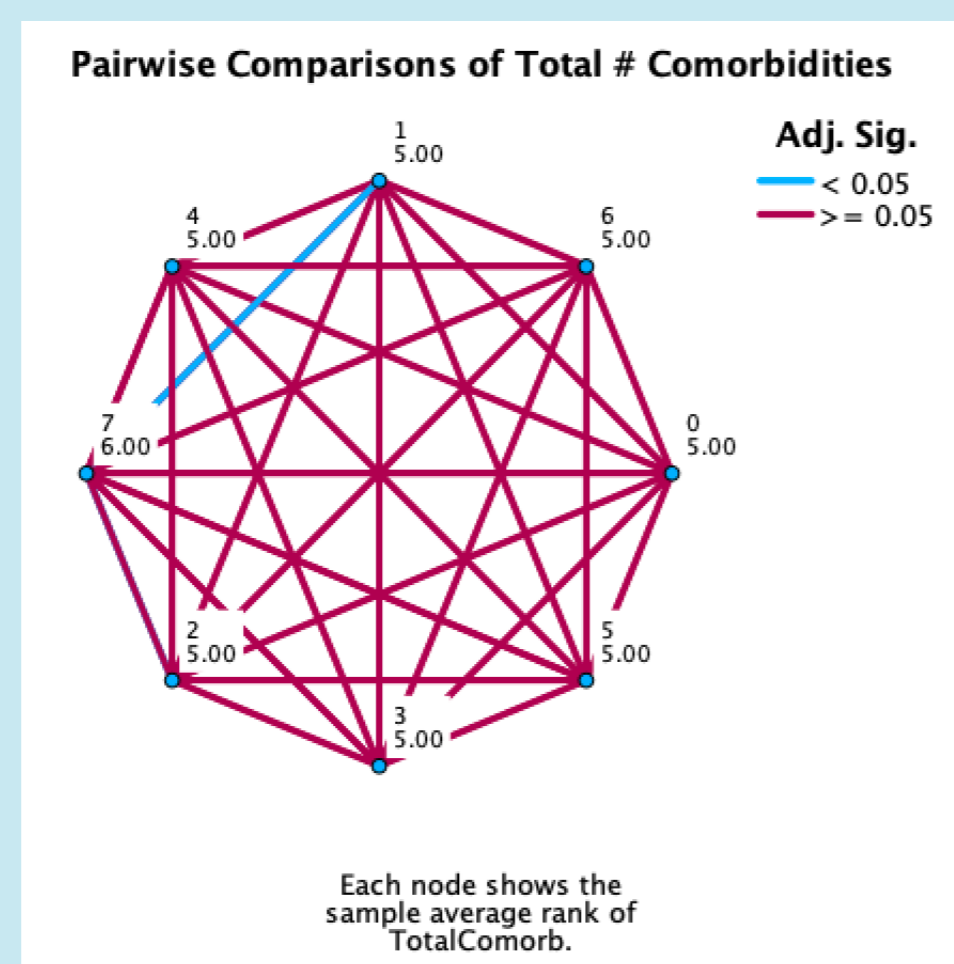3714 patients met inclusion criteria (19.4%) of 19,096 activations, 31.2% transferred

All patients fell from heights of 6 feet or less.

Variable	Median [25%, 75%]
GCS	15 [15,15]
ISS	10 [5, 17]
LOS	5 [3,8]
ICU LOS (n=1118, 30%)	2 [1,3]
Comorbidities	2 [0,4]

Mortality rate = 3.3%

2,666 (71.7%) had $\geq$ 1 comorbidity

Kruskal-Wallis comparison of LOS by total number of comorbidities

Pairwise Comparisons of Total # Comorbidities

Each node shows the sample average rank of TotalComorb.

Results

Service	n, %
Trauma Surgery	1600 (43.1%)
Non-Surgical Service	849 (22.8%)
Other Surgical Service	1265 (34.1%)

Median Number of Comorbidities by Admitting Service
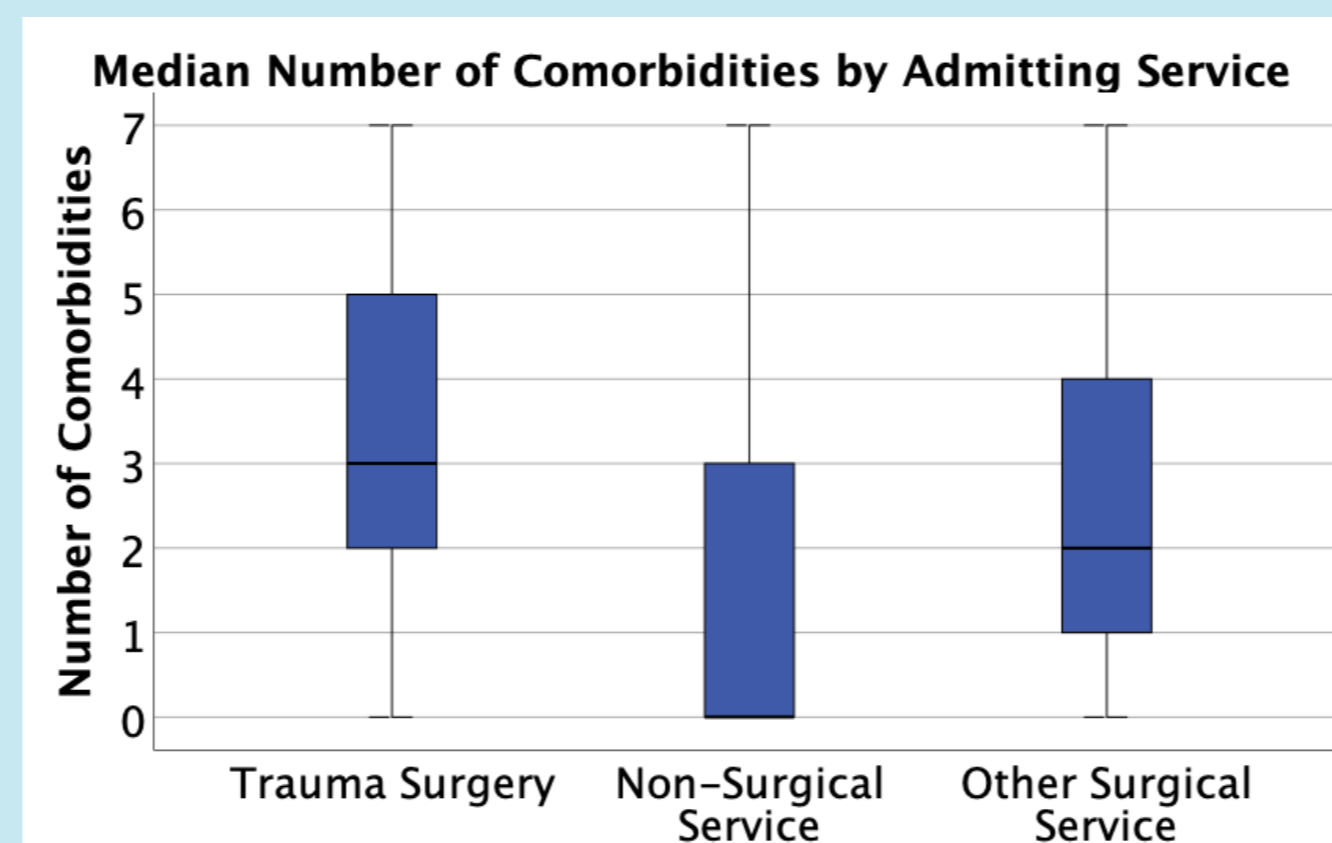
Number of comorbidities differed significantly by admitting service (p<0.01).

Kruskal-Wallis Independent-Samples Median Test
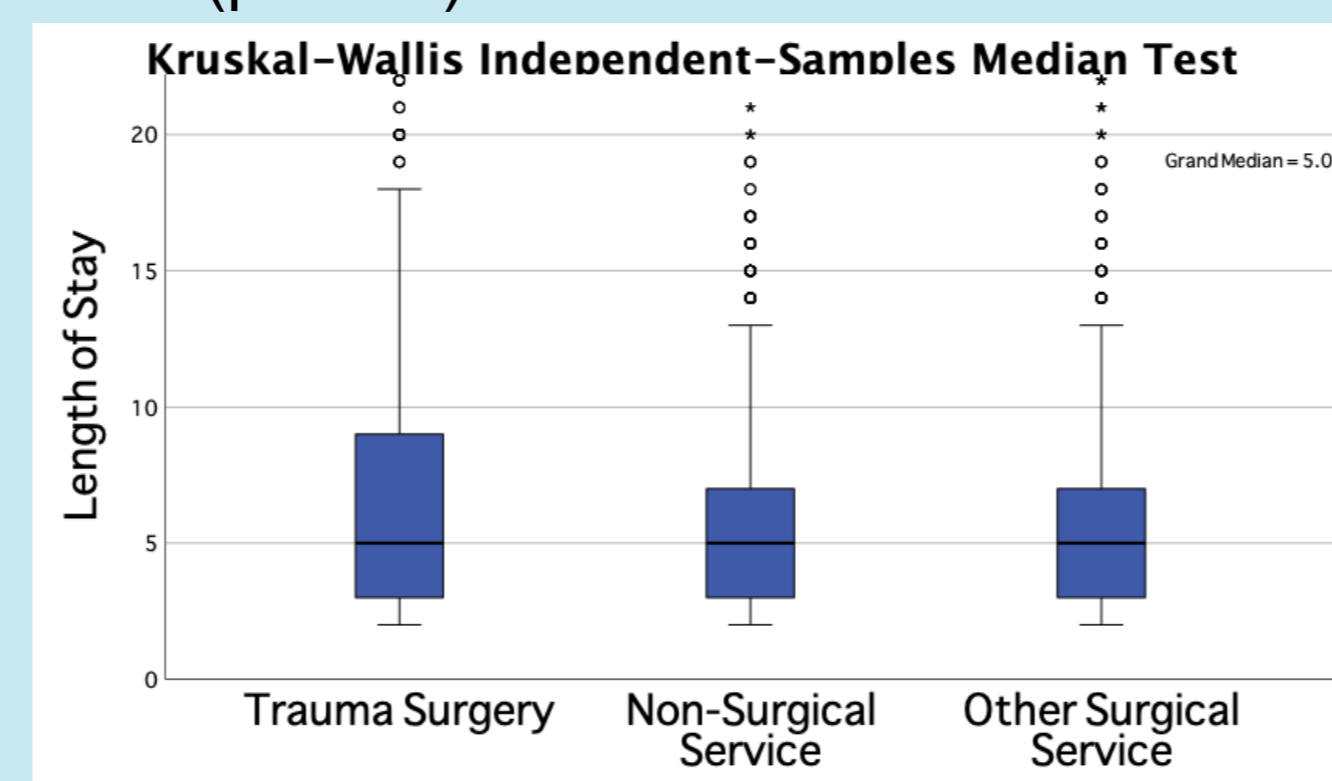
Length of stay was highest for trauma surgery service (p<0.01).

Results

Comorbidity	n, %
Cardiovascular	2119 (57.1%)
Musculoskeletal	1166 (31.4%)
Diabetes Mellitus	772 (20.8%)
Neurological	581 (15.9%)
Psychiatric	455 (12.3%)
Pulmonary	424 (11.5%)

Multivariate linear regression modeling of length of stay controlling for age, ISS, admission GCS and significant comorbidities:

Variable	$\triangle$LOS	95% CI	p-value
Age	- 0.48	- 0.08, -0.02	< 0.01
ISS	0.14	0.11, 0.18	< 0.01
Admission GCS	- 0.28	-0.42, -0.14	< 0.01
Diabetes Mellitus	0.92	0.34, 1.50	< 0.01
Pulmonary Disease	0.69	0.03, 1.36	0.04
Psychiatric Disease	1.23	0.53, 1.93	< 0.01

5 or greater comorbidities had a higher proportion of hospital adverse events (chi-squared test, p < 0.01).

Conclusions

In this 7 year review, geriatric patients with fall-related injuries have different LOS based on their comorbidities.

Admitting services had significantly different LOS and average number of comorbidities.

Diabetes, pulmonary, and psychiatric diseases contribute an increase of approximately one day to average LOS.

For trauma services that offer a trauma ICU, these findings indicate higher rates of comorbidity management.

As trauma centers improve geriatric trauma care, comorbidity management represents an opportunity for proactive intervention and efficient disposition planning.

References

1) Jiang L, Zheng Z, Zhang M. The incidence of geriatric trauma is increasing and comparison of different scoring tools for the prediction of in-hospital mortality in geriatric trauma patients. *World J Emerg Surg* 15, 59 (2020). doi.org/10.1186/s13017-020-00340-1

2) Brooks SE, Peetz AB. Evidence-based care of geriatric trauma patients. *Surg Clin North Am.* 2017 Oct 1;97(5):1157-74.

3) Charles EJ, Napoli NJ, Johnston LE, et al. Outcomes after Falls Continue to Worsen Despite Trauma and Geriatric Care Advancements. *Am Surg.* 2018;84(3):392-397. doi:10.1177/000313481808400323