Is Grip Strength a Better Measure of Long Segment Fusion Outcomes than an Established Frailty Index?

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Introduction

Grip strength has been established as a valid biomarker for health, has been inversely correlated with all-cause mortality, and directly correlated with length of hospital stay[1].

In contrast to the simplicity of grip strength, frailty indexes using numerous data points have been developed. One such measurement, the Five-item Modified Frailty Index, has been successful in predicting postoperative adverse events in patients after spine surgery[2].

We aim to compare the ability of grip strength and the Five-item Modified Frailty Index to predict outcomes in patients undergoing long segment fusions.

Methods

An IRB-approved retrospective chart review was conducted on 23 patients undergoing long segment fusions from 2020-2023.

Post-operative outcomes included discharge location, post-operative length of stay in the ICU, and post-operative length of stay in the hospital overall.

Data was collected on variables necessary for calculating frailty based on the Five-item Modified Frailty Index which included:

- Congestive heart failure within 30 days of surgery
- Diabetes mellitus
- COPD/Pneumonia
- Total/Partial functional dependency
- Hypertension requiring medication

Descriptive statistics and analysis were performed using IBM SPSS Statistics and required binary logistic regression and Pearson's and Spearman's correlation coefficients with p-value < 0.05 being significant.

Results

Pearson's coefficient: Grip strength vs length of stay.
Increased grip strength was significantly correlated with a shorter ICU stay (RH: p=0.004, LH: p=0.006), but not with a decreased hospital stay.

Spearman's coefficient: Frailty index vs length of stay.
Increased frailty was also significantly correlated with a longer ICU stay (p=0.024), but not with an increased hospital stay.

Binary logistic regression: Grip strength and frailty index vs discharge location.
Patients with an increased grip strength were significantly more likely to be discharged home as opposed to a rehabilitation facility (right hand: p=0.023, left hand: p=0.035), while patients with decreased frailty had no significant correlation with location of discharge.

	ICU Stay	Hospital Stay	Discharge location
Right grip strength	✓	✗	✓
Left grip strength	✓	✗	✓
Frailty index	✓	✗	✗

Table 1. Representation of which patient variables are significantly correlated with the measured outcomes.

Conclusion

Increased grip strength and decreased frailty are both correlated with a decreased length of ICU stay.

However, only increased grip strength is associated with a higher likelihood of patients returning directly home postoperatively, therefore making grip strength a potentially superior predictor of postoperative outcomes.

Future steps include increasing our patient cohort and as well examining more post-operative variables that demonstrate post-operative patient outcomes. Furthermore, we plan to examine our data to find any associations between grip strength and frailty and determine if there are instances where one predictor of post-surgical outcomes should be used over the other.

Bibliography

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