An 8-Item Modified Frailty Index as a Risk Assessment Tool for Long-Bone Fractures: Analysis of 150,452 Patients

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INTRODUCTION: Long-bone fractures are a major cause of injury worldwide, and evaluating the risks versus benefits of surgical fixation is critical. The modified frailty index (MFI) uses preoperative risk factors to predict postoperative complications after orthopaedic procedures. We hypothesized that this index would predict complications in a large cohort of long bone fractures.

METHODS: We retrospectively reviewed the American College of Surgeons (ACS) - National Surgery Quality Improvement Program (NSQIP) database for all surgically repaired adult extremity fractures from 2015 to 2020. We assigned a non-weighted MFI score to each patient composed of eight preoperative risk factors: morbid obesity (BMI >35), osteoporosis, congestive heart failure, hypoalbuminemia (<3.5), hypertension, chronic obstructive pulmonary disease (COPD), diabetes mellitus, and non-independent functional status. No risk factor was designated as MFI 0, 1-2 risk factors as MFI 1, 3-4 risk factors as MFI 2, and ≥5 factors as MFI 3. Multiple linear and logistic regression determined relationships between MFI categories and five key postoperative outcomes: complications, readmissions, reoperations, length of hospital stay, and mortality.

RESULTS: We identified 150,452 adult patients who underwent surgical treatment for long-bone fractures. Compared to MFI 0, each increasing MFI score was associated with a subsequently significant (P<0.0001) increased risk of complications, readmissions, reoperations, length of hospital stay, and mortality. Compared to MFI 0, patients with MFI 3 were nearly 17 times more likely to experience a complication after the procedure (7.2% vs. 56.3%) and had over 63 times higher odds of 30-day mortality (0.2% vs. 11.0%). Comparing MFI 0 to MFI 3, the reoperation rate increased from 1.1% to 6.0%, and the readmission rate increased from 1.6% to 19.5%. Hospital stay increased by 2.29 days on average across MFI intervals.

DISCUSSION AND CONCLUSION: Frailty is highly predictive of postoperative complications, readmission, and reoperation following long bone fracture surgery. A simple frailty evaluation could guide surgical decision-making and patient counseling.