

Does frailty predict outcomes in patients undergoing local, regional or free flap procedures at the time of craniotomy? An analysis of the ACS-NSQIP database (2011-2021)

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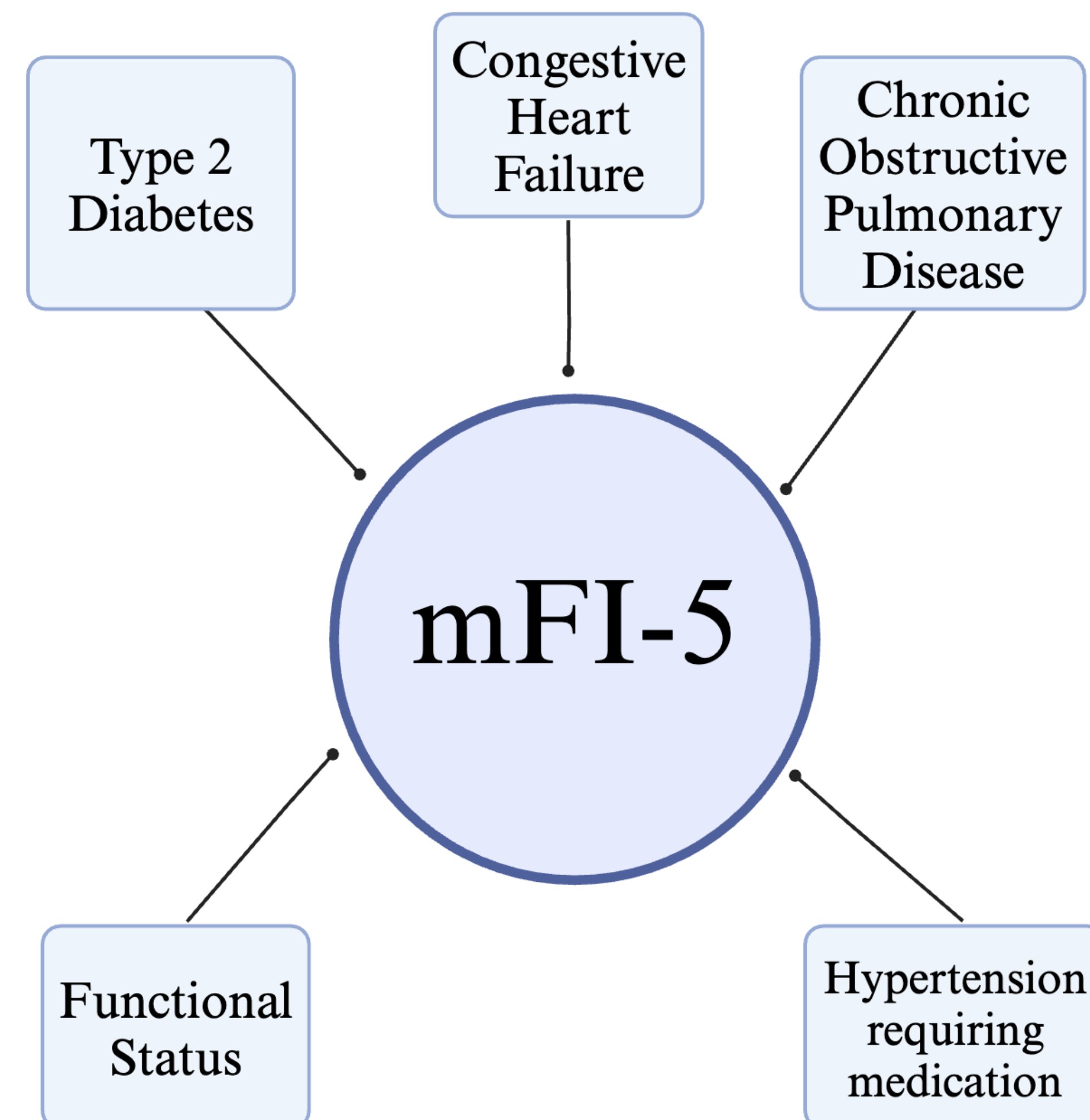
Background

- **Complications** after craniotomy, one of the most common neurosurgical procedures, include **surgical site infection**, **myocardial infarction**, and **sepsis**.
- Patients at **high-risk** for complications may undergo concurrent **plastic surgery procedures** such as local, regional, or free flaps.
- The **modified frailty index (mFI-5)** has been validated as a strong predictor of outcomes in other surgical populations.
- Little is known about the impact of frailty in patients undergoing flap procedures at the time of craniotomy.

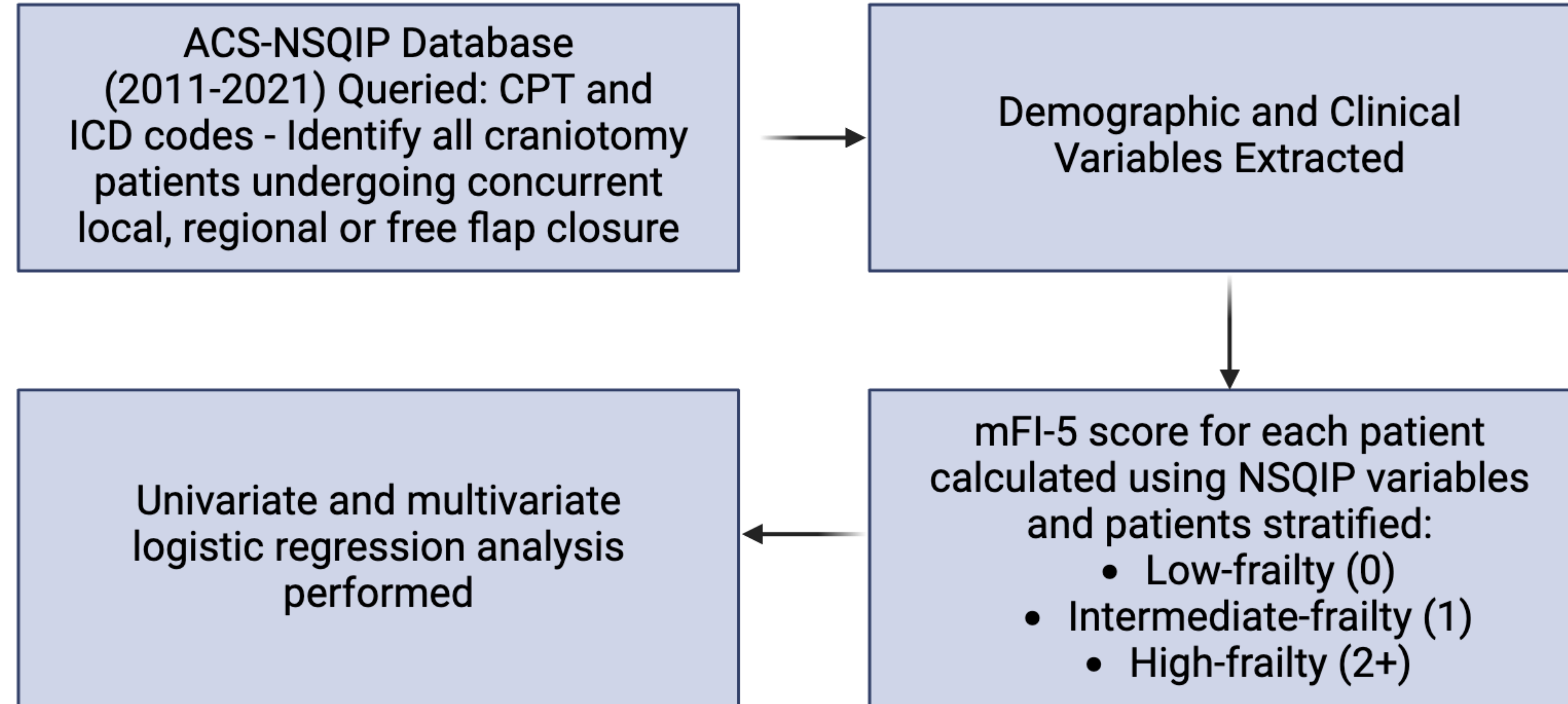
Objective

- Determine the **adjusted effect of the mFI-5** on postoperative **outcomes** in this high-risk neuroplastic cohort using the National Surgical Quality Improvement Program (NSQIP) database.

Table 1. Indications for Craniotomy
Oncologic
Aneurysms
Arterio-venous malformations
Subdural empyema
Subdural hematomas
Intracerebral hematomas
Hemorrhage
Abscesses
Severe nerve or facial pain
Epilepsy



Methods



Results

Table 2. Descriptive Statistics and Peri-Operative and Postoperative Outcome Variables				
	No Frailty	Low Frailty	High Frailty	p-value
n	247 (48.0%)	185 (35.9%)	83 (16.1%)	
Age (mean±SD)	54.9 ± 17.0	67.2 ± 13.2	65.4 ± 13.2	<0.001
Gender				
Female	113 (45.8%)	67 (36.2%)	33 (39.8%)	0.1
Male	134 (54.3%)	118 (63.8%)	50 (60.2%)	
Race				
White	171 (69.2%)	149 (80.5%)	60 (72.3%)	0.02
Black	21 (8.5%)	6 (3.2%)	10 (12.1%)	
Other/Unknown*	55 (22.3%)	30 (16.2%)	13 (15.7%)	
Indication for Craniotomy				
Tumor	164 (66.4%)	128 (69.2%)	62 (74.7%)	0.4
Infection	33 (13.4%)	18 (9.7%)	11 (13.3%)	
Other	50 (20.2%)	39 (21.2%)	10 (12.1%)	
Location of Craniotomy				
Supratentorial	79 (85.9%)	58 (93.6%)	24 (82.8%)	0.4
Infratentorial	12 (13.0%)	4 (6.5%)	5 (17.2%)	
Concurrent Cranioplasty				
Yes	53 (22.2%)	34 (20.0%)	14 (17.7%)	0.7
Cranioplasty Defect Size				
< 5 cm	18 (40.9%)	13 (39.4%)	3 (25.0%)	0.7
> 5 cm	26 (59.1%)	20 (60.6%)	9 (75.0%)	
Flap Type				
Local flap	72 (29.2%)	61 (33.0%)	24 (28.9%)	0.7
Pedicled flap	89 (36.0%)	55 (29.7%)	29 (34.9%)	
Free flap	86 (34.8%)	69 (37.3%)	30 (36.1%)	

Table 3. Multivariate Regression Analysis for All-Cause Complications in Flap Patients.		
	OR (95% CI)	p-value
Age		
< 50	Reference	Reference
51-65	1.61 (0.95-2.74)	0.08
66-75	1.45 (0.81-2.61)	0.2
>75	1.85 (1.01-3.39)	0.05
Race		
Other	Reference	Reference
White	1.06 (0.66-1.71)	0.8
Black	1.03 (0.45-2.36)	0.9
BMI		
30-35	Reference	Reference
< 30	1.54 (0.94-2.53)	0.09
> 35	1.36 (0.68-2.73)	0.4
Smoking		
Smoking	Reference	Reference
No Smoking	1.06 (0.63-1.80)	0.8
ASA Class		
1-2	Reference	Reference
3	1.59 (0.98-2.57)	0.06
4-5	2.34 (1.06-5.15)	0.04
Frailty Index (mFI-5)		
0	Reference	Reference
1	1.07 (0.70-1.64)	0.8
2+	1.63 (0.94-2.84)	0.08
Abbreviations: ASA: American Society of Anesthesiologists; BMI: body mass index; CI: confidence interval; mFI-5: 5-factor modified frailty index; OR: odds ratio		

Results

- There was **no association** between **frailty** and **flap choice** or concurrent cranioplasty.
- Greater frailty was associated with multiple preoperative variables, including increased **age**, **BMI**, **ASA** class, and recent **smoking** history.
- Greater frailty was associated with **greater resource utilization**, including longer **length-of-stay** and greater **readmission** rates.
- **High-frailty** was associated with higher rates of **all-cause** and **severe systemic complications** and **death**

Conclusions

- Among **high-risk neuroplastic surgery patients** – higher frailty is associated with increased risk of **postoperative complications** and **resource utilization**
- Study highlights the importance of **pre-habilitation** among higher-frailty groups
- **mFI-5** is a **validated** predictor of outcomes for flap procedures with craniotomy
- Future directions aimed towards **risk scoring systems** in other prophylactic procedures