

**PURPOSE / OBJECTIVES**

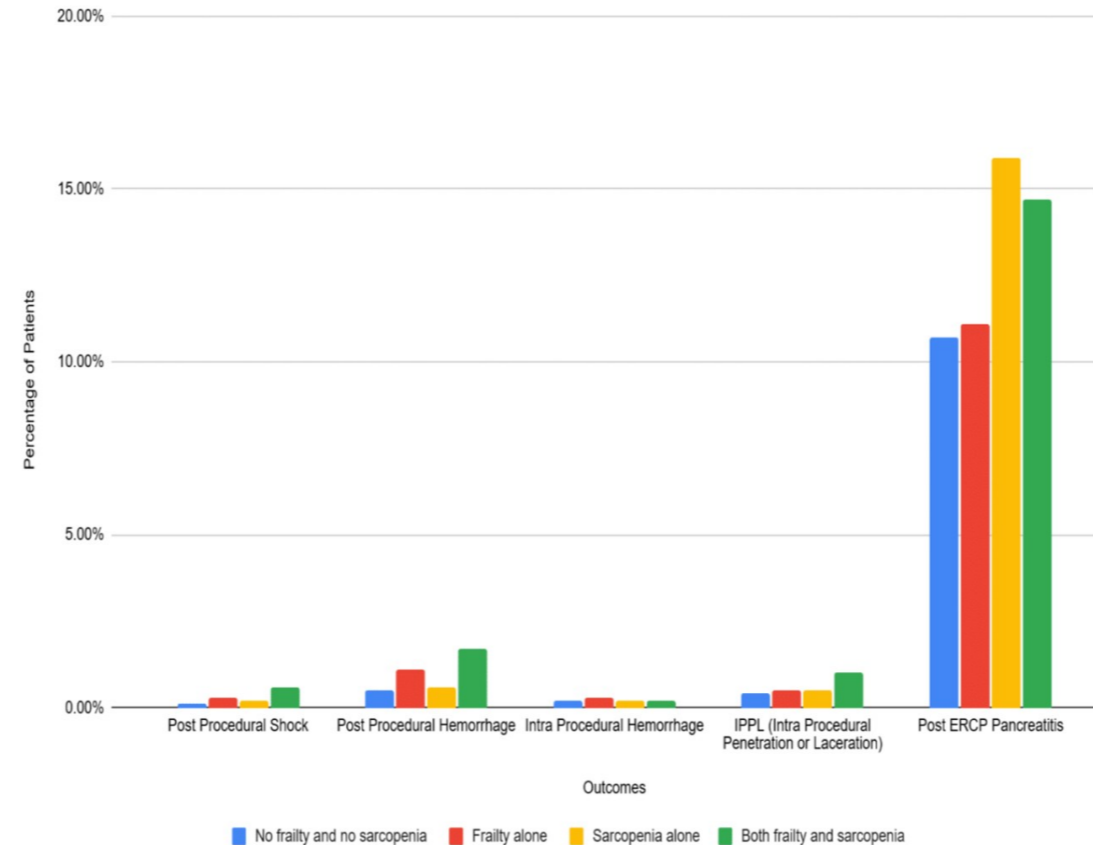
Frailty and sarcopenia are conditions that significantly impair a patient's physiological reserve and functional capacity. Frailty refers to the decline across multiple organ systems, leading to increased vulnerability to stress, while sarcopenia is characterized by the loss of muscle mass and strength, often resulting in impaired physical function. Both conditions are associated with adverse clinical outcomes, including peri-procedural complications. Although each has been studied individually in relation to procedural risks, no study has yet evaluated the combined impact of frailty and sarcopenia on outcomes in patients undergoing ERCP.

**MATERIAL & METHODS**

We analyzed data from the 2016-2020 NIS database using ICD-10 codes to identify adult patients who underwent ERCP. The Hospital Frailty Risk Score (HFRS) and sarcopenia ICD-10 codes were used to classify patients into four groups: (1) no frailty or sarcopenia, (2) frailty alone, (3) sarcopenia alone, and (4) combined frailty and sarcopenia. Peri-procedural outcomes were compared across these groups. Multivariate logistic and linear regression analyses were performed to assess the impact of combined frailty and sarcopenia on adverse events, adjusting for patient demographics, hospital characteristics, Charlson Comorbidity Index, and the indication for ERCP.

**RESULTS**

A total of 661,130 patients underwent ERCP, of which 420,285 had neither frailty nor sarcopenia (63.5%), 172,055 had only frailty (26.0%), 28,645 had only sarcopenia (4.3%), and 40,145 were diagnosed with both frailty and sarcopenia (6.1%). The most common indications for ERCP in this group were choledocholithiasis (42.5%), biliary stricture (31.1%), and pancreaticobiliary cancer (22%). Patients in the combined frailty and sarcopenia group experienced a higher incidence of post-procedural complications, including post-procedural shock (0.6%), post-procedural hemorrhage (1.7%), and intra-procedural penetration or laceration (1%) (Figure-1). After adjusting for confounding factors, this group had significantly higher odds of experiencing post-procedural shock (aOR 11.6, 95% CI 6.9–19.4, p<0.001), post-procedural hemorrhage (aOR 3.27, 95% CI 2.63–4.05, p<0.001), intra-procedural perforation (aOR 2.94, 95% CI 2.39–3.87, p<0.001), and post-ERCP pancreatitis (aOR 1.46, 95% CI 1.31–1.63, p<0.001) (Figure-2).



**Figure-1:** Adverse events stratified by presence of frailty and sarcopenia

	No frailty and no sarcopenia	Frailty alone	Sarcopenia alone	Both frailty and sarcopenia
	Ref	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)
<b>Post Procedural Shock</b>	Ref	<b>6.42 (4.2-9.9)</b>	<b>4.35 (2.2-8.6)</b>	<b>11.6 (6.9-19.4)</b>
<b>Post Procedural Hemorrhage</b>	Ref	<b>2.15 (1.83-2.52)</b>	1.19 (0.83-1.70)	<b>3.27 (2.64-4.05)</b>
<b>Intra Procedural Hemorrhage</b>	Ref	1.23 (0.92-1.63)	1.16 (0.65-2.05)	1.13 (0.70-1.82)
<b>IPPL (Intra Procedural Penetration or Laceration)</b>	Ref	<b>1.33 (1.08-1.65)</b>	1.31 (0.89-1.96)	<b>2.95 (2.24-3.87)</b>
<b>Post ERCP Pancreatitis</b>	Ref	<b>1.23 (1.15-1.32)</b>	<b>1.22 (1.07-1.39)</b>	<b>1.45 (1.31-1.63)</b>

**Figure-2:** Results of multivariate logistic regression assessing the relationship between frailty and/or sarcopenia and adverse events.

**SUMMARY / CONCLUSION**

In conclusion, frailty and sarcopenia significantly increase the risk of complications in patients undergoing ERCP, particularly when both conditions are present. Incorporating these factors into pre-procedural risk assessments can help identify high-risk patients, enabling more personalized care and potentially reducing adverse outcomes. This approach emphasizes the importance of proactive management in vulnerable populations to improve patient safety and outcomes.