



## Abstract

**OBJECTIVES:** To analyze the association between the geriatric nutritional risk index (GNRI) and adverse outcomes in parotidectomy patients using a national database.

**STUDY DESIGN:** Retrospective database review.

**METHODS:** Current Procedural Terminology (CPT) codes were used to identify cases of parotidectomy in patients aged 65+ in the 2005-2018 National Surgery Quality Improvement Program (NSQIP) database. Demographics and comorbidities were compared between well-nourished patients (WN), GNRI > 73, and severely malnourished patients (MN), GNRI < 73, using unadjusted chi-square analysis. Propensity score matching was used to adjust for covariates. After confirming adjustment through chi-square analysis, the independent effect of malnutrition was evaluated using chi-square testing on the adjusted dataset.

**RESULTS:** 1,049 (77.1%) WN and 312 (22.9%) MN patients underwent parotidectomy from 2005 to 2018. Well-nourished patients had a significantly higher proportion of female sex (p=0.049) and Hispanic ethnicity (p=0.024). Chi-square analysis indicated MN patients had higher incidences of congestive heart failure (1.9% vs. 0.2%; p=0.003). A propensity score matched subset of 240 WN (49.1%) and 249 MN (50.9%) patients had no significantly varying demographics factors or comorbidities. After adjustment for confounders, chi-square analysis indicated low GNRI (MN) was an independent risk factor for prolonged length of stay (OR 2.48; 1.12 - 5.50; p=0.025).

**CONCLUSIONS:** Low GNRI is associated with an increased risk of prolonged length of stay in parotidectomy patients. Preoperative optimization of a patient's nutritional status can possibly prevent these adverse outcomes.

## Introduction

- Parotidectomy is performed for a variety of indications, including neoplasms, inflammatory conditions, infections, many of which may present at older age.<sup>1</sup>
- Prior single center studies have indicated the parotidectomy may expose older patients to a greater risk of serious complications.<sup>2,3</sup>
- The geriatric nutritional risk index (GNRI) has been described to predict adverse outcome in advanced head and neck cancer patients.<sup>4</sup>
- This study seeks to evaluate the association between severe malnourishment as indicated by the GNRI and adverse outcomes in national cohort of geriatric patients undergoing parotidectomy.

## Methods and Materials

This retrospective cohort analysis utilized the 2005-2018 National Surgery Quality Improvement Program database. CPT codes were used to identify cases of parotidectomy, including 42410, 42415, 42420, 42425, and 42426. Demographics, comorbidities, and complications were compared between well-nourished patients, GNRI greater than 73, and severely malnourished patients, GNRI less than 73, using unadjusted chi-square analysis. Covariates were adjusted for using propensity score matching and confirmed using chi-square adjustment. The independent effect of being malnourished was evaluated through chi-squared tests on the adjusted dataset.

## Conclusion

- After adjusting for comorbidities by PSM, severely malnourished patients were at higher risk for an extended length of stay.
- This suggests that optimizing a patient's preoperative nutritional status may improve post-operative length of stay.

## Results

**Table 1.** Demographics and rates of comorbidities of patients undergoing parotidectomy according to GNRI status before and after propensity score matching.

	Well-nourished (n = 1,049)	Malnourished (n = 312)	p-value	Well-nourished (PSM) (n = 240)	Malnourished (PSM) (n = 249)	p-value
<b>Gender</b>			<b>0.049</b>			0.401
Female	41.9%	35.6%		39.2%	35.3%	
Male	58.1%	64.4%		60.8%	64.7%	
<b>Race</b>			0.958			0.757
White	82.6%	83.4%		90.4%	89.6%	
Black	5.0%	5.3%		5.4%	6.4%	
Asian	4.7%	4.3%		2.9%	3.2%	
Hawaiian/Pacific	0.3%	0.3%		0.0%	0.4%	
Native American	0.9%	0.3%		0.8%	0.4%	
Unknown	6.6%	6.3%		0.4%	0.0%	
<b>Hispanic Ethnicity</b>	5.5%	2.2%	<b>0.024</b>	1.7%	2.4%	0.752
Obese	41.4%	41.7%	0.948	45.4%	42.2%	0.523
Diabetic	10.3%	12.4%	0.318	15.8%	20.1%	0.240
Smoker	17.0%	19.9%	0.237	12.1%	12.9%	0.891
Dyspnea	7.9%	14.4%	<b>0.001</b>	3.3%	2.8%	0.797
Poor Functional Status	1.2%	4.8%	<b>&lt;0.001</b>	N/A	N/A	N/A
Ventilator Dependence	0.1%	0.0%	1.000	10.4%	11.2%	0.774
COPD	6.8%	11.5%	<b>0.008</b>	N/A	N/A	N/A
Ascites	N/A	N/A	N/A	0.8%	1.6%	0.686
<b>Congestive Heart Failure</b>	0.2%	1.9%	<b>0.003</b>	67.5%	69.9%	0.626
Hypertension	69.5%	67.0%	0.404	0.0%	0.4%	1.000
Renal Failure	0.1%	0.3%	0.406	1.3%	2.0%	0.725
Dialysis	0.4%	1.6%	<b>0.034</b>	7.1%	9.6%	0.331
<b>Disseminated Cancer</b>	4.2%	9.0%	<b>0.002</b>	2.5%	2.4%	1.000
Open wound	1.2%	3.5%	<b>0.012</b>	7.9%	8.8%	0.746
Steroid use	4.6%	9.3%	<b>0.003</b>	0.4%	1.2%	0.624
Weight loss	0.4%	1.9%	<b>0.012</b>	6.7%	6.8%	1.000
<b>Bleeding disorder</b>	3.6%	7.1%	<b>0.017</b>	N/A	N/A	N/A
Preop Blood Transfusion	0.1%	0.0%	1.000	N/A	N/A	N/A
Systemic Sepsis	0.5%	0.3%	1.000	0.0%	0.4%	1.000

PSM: propensity score matched. COPD: Chronic Obstructive Pulmonary Disease. N/A indicates that no cases of the complication occurred, precluding chi-square analysis.

**Table 2.** Adjusted, propensity score matched chi-square analysis of complication incidences in patients undergoing parotidectomy according to GNRI status.

	Well-Nourished	Malnourished	p-value
Ventilation >48 hours	N/A	N/A	N/A
Progressive Renal Insufficiency	0.40%	0.00%	0.491
Transfusions Intraop/Postop	0.80%	2.80%	0.176
Stroke/Cardiovascular Accident	0.80%	0.40%	0.617
Cardiac Arrest Requiring CPR	0.80%	0.40%	0.617
Myocardial Infraction	N/A	N/A	N/A
Superficial Incisional SSI	1.70%	2.40%	0.752
Organ/Space SSI	0.40%	0.80%	1.000
Urinary Tract Infection	0.00%	0.80%	0.499
Septic Shock	N/A	N/A	N/A
Sepsis	0.00%	0.40%	1.000
Pneumonia	0.00%	1.20%	0.249
Wound Disruption	0.40%	0.80%	1.000
Pulmonary Embolism	N/A	N/A	N/A
Acute Renal Failure	N/A	N/A	N/A
Deep Incisional SSI	0.80%	1.20%	1.000
Unplanned Intubation	0.40%	0.80%	1.000
DVT Requiring Therapy	0.00%	1.60%	0.124
Any Surgical Complication	4.20%	6.80%	0.237
Any Medical Complication	2.10%	4.40%	0.204
Any Complication	6.30%	10.40%	0.104
Death	0.80%	2.00%	0.450
Extended Length of Stay	10.00%	17.30%	<b>0.025</b>
Extended Operation Time	10.80%	14.10%	0.338
Unplanned Reoperation	2.90%	1.60%	0.374

SSI: Surgical Site Infection. N/A indicates that no cases of the complication occurred, precluding chi-square analysis.

**Table 3.** Chi-Square analysis of adverse outcomes in malnourished patients compared to well-nourished patients

Outcome	Odds Ratio	95% Confidence Interval	p-value
Extended Length of Stay	2.479	1.118 - 5.498	<b>0.025</b>

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