

# Abnormal Geriatric Nutritional Risk Index is Associated with Perioperative Complications following Distal Radius Fracture Open Reduction Internal Fixation

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**INTRODUCTION:** Distal radius fractures (DRF) are one of the most common orthopedic injuries in the elderly. Given that the elderly population in the United States is projected to grow substantially in the following decades, understanding operative risks and complications related to malnutrition can allow for improved patient outcomes and quality of life in the geriatric patient following DRF. This study investigates the association between the Geriatric Nutritional Risk Index (GNRI), a simple multifaceted measure of malnutrition risk, and 30-day postoperative complications following DRF open reduction internal fixation (ORIF).

**METHODS:** The American College of Surgeons National Surgical Quality Improvement Program database was queried for all patients who underwent DRF ORIF from 2015 to 2021. The study population was divided into three groups based on preoperative GNRI: normal/reference (GNRI > 98), moderate malnutrition (92 ≤ GNRI ≤ 98), and severe malnutrition (GNRI < 92). Logistic regression analysis was conducted to investigate the relationship between preoperative GNRI and postoperative complications.

**RESULTS:** Compared to normal nutrition, moderate malnutrition was independently associated with a greater likelihood of any complications (odds ratio [OR] 1.99, 95% confidence interval [CI] 1.62-2.45;  $P < .001$ ), cardiac arrest or myocardial infarction (MI) (OR 10.94, 95% CI 1.19-100.73;  $P = .035$ ), non-home discharge (OR 1.82, 95% CI 1.39-2.38;  $P < .001$ ), and length of stay (LOS) > 2 days (OR 2.17, 95% CI 1.73-2.73;  $P < .001$ ). Severe malnutrition was independently associated with a greater likelihood of any complication (OR 3.22, 95% CI 2.48-4.17;  $P < .001$ ), sepsis (OR 15.41, 95% CI 1.66-143.32;  $P = .016$ ), cardiac arrest or MI (OR 20.58, 95% CI 1.62-261.26;  $P = .020$ ), pulmonary embolism (OR 9.40, 95% CI 1.76-50.11;  $P = .009$ ), surgical site infection (OR 7.73, 95% CI 1.99-30.02;  $P = .003$ ), non-home discharge (OR 2.55, 95% CI 1.87-3.49;  $P < .001$ ), readmission (OR 2.47, 95% CI 1.47-4.14;  $P < .001$ ), and LOS > 2 days (OR 3.51, 95% CI 2.67-4.62;  $P < .001$ ).

**DISCUSSION:** GNRI predictive of malnutrition is an independent significant predictor of early complications following DRF ORIF, with increasing severity related to an increased rate of complications. The GNRI is simple and easy to use assessment that has been validated as a strong prognostic indicator in several recent surgical studies. This study is the first to establish the association between preoperative GNRI-based malnutrition and a greater likelihood of early postoperative complication in elderly patients undergoing DRF ORIF. GNRI is a strong predictor of 30-day postoperative complications following DRF ORIF in geriatric patients and our results support the utility of GNRI as an adjunctive tool in the risk stratification of geriatric patients undergoing DRF ORIF.

**SIGNIFICANCE/CLINICAL RELEVANCE:** This study suggests GNRI's utility as a simple multifaceted assessment of malnutrition risk that physicians can use preoperatively to better identify surgical candidates in elderly DRF patients, reduce postoperative adverse events, and promote favorable patient outcomes.

## IMAGES AND TABLES:

**Table I.** Multivariate Analysis of 30-day Postoperative Complications in Patients with Preoperative Normal GNRI, Moderate Malnutrition, and Severe Malnutrition. Dashes represent associations not significant in bivariate analysis and were not included in multivariate analysis. Bold  $P$  values indicate statistical significance with  $P < .05$ .

	Moderate malnutrition (92 ≤ GNRI ≤ 98) OR, $P$ Value (95% CI)	Severe malnutrition (GNRI < 92) OR, $P$ Value (95% CI)
<b>Any complication</b>	1.99, <b>&lt;.001</b> (1.62-2.45)	3.22, <b>&lt;.001</b> (2.48-4.17)
<b>Sepsis</b>	--	15.41, <b>.016</b> (1.66-143.32)
<b>Pneumonia</b>	2.71, .068 (.93-7.92)	--
<b>Unplanned reintubation</b>	--	6.73, .117 (.62-73.07)
<b>UTI</b>	1.59, .233 (.74-3.38)	1.70, .279 (.65-4.43)
<b>Cardiac arrest or MI</b>	10.94, <b>.035</b> (1.19-100.73)	20.58, <b>.020</b> (1.62-261.26)
<b>Blood transfusions</b>	--	--
<b>PE</b>	--	9.40, <b>.009</b> (1.76-50.11)
<b>SSI</b>	--	7.73, <b>.003</b> (1.99-30.02)
<b>Non-home discharge</b>	1.82, <b>&lt;.001</b> (1.39-2.38)	2.55, <b>&lt;.001</b> (1.87-3.49)
<b>Readmission</b>	--	2.47, <b>&lt;.001</b> (1.47-4.14)
<b>Length of stay &gt; 2 days</b>	2.17, <b>&lt;.001</b> (1.73-2.73)	3.51, <b>&lt;.001</b> (2.67-4.62)
<b>Mortality</b>	3.68, .077 (.87-15.58)	2.95, .207 (.55-15.78)

GNRI, Geriatric Nutritional Risk Index; OR, odds ratio; CI, confidence interval; UTI, urinary tract infection; MI, myocardial infarction; PE, pulmonary embolism; SSI, surgical space infection