

Recognition and management of refeeding syndrome risk in hospitalized patients initiating enteral nutrition: a hospital-based observational study

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Abstract

Background:

Refeeding syndrome (RS) is a potentially severe metabolic complication in malnourished patients undergoing nutritional therapy. Protocol-based prevention strategies may improve patient safety and quality of care.

Objective:

To evaluate the recognition of RS risk, the diagnosis of RS, and the management strategies adopted in hospitalized patients receiving enteral nutrition, using an institutional protocol as the reference standard.

Methods:

This observational study included adult patients receiving enteral nutrition between April and August 2024. Data were derived from a secondary analysis of a previously implemented institutional protocol. Patients were evaluated for RS risk, adherence to preventive measures, and clinical outcomes.

Results:

A total of 78 patients were included (median age 67 years; 51.3% male). Most patients were classified as at risk for RS, including 24.4% with high risk and 75.6% with associated risk conditions. Pre-nutritional risk screening was performed in 26.9% of cases, and electrolyte assessment before initiation of nutritional therapy occurred in 61.5%. Prophylactic thiamine was administered in 17.9% of patients, including 15.8% of those at high risk. Nutritional interventions were performed in 25.6% of cases, and the median time to reach caloric target was 7 days (5.8–8.0 days). RS diagnosis occurred in 42.3% of patients overall, being more frequent in the high-risk group (47.4%) compared to those with associated conditions (40.7%).

Conclusion:

The use of an institutional protocol enabled identification of patients at risk for RS; however, adherence to key preventive measures remained suboptimal, highlighting opportunities to improve patient safety in nutritional therapy.

Introduction

Refeeding syndrome (RS) was first described in the 1940s during World War II, when Josef Brozek and colleagues observed that severely malnourished individuals, after prolonged periods of food restriction, developed significant cardiovascular alterations following the reintroduction of nutrition [1, 2]. Since then, RS has been recognized as a potentially severe metabolic complication associated with the reintroduction of energy intake in malnourished individuals or in those exposed to prolonged periods of fasting [2, 3].

Currently, RS is defined as a set of metabolic and electrolyte disturbances that occur mainly within the first 72 hours after the reintroduction or increase of caloric intake in patients previously exposed to reduced or absent energy intake. These alterations may occur regardless of the route of nutritional therapy administration, including oral diet, enteral nutrition, parenteral nutrition, or even intravenous infusion of glucose-containing solutions [2, 4, 5].

The pathophysiology of RS is related to the transition from a catabolic to an anabolic metabolic state following nutrient reintroduction. During prolonged periods of energy deprivation, metabolic adaptation occurs with the utilization of body energy reserves, accompanied by progressive depletion of intracellular electrolytes and vitamins. When energy intake is resumed, increased insulin secretion promotes intracellular shifts of electrolytes, particularly phosphorus, potassium, and magnesium, in addition to extracellular retention of sodium and water. These alterations may result in serious clinical complications, including cardiac arrhythmias, respiratory failure, neurological disturbances, and fluid overload [2, 6, 7].

Among the electrolyte disturbances associated with RS, hypophosphatemia is considered the most characteristic and clinically relevant laboratory finding [3, 5, 6, 8]. Reduced serum phosphorus levels may impair muscular and cardiac function, decrease the production of 2,3-diphosphoglycerate, and reduce oxygen delivery to tissues, contributing to tissue hypoxia [6, 8]. Hypokalemia may impair cardiac electrical conduction, increasing the risk of potentially fatal arrhythmias and gastrointestinal disturbances, while hypomagnesemia is associated with cardiac rhythm abnormalities, seizures, and neurological manifestations. These disturbances frequently coexist and may worsen the clinical condition [5, 6].

Another important component in the pathophysiology of RS is thiamine deficiency, a vitamin essential for glucose metabolism. In individuals with reduced food intake, body stores of thiamine may become rapidly depleted. Deficiency of this vitamin may lead to neurological complications such as Wernicke encephalopathy and Korsakoff psychosis, as well as cardiovascular manifestations including high-output heart failure [4, 8, 9].

Despite its clinical relevance, the reported incidence of RS remains highly variable in the literature. Systematic reviews have reported wide variation in the frequency of the syndrome, ranging from 0% to 62% in observational studies and from 0% to 80% in other reviews. This variability largely reflects differences in diagnostic criteria used across studies. Moreover, evidence suggests that RS remains frequently underdiagnosed in healthcare settings [10, 11]. In a study involving 281 participants

(physicians and 5th-year medical students), only 14% were able to correctly identify the syndrome, which may contribute to its underreporting [12].

Several patient populations are considered at higher risk for developing RS, including individuals with eating disorders, alcoholism, chronic diseases associated with intestinal malabsorption, cancer, severe malnutrition, patients undergoing gastrointestinal surgery, and those exposed to prolonged periods of fasting [2, 5].

Traditionally, greater attention has been directed toward the occurrence of RS in patients receiving parenteral nutrition, frequently accompanied by specific institutional monitoring protocols. However, the syndrome may also occur during the initiation of oral or enteral nutrition, which are much more prevalent modalities in the hospital setting [11, 12]. Recent evidence suggests that the incidence of RS may also be significant among patients initiating enteral nutrition, possibly related to the incretin effect resulting from nutrient absorption in the gastrointestinal tract, leading to increased insulin secretion [5, 6].

Given this context, it is important to evaluate the occurrence of RS and the recognition of clinical risk among hospitalized patients initiating nutritional therapy. Therefore, the present study aimed to evaluate the frequency of risk identification and diagnosis of RS patients initiating enteral nutrition at a tertiary/quaternary teaching hospital located in the interior of São Paulo State, Brazil, as well as to analyze the management strategies adopted by healthcare teams in these cases.

Secondary objectives included evaluating the frequency of serum electrolyte testing (phosphorus, potassium, and magnesium) before the initiation of enteral nutrition, comparing the risk classification for RS performed by healthcare teams with that determined by the investigator based on medical record data, describing the clinical management adopted for patients classified as high risk for RS, assessing the use of prophylactic thiamine supplementation in patients at high risk, and comparing the occurrence of RS between patients classified as high risk and those with conditions associated with increased risk according to the institutional protocol.

Methods

This was a descriptive observational retrospective study conducted at a tertiary/quaternary teaching hospital in the interior of São Paulo State, Brazil. Hospitalized patients who initiated enteral nutrition between April and August 2024 were included. Individuals aged ≥ 18 years who required the acute use of an alternative enteral feeding route, including nasoenteral tube, gastrostomy, or jejunostomy, were eligible for inclusion. Patients were recruited from the medical wards, neurology ward, gastrointestinal surgery ward, stroke unit, and the clinical, neurological, and surgical intensive care units. Patients were excluded if they had chronic use of an alternative enteral feeding route, concomitant use of enteral and parenteral nutrition, enteral nutrition for ≤ 2 days, or if enteral nutrition prescriptions were subsequently canceled or not administered.

Based on the recommendations of the European Society for Clinical Nutrition and Metabolism (ESPEN), the American Society for Parenteral and Enteral Nutrition (ASPEN), and the National Institute for Health and Care Excellence (NICE) [4, 5, 11], an institutional protocol was developed to classify the risk of RS. Patients were classified as high risk for RS if they presented at least one of the following criteria: body mass index (BMI) < 16 kg/m²; unintentional weight loss > 7.5% within three months or > 10% within six months; little or no nutritional intake for more than seven days; energy intake < 50% of estimated requirements for more than five days during acute illness or injury; energy intake < 50% of estimated requirements for one month; or low serum levels of potassium, phosphorus, or magnesium before the initiation of nutritional therapy. Patients who did not meet criteria for high risk were classified as having conditions associated with increased risk if at least one of the following factors was present: critical illness, alcohol or substance abuse, advanced age, oncologic disease, prolonged fasting, postoperative status following malabsorptive surgery, short bowel syndrome, nutritional risk screening (NRS-2002) score ≥ 3, or hyperemesis gravidarum. Patients who did not meet the criteria for either group were classified as “no risk for RS”.

Data were obtained through review of electronic medical records and the institutional database. The following variables were collected: sex, age, presence of diabetes mellitus, nutritional risk classification, indication for alternative feeding route, type of feeding route used, clinical or surgical profile of the patient, documentation of RS risk screening by healthcare teams, request for laboratory tests including electrolytes initiation of enteral nutrition, volume of enteral nutrition administered during the first seven days of nutritional therapy, diagnosis of RS by healthcare teams, and prophylactic thiamine supplementation including route of administration. For the purposes of analysis, the healthcare team included both the medical staff and the clinical nutrition team responsible for patient care.

Refeeding Syndrome risk screening was considered present when healthcare teams documented relevant information in the medical record prior to the initiation of nutritional therapy, such as prior weight loss, reduced food intake, prolonged low-energy intake, or low body mass index.

Laboratory evaluation before initiation of enteral nutrition was considered adequate when phosphorus, potassium, and magnesium were requested simultaneously. The absence of any of these electrolytes was considered an incomplete request. Laboratory reference values used were those adopted by the hospital laboratory: potassium 3.5–5.1 mmol/L, magnesium 1.6–2.3 mg/dL, phosphorus 2.5–4.5 mg/dL, and serum glucose 60–100 mg/dL.

Refeeding syndrome was defined as a decrease greater than 30% in serum phosphorus levels or the reduction of phosphorus, potassium, or magnesium levels below the normal reference range within the first 72 hours after initiation of enteral nutrition.

The outcomes evaluated were the occurrence of RS according to the institutional protocol and the time required to reach the full caloric target of enteral nutrition.

Continuous variables were expressed as mean $\pm$ standard deviation or median (first and third quartiles), while categorical variables were presented as absolute and relative frequencies. The comparison of the frequency of RS between patients classified as high risk and those with conditions associated with increased risk was performed using Pearson's chi-square test. Statistical analyses were performed using SigmaPlot® version 12.0.

The study was approved by the institutional Research Ethics Committee, and all procedures were conducted in accordance with the Declaration of Helsinki (Protocol number: 7.438.971/ approval code CAAE: 86508825.2.0000.5411 on 05/02/2025-Appendix). The requirement for informed consent was waived by the Ethics Committee.

Results

Patient characteristics

Between April and August 2024, a total of 95 patients received enteral nutrition in the medical wards, neurology ward, gastrointestinal surgery ward, stroke unit, and the clinical, neurological, and surgical intensive care units of a tertiary teaching hospital in São Paulo State, Brazil. After applying the eligibility criteria, 17 patients were excluded: seven due to chronic prior use of enteral nutrition via nasoenteral tube, gastrostomy, or jejunostomy; one due to concomitant use of enteral and parenteral nutrition; two due to very short-term enteral nutrition use (1 day); one because the enteral nutrition prescription was subsequently canceled or not administered; and six due to incorrect or canceled prescriptions. Thus, 78 patients were included in the final analysis. The patient selection process is illustrated in Fig. 1.

The demographic and clinical characteristics of the study population are presented in Table 1. Sex distribution was similar, with 51.3% men and 48.7% women. The median age was 67 years, with most participants classified as older adults (65.4%). Regarding comorbidities, 30.7% of patients had a diagnosis of diabetes mellitus. The clinical profile predominated in the sample (78.2%), while surgical patients accounted for 21.8%.

The main indications for the use of an alternative feeding route were orotracheal intubation (51.3%) and decreased level of consciousness (33.3%). Other indications included poor oral intake (9.0%), inability to use the upper gastrointestinal tract (5.1%), and dysphagia (3.8%). Regarding underlying diagnoses, neurological diseases predominated (35.9%), followed by infectious conditions (23.1%), surgical conditions (21.8%), neoplasms (19.2%), cardiovascular diseases (14.1%), and trauma or respiratory diseases (11.5%). Some patients presented with more than one clinical diagnosis.

A nasoenteral tube was used in 97.4% of patients, while 2.6% received feeding via gastrostomy. Additionally, 10.6% maintained complementary oral intake. Nutritional screening using the NRS-2002 showed that 97.4% of patients had a score ≥ 3 , indicating high nutritional risk, with a median score of 4 (3–5).

Table 1
Characteristics of the study population.

Variables	Number of cases (n = 78)
Male sex (n = 78)	40 (51.3)
Age	67 years (50.7–79.0)
Elderly age group: elderly (≥ 65)	51 (65.4%)
Diabetes mellitus	24 (30.7)
Patient profile	61 (78.2)
Clinical	17 (21.8)
Surgical	
Indication for alternative feeding route	40 (51.3)
Orotracheal intubation	26 (33.3)
Decreased level of consciousness	7 (9.0)
Poor oral intake	4 (5.1)
Inability to use upper GI tract	3 (3.8)
Dysphagia	
Primary diagnostic category *	28 (35.9)
Neurological	18 (23.1)
Infectious	17 (21.8)
Surgical	15 (19.2)
Cancer	11 (14.1)
Cardiovascular	9 (11.5)
Trauma	9 (11.5)
Respiratory	8 (10.3)
Others	
Alternative feeding route	76 (97.4)
Enteral tube	2 (2.6)
PEG	
With oral intake	8 (10.6)
NRS-2002 classification ≥ 3	76 (97.4)

Data are expressed as median (p25-p75) or number of cases (%).

GI: gastrointestinal; PEG: percutaneous endoscopic gastrostomy; NRS-2002: Nutritional Risk Screening 2002.

* Patients could have more than one diagnostic category.

Source: Author

Clinical practice indicators related to refeeding syndrome

Table 2 presents clinical practice indicators related to RS. Only 26.9% of patients had documented screening or risk assessment for RS by healthcare teams before initiating enteral nutrition.

The simultaneous request for laboratory tests including phosphorus, potassium, and magnesium prior to initiation of nutritional therapy occurred in 61.5% of cases.

Regarding risk classification, 24.4% of patients were considered high risk for RS, while 75.6% were classified as having conditions associated with increased risk. No patient was classified as having no risk according to the protocol criteria.

Risk classification was predominantly performed by the investigator (89.7%), whereas only 10.3% were documented by healthcare teams. Among patients classified as high risk ($n = 19$), only five (26.3%) were identified as such by the healthcare teams.

Interventions related to the management of RS were documented in 25.6% of patients and included electrolyte replacement, slower progression of enteral nutrition, temporary interruptions in diet advancement, and reduction of caloric supply in cases with suspected RS.

Among patients who received prophylactic thiamine supplementation ($n = 14$), 64.3% received the vitamin via the enteral route and 35.7% via the parenteral route. Considering specifically the patients classified as high risk for RS, only 15.8% were receiving prophylactic thiamine supplementation.

The median time required to reach the caloric target of enteral nutrition was seven days (5.8–8.0 days).

Table 2
Key tracked indicators.

Variables	Number of cases (n = 78)
Refeeding syndrome risk screening before nutrition therapy	21 (26.9%)
Electrolyte testing before nutrition therapy	48 (61.5%)
Risk classification performed by	70 (89.7%)
Examiner	8 (10.3%)
Assistant team	
Risk classification for refeeding syndrome	19 (24.4%)
High risk	59 (75.6%)
Conditions associated with refeeding syndrome risk	0 (0)
No refeeding syndrome risk	
Prophylactic thiamine use	14 (17.9%)
Supplementation for 7 days	9 (64.3%)
Enteral administration *	5 (35.7%)
Parenteral administration *	3 (15.8%)
Among those with refeeding syndrome risk **	
Nutritional interventions performed	20 (25.6%)
Days to reach proposed calorie goal	7 (5.8–8.0 ***)

Data are expressed as median (p25-p75) or number of cases (%).

Electrolyte testing before nutrition therapy: joint request for phosphorus, potassium, and magnesium prior to the start of enteral nutrition therapy.

Nutrition interventions performed: based on the diagnosis, nutritional measures were imposed such as electrolyte replacement, use of thiamine, slow progression of diet, pause in the progression of enteral feeding, reduction of caloric intake in response to signs and symptoms of the syndrome, and discharge instructions with slow progression of enteral feeding.

* Given that n = 14 of patients used prophylactic thiamine.

** Given n = 19, referring to the number of patients at high risk for refeeding syndrome.

*** A period of 1 to 7 days was considered in the analysis; values above this period were categorized as 8 (> 7 days).

Occurrence of refeeding syndrome

The criteria used to classify patients as high risk for RS are detailed in Table 3. Among patients classified as high risk for RS (n = 19), the most frequently observed criteria were energy intake below 50% of requirements for more than five days during acute illness or injury (84.2%) and little or no food intake for more than seven days (31.6%). Other criteria included low serum levels of potassium, phosphorus, or magnesium before the initiation of nutritional therapy (31.6%) and significant unintentional weight loss (26.3%). Some patients met more than one criterion simultaneously.

RS occurred in 42.3% of the sample according to the diagnostic criteria established by the institutional protocol. When comparing risk classification groups, RS occurred in 47.4% of patients classified as high risk and in 40.7% of those classified as having conditions associated with increased risk, with no statistically significant difference between the groups (Fig. 2). Notably, the occurrence of RS was similar between patients classified as high risk and those with conditions associated with increased risk, despite the expectation of higher incidence in the high-risk group.

Table 3
Indication for high refeeding syndrome risk classification.

Variables	Number of cases (n = 19)
< 50% caloric needs for > 5 days during acute illness injury	16 (84,2%)
Little or no food intake for > 7 days	6 (31,6%)
Low K, P and Mg levels prior to starting nutrition therapy	6 (31,6%)
Unintentional weigh loss > 7,5% in 3 months and > 10% in 6 months	5 (26,3%)
< 50% estimated caloric needs for 1 month	3 (15,8%)
BMI < 16 kg/m ²	2 (10,5%)

Data are expressed as number of cases (%).

K: potassium; P: Phosphorus; Mg: Magnesium; BMI: Body Mass Index.

* Patients could have more than one diagnostic category.

Source: Author

Discussion

Characterization of the study population

The study population was predominantly composed of older adults, with a median age of 67 years, a profile frequently observed among hospitalized patients requiring alternative feeding routes. This finding is consistent with the current hospital scenario, in which population aging and the high prevalence of chronic diseases contribute to an increasing demand for artificial nutritional support. Older patients often present greater nutritional vulnerability, higher burden of comorbidities, and increased risk of malnutrition, factors that may increase susceptibility to the development of RS [13, 14].

Regarding the indications for nasoenteral tube placement, orotracheal intubation and decreased level of consciousness were the most frequent conditions identified. These clinical situations are commonly associated with temporary inability to maintain adequate oral intake. Such findings are consistent with the literature, which describes neurological impairment, reduced level of consciousness, and ventilatory support as some of the main indications for initiating enteral nutrition in hospitalized patients [15].

Another relevant aspect of the study population was the high nutritional risk identified by the NRS-2002 screening tool, in which nearly all patients presented a score ≥ 3 . This result highlights the substantial nutritional vulnerability of the sample, a characteristic expected in hospitalized patients requiring enteral nutritional therapy [16].

Clinical practice indicators and gaps in refeeding syndrome screening

This study evaluated clinical practice indicators related to the screening and management of RS in hospitalized patients initiating enteral nutrition. Despite the high nutritional risk observed in the study population, a low frequency of RS risk screening was documented before the initiation of nutritional therapy, along with limited recognition of patients classified as high risk by healthcare teams.

Although electrolyte testing was requested in a portion of patients before the initiation of nutritional therapy, formal screening for RS risk was rarely documented in medical records. This finding suggests that although laboratory tests are frequently ordered in routine clinical practice, they are not always part of a structured protocol for assessing the risk of RS [17].

Among patients classified as high risk, only a small proportion were recognized as such by healthcare teams. Similar findings have been reported in the literature, which consistently describes underdiagnosis of RS in healthcare settings. In a study involving physicians from different specialties, only a small proportion demonstrated adequate ability to correctly identify the syndrome, highlighting important limitations in its clinical recognition [12].

Another relevant finding was the low use of prophylactic thiamine supplementation, even among patients classified as high risk. Considering the role of thiamine deficiency in the pathophysiology of RS and its association with severe neurological complications, such as Wernicke encephalopathy and

Korsakoff syndrome, this result reinforces the need for greater attention to preventive measures at the initiation of nutritional therapy [2, 18, 19].

Diagnostic challenges and implications for risk classification protocols

An important aspect identified in this study relates to the limitations of the criteria used for classification and diagnosis of RS. A similar frequency of RS was observed among patients classified as high risk and those classified as having conditions associated with increased risk. Theoretically, a higher proportion of cases would be expected in the high-risk group, since this category encompasses the classical criteria described in international guidelines for identifying patients with greater vulnerability [2, 4].

This finding may indicate limited discriminatory capacity of the protocol used for risk classification. Alternatively, it may reflect inherent challenges in diagnosing RS, particularly when electrolyte disturbances are used as isolated diagnostic criteria. Changes in serum levels of phosphorus, potassium, and magnesium may occur in several other clinical conditions frequently observed in hospitalized patients, including gastrointestinal losses, medication use, renal dysfunction, and metabolic alterations [5, 6, 8].

The possible overestimation of RS diagnoses may also contribute to excessively cautious progression of nutritional therapy, increasing the risk of underfeeding in hospitalized patients. Although the institutional protocol was developed based on recommendations from international guidelines, including ASPEN, ESPEN, and NICE, the present findings suggest that its application may present limitations regarding sensitivity and specificity for the accurate identification of the syndrome [2, 4, 15].

Another relevant finding of this study was the median time of seven days required to achieve the enteral nutrition caloric target, which is longer than that reported in studies conducted in similar hospitalized populations. Slow progression of nutritional therapy may be related to several clinical factors, such as gastrointestinal intolerance or clinical instability. However, concern about the development of RS may also lead, in some cases, to overly cautious progression of caloric intake [6, 18].

When the diagnosis of RS is overestimated or based predominantly on nonspecific laboratory abnormalities, there is a risk of unnecessarily delaying the advancement of enteral nutrition. This may result in underfeeding and delay in meeting the patient's nutritional requirements. Although the present study does not allow causal inference between these factors, this scenario illustrates a potential clinical consequence of the diagnostic challenges associated with RS .

Strengths and limitations

This study has some limitations that should be considered when interpreting the results. First, this was a single-center observational study conducted in a tertiary teaching hospital, which may limit the

generalizability of the findings to other healthcare settings. In addition, data collection was based on retrospective review of electronic medical records, and some clinical information relevant to risk assessment for RS may not have been fully documented by healthcare teams. Another limitation relates to the diagnostic criteria used for RS, which were based on electrolyte changes and may be influenced by other clinical conditions commonly observed in hospitalized patients.

Despite these limitations, the study also presents important strengths. To our knowledge, few studies have evaluated clinical practice indicators related to the recognition and management of RS in patients initiating enteral nutrition. The systematic assessment of medical records allowed identification of gaps in risk screening, diagnostic recognition, and preventive management of RS in routine clinical practice. These findings provide relevant information for improving institutional protocols and strategies aimed at early identification and prevention of this potentially serious complication.

Conclusion

The present study demonstrated a low frequency of screening and recognition of RS among hospitalized patients initiating enteral nutrition, despite the high nutritional risk observed in the study population. Identification of patients classified as high risk by healthcare teams was limited, as was the documentation of preventive and therapeutic interventions related to the management of the syndrome, including prophylactic thiamine supplementation.

Furthermore, the similar occurrence of RS among patients classified as high risk and those with conditions associated with increased risk suggests limitations in the discriminatory capacity of the institutional protocol used for risk stratification. These findings highlight the need to improve strategies for identification, prevention, and management of RS in hospital clinical practice, as well as to review the criteria used for risk classification and diagnosis of the syndrome.

Declarations

Compliance with Ethical Standards

Conflict of Interest

The authors did not receive support from any organization for the submitted work. The authors have no relevant financial or non-financial interests to disclose. Except Dr. PSA serves as an Associate Editor of the journal. To avoid any conflict of interest, the article was managed independently by another member of the editorial board.

Approval by the Research Ethics Committee

The study was approved by the institutional Research Ethics Committee, and all procedures were conducted in accordance with the Declaration of Helsinki (Protocol number: 7.438.971/ approval code

CAAE: 86508825.2.0000.5411 on 05/02/2025-Appendix). The requirement for informed consent was waived by the Ethics Committee.

Author Contribution

L.F.P. and V.D.P. wrote the main text of the manuscript. L.F.P. and M.B.T. were responsible for data collection and submitted the project to the institutional review board. D.S.B.V., P.S.A., T.L., R.S.B., B.R., T.M., and V.A.M. reviewed the entire work. D.S.B.V., S.A.R.P., B.R. they approved the final version. V.D.P. and S.A.R.P. prepared the figures. D.S.B.V., R.S.B., S.A.R.P., and P.S.A. supervised the study.

Data Availability

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

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Figures

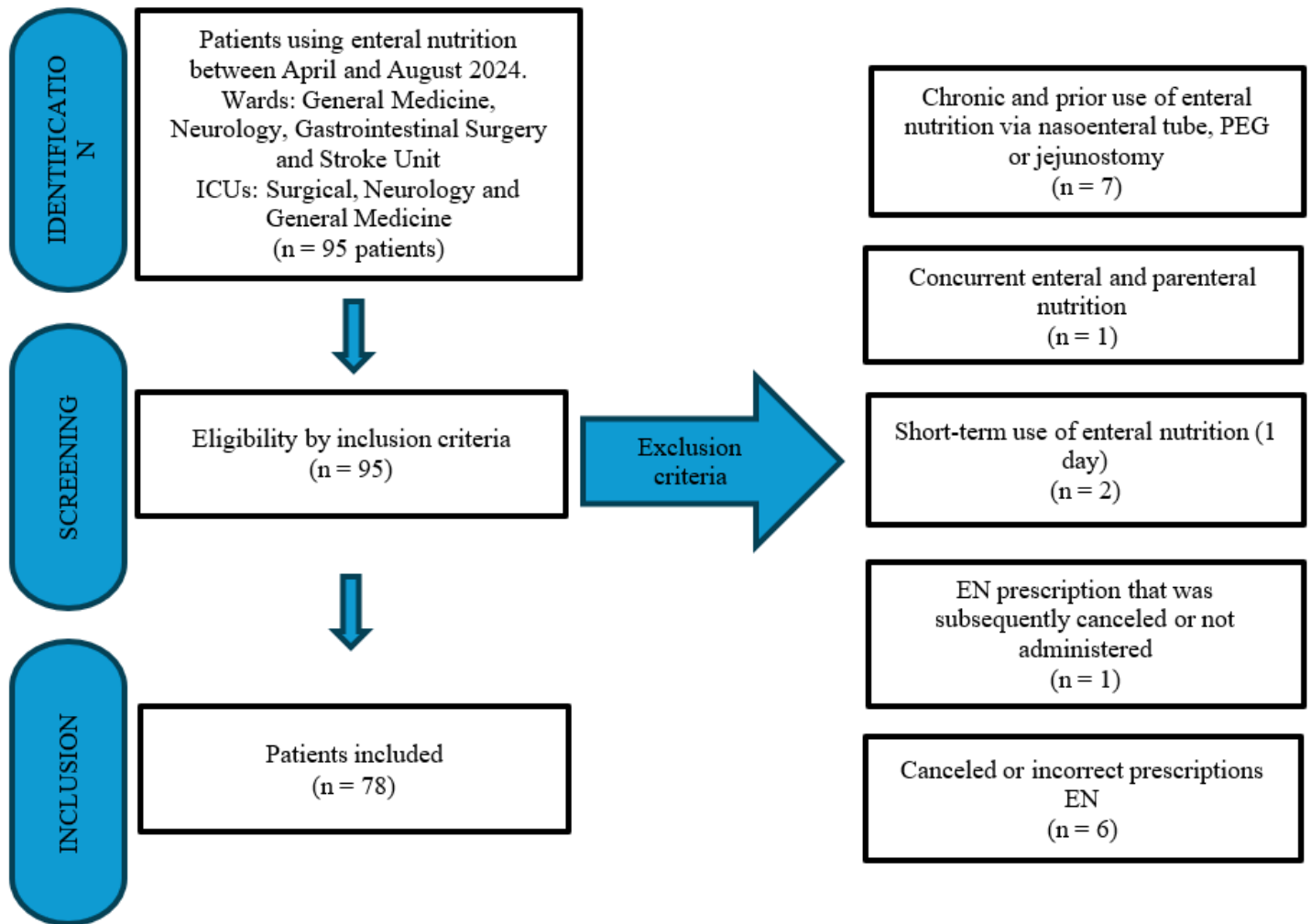


Figure 1

Flowchart of patient selection for study.

EN: Enteral nutrition; PEG: percutaneous endoscopic gastrostomy; ICU: Intensive care unit; Inclusion criteria: adults 18 years or older with surgical or clinical requirements initially requiring the use of an alternative enteral feeding Route such as a nasoenteral tube, gastrostomy, or jejunostomy; Short-term: Only 1 day of enteral nutrition

Source: Author

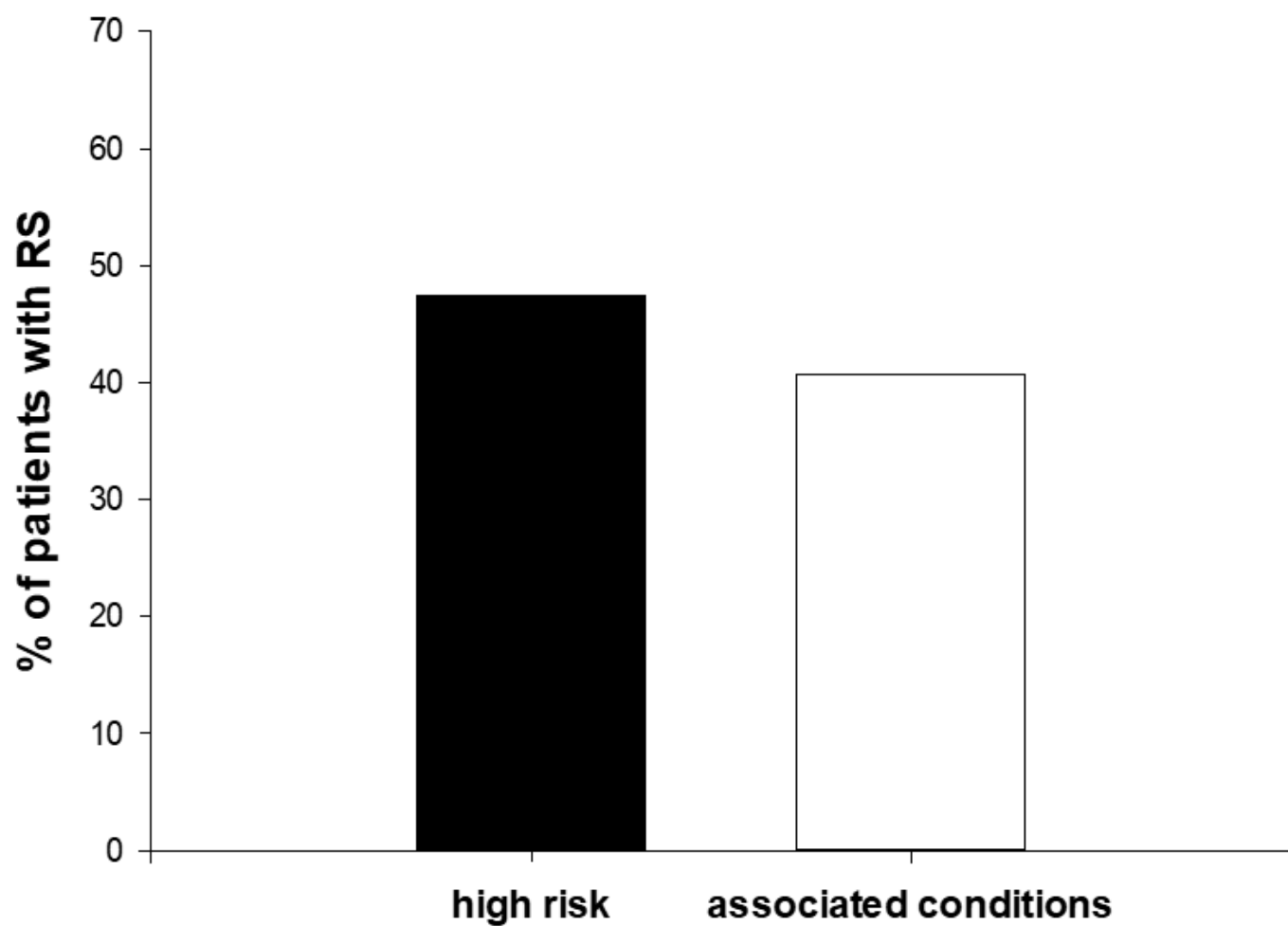


Figure 2

Occurrence of refeeding syndrome according to risk classification. Chi-square ($p=0,805$)