

# High frequency of non-conformities in quality indicators in nutritional therapy: longitudinal analysis in critically ill patients

*Elevada frequência de não conformidades de indicadores de qualidade em terapia nutricional: análise longitudinal em pacientes críticos*

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## ABSTRACT

**Introduction:** Nutritional therapy (NT) is essential to maintain the nutritional status of critically ill patients in the intensive care unit (ICU). Efficient delivery of NT is crucial for better clinical outcomes, which can be assessed through nutritional therapy quality indicators (NTQI). This study aimed to evaluate six NTQIs over one year in an ICU of a medium-sized hospital in the southern of Minas Gerais. **Methods:** This was a longitudinal and retrospective study, conducted from January to December 2019. The following NTQIs were assessed: 1) adequacy of prescribed vs. infused volume; 2) frequency of diarrhea; 3) frequency of constipation; 4) hyperglycemia; 5) acute and chronic renal dysfunction and 6) fasting for more than 24 hours. The indicators were evaluated cumulatively throughout the year and divided into four groups according to hospitalization quarters (G1-G4). The chi-square test verified associations ( $p < 0.05$ ). **Results:** A total of 87 patients were evaluated, 52.9% male and 77% of whom were elderly. Annual analysis showed noncompliance for all indicators. By quarters, hyperglycemia in G1 (50%), acute renal dysfunction in G2 (0%), chronic renal dysfunction in G2 (0%) and G3 (0%), and fasting in G1 (0%) and G2 (0%) met the target. No group met the prescribed vs. infused volume, diarrhea, or constipation targets. There was a significant reduction in the adequacy of prescribed vs. infused volume, frequency of diarrhea, and fasting when comparing G1/G2 to G3/G4 ( $p < 0.05$ ). **Conclusion:** None of the six NTQIs were compliant with the annual analysis. Implementing NTQIs routinely in ICUs is crucial for early failure correction and adequate nutritional support.

## RESUMO

**Introdução:** A terapia nutricional (TN) é essencial para manter o estado nutricional de pacientes críticos em unidades de terapia intensiva (UTI). O uso eficiente da TN é crucial para melhores desfechos clínicos, que podem ser investigados por meio dos indicadores de qualidade em TN (IQTN). O objetivo deste estudo foi avaliar, durante um período de um (01) ano, seis IQTNs em um centro de terapia intensiva (CTI) de um hospital de médio porte do sul de Minas Gerais. **Método:** Esse foi um estudo longitudinal, retrospectivo realizado no período de janeiro a dezembro de 2019. Foram aplicados os seguintes IQTNs: 1) adequação do volume prescrito vs. infundido; 2) frequência de diarreia; 3) frequência de obstipação; 4) hiperglicemia; 5) disfunção renal aguda e crônica e 6) jejum por mais de 24 horas. Os indicadores foram expressos em metas percentuais e foram avaliados compilados durante todo o ano e divididos em quatro grupos de acordo com o trimestre de internação (G1-G4). O teste de qui-quadrado foi utilizado para verificar associação entre os IQTNs e os grupos de período de internação ( $p < 0,05$ ). **Resultados:** Foram avaliados 87 pacientes sendo 52,9% do sexo masculino e 77% idosos. Na avaliação anual, houve não conformidade em todos os indicadores avaliados. Na análise por grupos trimestrais, os percentuais de pacientes com hiperglicemia no G1 (50%), disfunção renal aguda no G2 (0%) e crônica no G2 (0%) e G3 (0%) e jejum por mais de 24 h, o G1 (0%) e G2 (0%) estavam em conformidade com a meta estabelecida. Em nenhum grupo houve conformidade no indicador de volume prescrito contra infundido e da frequência de diarreia e obstipação nos pacientes. Além disso, houve redução significativa do percentual de adequação de volume prescrito contra infundido, da frequência de diarreia aguda e crônica e da frequência de jejum por mais de 24 h quando comparados os G1/G2 e G3/G4 ( $p < 0,05$ ). **Conclusão:** Nenhum dos seis IQTNs esteve em conformidade na análise anual. Esse estudo destaca a importância crucial da implementação de IQTNs como rotina em CTIs para correção precoce das falhas relacionadas ao controle a fim de garantir suporte nutricional adequado ao paciente.

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## INTRODUCTION

Nutritional therapy (TN) is essential in the care of critically ill patients, as nutritional status directly affects clinical outcomes and length of hospital stay<sup>1</sup>. Critically ill patients are at higher risk of nutritional deterioration due to metabolic stress. Thus, NT aims to provide the necessary substrates to meet nutritional demands, reduce physiological stress, and maintain immunity<sup>2</sup>.

When malnutrition is present, or when oral feeding is impossible and/or food intake is below 60% of nutritional needs, but with a functioning gastrointestinal tract, enteral nutritional therapy (ENT) is recommended<sup>1</sup>. Early provision of ENT can reduce the length of stay in the Intensive Care Unit (ICU). However, around 25% of critically ill patients still receive inadequate nutritional intake<sup>3</sup>.

During ENT administration, complications can lead to temporary and/or permanent suspension, preventing the achievement of nutritional requirements. These alterations contribute to failing in fully meeting caloric needs. Discrepancies between what is prescribed and what is infused impair the quality of nutritional treatment, reducing the effectiveness of this therapy. These limiting factors in the complete administration of nutritional intake are a point of vulnerability in ENT<sup>4</sup>.

Nutritional therapy quality indicators (NTQI) should be used to monitor the effectiveness of NT. These indices determine, over time, the performance of functions and failures related to nutritional care, allowing activities to be measured, highlighting discrepancies from the desired standard, identifying errors, and directing efforts to areas of care that require more attention<sup>2</sup>.

The importance of using NTQIs is evident for evaluating intensive care in the ICU, a setting vulnerable to adverse events due to the clinical complexity of patients and the need for urgent decisions. Despite the availability of these indicators, continuous and careful monitoring of ICU patients is modestly described in the literature<sup>5,6</sup>.

In 2008, the International Life Sciences Institute Brazil (ILSI-Brazil) published 36 NTQIs<sup>7</sup>. Subsequently, the same group published the ten best NTQIs, facilitating their clinical applicability<sup>8</sup>. In 2018, the Brazilian Society of Parenteral and Enteral Nutrition (SBNPE/BRASPEN) proposed that all Brazilian hospitals apply at least two NTQIs, one indicator to monitor TN, and another to assess TN-related complications such as diarrhea, constipation, hyperglycemia, and renal dysfunction, among others<sup>9</sup>.

Given the importance of NTQIs in evaluating TN and therapeutic efficiency in critically ill patients, the objective of this study was to evaluate six NTQIs in patients from an ICU of a medium-sized hospital in southern Minas Gerais (MG), Brazil.

## METHODS

This was a longitudinal, retrospective study conducted on patients hospitalized in the ICU of a medium-sized hospital (104 beds) with a secondary level of complexity, located in a municipality in the interior of the state of Minas Gerais, southeastern Brazil, from January to December 2019. The study included patients over 18 years of age of both sexes who were admitted to the ICU and received ENT or combined with oral feeding, using an open or closed system, via nasogastric, nasoenteric, orogastric tubes, gastrostomy, or jejunostomy. Individuals who received enteral nutrition therapy for only one day were excluded. There was a sample loss due to missing data in some patients' medical records, such as length of hospital stay, prescribed volume, and infused volume.

The study was approved by the Ethics Committee for Research with Human Subjects at the Federal University of Lavras (COEP/UFLA), under opinion number 2.676.789. The study was exempted from the requirement for informed consent, as it did not involve direct contact with participants, only the use of previously collected data.

To describe the patients, data were collected from medical records, including biological sex (male and female), age (adults, <60 years, and elderly, ≥60 years), number of days in the ICU, and clinical diagnosis at admission. The clinical diagnosis at admission was divided into groups such as respiratory diseases (pneumonia, chronic obstructive pulmonary disease, and respiratory failure), neurological diseases (ischemic and hemorrhagic stroke, decreased level of consciousness, traumatic brain injury, dementia/Alzheimer's, and aneurysm), cardiovascular diseases (congestive heart failure, cardiorespiratory arrest – CRA, and post-CRA coma), and other diseases (sepsis, cirrhosis, pancreatitis, urinary tract infection, sedative drugs, and acute renal failure). Patients diagnosed with more than one disease were classified in a separate group called "two or more diseases." The presence of diabetes was also investigated. When there was an interruption of ENT, the reasons for such were also recorded.

### Quality Indicators

For the evaluation of quality indicators, data were recorded daily throughout the period of ENT use, from its indication to its suspension. The following NTQIs, formulated by ILSI-Brazil<sup>8</sup>, were assessed: 1) adequacy of the prescribed vs. infused ENT volume; 2) frequency of diarrhea in patients on ENT; 3) frequency of constipation in patients on ENT; 4) frequency of hyperglycemia in patients on ENT; 5) frequency of acute and chronic renal dysfunction in patients on ENT; and 6) frequency of digestive fasting for more than 24 hours in patients on ENT. Board 1 describes the NTQIs, along with their respective formulas and targets established to evaluate the effectiveness of NT.

The prescribed volume was obtained from the patient's medical record, and the infused volume was recorded through the patients' fluid balance logs noted by the nursing staff. Diarrhea was considered present when patients had three or more episodes of liquid stools daily, constipation was considered present in patients who experienced a decrease in stool frequency and volume, with an absence of stool for at least three consecutive days, and hyperglycemia was defined as glucose  $>180$  mg/dl<sup>9</sup>. The presence of acute and chronic renal dysfunction was obtained through medical diagnosis. The target for the indicator "prescribed vs. infused volume" was considered met when patients achieved 80% of the infused diet adequacy on 80% of the days hospitalized in the ICU.

### Data Analysis

The data were recorded in a Microsoft Excel 2016 spreadsheet and statistical analyses were performed using the Statistical Package for Social Sciences (SPSS), version 22.0. Categorical variables were presented as absolute values and percentages. Continuous variables with a non-Gaussian distribution (Kolmogorov-Smirnov test;  $p>0.05$ ) were expressed as medians and respective interquartile ranges, or as minimum and maximum values.

To analyze the daily data of the collected indicators, they were compiled as follows: a general analysis representing one year of information, and a quarterly analysis (G1-G4), where patients in G1 were hospitalized from January to March, G2 from April to June, G3 from July to September, and G4 from October to December. To verify the association between the indicators and the groups based on hospitalization period (G1-G4), Pearson's Chi-Square test was applied. A statistically significant difference was considered when  $p<0.05$ .

## RESULTS

Data were collected from 87 patients, with 52.9% being male and 77.0% elderly. The length of stay in the ICU varied from 2 to 61 days, with a median duration of TNE of 10 (5-19) days. Table 2 presents the characterization of the patients included in the study.

All patients experienced at least one interruption of EN during their stay in the ICU. Since each patient remained hospitalized for several days, multiple episodes of ENT interruption were recorded, with one or more distinct reasons occurring at different times throughout hospitalization. The most frequent reason was "pause for various procedures", reported in 82.8% ( $n=72$ ) of patients. Moreover, in 71.3% ( $n=62$ ) of patients, more than one reason for interruption was identified during their ICU stay. In 48.3% ( $n=42$ ), there was at least one episode of ENT interruption without documentation of the corresponding reason. Table 2 presents the distribution of the different reasons for ENT interruption observed during ICU hospitalization.

Table 3 presents the results of the application of the indicators throughout the year, both in general and by groups.

None of the indicators were in compliance in 2019. Regarding the indicator for the adequacy of the administration of the prescribed vs. infused volume, it was observed that, in general, 97.7% of patients did not reach the adequacy percentage of 80% of what was prescribed. Concerning the indicators related to complications associated with ENT, the percentage of patients with diarrhea was 25.3%, constipation was 60.9%, and 74% had hyperglycemia, with no significant differences among the evaluated groups. Patients experienced a higher frequency of complications such as

**Board 1** – Quality indicators, formulas and adequacy targets established for the evaluation of Enteral Nutrition Therapy for critically ill patients.

Indicador	Formulas	Goals
% adequacy of administration of prescribed volume vs. volume of infused ENT	Number of patients with adequate ENT volume x 100 (number of patients on ENT)	$\geq 80\%$
Frequency of diarrhea in patients on ENT	Number of patients with diarrhea x 100 (total number of patients)	$\leq 10\%$
Frequency of constipation in patients with ENT	Number of patients with constipation x 100 (total number of patients)	$< 20\%$
Frequency of hyperglycemia in patients with ENT	Number of patients with hyperglycemia x100 (total number of patients)	$< 70\%$
Frequency of renal dysfunction in patients with ENT	Number of patients with renal failure x100 (total number of patients)	Acute = $< 5\%$ Chronic = $< 1\%$
Frequency of digestive fasting for more than 24 hours in patients on ENT	Number of patients on ENT fasting for $> 24$ h x 100 (total number of patients on ENT)	$\leq 20\%$

ENT = enteral nutritional therapy. Adapted from International Life Sciences Institute Brazil (ILSI-Brazil), 2018.

**Table 1** – Characterization of patients using enteral nutritional therapy in the intensive care unit of a medium-sized hospital in southern Minas Gerais, 2019.

Patient characterization; n (%)	
<b>Days in TNE (Interquartile Range)</b>	
Median	10 (5–19)
<b>Sex</b>	
Male	46 (52.9)
<b>Age</b>	
Elderly	67 (77.0)
<b>Admission diagnosis:</b>	
Respiratory diseases	33 (37.9)
Neurological diseases	24 (27.6)
Cardiovascular diseases	13 (14.9)
Two or more disease groups	3 (3.4)
Others	14 (16.1)
<b>Diabetes Mellitus</b>	
No	56 (64.4)
<b>Total</b>	<b>87 (100)</b>

n = sample size; ENT = enteral nutritional therapy; CTI = intensive care center.

**Table 2** – Reasons that led to the interruption of enteral nutritional therapy during hospitalization in the intensive care unit of a medium-sized hospital in southern Minas Gerais, Brazil, during 2019.

Reasons for interrupting the diet during hospitalization	n	%
Stop for various procedures	72	82.8
Abdominal distension	2	2.3
Diarrhea	8	9.2
Clinical complications	24	27.6
Fasting >24 h	25	28.7
Gastric stasis	13	14.9
High doses of amines	9	10.3
Vomiting	2	2.3
Probe removal	3	3.4
Not informed	42	48.3

n = sample size.

acute renal disease and fasting >24 hours in the second half of the year (G3 and G4) and chronic renal disease in G4 ( $p < 0.05$ ). On the other hand, the percentage of patients with hyperglycemia in G1 (50%), acute renal dysfunction in G2 (0.0%), chronic renal dysfunction in G2 (0%) and G3 (0.0%), and fasting for more than 24 hours in G1 (0%) and G2 (0%) was in compliance with the established target.

**Table 3** – Frequency of patients using enteral nutritional therapy admitted to the intensive care unit of a medium-sized hospital in southern Minas Gerais in relation to the nutritional therapy quality indicators evaluated throughout 2019 (general) and its quarters (G1-G4).

	2019	G1	G2	G3	G4	
	n=87	n=18	n=20	n=22	n=27	
Indicator	n (%)	n (%)	n (%)	n (%)	n (%)	Valor p*
Frequency of adequacy of administration of prescribed volume vs. volume of ENT infused (target = $\geq 80\%$ )	2 (2.3%)	2 (11.1%) <sup>a</sup>	0 (-) <sup>b</sup>	0 (-) <sup>b</sup>	0 (-) <sup>b</sup>	<b>0.049</b>
Frequency of diarrhea in patients on ENT (target = $\leq 10\%$ )	22 (25.3%)	6 (33.3%)	6 (30.0%)	4 (18.2%)	6 (22.2%)	0.665
Frequency of constipation in patients with ENT (target = $< 20\%$ )	53 (60.9%)	8 (44.4%)	14 (70.0%)	12 (54.5%)	19 (70.4%)	0.247
Frequency of hyperglycemia in patients with ENT (target = $< 70\%$ )	65 (74.7%)	9 (50.0%)	16 (80.0%)	19 (82.6%)	21 (77.8%)	0.050
Frequency of acute renal dysfunction in patients with ENT (target = $< 5\%$ )	23 (26.4%)	3 (16.7%) <sup>a</sup>	0 (-) <sup>b</sup>	9 (40.9%) <sup>c</sup>	11 (40.7%) <sup>c</sup>	<b>0.004</b>
Frequency of acute renal dysfunction in patients with ENT (target = $< 1\%$ )	6 (6.9%)	1 (5.6%) <sup>a</sup>	0 (-) <sup>b</sup>	0 (0.0%) <sup>b</sup>	5 (18.5%) <sup>c</sup>	<b>0.031</b>
Frequency of digestive fasting for more than 24 hours in patients on ENT (target = $\leq 20\%$ )	25 (28.7%)	0 (-) <sup>a</sup>	2 (10.0%) <sup>a</sup>	10 (45.5%) <sup>b</sup>	13 (48.1%) <sup>b</sup>	<b>0.001</b>

n = sample size; NTQI = nutritional therapy quality indicators; ICU = intensive care unit; ENT = enteral nutritional therapy. Different letters in the rows indicate statistically significant differences between the quarters (chi-square test,  $p < 0.05$ ). Values sharing the same letter do not differ from each other.

Board 2 describes the compliance and non-compliance based on the analysis of the indicators and the targets set by ILSI-Brazil.

**Board 2** – Survey of compliance and non-compliance based on analysis of quality indicators in nutritional therapy by Institute of Life Sciences Brazil in 2018.

#### Conformities

Adjustment of the target number of patients with hyperglycemia in group 1.  
Adjustment of the number of patients with acute renal dysfunction in group 2.  
Adjustment of the number of patients with chronic renal dysfunction in groups 2 and 3.  
Adjustment of the fasting frequency in groups 1 and 2.

#### Non-conformities

There was no adjustment in the administration of the prescribed versus infused volume during the year.

Throughout the year, the frequency of diarrhea and constipation in patients was higher than the proposed target. Values above the proposed target for patients with hyperglycemia in groups 2, 3, and 4.

Values above the proposed target for the prevalence of acute renal dysfunction in groups 1, 3 and 4  
Values above the proposed target for the prevalence of chronic renal dysfunction in groups 1 and 4  
Values above the proposed target for patients with digestive fasting >24h in groups 3 and 4.

**There was no adjustment in any indicator when analyzed throughout the year.**

## DISCUSSION

NTQI aim to ensure patient safety in the context of intensive care, representing an important tool for planning, correcting adverse events, and achieving successful outcomes<sup>5</sup>. In this study, when applying and evaluating the quality indicators in patients receiving ENT in an ICU, none of the indicators met the established targets throughout the year. Additionally, it was observed that all patients experienced at least one interruption of ENT during hospitalization. Recent studies show that nutritional compromise is not only a consequence of pre-existing conditions, but also tends to worsen during hospital admissions, with hospital-acquired malnutrition affecting up to 65% of patients<sup>10</sup>. These findings are concerning, as nutrition plays a critical role in the clinical progression of critically ill patients, helping maintain or restore physiological functions and reducing mortality<sup>11</sup>.

Even when the patient is receiving ENT, certain situations may reduce nutritional intake, increasing the risk of developing or worsening malnutrition. Complications and diagnostic

procedures can lead to interruptions in feeding, contributing to this deficit. A prospective cohort study conducted in an ICU demonstrated that most interruptions in enteral nutrition occur within the first three days of admission, with diagnostic reasons (such as medical exams) being the most common cause<sup>3</sup>. Fasting has also been identified as a major factor impacting nutritional intake, with reported rates ranging from 90%<sup>12</sup> to 51%<sup>13</sup>. In this study, the most frequent reasons for feeding interruption were procedures, unspecified causes, and fasting >24 hours. Similar results were observed by Rabelo et al. (2023)<sup>10</sup> in a study conducted in an intensive care unit in Goiás, Brazil, where hemodynamic instability was the leading cause of interruption (28.2%), followed by fasting for exams (19.0%). Likewise, Zheng et al.<sup>15</sup> found that enteral nutrition was interrupted in 18.6% of patients, mainly due to procedures and diagnostic reasons. These data reinforce that interruptions may vary depending on the clinical profile, nutritional status, and required procedures, as well as how the reason for interruption is classified. This can justify discrepancies in percentages. Some patients may experience more than one reason for enteral nutrition interruption during their stay, as was the case for most patients in this study.

Regarding the quality indicators evaluated, the prescribed diet volume compared to the infused volume did not meet the target established by ILSI-Brazil 2018 throughout the year, as almost all patients did not receive the full prescribed amount. Achieving the nutritional therapy target is essential in critical care<sup>12</sup>. A reduced 30-day mortality rate has been associated with adequate nutritional support in patients who received at least 80% of the prescribed enteral nutrition over 5–10 days in the ICU<sup>11</sup>. Nutritional therapy plays a key role in the treatment of critically ill patients, allowing for individualized energy and nutrient administration, preventing the onset of malnutrition or correcting existing deficiencies. A careful assessment of energy requirements and the appropriate delivery of nutrients through the suitable route are essential steps in reaching this goal<sup>4</sup>. Therefore, achieving complete diet infusion, or at least meeting the 80% target, is crucial to ensuring adequate nutritional intake<sup>16</sup>.

Upon reviewing the literature, it was found that the high inadequacy rate observed contrasts with other studies, which reported inadequacy rates of 13.6%<sup>14</sup> and 5.7%<sup>16</sup> in studies conducted in ICUs in São Luís (MA, Brazil) and Curitiba (PA, Brazil), respectively. The difference between the findings in this study and others may be related to frequent ENT interruptions noted in medical records, the absence of systematic monitoring by the multidisciplinary team, and complications associated with nutritional therapy, which can lead to feeding suspension and inadequate nutritional provision.

Although not one of the main reported reasons for ENT interruption, diarrhea showed a considerable prevalence in the present study. The diarrhea indicator was inadequate



throughout the evaluation period, with a frequency of approximately 30%, exceeding the target of  $\leq 10\%$ . The percentage of diarrhea was similar to previously cited studies, being 20.7% in São Luís (MA, Brazil)<sup>14</sup> and ranging from 24% to 31% in Curitiba (PR, Brazil)<sup>16</sup>. Diarrhea in the hospital environment, especially in ICU, has a direct impact on clinical conditions, affects the progression of nutritional status, delays patient recovery, and predisposes individuals to other hospital-acquired infections. A study that implemented a diarrhea risk screening tool and preventive strategies showed a reduction in diarrhea rates among critically ill patients receiving ENT, from 37.14% to 17.33%<sup>17</sup>. This reinforces the idea that monitoring diarrhea frequency is one of the most relevant and frequent quality indicators in ENT. However, it is important to emphasize that several factors may be associated with diarrhea episodes, such as length of hospital stay, infections, malnutrition, hypoalbuminemia, and prescribed medications<sup>1</sup>.

In addition to diarrhea, constipation was also frequently reported among the study patients. Thus, the indicator for episodes of intestinal constipation was considered inadequate throughout the year when compared to the target of  $< 20\%$ . The incidence of constipation varies widely in the literature (5% to 83%<sup>19</sup>), primarily due to the lack of standardized definitions. Constipation has been found to be more frequent than diarrhea in patients exclusively fed by enteral nutrition (70% vs. 13%), as demonstrated in the study by Bittencourt et al.<sup>20</sup>, conducted in a Brazilian hospital with 203 patients. Similar frequencies were found in other Brazilian studies, such as in São Luís (MA, Brazil) (65.28%)<sup>21</sup> and João Pessoa (PB, Brazil) (62.02%)<sup>22</sup>. Constipation has a direct impact on the patient's clinical status, potentially leading to abdominal distension, vomiting, and intestinal obstruction<sup>19</sup>. It is important to highlight that constipation may result from several factors, such as medication use, dehydration, use of sedatives, and presence of fecal impaction, not solely due to nutritional therapy<sup>19</sup>.

Glycemic variability is a common condition in the ICU, as the stress response is complex and dynamic, making safe and effective glycemic control difficult<sup>23</sup>. Stress-induced hyperglycemia is associated with the release of hormones such as adrenaline and cortisol, insulin resistance, and increased hepatic gluconeogenesis<sup>24</sup>. In some cases, stress hyperglycemia is an adaptive physiological response that provides energy for the body to cope with physiological or pathological stress. However, in patients with chronic diseases or those exposed to prolonged stress, such as critically ill patients, this hyperglycemic state may be associated with unfavorable clinical outcomes and increased morbidity and mortality<sup>23,25,26</sup>. This highlights the importance of monitoring hyperglycemia as a quality indicator, since identifying its incidence in patients receiving ENT enables the implementation of

control measures, including through NT, minimizing complications. In the present study, the frequency of patients with hyperglycemia exceeded the target ( $< 70\%$ ), with adequacy observed only in the first quarter (G1). A study conducted in Passo Fundo (RS, Brazil) reported adequate hyperglycemia values in critically ill patients (43.9%), which differs from the results found in this study<sup>27</sup>.

Renal dysfunction is one of the most common complications in the hospital setting, and its incidence increases with patient severity. Early identification can serve as an indicator to better guide clinical care and support decision-making<sup>28</sup>. The data analyzed showed no cases of acute kidney injury in the second quarter (G2), keeping within the target ( $< 5\%$ ) in this period. However, the remaining quarters showed values above the target. As for chronic kidney disease, the first (5.6%) and fourth (18.5%) quarters also exceeded the proposed target ( $\leq 1\%$ ), while no cases were reported in the second and third quarters. Although it is one of the NTQIs, renal dysfunction does not directly assess the quality of NT itself. Instead, it aims to measure the frequency and extent of dysfunctions occurring in patients and guide corrective measures that may improve outcomes through NT<sup>8</sup>. The quarterly fluctuations in the number of patients with renal dysfunction may be explained by other factors, such as different medical diagnoses or complications experienced during hospitalization. Similarly high values were observed in an ICU in Rio Branco (AC, Brazil), where acute kidney injury was reported in 38.9% of patients<sup>29</sup>.

In the hospital environment, dietary interruptions are common due to various circumstances. Therefore, monitoring fasting time is essential to prevent patients from remaining without nutrition longer than necessary. Prolonged fasting can lead to metabolic changes and clinical complications<sup>3</sup>. In this study, the indicator for digestive fasting  $> 24$  hours was within target for the first two quarters. However, the third (45.5%) and fourth (48.1%) quarters showed values above the proposed target ( $< 20\%$ ). Similar results were observed in a study conducted in São Luís (MA, Brazil), where 52.8% of patients experienced fasting  $> 24$  hours<sup>30</sup>, also exceeding the target.

In some situations, ENT interruptions are avoidable, as they are related to logistical issues or interference from other members of the multidisciplinary team during nutrition administration. The use of targeted institutional protocols is considered an effective strategy to reduce interruptions in nutritional support. A study conducted at a teaching hospital in Minas Gerais, Brazil, showed that an educational intervention with nurses significantly reduced the frequency of nutritional support interruptions and improved the quality of the therapy<sup>31</sup>. A systematic review<sup>32</sup> also emphasized that, although the nutritional management of critically ill ICU patients has improved significantly, continuous monitoring of ENT interruption causes

and standardized data evaluation remain necessary. These findings reinforce the importance of proper training for the entire multidisciplinary team and the effective implementation of IQNTs to ensure proper monitoring and improved delivery of ENT to patients.

This study has the limitation of data collection conducted through recording forms filled out by third parties, which may lead to a lack of standardization in the records, a common limitation in retrospective studies. However, it is a longitudinal study that represents the reality of NTQI in an ICU analyzed over one year and evaluated a number of indicators well above the recommendations of national guidelines<sup>9</sup>. This study also has the relevant characteristic of being conducted in a medium-sized hospital, reflecting the reality of 29.6% (1929) of Brazilian hospitals<sup>33</sup>. Finally, this study serves as a warning to healthcare professionals working with critically ill patients, especially those responsible for nutritional therapy, about the importance of analyzing and monitoring quality indicators, thereby promoting continuous improvement and greater effectiveness in nutritional therapy.

## CONCLUSION

No indicator met the target when compared to the goals throughout the year. Planning, implementing NTQIs, and training the multidisciplinary team involved in this process is essential for correcting failures related to nutritional support management.

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