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Nutrition support team activities can improve enteral nutrition administration in intensive care units

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ABSTRACT

Objectives: The aim of this study was to evaluate the effect of the nutritional support team (NST) activities on the quality of enteral nutrition administration in intensive care units.**Methods:** An observational, analytical, and cross-sectional study was performed in nine hospitals in the Brazilian Federal District through the administration of two questionnaires. One questionnaire focused on the activities of the NST and the other on the quality of enteral nutrition administration in intensive care units.**Results:** There was a strong correlation between the scores of the two questionnaires, which was confirmed by a linear regression model ($R^2 = 0.623$; $P = 0.007$). The results suggest that high scores in the NST activities questionnaire predict a better performance in enteral nutrition administration. The sections of the NST activity questionnaire that most strongly affected enteral nutrition administration were the protocols ($r = 0.895$; $P < 0.01$), quality control ($r = 0.779$; $P < 0.05$), and continuing education ($r = 0.753$; $P < 0.05$).**Conclusions:** The NST has the potential to positively influence enteral nutrition management in intensive care units and investments could be directed to the areas of continuing education, protocols, and quality control to maximize the effect of NST in intensive care units.

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Introduction

Enteral nutrition therapy (ENT) is the first treatment line to feed patients on mechanical ventilation or patients at nutritional risk in intensive care units (ICUs) once they cannot rely only on oral nutrition to fulfill their needs [1]. Because of complication risks, ENT is considered a complex therapy and involves high operational costs [2]. Currently, nutrition support teams (NST) are responsible to control ENT quality and all aspects involved in nutritional care, which is determined by law in some countries. The service that regulates NST in accordance with these legal precepts can benefit at the administrative level as well as health care overall [3,4]

Brazil is one of the first Latin-American countries to develop specific laws for ENT and NST activities [4,5]. Brazil's National Health Surveillance Agency regulates ENT and determines NST

creation in all hospitals that provide ENT to manage this chain of care. NSTs are originally composed of a physician, nutritionist, nurse, pharmacist, and other health professionals at complementary level [5]. NST activities vary according to each hospital's characteristics as well as the human resources available. These teams act by establishing new routines and protocols for nutritional intervention as well as provide direct patient assistance [5,6]. Given this variety of roles, NST performance can be measured at the patient and administrative levels. This includes nutritional assessment, organizational structure, creation and access to updated protocols, clinical rounds, activities registration, and continual education [7,8].

In this sense, quality control can be defined as the fulfilment of basic security requirements and processes that guarantee service compliance [9] and comprises the adoption of dynamic, uninterrupted processes that aim to identify flaws in routines and procedures that must be periodically reviewed, updated, and disseminated [10]. This way, ENT quality (defined and evaluated by compliance level with the established standard) should be periodically monitored through audits. Quality indicators are essential components of this evaluation and should reflect the service

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performance both in clinical and administrative aspects, which demands the use of specific tools [11–13].

The presence of multidisciplinary teams in ICUs is not mandatory in most countries and in Brazil, few studies have been conducted on the effectiveness of NST care to critically ill patients, especially in Latin American countries [8,14]. To fulfill this gap, the objective of the present study was to evaluate the effectiveness of NST activities related to ENT administration in ICUs.

Methods

This is a cross-sectional and analytic study that was approved by the research ethics committee of the Health Sciences Teaching and Research Foundation of the Brazilian Federal District (FEPECS/SES-DF, n° 943.1322015).

Participants

The study included public hospitals that are located in the Brazilian Federal District.

Inclusion and exclusion criteria

The inclusion criteria for this research were to be a public hospital in the Brazilian Federal District with at least 200 active beds. In 2014, there were 17 hospitals in this network. These hospitals have a shared services group that includes a management central for ICU beds, admissions, personnel hiring, and drug and equipment acquisition. These shared services within the hospital web contribute to homogenize routines and services while respecting normal differences between hospital specialties.

An agreement to participate in the research was signed by every hospital director as well as the heads of nutrition and nursing services and any other questionnaire respondents. Once they introduced the hospital facilities to the research team, they became responsible for providing answers, documents, protocols, or explanations with regard to routines.

Hospitals were excluded from the study if they refused to sign the term of consent, if they interfered in the audit independency, or tried to influence the study results. The research team previously selected to audit only ICUs for this study because they are closed areas, have more regimentations that are already established, and more similarities to each other, which makes ICUs a more homogeneous group compared with other hospital wards.

Procedures

The research team performed an independent audit on NST activities and applied validated questionnaires of assessment [15]. A separate audit was performed 2 y before by Ceniccola et al. [16] using similar a methodology and the same accessible population but explored different objectives.

To assess ENT quality, the researchers applied two questionnaires separately: one with a dedicated NST member (nutritionist) and the other with an ICU nurse. This methodology is needed because some items can be visualized by the researcher and others demand hospital staff participation for document verification and routine registration. The researchers were instructed to comply with the study protocol and formalities to ensure that the questionnaires were fully completed to generate comparable data. In addition, the researchers were also granted unrestricted access to electronic health records (EHRs), protocols, and ENT routines.

The questionnaires utilized in this audit were idealized to assess NST activities and ENT quality. Questionnaire 1 covers the broad scope of activities performed by NSTs and consists of six scored sections (NST characteristics, protocols, training and team update, quality control, NST overview, and EHRs) that include 54 items for a total of 592 points (Table 1). Questionnaire 2 assesses the ENT process from reception in the ICU until a patient's discharge and has eight scored sections (human resources, prerequisites, ENT administration, ENT quality control, ENT monitoring, EN storage outside the nutrition and dietetics unit, responsibility and authority, and general conditions) that consist of 64 items for a total of 588 points (Table 2).

During the questionnaires application, respondents evaluated each item adequacy level using a 5-point Likert scale (0–4). Additionally, the items were weighted according to degree of importance: Essential items (E; up to 16 points), necessary items ; up to 8 points), and recommended items (R; up to 4 points). On the basis of the 5-point Likert scale structure, scores 3 and 4 are in the upper quadrant (>75% of the total). We established this value as a cutoff for adequacy and values 0, 1, and 2 are considered insufficient. The maximum score of 4 was granted only when the item under evaluation was fulfilled in its integrity (Tables 1 and 2). The original versions of the questionnaires are presented in another study [15].

Table 1
Questionnaire 1: NST activities

SECTIONS	Level of compliance – Likert Scale				
	0	1	2	3	4
NST CARACTERISTICS					
1 – The hospital has an active and formally-established NST. (E)					
2 – The NST has scheduled meetings. (N)					
3 – The NST keeps formal records of its meetings. (N)					
4 – The hospital managers provide full conditions to NST work effectively (NST exclusively dedication, human resources, continuing education, technical support and autonomy). (E)					
PROTOCOLS					
5 – Medical protocols are registered and available. (E)					
6 – Nursing protocols are registered and available. (E)					
7 – Pharmacy protocols are registered and available. (E)					
8 - Nutrition protocols are registered and available. (E)					
9 – ENT indication protocols are available. (N)					
10 – Protocols determining gastrointestinal tract access are available. (E)					
11 - Protocols for specific ENT formulas utilization are available. (N)					
12 - Protocols indication for percutaneous endoscopically-guided gastrostomy are available. (N)					
13 - Final evaluation of ENT protocols are available. (N)					
14 – ENT procedures and its complications are documented and available. (E)					
TRAINING AND UPDATE					
15 – NST training programs are duly registered. (N)					
16 - The NST training programs covers all professionals in the hospital. (N)					
17 - The managers encourage NST members to seek technical and scientific improvement. (N)					
18 – The NST training programs are appropriate to hospital complexity. (N)					
QUALITY CONTROL					
19 – The overall hospital quality control system meets the complexity of the offered services. (E)					
20 – The hospital quality control system ensures ENT patient safety. (E)					
21 – Quality indicators strictly control the compliance with critical control points. (E)					
22 – Quality deviations are properly investigated by the NST. (E)					
23 – Quality deviations are properly documented by the NST. (N)					
24 – The corrective actions established were able to control the quality deviations. (E)					
25 – Quality control records are available. (N)					
26 – ENT quality indicators are easily applicable. (R)					
27 – ENT quality indicators are low cost. (R)					
NST OVERVIEW					
28 – The NST performs nutritional risk screening. (E)					
29 – NST visit ENT patients frequently. (N)					
30 – NST members participate in multidisciplinary rounds. (N)					
31 – The multidisciplinary rounds are recorded properly. (N)					

(continued)

Table 1 (Continued)

SECTIONS	Level of compliance – Likert Scale				
	0	1	2	3	4
32 – NST members are available to provide technical advice. (N)					
33 – NST members are engaged in the supervision of all ENT patients. (N)					
34 – Patient supervision is recorded properly by the NST. (N)					
35 – NST activities are properly registered. (N)					
36 – Medical prescriptions of ENT are performed properly. (E)					
37 – NST physicians prescribes all patients in ENT. (R)					
38 – Dietitians monitored daily ENT prescriptions'. (E)					
39 – The dietitian prescriptions are available to everyone (are recorded in patient charts and controlled by nursing). (E)					
40 – The frequency of nutritional assessments meets recommendations (such as every 10–12 d). (N)					
41 – The hospital has ENT outpatient care. (N)					
42 – Outpatient care is properly registered. (N)					
43 – There is a medical ethics committee in the hospital. (N)					
44 – There is a death commission in the hospital. (N)					
45 – The hospital has its own Infection Control Commission. (N)					
ELECTRONIC HEALTH RECORDS (EHR)					
46 – The EHR is suitable (available and used across disciplines). (E)					
47 – There is an EHR steering committee in the hospital. (N)					
48 – Number of EHR with ENT daily prescriptions. (E)					
49 – Number of EHR with daily dietary requirements made by dietitians (E)					
50 – Number of EHR with any ENT data (registration made by dietitians / NST members). (N)					
51 – Presence of nutritional screening records. (E)					
52 – Number of EHR with nutritional assessment. (E)					
53 – Number of EHR with calories prescribed and infused daily. (R)					
54 – Number of EHR with minimal blood test results. (N)					

E, essential; ENT, enteral nutrition therapy; N, necessary; NST, nutrition support team; R, recommended; EHR: electronic health records

Analysis of outcomes

As a primary outcome, this study measured the effect of NST activities (Questionnaire 1 total score) on the increase in effectiveness of ENT in ICUs (Questionnaire 2 total score). Secondary outcomes included the assessment of individual sections of Questionnaire 1 effects on the improvement of quality of ENT management to deduce where NST efforts would be most effective. Specifically, the role of protocols, continuing education, and quality control (Questionnaire 1 sections) in relation to the quality of ENT administration (Questionnaire 2 total score) were selected as secondary outcomes.

Statistical analysis

The data were analyzed using STATA, version 14.1 (STATACorp, College Station, TX). The statistical tests included the Shapiro-Wilk test for normality, means comparison, and Pearson's correlations. To assess the main and secondary outcomes, Pearson's correlations were performed followed by linear regressions. The correlation values were interpreted as a small effect when $r < 0.1$, medium effect

Table 2

Questionnaire 2: ENT administration

SECTIONS	Level of compliance – Likert scale				
	0	1	2	3	4
HUMAN RESOURCES					
1. The employees who administer the ENT have updated medical and laboratory examinations. (N)					
2. There are records of periodic medical examinations (N)					
PREREQUISITES					
3. The nurse participates in the process of selection, standardization and acquisition of ENT administration equipment and materials. (N)					
4. There is an initial and ongoing training program for ENT administration and the use of infusion pump (N)					
5. Employee training has preestablished scheduling. (R)					
6. There are training records. (R)					
7. The ENT procedures manual is available. (N)					
8. The number of hand-sanitizing lavatories is adequate. (R)					
9. Soap and paper towels or air devices are available for hand hygiene. (N)					
10. There is an illustrative handout or recommendation for hand hygiene near the sinks. (R)					
11. Employees work unadorned. (N)					
12. Employees wear cap and mask when handling ENT. (N)					
13. Employees wear gloves at installation of ENT in the patient and in the exchange of equipment. (R)					
14. Standard operating procedures for sanitizing infusion pumps are available. (N) () NA					
15. Records of infusion pump sanitation operations are available. (N) () NA					
16. Infusion pumps have a label indicating the dates of calibration procedures. (N)					
17. There is infusion pumps periodic maintenance. (N)					
18. There are records of maintenance operations. (N) () NA					
ENTERAL NUTRITION ADMINISTRATION					
19. The ENT administration is always under nurse responsibility even if it is infused by others. (E)					
20. A nurse is always on duty when ENT is administered. (E)					
21. Nurses are responsible to receive and administer ENT. (E)					
22. The nursing team checks for foreign particles in the enteral solution upon receipt and administration. (E)					
23. The nursing team observes patient names / bed number on the receipt before ENT administration. (E)					
24. Nurses certificates ENT total volume of administration. (E)					
25. Nurses observes EN expiration time at receipt and administration. (E)					
26. The receipt of all ENT solutions are recorded by nurses on NST forms. (R)					
27. Every open system ENT does not exceed 4 h under ambient temperature. (E) () NA.					
28. In the case of systematic use of more than 4 h, there is an internal validation procedure to ensure its use. (E) () NA					

(continued)

Table 2 (Continued)

SECTIONS	Level of compliance – Likert scale				
	0	1	2	3	4
29. The ENT handling site is appropriate with regards to space, conservation and organization. (N)					
30. Sanitation of the ENT handling site is adequate. (N)					
31. ENT is administered under suitable conditions of sunlight. (N)					
32. There is protection of heat-generating sources during ENT administration. (N)					
33. ENT is always administered in the same container as approved by NST. (E)					
34. ENT administration is performed with infusion pumps. (R)					
35. Infusion pumps are suitable for ENT administration. (N) NA ()					
36. ENT lines are suitable for administration (daily supply and sufficient numbers). (N)					
37. There are procedures to confirm enteral tube placement. (N)					
38. Disinfection is carried out at the ENT probe connections when exchanging equipment. (R)					
39. There are records of the entire ENT management process. (N)					
ENT QUALITY CONTROL					
40. The nursing team monitors the dietary prescription and promotes infusion. (N)					
41. There is a record of the taken measures when the dietary prescription cannot be fulfilled. (R)					
42. Unintended loss of EN connection is registered. (R)					
43. There is patient follow up regarding diarrhea occurrence. (N)					
44. If diarrhea occurs, ENT is discontinued only after NST is advised. (N)					
45. There is control and registration of ENT line obstructions. (R)					
46. The ENT flow charts are reviewed for critical points until its final destination. (E)					
ENT MONITORING					
47. Weight is monitored. (R)					
48. Capillary glycaemia is monitored. (R)					
49. Clinical and laboratory records are available. (E)					
50. Clinical and laboratory tests are performed in a timely manner. (N)					
51. There is a gastric residual volume protocol for patients in ENT. (R)					
52. Clinical and laboratory testing for ENT patients is effective. (R)					
ENT STORAGE OUTSIDE THE NUTRITION AND DIETARY UNIT					
53. When not in use, enteral solutions are always refrigerated. (E)					
54. Systematic monitoring and temperature recording of the refrigerator is available. (E)					
55. Refrigerator maintenance is adequate including cleans and frost free. (N)					
RESPONSIBILITY AND AUTHORITY					
56. NST has autonomy to implement its practices and routines in the hospital. (E)					
57. All staff have the autonomy to communicate to the designated person(s). (N)					
58. Top management recognizes the importance of meeting law requirements and demonstrates other support such as recognizing and supporting NST, weekly clinical rounds, training and an ombudsman system for complains. (E)					

(continued)

Table 2 (Continued)

SECTIONS	Level of compliance – Likert scale				
	0	1	2	3	4
GENERAL CONDITIONS					
59. Nurses take part in the ENT outpatient care program. (R)					
60. Nursing participates in nutritional risk screening at hospital admission. (R)					
61. The unit's emergency resuscitation equipment is ready for use. (E)					
62. The resuscitation equipment is easily accessible. (N)					
63. The resuscitation material sanitization is adequate. (N)					
64. ENT management is informed by the nursing team to family or legal guardian. (R)					

E, essential; ENT, enteral nutrition therapy; N, necessary; NA, not applicable; NST, nutrition support team; R, recommended

when $0.1 < r < 0.3$, and large effect when $r > 0.5$. Significance was based on P -values < 0.05 .

Results

Of the 17 hospitals members of the public health system, nine hospitals met the inclusion criteria and participated in the research. The audits were made between March and April of 2014 after all enrolled hospitals agreed fully to participate in the audit. In the initial group, 11 hospitals were excluded because they had < 200 active hospital beds. Only three of nine hospitals that were included in the audit reached 75% of the agreement with NST activities (Questionnaire 1) and only 1 ICU scored below 75% for ENT administration (Questionnaire 2). The results of the questionnaires applications are shown in Table 3. Upon examination of the results from Questionnaire 2, ENT administration in these hospitals was above 75% on average as well as the percentages of fulfillment in the essential items. However, the prerequisite program and quality control sections of ENT administration did not reach 75% compliance (Table 4).

When comparing the scores from both questionnaires, the average scores that pertained to NST activities were strongly and positively correlated with the average scores regarding ENT administration ($r = 0.819$; $P < 0.01$). With regard to the secondary outcomes, the protocols section in Questionnaire 1 also had a high correlation with the total score that was obtained with the ENT administration questionnaire ($r = 0.895$; $P < 0.001$). Quality control ($r = 0.779$; $P < 0.05$) and continuing education ($r = 0.753$; $P < 0.05$) were also highly correlated with the adequacy of ENT administration.

These study outcomes were also explored in a scattered plot graphic (Fig. 1). The main outcome graphic (Fig 1A) showed a strong linear relationship between NST performance and the quality of the ENT administration. Indeed, for every 3 points that were scored on Questionnaire 1, an increase of 1 point was reflected in Questionnaire 2. This model (Fig 1A) also indicates that NST activities explain 62% of the results variability that were obtained in the ENT administration questionnaire ($r^2 = 0.623$; $P = 0.007$). The secondary outcomes results also suggest the presence of a strong positive linear relationship (Figs. 1B–D).

Discussion

The data presented here are important because they show that the activities performed by NST (Questionnaire 1) can promote a

Table 3
Total scores and percent of adequacy by each hospital on the questionnaires

Hospital	Questionnaire 1: NST activities		Questionnaire 2: ENT administration	
	Total score	Adequacy (%)	Total score	Adequacy (%)
H1	384	64.8	446	81.0
H2	502	84.8	490	86.0
H3	398	67.2	468	82.0
H4	512	86.4	478	84.0
H5	344	58.1	444	78.0
H6	495	83.6	476	83.0
H7	205	34.6	373	70.0
H8	435	73.4	515	90.0
H9	418	70.6	427	78.0

ENT, enteral nutrition therapy; NST, nutrition support team

The data represent the total means of adequacy obtained by each hospital from Questionnaire 1 and 2 applications.

Table 4
Means and standard deviations from questionnaire sections achieved by the hospitals

Questionnaire sections	Means (%)	Standard deviation
Total Questionnaire 1 adequacy	69.31	16.24
Essential items adequacy – Questionnaire 1	65.00	19.42
Total Questionnaire 2 adequacy	81.3	5.68
Essential items adequacy – Questionnaire 2	83.98	6.71
Questionnaire 1: Activities of NST		
NST characteristics	66.66	32.20
NST overview	88.48	8.39
Protocols	56.96	30.19
Training and team update	42.36	39.75
Quality control	59.62	25.93
Electronic health records	70.99	15.70
Questionnaire 2: Administration of ENT		
Human resources	53.30	13.07
ENT Administration	85.89	9.36
ENT quality control	62.66	15.96
Monitoring of ENT	86.00	13.50
ENT storage outside nutrition and dietary unit	80.00	30.00
Responsibility and authority	90.00	17.3
General conditions	77.78	9.87

ENT, enteral nutrition therapy; NST, nutrition support team

The data represent the total means of adequacy obtained in each section and considers all hospitals included in the research.

direct and positive impact on the quality of ENT administration in ICU settings (Questionnaire 2) with regard to the quality of local services. We can also hypothesize the presence of a causal relationship between these activities due to the association between the scores in both questionnaires. In addition, we also found a strong linear relationship between the use of protocols, quality control, and continuing education that was related to nutritional therapy (as assessed by the Questionnaire 1 sections) with the quality of ENT administration (as assessed by the Questionnaire 2 total score). These findings only reinforce the importance of routine standardization, continual staff training, and quality control as specific activities with a potential to improve health care that is related to ENT in ICU settings. Other recent studies also reported the importance of NST to improve cost-effectiveness for critically ill patients [17–19].

A literature review discussed NST impact on nutritional therapy administration and suggested a decrease in metabolic complications when NSTs are present [6]. The review also reported an increase in nutritional assessment frequency, more adequate nutrient supplies, more appropriate parenteral nutrition indications,

and cost reductions associated with NSTs [6]. These positive aspects corroborate the findings of the present study findings where high performance scores in NST activities coincide with an enhanced quality of ENT administration. Indeed, this highlights the key NST role in the management of nutrition support therapy [6,20].

The strong positive correlation between the presence of protocols and ENT administration in the present study evidences the importance of standardization and the use of protocols in clinical practice. A prospective cohort study conducted in 269 ICUs from 28 countries to evaluate the effects of ENT protocols showed that sites with pre-established ENT protocols presented better results compared with sites without standardized protocols [21]. Specific differences were found in the use of ENT as a single route (70.4% versus 63.6% of patients; $P=0.0036$) as well as early ENT start (41.2 h 57.0 h of ICU hospitalization; $P=0.0003$) and better nutritional adequacy (61.2% 51.7% of patients' caloric needs; $P=0.0003$). These results, along with those from other studies, suggest that the use of ENT protocols may be associated with significant improvements in nutritional assistance [21,22].

The Questionnaire 1 section on training and continuing education indicated that an efficient training program could promote improvements in ENT management in ICUs. Continuing education is indispensable for professionals who assist patients who require specialized nutrition [23]. One study evaluated the impact of a multifaceted educational intervention on ENT quality and clinical outcomes in critically ill patients. The study measured the outcomes both pre- and post-training in ENT and the measurements were based on nutritional assessments, duration of fasting, and adequacy of caloric nutritional goals. The results suggested that the intervention was efficient and data were significant for ENT adequacy (pre-training: $74.2 \pm 33.3\%$ post-training: $96.2 \pm 23.8\%$; $P < 0.001$). Furthermore, the fasting period was reduced by 1 d (pretraining: 3.8 ± 3.1 ds post-training: 2.2 ± 2.6 d; $P=0.002$), ENT was started 48 h earlier (pretraining: 24% post-training: 60%; $P=0.001$), and the length of stay decreased significantly (pretraining: 18.5 d post-training: 9.5 d; $P < 0.001$) [24], which is in accordance with the results from the present study.

The quality control section (Questionnaire 1) also showed a potential to positively influence ENT administration in ICUs. As the quality of care improved, the indicators of ENT administration moved toward their goals in the hospitals that were assessed. With regard to nutritional therapy, the monitoring of these kinds of quality indicators allows for the provision of the best therapy available while also considering cost-effective concepts and guarantees for patients' optimal clinical recovery. Thus, a failure to accurately

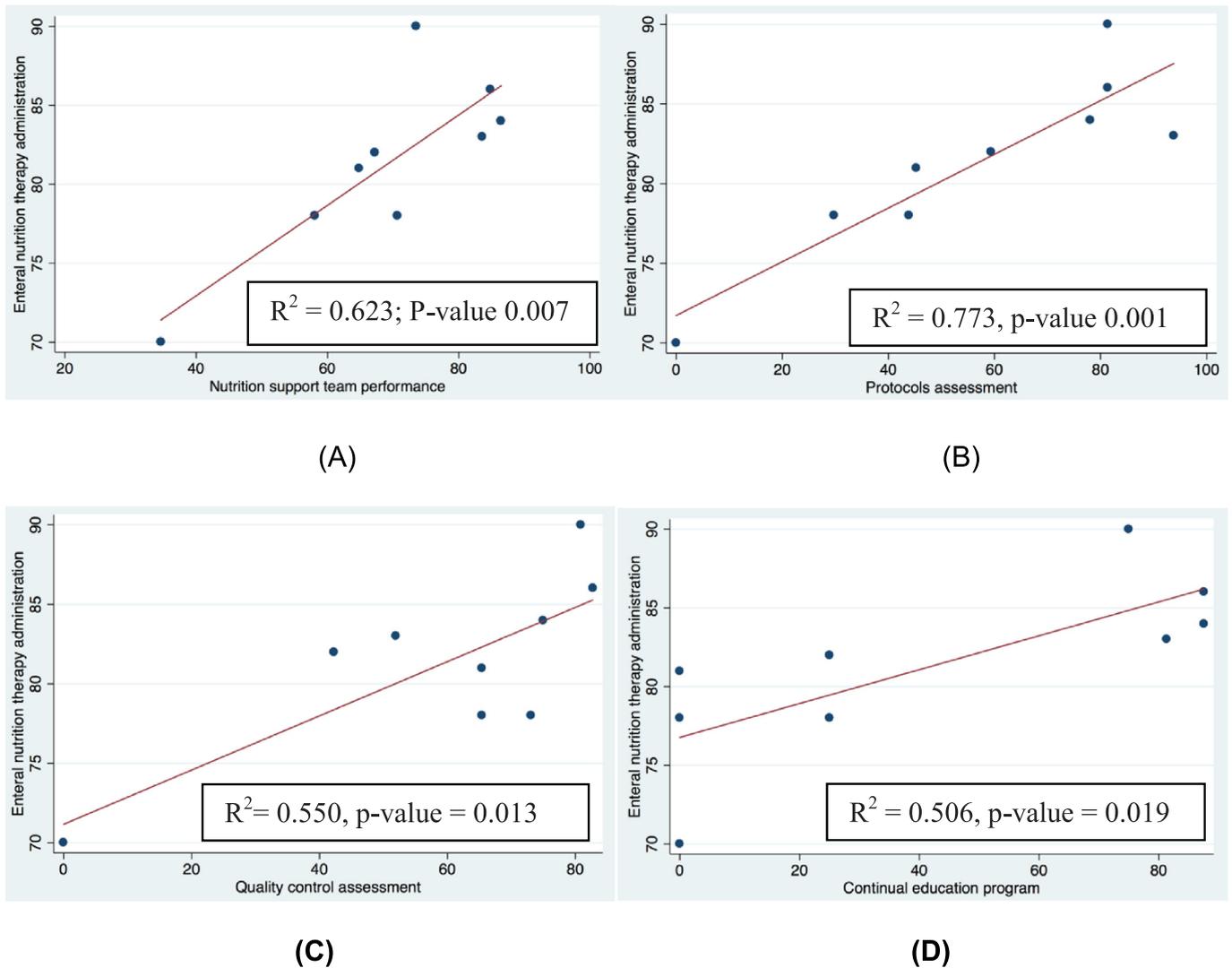


Fig. 1. Main (A) and secondary (B–D) study outcomes assessed by linear regression model. (A) Nutritional support team activities versus enteral nutrition (EN) administration assessment. (B) Protocol adequacy versus EN administration assessment. (C) Quality control adequacy versus EN administration assessment. (D) Continuing education adequacy versus EN administration assessment.

monitor quality may directly impair a patient's nutritional status and recovery [11,12,18].

Specific quality control indicators, including standard operating procedures, employee training, and the use of masks and caps for hygiene, are essential to avoid ENT contamination. In general, lower scores for these items compromised the prerequisite program section. Another situation is stopping ENT due to diarrhea before NST evaluation. Failures to review pre-established flow charts for critical points affected adequacy scores in the quality control section of the ENT administration assessment and could be avoided with training [2].

Limitations of this study include the observational design and its limited ability to measure true causality. Furthermore, the low number of hospitals included blocked the analysis of confounding factors that might have maximized the effects measured in the variables analyzed by the regression models. Some bias is expected due to the use of questionnaires with subjective answers; however, this verification bias was minimized by administering the

questionnaires in loco with the research teams and local NST members together. Moreover, the statistical analysis was performed by a different research team member who was not involved in the questionnaire assessment, which makes the audit more impartial and avoids outcome bias. Another limitation is the lack of a control group composed of hospitals without NST, which could have provided extra comparison insights.

Conclusions

This study revealed that a well-implemented NST may improve ENT administration in ICU settings by complying with quality parameters. Adherence to protocols, continuing education of professionals and assessment of quality indicators also were found to be NST activities that should be prioritized and further studied. These specific activities could positively influence the adequacy of ENT administration and the achievement of nutritional goals. A study with a larger number of hospitals may provide more

consistent models to understand which aspects of NST activities could promote the greatest improvements in ENT quality for ICUs and contribute to the costeffectiveness of treatment.

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