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ADHERENCE TO THE PNEUMONIA PROTOCOL ASSOCIATED WITH MECHANICAL VENTILATION

ADESÃO AO PROTOCOLO DE PNEUMONIA ASSOCIADO À VENTILAÇÃO MECÂNICA

ADHESIÓN AL PROTOCOLO DE NEUMONIA ASOCIADO A LA VENTILACIÓN MECÁNICA

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ABSTRACT

Objective: to get to know the adherence of the nursing team to the pneumonia protocol associated with mechanical ventilation in the Intensive Care Units. ***Method:*** this is a quantitative, descriptive, observational, cross-sectional study in six Intensive Care Units of a teaching hospital. The data was collected through a checklist at the hospital beds. The multivariate linear regression test and the descriptive and inferential statistics were used for data analysis. Results were presented in the form of tables and figures. ***Results:*** 945 patients with a prevalence of males, aged 61 to 80 years, hospitalization time of up to 15 days and incidence of VAP were 10.58%. The nursing team maintained in agreement with the institutional protocol approximately 90.05% of the elevated headrests from 30º to 45º. Statistically, the VAP relationship with the male sex, length of hospital stay in the first 15 days and HME filter was demonstrated. There was a high bedside correlation with age and hospitalization time and HME filter with hospitalization time. ***Conclusion:*** the nursing team puts the protocol of prevention of VAP into practice, reducing the incidence of this infection in the unit. ***Descriptors***: Nursing; Protocols; Pneumonia; Respiration, Artificial; Intensive Care Units; Teaching.

RESUMO

Objetivo*:** conhecer a adesão da equipe de enfermagem ao protocolo de pneumonia associada à ventilação mecânica nas Unidades de Terapia Intensiva. ***Método*:** trata-se de estudo quantitativo, descritivo, observacional, transversal, em seis Unidades de Terapia Intensiva de um hospital de ensino. Coletaram-se os dados por meio de um *checklist* à beira do leito. Utilizou-se para análise dos dados o teste de regressão linear multivariada e estatística descritiva e inferencial. Apresentaram-se os resultados em forma de tabelas e figura. ***Resultados*:** participaram 945 pacientes com prevalência do sexo masculino, faixa etária 61 a 80 anos, tempo de internação de até 15 dias e incidência de PAV foi 10,58%. A equipe de enfermagem manteve em acordo com o protocolo institucional aproximadamente 90,05% das cabeceiras elevadas de 30º a 45º. Demonstrou-se estaticamente a relação PAV com o sexo masculino, tempo de internação nos primeiros 15 dias e filtro HME. Houve a correlação de cabeceira elevada com idade e tempo de internação e filtro HME com tempo de internação. ***Conclusão: a equipe de enfermagem coloca em prática o protocolo de prevenção de PAV reduzindo a incidência dessa infecção na unidade. ***Descritores*:** Enfermagem; Protocolos; Pneumonia; Respiração Artificial; Unidades de Terapia Intensiva; Ensino.

RESUMEN

Objetivo: conocer la adhesión del equipo de enfermería al protocolo de neumonía asociada a la ventilación mecánica en las Unidades de Terapia Intensiva. ***Método:*** se trata de un estudio cuantitativo, descriptivo, observacional, transversal, en seis Unidades de Terapia Intensiva de un hospital de enseñanza. Se recolectaron los datos por medio de un checklist al borde del lecho. Se utilizó para análisis de los datos la prueba de regresión lineal multivariada y estadística descriptiva e inferencial. Se presentaron los resultados en forma de tablas y figura. ***Resultados:*** participaron 945 pacientes con prevalencia del sexo masculino, grupo de edad 61 a 80 años, tiempo de internación de hasta 15 días e incidencia de PAV fue 10,58%. El equipo de enfermería mantuvo de acuerdo con el protocolo institucional aproximadamente el 90,05% de las cabeceras elevadas de 30º a 45º. Se demostró estáticamente la relación PAV con el sexo masculino, tiempo de internación en los primeros 15 días y filtro HME. Hubo la correlación de cabecera elevada con edad y tiempo de internación y filtro HME con tiempo de internación. ***Conclusión:*** el equipo de enfermería pone en práctica el protocolo de prevención de PAV reduciendo la incidencia de esa infección en la unidad. ***Descriptores***: Enfermería; Protocolos; Neumonía; Respiración Artificial; Unidades de Cuidados Intensivos; Enseñanza.

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INTRODUCTION

It is understood that, in an Intensive Care Unit (ICU), patients present constant hemodynamic changes and high risk of death requiring complex care, uninterrupted and immediate decision-making by professionals, advanced pharmacology and continuous monitoring and, therefore, they are more likely to suffer any adverse events.[1] It is reported that one of the most frequent care-related infections in this unit is ventilator-associated pneumonia (VAP).[2]

It is known that VAP is a lung parenchymal infection diagnosed after 48 hours of endotracheal intubation and the beginning of invasive mechanical ventilation (IMV), which was not incubated at the time of patient admission and also after 72 hours of extubation, being classified as precocious or late, where the late one develops after the fourth day of intubation and the early one, in the first four days.[3-5]

One of the main causes of VAP is the aspiration of secretions from the upper respiratory tract, which generates an inflammatory response caused by the uncontrolled multiplication of microorganisms that penetrate the distal airways of the host.[4] VAP occurs in three ways: the first through tracheal aspiration, inhalation and nebulization with contaminated material; the second by the penetration of secretions retained in the upper airways above the cuff of the endotracheal tube in the trachea by means of deflation of the cuff or the space between the cuff and the tracheal wall and the third by the reflux of the gastrointestinal tract.[5-6]

The following risk factors for VAP are listed: advanced age (above 70 years); coma; level of consciousness; tracheal intubation and reintubation; immune conditions; use of immunosuppressive drugs; shock; disease severity; antecedence of Chronic Obstructive Pulmonary Disease (COPD); prolonged mechanical ventilation longer than seven days; aspirated from the condensation from the fan circuits; malnutrition; exogenous contamination; antibiotic therapy as prophylaxis; microbial colonization; prolonged surgeries; aspiration of contaminated secretions; gastric colonization and its aspirations and the gastric pH (> 4).[6]

The standardization of preventive measures in patient care should be performed by means of a protocol for the reduction of VAP.[3,5] The protocol was developed as an instrument, through evidence-based practices, with the purpose of describing a care, how and by whom it will be carried out, in order to reduce the versatility of information and behavior of members of health teams and promote prevention, rehabilitation or rehabilitation of health.[7]

It is recommended to take specific measures, such as maintaining a high pressure between 30 and 45°, the indication and the use of a Heat and Moisture Exchangers (HME) filter, and the indications and care with the aspiration system, inhalation and nebulization are interventions that have a significant impact on the prevention of VAP because it is an important and complex infection.[4,6]

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It is estimated that ventilator-associated pneumonia episodes generate an overall mortality rate of 20-60%, reflecting the severity of the disease and organ failure.[6] The Nursing team is considered essential for the accomplishment of measures of prevention of the VAP, since the majority of the procedures in patients with mechanical ventilator is executed by it.[3] The objective of this study was to verify the adherence of the nursing team to the protocol of pneumonia associated with mechanical ventilation in an intensive care unit.

OBJECTIVE

- To know the adhesion of the nursing team to the protocol of pneumonia associated with mechanical ventilation in the Intensive Care Units.

METHOD

This is a cross-sectional, with a descriptive outline, applied, observational, with a quantitative approach, performed at the UHS General ICUs, Health plans, Neurological, Cardiologic, Emergency and Post-Operative Unit, totaling 104 intensive care beds of a hospital in the interior of the State of São Paulo, by means of a checklist filled by nurses at the patient's bedside, during the weekly visits, in the morning, afternoon and evening shifts, from May to August 2017, totalizing ten checklists and getting 945 checks.

All adult patients (≥18 years) were included in this study, with an ICU stay longer than 48

hours, excluding those who were in the procedure at the time of data collection, patients who were newly admitted to the unit, considering hospitalization of less than three hours and those with contraindication of assessed assistencial care.

A checklist composed of several items was used, but in order to achieve the objectives of this study, the variables age, sex, hospitalization time, headrest elevation between 30º - 45º, respiratory materials and HME filter were used, identified and within the validity period, in addition to the Protocol of Prevention of VAP already used in the institution.

The data was collected after approval by the Research Ethics Committee (REC), under Opinion no. 2,074,847, respecting the guidelines and norms recommended by Resolution No. 466/12 of the National Health regulate research involving human beings.

The data was tabulated using descriptive statistics, plotting the sample profile and considering the analyzed variables and their unfolding, as well as the inferential method and, for the independence analysis, the Multivariate Linear Regression. The results of independence between the variables proposed by the analysis between the values of "p" (significance) were found. All analyses were obtained using the SPPSS Statistics software linked to the functionalities of the Excel tool (version 2016).

RESULTS

It is noteworthy that 945 patients were screened for mechanical ventilation, of which 538 (56.93%) were males, with the highest prevalence age range of 61-80 years (n = 427, 45.19%) and less prevalent up to 20 years (n = 19, 2.01%); 680 (71.96%) were hospitalized for approximately 15 days in the ICUs and 310 patients (32.80%) died, as shown in table 1.

Table 1. Sex, age, length of hospital stay and clinical outcome of patients. São José do Rio Preto (SP), Brazil, 2017.

	N	%	SD	SE
Sex				
Male	538	56.93	92.63	3.01
Female	407	43.07		
Total	945	100.00		
Age				
Up to 20 years	19	2.01	163.14	5.31
21 to 40 years	107	11.32		
41 to 60 years	273	28.89		
61 to 80 years	427	45.19		
> 80 years	115	12.17		
Missing	4	0.42		
Total	945	100.00		
Duration of hospitalization				
Up to 15 days	680	71.96	264.68	8.61
16 to 30 days	185	19.58		
31 to 45 days	45	4.76		
46 to 60 days	15	1.59		
> 60 days	14	1.48		
Missing	6	0.63		
Total	945	100.00		
Mortality				
Yes	310	32.80	281.53	9.16
No	599	63.39		
Missing	36	3.81		
Total	945	100.00		

N: Records; %: Proportion; SD: Standard deviation; SE: Standard error

It was found that the head elevated between 35º to 45º was the most accomplished item of the institution's VAP protocol, corresponding to 90.05%, followed by 74.29% of the respiratory articles identified and within the validity period. It is inferred that the HME filter was the item of care for the prevention of VAP that was less in disagreement with the protocol, approximately 46.14%, as observed in table 2. Respiratory materials were considered as aspiration extension, inhalation (mask, cup

and extension) and the nebulization kit (mask, cup and extension), both with validity of 48 hours, according to the protocol established by the Institutional Hospital Infection Control.

Table 2. Conformity of preventive actions with the VAP protocol. São José do Rio Preto (SP), Brazil, 2017.

Information	N	%	DP	EP
Elevated headrest				
30° to 45°	851	90.05%	464.23	15.1
< 30° and > 45°	53	5.61%		
Patients in procedures	41	4.34%		
Total	945	100%		
Respiratory Devices				
Within sell by date	702	74.29%	337.03	10.96
Past sell by date	86	9.10%		
Absence os respiratory materials	157	16.61%		
Total	**945**	**100%**		
HME filter				
Within sell by date	436	46.14%	250.47	8.15
Past sell by date	27	2.86%		
Eupneic in ambient air	482	51.01%		
Total	**945**	**100%**		

N: Records; %: Proportion; SD: Standard deviation; SE: Standard error.

It was observed that approximately 100 patients (10.58%) acquired the VAP and, for the microorganisms found, six patients (0.63%) contracted Enterobacter cloace and Serratia marcenscens and in 94 (9.95%) patients, the microorganism was not identified.

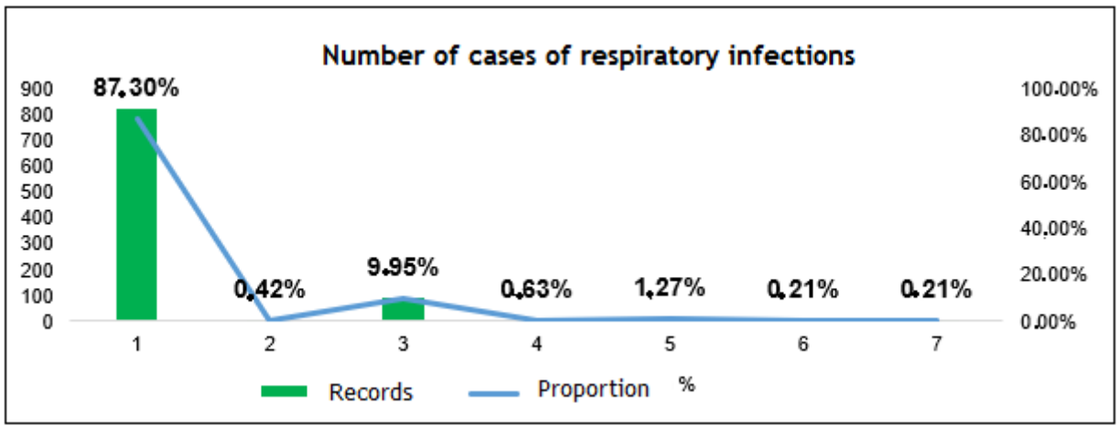

Figure 1. Number of cases of respiratory infection. São José do Rio Preto (SP), Brazil, 2017.

Caption: 1. No Respiratory Infection; 2. KPC Tracheal Aspiration; 3. VAP; 4. VAP by Enterobacter cloace + Serratia marcenscens + PNM Clinical Acinetobacter baumannii; 5. Clinical pneumonia; 6. Clinical pneumonia by Pseudomonas aeruginosa; 7. Tracheobronchitis + Tracheal Aspiration by Acinetobacter baumanni.

After the data analysis, the cross-checking of dependent variables with independent variables was performed using the coefficient of determination, the Square R (R^2), as shown in Table 3.

Table 3. Correlation of the variables for the verification of significance. São José do Rio Preto (SP), Brazil, 2017.

Dependent variable	Independent variable	P	Statistical evidence
Elevated headrest	Sex	0.464	No
	Age	0.036	Yes
	Duration of hospitalization	0.001	Yes
Respiratory devices	Sex	0.485	No
	Age	0.812	No
	Duration of hospitalization	0.297	No
HME Filter	Sex	0.699	No
	Age	0.106	No
	Duration of hospitalization	0.004	No
VAP	Sex	0.010	Yes
	Age	0.098	No
	Duration of hospitalization	0.012	Yes
VAP	Elevated headrest	0.645	No
	Respiratory devices	0.080	No
	HME filter	0.000	Yes

It was verified, after the correlation of the variables, that the longer the patient's ICU stay, the lower the number of headwaters from 30 ° to 45 °, and the first 15 days of hospitalization with higher adherence. It is reported that the age range from 41 to 60 years and from 61 to 80 years was the range that was most in non-compliance, since it had the head of less than 30º. Most of the identified HME filters and within the 72-hour shelf life within the first 15 days of hospitalization were found. It was observed that male gender was the gender that most acquired VAP in relation to the female sex (73.40%) and 52.13% of the patients acquired this infection during the first 15 days of hospitalization. Of the 100 patients (10, 58%) who had VAP, 77 (81.91%) had the HME filter identified and within the validity period of 72 hours.

DISCUSSION

It was observed that of the 945 checkups, 538 (56.93%) are male, being the gender of higher prevalence in the study, corroborating data from the literature. It was revealed that in a study carried out at the ICU of the Nossa Senhora da Conceição Hospital in Tubarão, Santa Catarina, which analyzed the demographic data of the incidence of VAP of which the population of the 120 patients was predominantly male, with 69 (57.5%) participants in the sample.[8] The difference in the number of men who participated in both studies can be observed, and this fact can be explained by the fact that the teaching hospital has more beds and turnover when compared to the 30 beds in the ICU of Tubarão Hospital. It is possible to clarify the prevalence of male patients in intensive care units due to their low interest in health care in relation to women.[9]

In this study, it is reported that the prevalent age group was 61 to 80 years old, corresponding to 427 of the 945 patients checked, that is, the elderly population, as defined in the Statute of the Elderly (Law No. 10,741).[10] The mean age of the 120 patients was 58.5 ± 19.4 years, while in the University Hospital of Montes Claros (MG), a study was carried out in the Nossa Senhora da Conceição Hospital in Tubarão (SC), the mean age of the 190 participants was 56.9 years ± 18.6.[8,11] The age group divergence is demonstrated by the number of participants in each study and by the population characteristics that each hospital treats in its regions. The elderly population in ICUs is becoming increasingly present due to the high rates of degenerative diseases that appear with aging and require high complexity care.[9]

In this study, it was demonstrated that the mean time of ICU stay was up to 15 days, corresponding to 71.96% (680) of the sample analyzed. The result found in a study carried out in an ICU of the Hospital Universitário de Montes Claros (MG), with 190 patients, presenting an hospitalization rate of up to 15 days, of 82.1% is similar to this result.[11]

It was estimated that the adherence in maintaining the headrest elevated from 30º to 45º by the Nursing team was high, 90.05%, that is, of the 945 patients, 851 were in correct headrest positioning. In a study carried out at the ICU of São Vicente de Paulo Hospital, in Passo Fundo (RS), in the first stage of the study, 18.7% of the headrests were between 30º and 45º, and after an educational lecture, adherence to correct bedside positioning went to 34.5% of the 235

patients seen in this second stage of the study. In the ICU of the Public Hospital of Ponta Grossa (PR), of the 33 patients in the study, 57.32% had the right head angulation.[12-3] It was verified that there was greater adhesion of the elevated headrest protocol of VAP, by the Nursing team of this study, when compared to the others.

It is important to emphasize that the elevated headrest at this angle (30º to 45º) promotes the reduction of reflux and aspiration of nasopharyngeal, oropharyngeal and gastrointestinal secretions, favoring a greater tidal volume, with the improvement of the ventilatory parameters with the support pressure, and reducing the risk of VAP in relation to positions below 30 degrees.[3,13-4]

Statistical evidence was obtained from the analysis in relation to the "Elevated Headrest" with the variables "Age" (p = 0.036) and "Duration of hospitalization" (p = 0.001), being the one with greater explanatory power. It is explained that, in the literature, research was not found that justified the elevated headrest ratio and age demonstrating the need for studies that address this relationship, however, it was found that the older the patients, the less correct the headrests were).

It was found that the longer the hospitalization time, the lower the number of elevated headrests from 30º to 45º, and in the first 15 days, 72.74% (619) of the beds were in the angulation of the headrest according to the protocol and, in 30 days, it became 19.86% (169) of the 945 checks. This result can be explained by the daily occurrence of decubitus changes and the position of the patient as a result of the Nursing care and the prevention of pressure ulcers, preventing the maintenance of the head in the appropriate angle.[12,15] In all pressure-injury prevention protocols, patients are expected to stay 30-45 degrees, otherwise the lesion is increased.

It is perceived that respiratory materials are the second most accomplished item in accordance with the protocol of the institution. These materials include the aspiration extension, the inhalation kit (mask, cup and extension) and the nebulization kit (mask, cup and extension), corresponding to 74.29%, that is, 702 checks. It should be noted that this item did not present statistical evidence with the variables "age", "sex", "duration of hospital stay" and, mainly, "pneumonia associated with mechanical ventilation".

It has been reported in several studies that there is no evidence that the closed aspiration system reduces the incidence of VAP and is more commonly used as an empirical recommendation.[14,16] In a study carried out with 33 patients of the General Adult ICU of the Public Hospital of Ponta Grossa/PR, it was examined, although there was no consensus in the literature regarding the prevention of infection with the exchange of the nebulization kit in 48 or 72 hours , it was observed that the infection did not develop when 90.99% of the filters in use were within the validity period.[13]

The identification and validity of the HME filter were evaluated and verified that of the 463 patients who were using mechanical ventilation and HME filter, 27 (2.86%) were overdue and 482 (51.01%) of hospitalized patients in the intensive unit were eupneic in ambient air. In a study carried out at the São Vicente de Paulo Hospital ICU in Passo Fundo, RS, the validity of the filter was not analyzed, but rather the correct positioning, which corresponded to 81.3% of 198 patients analyzed.[12] It was reported that, in 15 patients analyzed, 48.9% of HME filters were in use at the beginning of mechanical ventilation, in a study conducted at the Intensive Care Unit of the Clinical Hospital of the Federal University of Goiás (GO).[17] It can be verified that the HME filter was present, at the beginning of mechanical ventilation, in all patients hospitalized in the hospital of this study, proving the adhesion to the institutional protocol.

It is added that the HME filter presented statistical evidence only with the variable "duration of hospitalization" (p = 0.004), because, during the first 15 days of hospitalization, there were more filters within the validity. It is noted that in the literature there are no studies that explain this correlation, only that its use reduces the condensation in the ventilator circuit, preventing exogenous germs from being inhaled and therefore, there is a need for further studies to prove its efficiency.[17-9] It is believed, through the researchers, that failure to perform the filter change within the validity can occur due to team inattention, since only 27 filters were expired.

The variable "Pneumonia Associated with Mechanical Ventilation" was correlated with the "Sex" variable, proving the dependence on the male sex (p = 0.010). This statistical dependence was associated with a study performed at the ICU of the Hospital Nossa Senhora da Conceição de Tubarão (Santa Catarina) where the development of VAP with the male gender is p = 0.004.[8] Male sex is defined as both an independent risk factor and more susceptible to developing VAP, as it

is only a risk factor in the hospital setting to develop infection.[18]

It was demonstrated that VAP also showed statistical dependence with length of hospital stay in the first 15 days (p = 0.012). The VAP was statistically associated with the Hospital Nossa Senhora da Conceição de Santa Catarina and the Montes Claros Hospital, Minas Gerais, Brazil, with a hospital stay of 20.4 days ± 15.3 (p = 0.003) and hospitalization time greater than 15 days with relative risk (RR) of 7.29, respectively.[8,11] In this relation, it is shown that the length of stay in the ICU increases the risk of developing hospital infection.[11] It can relate the divergence of hospitalization time with the VAP of this study with others in the literature to the number of participants.

It is pointed out that the HME filter presented statistical dependence (p = 0.000) with the VAP. In a study of ICU trauma patients at the Federal University of Pernambuco's Clinical Hospital, a reduction in the incidence of VAP was reported in patients who used the filter.[19] This correlation can be justified because the filter provides a barrier between the patient and the mechanical ventilator.[20]

It was verified that the incidence of VAP in this study was 100 (10.58%) patients out of the 945 check-ups, that is, below that reported in the literature. The microorganisms Enterobacter cloace and Serratia marcenscens were identified in six (0.63%) cases. The VAP was developed in the ICU of the Montes Carlos University Hospital (MG), by 44 (23.2%) of the 190 sample participants. It was added that the incidence rate of VAP in the Hospital Nossa Senhora da Conceição Hospital of Tubarão (SC) was 31.8%, that is, of the 120 patients, 38 acquired the VAP.[8,11]

It was registered, in a literature review [21], that the main microorganisms related to VAP were Pseudomonas aeuroginosa, Staphylococcus aureus, Acinetobacter spp., Escherichia coli and Klebisiella spp., not corroborating the microorganisms identified in this study. The fact that this study presents different microorganisms from the study mentioned by the study period of the articles is explained, that is, publications from 1993 to 2013. A lower incidence of VAP in relation to other studies and high adherence to the protocol of prevention of VAP by the Nursing team of the ICUs studied was found.

CONCLUSION

The high adherence of the nursing team to the institution's VAP prevention protocol was demonstrated in this study, as it was found that 90.05% of the headwaters were elevated between 30 ° to 45 ° and that 74.29% of respiratory devices and 46.14% of the HME filters were within the expiration date. There was also a lower rate of VAP when compared to other studies, demonstrating the improvement of this indicator in the ICU from the preventive actions. The contribution of the study to the advancement of scientific knowledge was that the need for studies on the headrest relation between the patient's age and the VAP with the use of the HME filter to reduce the risks related to health care was realized. The considerations about the theoretical or practical implications of the results are that pneumonia associated with mechanical ventilation is a serious infection that, in addition to increasing healthcare costs, high mortality rates, and prolonged hospitalization time, requires careful attention not only to managers or infection control teams, but mainly the nursing team, who are professionals who are almost uninterruptedly next to the patient and perform most of the care that may prevent or collaborate for the onset of infection. Thus, these professionals should know the importance of implementing the VAP protocol. Consequently, they would receive a return on care measures that are taken to prevent or reduce infection in their units, reducing costs and improving care.

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