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ARTIGO DE INVESTIGAÇÃO (ORIGINAL)

The critically ill person submitted to non-invasive ventilation in an emergency department

A pessoa em situação crítica submetida a ventilação não invasiva num serviço de urgência

La persona en estado crítico que se somete a ventilación no invasiva en un servicio de urgencias

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Abstract

Background: The effectiveness of non-invasive ventilation (NIV) may be impacted by potential complications that require preventive nursing attention.
Objective: To identify the complications of critically ill patients undergoing NIV therapy admitted to the Emergency Department of ULS-Bragança.
Methodology: Exploratory-descriptive, observational, quantitative study conducted through the application of two data collection instruments, between November 2017 and March 2018: A Questionnaire and an Observation Grid of a sample of 35 patients, mostly female (57.14%) over the age of 85 (37.14%).
Results: The most frequent clinical diagnosis was respiratory failure (45.71%). The most frequent complications were the sensation of claustrophobia, ulcerations of the face, pain, and accumulation of secretions. Less frequent complications were nasal congestion, conjunctivitis, gastric distension, aerophagia, and vomiting.
Conclusion: The dissemination of the results is advocated, in order to open the discussion within and between teams, to reinforce the relevance of nursing training regarding the care of patients with NIV.

Keywords: complications; person in critical situation; noninvasive ventilation

Resumo

Enquadramento: A eficácia da ventilação não invasiva (VNI), pode decorrer com possíveis complicações que exigem atenção preventiva por parte da enfermagem.
Objetivo: Identificar as complicações da pessoa em situação crítica, submetida a terapia VNI, internada no serviço de urgência.
Metodologia: Estudo exploratório-descritivo, observacional, de caráter quantitativo, realizado através da aplicação de dois instrumentos de recolha de dados: um questionário e uma grelha de observação, a uma amostra de 35 doentes, na sua maioria do sexo feminino (57,14%) e com idade superior a 85 anos (37,14%).
Resultados: O diagnóstico clínico mais frequente foi a insuficiência respiratória (45,71%). As complicações mais frequentes foram a sensação de claustrofobia, as ulcerações da face, a dor e a acumulação de secreções. As complicações menos frequentes foram a congestão nasal, a conjuntivite, a distensão gástrica, a aerofagia e a sensação de vómitos.
Conclusão: Defende-se a divulgação dos resultados, no sentido de abrir a discussão intra e inter equipas, para reforçar a pertinência da formação de enfermagem relativamente aos cuidados em doentes com VNI.

Palavras-chave: complicações; pessoa em situação crítica; ventilação não invasiva

Resumen

Marco contextual: La eficacia de la ventilación no invasiva (VNI) puede dar lugar a posibles complicaciones que requieren cuidados preventivos de enfermería.
Objetivo: Identificar las complicaciones de los pacientes en estado crítico sometidos a terapia de VNI ingresados en el servicio de urgencias.
Metodología: Se realizó un estudio exploratorio-descriptivo, observacional, de carácter cuantitativo, mediante la aplicación de dos instrumentos de recogida de datos: un cuestionario y una parrilla de observación a una muestra de 35 pacientes, la mayoría de los cuales eran mujeres (57,14%) y con una edad superior a los 85 años (37,14%).
Resultados: El diagnóstico clínico más frecuente fue la insuficiencia respiratoria (45,71%). Las complicaciones más frecuentes fueron la sensación de claustrofobia, las ulceraciones faciales, el dolor y la acumulación de secreciones. Las complicaciones menos frecuentes fueron la congestión nasal, la conjuntivitis, la distensión gástrica, la aerofagia y la sensación de vómitos.
Conclusión: Se aboga por la difusión de los resultados, con el fin de abrir el debate dentro de los equipos y entre ellos para reforzar la pertinencia de la formación de enfermería en relación con la atención de los pacientes con VNI.

Palabras clave: complicaciones; persona en situación crítica; ventilación no invasiva

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Introduction

The training of health professionals in the area of critically ill persons presents needs and demands specific attention and care, due to the gravity of their clinical state (Rodrigues, 2017), and among these, in particular, non-invasive ventilation (NIV) support, as an indispensable technique in the treatment of various pathologies of the respiratory system, especially in emergencies. NIV plays a significant role in the clinical practice as a method of respiratory therapy and an advantageous alternative to invasive mechanical ventilation (IMV; Ferreira, Nogueira, Conde, & Taveira, 2009), and as such, this therapy is frequently used in this context and constitutes a common practice for health professionals who care for critically ill persons. Based on these assumptions, this study has as its objective to identify the complications in critically ill persons undergoing NIV therapy, hospitalized in the emergency department, whether perceived by the person him/herself and/or noted by medical personnel.

Background

The emerging authors in this field (Asseiro & Beirão, 2012; Ferreira et al., 2009; Pinto, 2013; Ruzic, 2019; Simonds & Hare, 2013) argue that NIV is an alternative in the treatment of patients with hypoxemic or hypercapnic respiratory failure, avoiding orotracheal intubation (OTI) and the complications resulting from that procedure. However, this study will adopt the definition by Bezerra et al. (2019, p. 1) which argues that NIV

> consists of the administration of mechanical ventilation to the lungs without the need for artificial airways, being dispensed to the patient using mechanical ventilators . . . with the goal of reducing the respiratory effort, resting the respiratory muscles and improving the exchange of air between the lungs and the atmosphere.

Thus, NIV offers an alternative in the treatment of patients who, because of failure of one or more levels of vital functions, are considered critical patients (Sociedade Portuguesa de Cuidados Intensivos, 2008) or a person in a critical situation (Ordem dos Enfermeiros, 2010). To this end, and because this study used a convenience sample, the typology of the critically ill person is characterized by the Ordem dos Enfermeiros in regard to the specific skills of the specialist nurse, defining this specific condition: "The critically ill person is one whose life is threatened by failure, or the imminent failure, of one or more vital functions, and whose survival depends upon advanced observation, monitoring and therapy methods" (Regulamento n.º 124/11 de 18 de fevereiro, p. 8656, 2011).

According to Cruz and Zamora (2013), and Esquinas (2011), NIV is indicated in the event of functional and clinical signs of respiratory discomfort, namely: deterioration in the air exchange (PaO_2 /FiO_2 < 200) or oxygen saturation (SpO_2< 92%); acute or chronically acute respiratory pump failure or with hypercapnia and respiratory acidosis ($PaCO_2$> 45 mmHg and pH < 7.35); dyspnea with use of ancillary musculature and/or paradoxical respiration; tachypnea (respiratory rate > 24 breaths per minute); hypoxemia [blood pressure of O_2, (PaO_2 < 60 mmHg) with an inspired fraction of O_2 of (FiO_2>21% and with $PaCO_2$< 45 mmHg)].

Among the respiratory pathologies of an urgent nature, NIV is indicated (Esquinas, 2011; Ferreira et al., 2009) most often in acute chronic obstructive pulmonary disease flare-up; acute asthma; in cardiogenic acute hypoxemic respiratory failure; in non-cardiogenic acute hypoxemic respiratory failure, as well as in pneumonia.

Complications from the use of NIV are grouped in three areas (Gay, 2009): those related to the type of mask; those caused by airflow; and those with hemodynamic consequences, the most serious and potentially fatal. The first, related to the type of mask, are the skin rashes, ulcerations of the nasal bridge, nasal obstruction, vomit aspiration, hypersalivation or dry mouth, aerophagia and mucosal lesions. Those caused by pressure or airflow are, according to the same author, earaches, sinusitis, gastric insufflation, pneumothorax, and irritation of the eyes. Finally, Gay (2009) reports agitation or intolerance to ventilation (discomfort), accumulation of secretions, severe hypoxemia, hypotension, and hemodynamic impairment. Others, related to face pain or discomfort, skin lesions, and feelings of claustrophobia (fostering agitation and intolerance to NIV), nasal congestion, dryness of the nasal and oral mucosa, pain in the ears, irritation of the eyes, and gastric distension (Pinto, 2013; Ximendes & Silva, 2015), and

also: facial erythema, changes in the mucous membranes, agitation, and intolerance to ventilation; claustrophobia, abdominal distension; aerophagia, vomiting, aspiration pneumonia, bronchoaspiration, skin lesions at the point of contact with the mask (face and nose), pain and secretion accumulation in airways.

Research question

What complications arise in patients subjected to NIV in an emergency department?

Methodology

Working from the formulated objective and research question, a quantitative, descriptive, exploratory, and observational study was developed between November 2017 and March 2018 for hospitalization stays in the emergency department of the Local Health Center of the Northeast (LHCNE). The subject sample is of the intentional type, made up of 35 patients who meet the following inclusion criteria: exhibit time and spatial awareness, and meet clinical criteria to begin NIV therapy. All the patients included in the study used the same type of mask (facial).
The data collection was carried out by means of two data collection instruments (DCI): (i) Questionnaire related to the characterization of the sample: sociodemographic variables and clinical characterization of the patient (state of consciousness, comorbidities, oxygen therapy and/or ventilation support at home, reasons for admission to the emergency department, and clinical diagnosis); (ii) Grid related to the observation of complications (variable dependent being studied) which includes: 1) Complications perceived by the patient (nasal congestion, conjunctivitis, feelings of claustrophobia, gastric distension, aerophagia, vomiting, facial ulcerations, pain, accumulation of secretions in airways); 2) Complications observed by medical personnel (changes in the mucous membrane, conjunctivitis, agitation and intolerance to ventilation, gastric distension, vomiting, facial ulcerations, accumulation of secretions in airways).
The data collection followed a chronological mapping of three observations separated by 8 and 24 hours between them respectively, forming three distinct periods of time, these being: 1st observation (occurrences of complications during and up to the first 8 hours of hospitalization); 2nd observation (occurrences during and up to the 24 hours following the start of treatment); 3rd observation (occurrences during and up to the 48 hours following the start of treatment). These three chronological periods were established this way to meet what authors such as Gay (2009), Pinto (2013), and Ximendes and Silva (2015) all highlight in some manner, arguing that complications appear progressively and exponentially with each hour spent on NIV.
The number of patients decreased throughout these observations, explained by the transferring of patients to another unit or the suspension of NIV therapy.
The data collected was inserted and analyzed in the IBM SPSS Statistics software version 21.0 using a code number, ensuring the anonymity and confidentiality of the information. The data analysis employed descriptive statistics to describe and characterize the sample being studied, with a calculation of absolute (*n*) and relative (%) frequencies, measures of central trends (mean, *X*) and of dispersion (*SD*), as well as to identify and compare the observed versus perceived complications.
The study was given a favorable ruling from the Ethics Committee, according to reference no. 006540 and the authorization of the Director of the Urgent Care, Emergency and Intensive Care Department of the LHCNE. The use of confidential data from the patient files took into account the following presuppositions: an ethical agreement regarding the consultation of the case and data retrieval; agreement regarding the absolute preservation of anonymity; data collection was carried out at all times within the physical boundaries of this department. The informed consent, included at the start of the DCI, was obtained in two ways: in literate patients, through a signature, and in illiterate patients, using a fingerprint.

Results

The sample, as seen in Table 1, details 20 female individuals (57.14%) and 15 males (42.86%). All the members are over 75 years of age, 13 of them being older than 85 (37.14%).

Table 1
Distribution layout of the absolute (n) and relative (%) frequency values for the variables "Gender" and "Age"

Age group	Gender		Total
	Female *n* (row %) column %	Male *n* (row %) column %	*n* (row %) column %
Up to 75 years of age	5(45.45%) 25.00%	6(54.55%) 40.00%	11(100%) 31.43%
From 76 to 85 years of age	7(63.64%) 35.00%	4(36.36%) 26.67%	11(100%) 31.43%
Over 85 years of age	8(61.54%) 40.00%	5(38.46%) 33.33%	13(100%) 37.14%
Total	20(57.14%) 100%	15(42.86%) 100%	35(100%) 100%

In order to understand the pathogenic context in which the complications being studied arise, the clinical diagnoses of the sample were identified. It was established (Table 2) that most of the sample (*n* = 16; 45.71%) was diagnosed with respiratory failure and 13 patients had pneumonia (37.14%), followed by 12 patients with heart failure (34.29%). Acute chronic obstructive pulmonary disease (COPD), respiratory acidosis, and sepsis recorded the same number of cases (14.29%; *n* = 5) respectively.

Table 2
Distribution layout of the absolute (n) and relative (%) frequency values for the variable "Clinical Diagnosis"

Diagnosis	No *n* (row %)	Yes *n* (row %)	Total *n* (row %)
Respiratory failure	19(54.29%)	16(45.71%)	35(100%)
Pneumonia	22(62.86%)	13(37.14%)	35(100%)
Cardiac failure	23(65.71%)	12(34.29%)	35(100%)
Acute COPD	30(85.71%)	5(14.29%)	35(100%)
Respiratory acidosis	30(85.71%)	5(14.29%)	35(100%)
Sepsis	30(85.71%)	5(14.29%)	35(100%)
Acute pulmonary edema	31(88.57%)	4(11.43%)	35(100%)
Metabolic acidosis	33(94.29%)	2(5.71%)	35(100%)
AMI type II	34(97.14%)	1(2.86%)	35(100%)

Note. COPD = chronic obstructive pulmonary disease; AMI = acute myocardial infarction.

The results of complications perceived by the sample in the three periods of evaluation after starting NIV are recorded in Table 3.
It is essential to highlight that in the 1st period of evaluation, 35 patients were observed; in the 2nd period, 24 patients and in the 3rd period, 14 patients.
The frequency layout will reveal the most relevant perceived complications. In relation to the feeling of claustrophobia, it is noted that 68.57% of patients claimed to experience it in the 1st evaluation, while 58.33% experienced it in the 2nd evaluation and 50% in the 3rd evaluation. As for the ulcerations of the face, it was found that, in the different evaluation periods, most of the patients, 51.43%; 62.50%

and 57.14%, respectively, felt that the mask was hurting them. During all the evaluation periods, 45.71%, 58.33% and 50% of the patients perceived pain and indicated that the most painful area was the nasal bridge. As to the accumulation of secretions perceived by patients, it was mentioned by 31.34% of the sample in the 1st evaluation, by 41.67% patients in the 2nd evaluation, and also in the 3rd evaluation by 42.86% of the sample.

The remaining complications analyzed - nasal congestion, conjunctivitis, gastric distension, aerophagia, and the sensation of vomiting – appeared to be less relevant, as they were infrequent, having been reported only in the 2nd and 3rd evaluation periods.

Table 3

Distribution layout of the absolute (n) and relative (%) frequency values for the variable complications perceived by the critical patients

Complications	Feeling…?	Options (measured)	Up to 8h (*n* = 35)	Up to 24h (*n* = 24)	Up to 48h (*n* = 14)
Nasal congestion	Runny nose	No *n*(%)	35(100%)	24(100%)	11(78.57%)
		Yes *n*(%)	0(0.00%)	0(0.00%)	3(21.43%)
		Total *n*(%)	35(100%)	24(100%)	14(100%)
	Stuffy nose	No *n*(%)	35(100%)	23(95.83%)	12(85.71%)
		Yes *n*(%)	0(0.00%)	1(4.17%)	2(14.29%)
		Total *n*(%)	35(100%)	24(100%)	14(100%)
Conjunctivitis	Eye pain	No *n*(%)	34(97.14%)	19(79.17%)	12(85.71%)
		Yes *n*(%)	1(2.86%)	5(20.83%)	2(14.29%)
		Total *n*(%)	35(100%)	24(100%)	14(100%)
	Burning eyes	No *n*(%)	35(100%)	22(91.67%)	11(78.57%)
		Yes *n*(%)	0(0.00%)	2(8.33%)	3(21.43%)
		Total *n*(%)	35(100%)	24(100%)	14(100%)
	Itchy eyes	No *n*(%)	35(100%)	23(95.83%)	13(92.86%)
		Yes *n*(%)	0(0.00%)	1(4.17%)	1(7.14%)
		Total *n*(%)	35(100%)	24(100%)	14(100%)
Feeling of Claustrophobia	Stifled	No *n*(%)	11(31.43%)	10(41.67%)	7(50.00%)
		Yes *n*(%)	24(68.57%)	14(58.33%)	7(50.00%)
		Total *n*(%)	35(100%)	24(100%)	14(100%)
Gastric distension	Bloated stomach	No *n*(%)	29(82.86%)	18(75.00%)	13(92.86%)
		Yes *n*(%)	6(17.14%)	6(25.00%)	1(7.14%)
		Total *n*(%)	35(100%)	24(100%)	14(100%)
Aerophagia	Urge to burp	No *n*(%)	28(80.00%)	19(79.17%)	14(100%)
		Yes *n*(%)	7(20.00%)	5(20.83%)	0(0.00%)
		Total *n*(%)	35(100%)	24(100%)	14(100%)
	Stomach gases	No *n*(%)	29(82.86%)	19(79.17%)	14(100%)
		Yes *n*(%)	6(17.14%)	5(20.83%)	0(0.00%)
		Total *n*(%)	35(100%)	24(100%)	14(100%)
Vomit	Urge to vomit	No *n*(%)	33(94.29%)	24(100%)	14(100%)
		Yes *n*(%)	2(5.71%)	0(0.00%)	0(0.00%)
		Total *n*(%)	35(100%)	24(100%)	14(100%)

Ulcerations of the face	The mask hurting	No *n*(%)	17(48.57%)	9(37.50%)	6(42.86%)
		Yes *n*(%)	18(51.43%)	15(62.50%)	8(57.14%)
		Total *n*(%)	35(100%)	24(100%)	14(100%)
Pain	Pain	No *n*(%)	19(54.29%)	10(41.67%)	7(50.00%)
		Yes *n*(%)	16(45.71%)	14(58.33%)	7(50.00%)
		Total *n*(%)	35(100%)	24(100%)	14(100%)
	Area	Nose	16(100%)	10(71.43%)	6(85.71%)
		Face	0(0.00%)	4(28.57%)	1(14.29%)
		Total *n*(%)	16(100%)	14(100%)	7(100%)
Accumulation of secretions	Expectoration	No *n*(%)	24(68.57%)	14(58.33%)	8(57.14%)
		Yes *n*(%)	11(31.43%)	10(41.67%)	6(42.86%)
		Total *n*(%)	35(100%)	24(100%)	14(100%)

The complications observed by medical personnel during the three periods of evaluation are presented in Table 4. The following set of data is deemed of the highest relevance. Changes in the mucous membrane, more specifically dry mouth, is mentioned by 80% of the patients in the 1st observation; 91.67% of the sample refers to it in the 2nd observation and 78.57% in the 3rd observation. As to agitation and the intolerance to ventilation, it was noted that in the 1st evaluation it was more common for patients to want to take off the mask (28.57%), and 25.71% exhibited psychomotor agitation; 25.71% of patients could not deal with the mask well. It was observed that, overall, patients in the study showed signs of adapting to the treatment and provided evidence of the progressive decrease in complications. It was found that a majority of patients – 62.86 %, 87.50%, and 78.57% respectively - showed imprints from the mask; and furthermore, it was verified that in 31.43%, 58.33%, and 71.43% of the sample respectively, there were facial ulcerations and redness at the point of contact during the different observation periods. As to the accumulation of secretions – verified by observing the presence of a productive cough – it was noted that 28.57% of patients had secretion accumulation in the 1st evaluation, 29.17% in the 2nd evaluation, and 35.71% of patients experienced this complication in the 3rd evaluation. The less common complications were conjunctivitis, abdominal distension, and vomiting.

Table 4
Distribution layout of the absolute (n) and relative (%) frequency values for the variable complications observed by medical personnel

Complications	Exhibits	Options (measured)	Up to 8h (*n* = 35)	Up to 24h (*n* = 24)	Up to 48h (*n* = 14)
Changes in the mucous membrane	Dry mouth	No *n*(%)	7(20.00%)	2(8.33%)	3(21.43%)
		Yes *n*(%)	28(80.00%)	22(91.67%)	11(78.57%)
		Total (%)	35(100%)	24(100%)	14(100%)
Conjunctivitis	Tearing	No *n*(%)	32(91.43%)	20(83.33%)	11(78.57%)
		Yes *n*(%)	3(8.57%)	4(16.67%)	3(21.43%)
		Total (%)	35(100%)	24(100%)	14(100%)
	Red eye	No *n*(%)	34(97.14%)	20(83.33%)	11(78.57%)
		Yes *n*(%)	1(2.86%)	4(16.67%)	3(21.43%)
		Total (%)	35(100%)	24(100%)	14(100%)
	Oozing eye	No *n*(%)	32(91.43%)	22(91.67%)	14(100%)
		Yes *n*(%)	3(8.57%)	2(8.33%)	0(0.00%)
		Total (%)	35(100%)	24(100%)	14(100%)
Agitation and intolerance to ventilation	Wanting to remove mask	No *n*(%)	25(71.43%)	23(95.83%)	13(92.86%)
		Yes *n*(%)	10(28.57%)	1(4.17%)	1(7.14%)
		Total (%)	35(100%)	24(100%)	14(100%)
	Psychomotor agitation	No *n*(%)	26(74.29%)	23(95.83%)	13(92.86%)
		Yes *n*(%)	9(25.71%)	1(4.17%)	1(7.14%)
		Total (%)	35(100%)	24(100%)	14(100%)
	Tolerates the mask well	No *n*(%)	9(25.71%)	2(8.33%)	2(14.29%)
		Yes *n*(%)	26(74.29%)	22(91.67%)	12(85.71%)
		Total (%)	35(100%)	24(100%)	14(100%)
	Adapted patient	No *n*(%)	10(28.57%)	2(8.33%)	2(14.29%)
		Yes *n*(%)	25(71.43%)	22(91.67%)	12(85.71%)
		Total (%)	35(100%)	24(100%)	14(100%)
	Air leaks present	No *n*(%)	34(97.14%)	22(91.67%)	13(92.86%)
		Yes *n*(%)	1(2.86%)	2(8.33%)	1(7.14%)
		Total (%)	35(100%)	24(100%)	14(100%)
	Patient well-positioned	No *n*(%)	1(2.86%)	1(4.17%)	0(0.00%)
		Yes *n*(%)	34(97.14%)	23(95.83%)	14(100%)
		Total (%)	35(100%)	24(100%)	14(100%)
Gastric distension	Abdominal Perimeter		100.94±20.05	106.83±19.01	102.14±18.72

Vomiting	Has already vomited	No *n*(%)	35(100%)	24(100%)	14(100%)
		Yes *n*(%)	0(0.00%)	0(0.00%)	0(0.00%)
		Total (%)	35(100%)	24(100%)	14(100%)
	Has a nasogastric tube	No *n*(%)	35(100%)	23(95.83%)	14(100%)
		Yes *n*(%)	0(0.00%)	1(4.17%)	0(0.00%)
		Total (%)	35(100%)	24(100%)	14(100%)
Face ulcerations	Mask imprint	No *n*(%)	13(37.14%)	3(12.50%)	3(21.43%)
		Yes *n*(%)	22(62.86%)	21(87.50%)	11(78.57%)
		Total (%)	35(100%)	24(100%)	14(100%)
	Redness at the site	No *n*(%)	24(68.57%)	10(41.67%)	4(28.57%)
		Yes *n*(%)	11(31.43%)	14(58.33%)	10(71.43%)
		Total (%)	35(100%)	24(100%)	14(100%)
	Open wound at the site	No *n*(%)	34(97.14%)	22(91.67%)	14(100%)
		Yes *n*(%)	1(.86%)	2(8.33%)	0(0.00%)
		Total (%)	35(100%)	24(100%)	14(100%)
Accumulation of secretions	Productive cough	No *n*(%)	25(71.43%)	17(70.83%)	9(64.29%)
		Yes *n*(%)	10(28.57%)	7(29.17%)	5(35.71%)
		Total (%)	35(100%)	24(100%)	14(100%)

Discussion

The complications were studied from two points of view: those perceived by the patient and those observed by medical personnel. Those perceived by the patient and found to be more evident were: the feeling of claustrophobia in the evaluation up to 8 hours, experienced by 68.57% of 35 patients; in the evaluation up to 24 hours experienced by 24 patients (58.33%); and in the evaluation up to 48 hours, experienced by 50% of the patients. This evidence corroborates the results of Mehta and Hill (2001) and Freo et al. (2013), who also found the sensation of claustrophobia in 10 to 20% of patients, but does not corroborate Gay (2009), whose main complication verified was patient discomfort in 30 to 50% of that sample.

Facial ulcerations were referred to by a majority of patients - 51.43%, 62.50%, and 57.14% - in the three evaluation periods as "the mask is hurting me."

When questioned if they felt pain during the evaluation up to 8 hours, the majority (54.29%) reported not feeling pain, but in the evaluation up to 24 hours, 25.33% of the sample answered yes. Furthermore, in the evaluation up to 48 hours, 50% of the sample responded in the affirmative and 50% responded conversely, which does not corroborate the study by Gay (2009), where pain only appears in 10 to 20% of patients. Regarding the site of pain, most of the sample identified the nose in all the evaluation periods.

Regarding the accumulation of secretions, the majority of patients, when questioned, answered *no* in the three evaluation periods; however, some patients in the sample - 31.43%, 41.67%, and 42.86%, respectively – had this complaint in the successive observation periods.

As to the second approach, the complications observed by medical personnel, it is noted that a change in the mucous membranes, most specifically dry mouth, is by and large observed in the three evaluation periods, corroborating the findings of Gay (2009) in reporting changes in the mucous membranes in 30 to 50% of patients studied.

Conjunctivitis, a complication also noted in the study by Gay (2009) in 33% of that sample, and in 10 to 20% of that of Mehta and Hill, (2001), is verified here by the presence of tearing, red eye, or oozing in the three successive evaluations.

Agitation and intolerance to ventilation were observed, but it was concluded that the pa-

tients were, in general, not very agitated and tolerated the treatment: in all the evaluation periods, patients did not demonstrate agitation nor the urge to remove the mask, they were well-positioned and adapted and, no leaks of air were verified.

Facial ulcerations, such as sores on the nasal bridge, previously identified by Gay (2009) in 10 to 20% of that sample, were also noted here with ample evidence: most of the patients showed mask imprints and redness at the point of contact in all evaluation events. Conversely, little evidence was noted concerning open sores at the point of contact.

Conclusion

Medical personnel who work in the context of care for critically ill persons in NIV therapy develop an empirical knowledge of the incidence and prevalence of complications from NIV. However, this knowledge is a matter of opinion, a reducer and an inducer of error. In nursing, it is essential to develop knowledge from evidence-based practice. It is essential to know the complications and the respective progressions, in order to develop preventative performance practices consistently, based on reliable data and results.

In terms of a response to the formulated objective, it was noted that the most common complications were the feeling of claustrophobia in the three evaluations, the ulcerations of the face, the pain brought on by the use of a mask, and the accumulation of secretions. The less frequently occurring complications were nasal congestion, conjunctivitis, gastric distension, aerophagia, and the sensation of vomiting.

It is vital to recognize that these are complications resulting from NIV therapy that can and should be monitored early on, for being minimized and/or prevented, a fact that is important for the success of this method and patient recovery, and the reason why medical personnel assumes a primary role in NIV therapy care. Therefore, it is worthwhile to disseminate these results to open up inter- and intra-team discussions and to reinforce the significance of nursing training in the care practices for patients with NIV.

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