Reeducação Funcional Respiratória No Cliente Submetido A Gastrectomia: Programa De Intervenção Pré E Pós-Operatório

Reeducación Funcional Respiratorio En Cliente Sometido A Gastrectomía: Programa De Intervención Pre Y Postoperatorio

Functional Reeducation Of Breathing In The Client Submitted To Gastrectomy: Pre And Postoperative Intervention Program

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RESUMO

Objetivo: Analisar os efeitos de um programa de reeducação funcional respiratória pré e pós-operatório na dor, frequência respiratória e saturação de oxigénio do cliente submetido a gastrectomia programada.

Método: Estudo quase-experimental e longitudinal, sustentado num paradigma quantitativo, com uma amostra de 60 clientes distribuídos por dois grupos: 30 controlo e 30 intervenção.

Resultados: Baixos níveis de dor (M<2.07) estiveram presentes no estudo, com vantagens estatisticamente significativas para os clientes do grupo de intervenção, no momento da alta e consulta de pós-operatório (p=0,016 e p=0,002, respetivamente). Existe um impacto imediato vantajoso na saturação de oxigénio após a realização do programa, (p<0,001, em todos os momentos de avaliação). A frequência respiratória manteve-se normal, não se verificando efeitos da intervenção (p>0,05).

Conclusão: A implementação do programa revelou benefícios, sobretudo pós-operatórios, com diminuição do nível de dor e aumento da saturação de oxigénio. Não se traduziram efeitos do programa na frequência respiratória. A sua característica de continuidade no tempo traz vantagens para os clientes.

Palavras-chave: gastrectomia; reeducação funcional respiratória; enfermagem em Reabilitação.

RESUMEN

Objetivo: Analizar los efectos de un programa de reeducación funcional respiratoria previa y postoperatoria en el dolor, frecuencia respiratoria y saturación de oxígeno del cliente sometido a gastrectomía programada.

Método: Estudio casi experimental y longitudinal, sostenido en un paradigma cuantitativo, con una muestra de 60 clientes distribuidos por dos grupos: 30 control y 30 intervención.

Resultados: Bajos niveles de dolor estuvieron presentes en el estudio, con ventajas estadísticamente significativas para los clientes del grupo de intervención, en el momento de la alta y consulta de postoperatorio (p = 0,016 y p = 0,002, respectivamente). Existe un impacto inmediato ventajoso en la saturación de oxígeno después de la realización del programa, (p <0,001, en todos los momentos de evaluación). La frecuencia respiratoria se mantuvo normal, no ocurriendo efectos de la intervención (p> 0,05).

Conclusión: La implementación del programa reveló beneficios, sobre todo postoperatorios, con disminución del nivel de dolor y aumento de la saturación de oxígeno. No se tradujeron efectos del programa en la frecuencia respiratoria. Su característica de continuidad en el tiempo trae ventajas para los clientes.

Palabras clave: gastrectomía; reeducación funcional respiratorio; enfermería en rehabilitación.

ABSTRACT

Aim: To analyze the effects of a pre and post-operative breathing functional reeducation program in pain, respiratory rate and O_2 saturation in the health/illness transition process of the client submitted to an elective gastrectomy.

Method: A quasi-experimental and longitudinal study, based on a quantitative paradigm, with a sample of 60 clients distributed in two groups: 30 control and 30 intervention.

Results: Low levels of pain were present in the study, with statistically significant advantages for clients of the intervention group at discharge and postoperative consultation (p=0.016 and p=0.002, respectively). There is an immediate beneficial impact on oxygen saturation after the completion of the program, (p<0.001, at all times of assessment). The respiratory rate remained normal, with no effect of the intervention (p> 0.05).

Conclusion: The implementation of the program revealed benefits, mainly post-operative, with decreased pain

level and increased oxygen saturation. There were no program effects on respiratory rate. Its characteristic of continuity in time brings advantages to the clients.

Key words: gastrectomy; respiratory functional of breathing; rehabilitation nursing.

INTRODUCTION

Gastric cancer, also called stomach cancer, occurs when there is an abnormal proliferation of constituent cells in the stomach [1]. It presents disturbing epidemiological values, with approximately one million new cases diagnosed worldwide in 2012 [2]. In the northern region of Portugal in 2015 it was the fourth malignant tumor to affect more men and women, with an incidence rate of 8.3% and 5.5%, respectively [3]. It is a public health problem with a tendency to worsen in the near future, and it is expected that a considerable percentage of population will develop this neoplasm, mainly due to eating, smoking, alcoholic and sedentary habits [4].

Gastric cancer has a great personal and social impact due to its hostility as a disease and its aggressiveness towards treatments, leading the client to experience a health/disease transition [5]. Gastrectomy is the most common treatment for this type of tumor, being a surgical procedure in which there is partial or total removal of the stomach and adjacent lymph nodes [1].

It is an aggressive surgery that causes anxiety situations in clients resulting from feelings of loss of control, failure and fear [6]. In addition to the psychological impact, associating the anesthetic and surgical act, there is an effect on respiratory dynamics, contributing to the increased risk of postoperative pulmonary complications [7,8].

This impairment in respiratory dynamics occurs due to factors intrinsic to the client (age, smoking, obesity, chronic lung disease, malnutrition, state of consciousness, alcoholism, sedentary lifestyle and chest deformities) [8,9,10,11] and related factors with the surgical procedure (hypoventilation, immobilization, central nervous system depression, intubation, ineffective cough and phrenic nerve inhibition and consequently diaphragmatic paresis) [11,12,13,14].

There is a consensus that pulmonary complications arising in the postoperative period continue to influence morbidity, mortality and length of hospital stay, despite progress in the intervention of health professionals in the pre, intra and postoperative periods [11,15, 16,17]. Respiratory Functional Re-education Programs (RFR) have been increasingly shown to be beneficial, both in the prevention of postoperative pulmonary complications, and in their effective recovery [18].

RFR, also known as respiratory kinesitherapy, is a therapy that fundamentally uses movement in its intervention and acts on the mechanical phenomena of breathing, that is, on external ventilation and, through it, on alveolar ventilation [19].

The specialist nurse in rehabilitation nursing assumes a fundamental role here, as it is a professional whose function is to care for, to train and to maximize the functionality of clients throughout the life cycle [20], and can intervene with these skills in preventing or correcting the postoperative pulmonary complications, helping clients to experience a healthy transactional process [5].

The aim of this study is to analyze the effects of a pre- and postoperative RFR program on pain, respiratory rate and O2 saturation in the health/disease transition process of the client undergoing scheduled gastrectomy.

In this logic of transactional nursing care and RFR intervention in clients undergoing gastrectomy, the starting question arises: what is the effect of a pre- and postoperative RFR program on pain, respiratory rate and O2 saturation in the health/ disease, of the client undergoing scheduled gastrectomy?

METHOD

To achieve the objective of the study, we developed an investigation that fits into a quantitative, quasi-experimental and longitudinal paradigm.

As a quasi-experimental study, an RFR program was used as an intervention. Its conception was a construct that we prefer to systematize and phase, in order to provide it with methodological and clinical rigor, pertinence, objectivity and applicability. In the first phase, we carried out the construction of the program, using literature analysis. In the second phase, it was analyzed by an individual panel of experts. The third phase referred to the analysis and discussion of the experts' criticisms and suggestions. In the fourth phase, there was a new evaluation of the experts according to the changes resulting from their criticisms, where the program was approved by them. The last phase was the pre-test of 3 customers with positive feedback at the end, so the program design was completed.

The RFR program, conceived according to the above systematization, intended to restore and maximize respiratory performance, avoiding respiratory complications related to the surgical procedure and facilitating the health/disease transition process the client was experiencing.

The RFR program included: rest and relaxation techniques (lying down, sitting and standing); awareness of breathing times and breathing control; abdominal diaphragmatic breathing exercises and bilateral lower costal breathing; opening of rib cage exercises, with a stick; directed cough with containment of the surgical wound; change of position, active body movement and postural correction; and breath control in exertion, walking, and climbing and descending of stairs.

It was carried out by the principal investigator in order to cause as much uniformity as possible. The average duration of the program was 30 to 45 minutes, being adjusted to the client's clinical situation. As for the frequency of exercises, it was a work of agreement between the researcher and the client, taking into account the client's availability and physical condition.

With this research methodology, using the RFR program presented, we intended to test the following hypotheses:

H 1: The pre- and postoperative RFR program reduces client pain undergoing scheduled gastrectomy;

H 2: The pre- and postoperative RFR program improves respiratory rate of client undergoing scheduled gastrectomy;

H 3: The pre- and postoperative RFR program improves O2 saturation of client undergoing scheduled gastrectomy.

Since the research design is a logical plan, conceived by the researcher, in order to reach valid answers to the formulated hypotheses, we present in Figure 1 the design of our study.

	Pre-op. consultation		Home	Day before surgery		1st day post-op. and remaining internment		Home after discharge	Post-op. consultation
Intervention group	O1	X1	X2	X1	O2	X1	O2	X2	O,2
Control group	O1		--	O2		O2		--	O2

O1 - Initial data collection | O2 - Data collection
X1 - RFR program with researcher | X2 - RFR program without investigator

Figure 1 *– Research design*

The RFR program first took on a phase of teaching clients in the intervention group and evaluating this teaching, right after the preoperative consultation. This program was continued at home, without the investigator. On the day before surgery and during the remaining hospital stay, except for the day of surgery, there was daily intervention of the RFR program with the investigator. After discharge, the RFR program continued without the investigator until the moment of the postoperative consultation, the end of the study.

For this study, the sample was non-probabilistic, accidental, because it consisted of clients who underwent scheduled gastrectomy in the surgical service of a hospital in the north of the country, in the period in which data collection took place (from 1-11-2016 to 17-3-2017) and that met the inclusion criteria defined below: clients with scheduled gastrectomy, with general anesthesia prediction, conscious and oriented in time and space, no pulmonary metastases, no physical dependencies, with more than 18 years-old and who agreed to participate in the study with informed consent.

As this is a study with two groups (intervention and control), the distribution of clients occurred according to the hospital's card number. If odd belonged to intervention group, if even to the control.

The sample consisted of 60 participants, 30 from the intervention group and 30 from the control group.

A data collection instrument was built for the study, consisting of a part of sociodemographic and clinical characterization and another part of recording grids of oxygen saturation, respiratory rate and pain (variables dependent on the study). Pain was assessed using the numerical pain scale.

Statistical analysis of data was performed using SPSS▫ version 23.0. The accepted significance level was 5%, with a 95% confidence interval.

Data processing was performed in two ways: through descriptive and inferential analysis.

In descriptive statistics of categorical variables, we used tables of absolute and relative frequencies, which were accounted for in each study group. For quantitative variables, we used the minimum, maximum, mean, median, standard deviation and interquartile range.

In the inferential analysis, we performed comparison tests between the two groups. In order to verify whether the two samples under study differed from each other, the chi-square test was used for categorical variables. When the dependent variable was quantitative, to verify differences between groups, the t-Student parametric test was used for two independent samples. When the assumption of normality of the samples was not validated, the non-parametric Mann-Whitney U test was used.

In order to analyze the differences between the various evaluation moments for all the variables of interest, in the case of more than two moments, the ANOVA was used for repeated measures, when the normality assumption was fulfilled, and when it is not found fulfilled, the non-parametric Friedman test was used.

The study was authorized by the institution's ethics committee and board of directors, and informed consent was obtained from all participants.

RESULTS

Regarding age, the clients in the control group had values between 33 and 86 years-old (M=65.30;

SD=13.68), those in the intervention group were aged between 40 and 85 years-old (M= 62.73; SD=12.52). There were no significant differences between the two groups in terms of age [t(58)=0.76; p=0.451].

With regard to gender, the control group comprised 18 (60.0%) men and 12 (40.0%) women, the intervention group consisted of 14 (46.7%) men and 16 (53.3 %) women. There were no significant differences between the two groups regarding gender [χ^2 (1) =1.07; p=0.301].

As in age and gender, in the remaining variables of sociodemographic and clinical characterization, there were no significant differences between the two groups. Due to its extensibility, we do not present the results in detail in this article. For a better explanation of the results, we chose to make a presentation according to the variables under study.

Pain

We present the results obtained in relation to pain in two different scenarios. Table 1 shows the statistical analysis carried out between control and intervention groups for each moment of pain assessment. Table 2 shows the statistical analysis at temporal level for control and intervention groups.

It was found that clients in the control group reported more pain at the time of discharge and postoperative consultation, and the differences observed between the two groups were significant (U=304.00; p=0.016 and U=288.00; p=0.002, respectively). In the remaining moments (preoperative visit, the day before surgery and the 1st postoperative day), there were no statistically significant differences.

According to table 2, statistically significant differences were found between pain assessments, both for the control group and for the intervention group [$\chi^2(4)$ =49.01; p<0.001 and $\chi^2(4)$ =49.63; p<0.001, respectively].

		Pre-op. consultation		Day before surgery		1st post-op.		Discharge		Post-op. consultation	
		C	I	C	I	C	I	C	I	C	I
Pain	Minimum	0	0	0	0	0	0	0	0	0	0
	Maximum	3	0	2	0	7	5	5	2	4	1
	Median	0.00	0.00	0.00	0.00	2.00	1.50	1.00	0.00	0.00	0.00
	Interquartile range	0.00	0.00	0.00	0.00	3.25	3.00	3.00	1.00	2.00	0.00
	Average	1.00	0.00	0.07	0.00	2,07	1.60	1.53	0.43	0.83	0.10
	Standard deviation	0.55	0.00	0.37	0.00	1.96	1.63	1.72	0.68	1.18	0.31
Comparison between groups		U= 435.00 p=1.000		U =435.00 p=1.000		U =395.50 p=0.411		U =304.00 p=0.016		U= 288.0 p=0.002	
Subtitle: C-Control group; I – Intervention group; U- *Mann-Whitney U* test statistic; *p*- value of test											

Table 1 *- Analysis of differences between the intervention group and the control group in pain*

	Pre-op consultation. Average order	The day before Average order	1st post-op. Average order	Discharge Average order	Post-op consultation. Average order	Comparison
Pain (Control)	2.23	2.18	3.95	3.60	3.03	$\chi^2(4)$ = 49.01 p < 0.001
Pain (Intervention)	2.48	2.48	4.03	3.27	2.73	$\chi^2(4)$ = 49.63 p < 0.001
Subtitle: χ^2 – *Friedman*'s test statistics; p- value of test						

Table 2 *- Analysis of differences between time points, in pain assessment, for the control group and for the intervention group*

Respiratory frequency

As for the respiratory rate, we present table 3 that shows the results making the statistical analysis between the study groups at each moment and table 4 that exposes the differences at the longitudinal level, that is, over time separately from the control and intervention groups.

No statistically significant differences were found between clients in the control and intervention groups in terms of the respiratory rate recorded at any of the evaluation moments (all p>0.05), as shown in table 3.

From the analysis of table 4, we can see that, in relation to the control group, no statistically significant differences were found between the

respiratory rate assessments performed at the five time points [$\chi^2(4)=3.62$; p=0.459]. With regard to the intervention group, statistically significant differences were found in respiratory rate among the five assessments [$\chi^2(4)=16.18$; p=0.003].

		Pre-operative consultation		The day before surgery		1st post-op.		Discharge		Post-op. consultation	
		C	I	C	I	C	I	C	I	C	I
Respiratory frequency	Minimum	14	14	16	14	14	14	14	16	14	16
	Maximum	20	20	20	22	24	20	22	20	20	20
	Median	16.00	16.00	17.00	18.00	17.00	18.00	16.00	16.00	17.00	16.00
	Interquartile range	2.00	2.00	2.00	2.00	4,00	4.00	2.00	2.00	2.00	2.00
	Average	16.80	16.53	17.20	17.40	17.93	17.73	16.87	16.73	17.07	16.60
	Standard deviation	1,54	1,38	1.35	1,83	2,90	2.08	1.87	1.11	1.36	1.07
Comparison between groups		U= 407,00 p=0.490		U =433.50 p=0.787		U= 450.00 p=1.000		U =436.00 p=0.832		U =355.50 p=0.121	
Subtitle: C-control group; I – intervention group; U- Mann-Whitney U test statistics; p- value test											

Table 3 *- Analysis of differences between intervention group and control group in respiratory rate*

	Pre.op. consultation Average order	The day before surgery Average order	1st post-op. Average order	Discharge Average order	Post-op. consultation. Average order	**Comparison**
Respiratory Freq. (Control)	2.73	3.15	3.33	2.87	2.92	$\chi^2(4) = 3.62$ p = 0.459
Respiratory Freq. (Intervention)	2.50	3.33	3.67	2.85	2.65	$\chi^2(4) = 16.18$ p = 0.003
Subtitle: χ^2 – *Friedman*'s test statistics; p- value of test						

Table 4 *- Analysis of differences between temporal moments, in the assessment of respiratory rate, for control group and for intervention group*

Oxygen Saturation

Initially we show the results regarding the initial O^2 saturation, that is, before the execution of the RFR program. Afterwards, we present the values related to the final saturation, and finally, the comparison between the initial and final O^2 saturation, in relation to the clients in the control group.

It was found that the clients in the intervention group had a higher initial saturation, at the time of discharge and postoperative consultation, and the differences observed between the two groups were significant at these times (U=293.50; p=0.018 and U=164.00; p<0.0001, respectively). In the remaining moments, the differences were not significant, as shown in table 5.

Analyzing table 6, we notice that statistically significant differences were found between the initial oxygen saturation assessments carried out at the five time points, both for the control group and for the intervention group [$\chi^2(4)=33.36$; p<0.001 and $\chi^2(4)=67.71$; p<0.001, respectively].

		Pre-operative consultation		The day before surgery		1st post-op.		Discharge		Post-op. consultation	
		C	I	C	I	C	I	C	I	C	I
Initial O_2 saturation	Minimum	95	94	95	95	92	93	95	95	95	96
	Maximum	100	99	100	100	98	97	100	99	100	100
	Median	97	97	97	98	96	95.5	96.5	97.5	97	98
	Interquartile range	2.00	2.00	2.00	2.25	3.00	2.00	2.00	1.25	1.25	1.00
	Average	97.07	96.97	97.10	97.70	95.50	95,57	96.53	97.27	97.23	98.47
	Standard deviation	1.39	1.33	1.40	1.42	1.48	1,19	1,31	1,23	1.04	0.90
Comparison between groups		U =443.00 p=0.915		U= 342.50 p=0.105		U= 445.00 p=0.939		U= 293.50 p=0.018		U= 164.00 p< 0.001	
Subtitle: C-control group; I – intervention group; U- Mann-Whitney U test statistics; p- value test											

Table 5- *Analysis of differences between intervention and control groups in initial oxygen saturation*

	Pre-op consultation. Average order	The day before Average order	1st post-op. Average order	Discharge Average order	Post-op. consultation. Average order	Comparison
Initial O_2 Sat. (Control)	3.45	3.32	1.78	2.73	3.72	$\chi^2(4) = 33.36$ $p < 0.001$
Initial O_2 Sat. (Intervention)	2.73	3.75	1.28	3.03	4.20	$\chi^2(4) = 67.71$ $p < 0.001$
Subtitle: χ^2 - Friedman's test statistics; p - value of test						

***Table 6** - Analysis of differences between time points, in assessment of initial oxygen saturation, for control group and for intervention group*

Regarding the final oxygen saturation, it can be seen from the analysis of table 7 that statistically significant differences were found at all evaluation moments, with the clients in the group of intervention showed higher saturation than clients in the control group at all times (all p<0.05).

		Pre-operative consultation		The day before surgery		1st post-op.		Discharge		Post-op. consultation	
		C	I	C	I	C	I	C	I	C	I
Final O_2 Saturation	Minimum	95	98	95	98	92	97	95	98	95	96
	Maximum	100	100	100	100	98	100	100	100	100	100
	Median	97	100	97	100	96	97	96,5	100	97	98
	Interquartile range	2.00	2.00	2.00	2.00	3.00	2.50	2.00	0.25	1.25	1.50
	Average	97.07	99.37	97.10	99.53	95.50	98.80	96.53	99.60	97.23	98.47
	Standard deviation	1.39	0.76	1.40	0.68	1.48	0.96	1.31	0.77	1.04	0.90
Comparison between groups		U =77.50 p<,0001		U= 59.00 p<,0001		U =16,50 p<,0001		U =34.50 p<,0001		U= 164.00 p<,0001	
Subtitle: C-control group; I - intervention group; U- Mann-Whitney U test statistics; p- value test											

***Table 7** - Analysis of differences between intervention and control groups in final oxygen saturation*

	Pre-op consultation. Average order	The day before Average order	1st post-op. Average order	Discharge Average order	Post-op. consultation. Average order	Comparison
Final O_2 Sat. (Control)	3.45	3.32	1.78	2.73	3.72	$\chi^2(4) = 33.36$ $p < 0.001$
Final O_2 Sat. (Intervention)	3.28	3.65	2.25	3.73	2.08	$\chi^2(4) = 43.22$ $p < 0.001$
Subtitle: χ^2 - Friedman's test statistics; p - value of test						

***Table 8** - Analysis of differences between time points, in the assessment of final oxygen saturation, for the control group and intervention grou*

When we analyzed the final oxygen saturation by groups in relation to the moments of evaluation that took place in the study (Table 8), we noticed there are statistically significant differences between the evaluations, both for control group and for intervention group [$\chi^2(4)$ =33.36; p<0.001 and $\chi^2(4)$=43.22; p<0.001, respectively].

The data in table 9 show statistically significant differences at all time points, and saturation was always higher in final assessment when compared to initial assessment (all p<0.05).

		Pre-operative consultation		The day before surgery		1st post-op.		Discharge	
		Inicial Sat.	Final Sat.	Inicial Sat.	Final Sat.	Inicial Sat.	Final Sat.	Inicial Sat.	Final Sat.
Intervention group	Median	97	100	98	100	95,5	97	97,5	100
	Interquartile range	2.00	2.00	2.25	2.00	2.00	2.50	1.25	0.25
	Average	96.97	99.37	97.70	99.53	95.57	98.80	97.27	99.60
	Standard deviation	1.33	0.76	1.42	0.68	1.19	0.96	1.23	0.77
Comparison		Z = -4.87 p<0.001		Z= -4.69 p<0.001		Z= -4.87 p<0.001		Z= -4.87 p<0.001	
Subtitles: Z -*Wilcoxon test statistics*; p - Proof value									

***Table 9** - Analysis of differences between initial and final oxygen saturation assessment*

DISCUSSION

As in the previous chapter, we chose to discuss the results according to the dependent variables under study.

Pain

The pain essentially happened on the first day of postoperative period with a median of 2, according to the pain scale (maximum 7 and minimum 0), in the control group; and a median of 1.5 (maximum 5 and minimum 0) in the intervention group. In the following evaluation moments (discharge and postoperative consultation) pain levels decrease compared to the 1st postoperative day in the intervention and control group.

When analyzing these values, it is clear that it is common in moments closer to surgery for pain levels to be higher. However, according to the medians, we can consider these pain levels reduced. This is because most clients have an epidural catheter, an infusion pump for continuous analgesia and the ability to infuse bolus autonomously when they are in pain. On the other hand, there are prescribed analgesia protocols to help manage pain.

Perhaps because of this pharmacological pain control, which aims at the absence of pain in the postoperative period, the statistical analysis at this time of evaluation (1st postoperative day) has not shown significant differences between the control and intervention groups. (p=0.411).

As previously described, the longitudinal analysis, between the 1st postoperative day, the time of discharge and postoperative consultation, allows us to verify that there is a decrease in pain in both groups with significant differences. This fact is understandable because as time passes, the pain becomes less. However, this decrease in pain intensity was greater for the intervention group, which leads us to conclude that the RFR program influenced pain.

Two studies corroborate our data in that they conclude that kinesitherapy promotes pain reduction after its completion [21]. These studies challenge the principle that mobilization can increase pain levels in the postoperative period of abdominal surgery. In fact, they say that not only analgesia, but also kinesitherapy, help to reduce pain levels, reduce hospital stay and improve clients' recovery [21].

Like our results, two other investigations conclude that there was an increase in pain levels in the immediate postoperative period and a decrease in the second postoperative day and following [22,23].

Our hypothesis is partially supported by the statistical analysis, that is, there are only statistically significant differences between the groups at discharge and at the postoperative visit, with pain levels being lower in the intervention group, in these two moments of assessment. With the longitudinal analysis, we realize that the long-term RFR program brings benefits with regard to pain levels, especially when pharmacological analgesia levels are lower. We can say that in addition to the statistical impact that these data translated, the clinical benefits caused by the RFR program on the pain levels of clients under study are also noticeable and valuable.

Respiratory Frequency

The values obtained by the statistical analysis regarding respiratory rate, show medians at all times and in both groups that vary between 16 and 18, meaning, values that are clinically considered normal and minimum values of 14 and maximum values of 24. The analysis does not show significant differences between groups (all p>0.05).

Regarding the longitudinal evaluation, the control group does not present significant differences. As for the intervention group, data tell us that there are significant differences, but they are not clinically valuable because the data obtained on respiratory rate were stable and normal throughout the study.

We can assume that the RFR program did not interfere with the respiratory rate of the study sample. Contrary to our results, an investigation carried out in the same context revealed that respiratory kinesitherapy resulted in an improvement in the respiratory rate, within a short period of time (30 minutes) after the therapy was carried out [24]. Another study concludes that the preoperative RFR

program implemented contributed to the stability of the respiratory rate [22].

The data from our study lead us to say that our hypothesis was neither statistically nor clinically supported.

O_2 Saturation

Oxygen saturation values throughout the study were considered normal (minimum value was 92%) in the control and intervention group. However, when comparing the values of initial oxygen saturation between groups, it was found that clients in the intervention group had a higher initial O_2 saturation, at time of discharge and postoperative consultation, being the differences observed between both groups significant at these times ($p=0.018$ and $p<0.0001$, respectively). In the remaining evaluation moments, the differences between the groups were not statistically significant.

Longitudinally, it is clear that from the preoperative consultation and the day before surgery in relation to the 1st postoperative day there is a decrease in this value, which is understandable, since the client underwent gastrectomy, which proves that this surgical procedure interferes with this variable. This happens in the control and intervention group. However, if we compare the 1st postoperative day with the time of discharge and postoperative consultation, we notice that there is a significant increase in saturation, which is higher in the intervention group, demonstrating advantages for clients in this group.

This fact leads us to affirm that the RFR program interfered in a beneficial way for the clients in the intervention group, allowing them to have, at the time of discharge and postoperative consultation, oxygen saturation values higher than clients in the intervention and control group. Let's say that there is a substantial improvement in oxygen saturation as the RFR program is implemented.

Regarding the final oxygen saturation, there are statistically significant differences between the control and intervention groups in all evaluation moments, always with better values in the intervention group. This demonstrates that the RFR program positively interferes with this variable. The RFR program brings immediate benefits in the final O_2 saturation of clients in the intervention group.

Other investigations corroborate the obtained data, demonstrating that respiratory kinesitherapy was able to improve oxygen saturation after its completion, favoring clients with higher oxygen levels at the end of its performance [21].

At the longitudinal level, the final O_2 saturation behaved like the initial O_2 saturation.

Contrary to our study, Rodrigues (2015), in his study with the application of a preoperative RFR program in patients undergoing abdominal surgery, says that this program did not have any advantage in terms of oxygen saturation.

Our hypothesis is partially supported by statistical analysis:

- in the comparison of the initial O_2 saturation between the intervention and control groups, at the time of discharge and during the postoperative consultation;

- in the comparison of the final O_2 saturation between the intervention and control groups, at all evaluation moments;

- in the comparison of initial O_2 saturation - final O_2 between the intervention group, in all evaluation moments;

- longitudinally, there is an improvement in the initial and final O_2 saturation from the 1st postoperative day to the day of discharge and postoperative consultation, with a significant advantage for the intervention group.

CONCLUSIONS

From the literature review carried out, which followed the entire research process, it was quickly realized that the study of rehabilitation nursing in this area is scarce. Internationally, research is carried out on RFR in clients undergoing abdominal surgery, and the studies are mainly carried out by physiatrists or physiotherapists. It should be added that this study was totally innovative in focusing its action only on clients undergoing gastrectomy, which, according to the review carried out, had never been done before.

We summarize the main results of this investigation, concluding that the RFR program:

• had an impact on pain at discharge and postoperative consultation, with favorable values for the intervention group with lower pain levels;

• had no impact on respiratory rate, the results being constant and within normal values;

• had an impact on initial O_2 saturation at discharge and postoperative consultation and on final O_2 saturation at all times between the control and intervention groups. As for the initial and final O_2 saturation values in the intervention group, there was always an improvement in these values in the final saturation, demonstrating a great advantage of implementing the RFR program.

We conclude that there is an influence of the RFR program on pain and O_2 saturation. This effect is beneficial for the intervention group, being more frequent during the postoperative period, which demonstrates that its continued application brings benefits to clients. This fact reveals the continued importance of the RFR program for this type of customer.

For the enhancement of Rehabilitation Nursing and recognition of its contribution to improving the quality of care provided, it is necessary to develop more research studies in this area, in order to demonstrate, through health gains for the client and for the health

service, the impact of the rehabilitation nurse on care.

BIBLIOGRAPHIC REFERENCES

1. Smyth EC, Verheij M, Allum W, Cunningham D, Cervantes A, Arnold D. Gastric cancer: ESMO Clinical Practice Guidelines for diagnosis, treatment and follow-up. Ann Oncol. 2016; 27 (Supplement 5): v38-v49. Doi:10.1093/annonc/mdw350.
2. Torre LA, Bray F, Siegel R, Ferlay J, Lortet-Tieulent J, Jemal A. Global cancer statistics – CA Cancer J Clin. 2015; 62 (2): 87-108. doi: org/10.3322/caac.21262.
3. Registo Oncológico Instituto Português de Oncologia do Porto. Registo Oncológico 2015. Porto: Instituto Português de Oncologia do Porto; 2016.
4. Silva V, Felício D. Fatores de risco para o câncer gástrico em grupos de classe socioeconómico baixa: revisão literária. Revista de Iniciação Científica da Universidade Vale do Rio Verde. 2016; 6 (1): 3-10.
5. Soares E. Programa de Reeducação Funcional Respiratória pré e pós-operatório na transição saúde/doença do cliente submetido a gastrectomia programada. Viana do Castelo: Instituto Politécnico de Viana do Castelo, Escola Superior de Saúde, 2017. Dissertação de Mestrado.
6. Taylor C. Improving outcomes for people recovering from cancer. J Community Nurs. 2017; 31 (2): 46-50.
7. Fonseca A. Influência da cirurgia abdominal na função pulmonar e capacidade de tosse. Porto: Instituto Politécnico do Porto, Escola Superior de Tecnologia da Saúde, 2011. Dissertação de Mestrado.
8. Isaías F, Sousa L, Dias L. Noções gerais da reabilitação respiratória na pessoa submetida a cirurgia torácica/cardíaca/abdominal. *In* Cordeiro M, Menoita E. Manual de Boas Práticas na Reabilitação Respiratória- Conceitos, Princípios e Técnicas. Loures: Lusociência, 2012: 303-14.
9. Alcantara E, Santos V. Estudo de complicações pulmonares e do suporte ventilatório não invasiva no pós-operatório de cirurgia cardíacaRev Méd Minas Gerais. 2009; 19 (1): 5-12.
10. Marek J, Boehnlein M. A Enfermagem Pré-Operatória. *In* Monahan F, et al. Enfermagem Médico-Cirúrgica/Perspetivas de Saúde e de doença. 8ª ed. (1). Loures: Lusociência, 2010: 245-74.
11. Ntutumu R, Liu H, Zhen L, Hu YF, Mou TY, Lin T, I BA, Yu J, Li GX. Risk factors for pulmonary complications following laparoscopic gastrectomy: A single-center study. Med. 2016; 95 (32): e4567. doi: 10.1097/MD.0000000000004567.
12. Gastaldi AC, Magalhães CMB, Baraúna MA, Silva EMC, Souza HCD. Benefícios da cinesioterapia respiratória no pós-operatório de colecistectomia laparoscópica. Braz J Phys Ther. 2008; 12 (2): 100-6. Doi: 10.1590/S1413-35552008000200005.
13. Javanainen MH, Scheinin T, Mustonen H, Leivonen M. Do Changes in Perioperative and Postoperative Treatment Protocol Influence the Frequency of Pulmonary Complications? A Retrospective Analysis of Four Different Bariatric Groups. Obes Surg. 2017; 27 (1): 64-69. doi.org/10.1007/s11695-016-2236-7
14. Yang CK, Teng A, Lee DY, Rose K. Pulmonary complications after major abdominal surgery: National Surgical Quality Improvement Program analysis. J Surg Res. 2015; 198 (2): 441-9. doi: 10.1016/j.jss.2015.03.028.
15. Fernandez-Bustamante A, Frendl G, Sprung J, Kor DJ, Subramaniam B, Martinez Ruiz R, et al. Postoperative Pulmonary Complications, Early Mortality, and Hospital Stay Following Noncardiothoracic Surgery: A Multicenter Study by the Perioperative Research Network Investigators. JAMA Surgery. 2017; 152 (2): 157-66. doi:10.1001/jamasurg.2016.4065.
16. Pasin L, Nardelli P, Belletti A, Greco M, Landoni G, Cabrini L, Chiesa R, Zangrillo A. Pulmonary Complications After Open Abdominal Aortic Surgery: A Systematic Review and Meta-Analysis. J Cardiothoracic Vasc Anest. 2017; 31 (2): 562-8. doi: 10.1053/j.jvca.2016.09.034.
17. Atilla N, Arpag H, Bozkus F, Kahraman H, Cengiz E, Bulbuloglu E, Atilla S. Can We Predict the Perioperative Pulmonary Complications Before Laparoscopic Sleeve Gastrectomy: Original Research. Obes Surg. 2017; 27 (6):1524-28. Doi: 10.1007/s11695-016-2522-4
18. Saltiél R, Brito J, Paulin E, Schivinski, C. Cinesioterapia respiratória nas cirurgias abdominais: breve revisão. Arq Ciências Saúde UNIPAR. 2012; 16 (1): 3-8.
19. Troosters T, Gosselink R, Janssens W, Decramer M. Exercise Training and Pulmonary Rehabilitation: New Insights and Remaining Challenges. European Respiratory Review. 2010; 19 (115): 24-9. doi: 10.1183/09059180.00007809.
20. Regulamento n.º 125/ 2011. DR II Série. 35 (2011/02/18): 2312-18.
21. Manzano RM, Carvalho C, Saraiva-Romanholo B, Vieira J. Chest physiotherapy during immediate postoperative period among patients undergoing upper abdominal surgery: randomized clinical Trial. São Paulo Mês J. 2008; 126 (5): 269-73. doi.org/10.1590/S1516-31802008000500005
22. Rodrigues, S. Efeitos de um programa pré-operatório de reeducação funcional respiratória, no doente submetido a cirurgia abdominal programada. Bragança: Instituto Politécnico de Bragança, Escola Superior de Saúde, 2015. Dissertação de Mestrado.
23. Miranda A, Novaes R, Ferreira A, Neves, M, Corrêa C, Mendonça V. Avaliação da força da musculatura respiratória, pico de fluxo expiratório e dor após colecistectomia aberta. Acta Gastroenterol Latinoam. 2009; 39 (1): 38-46.
24. Mimica Z, Pogorelić Z, Srsen D, Perko Z, Stipié R, Dujmović D, Tocilj J, Ujević D. The effect of analgesics and physical therapy on respiratory function after open and laparoscopic cholecystectomy. Coll Antropol. 2008; 32 (1): 193-9.