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CUIDADOS DE ENFERMAGEM DE REABILITAÇÃO À PESSOA COM PNEUMONIA: ESTUDO DE CASO

REHABILITATION NURSING CARE FOR THE PERSON WITH PNEUMONIA: CASE REPORT

REHABILITACIÓN DE LA FUNCIÓN RESPIRATÓRIA EN LA PERSONA COM NEUMONÍA: ESTUDIO DE CASO

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RESUMO

Introdução: A pneumonia é uma doença onde ocorre a inflamação do parênquima de um ou ambos os pulmões. É um dos principais motivos de internamento por doença respiratória e caracteriza-se por um padrão restritivo, onde há diminuição na capacidade do volume inspirado. O tratamento da pneumonia é sintomático e/ou farmacológico, em função dos agentes envolvidos, e deve ser complementado com a realização de exercícios de Reeducação Funcional Respiratória para otimizar a ventilação, prevenir e corrigir as alterações posturais, permeabilizar a via aérea e reduzir o trabalho respiratório.

Objetivo: Identificar o contributo de um programa de Reeducação Funcional Respiratória dirigido à pessoa com pneumonia.

Método: Estudo de Caso que respeita as *guidelines Case REport*. Foi implementado um programa de Enfermagem de Reabilitação dirigido aos diagnósticos identificados consoante os objetivos previstos e das necessidades identificadas na avaliação inicial da pessoa cuidada.

Resultados: As técnicas de Reeducação Funcional Respiratória utilizadas permitiram a redução da sintomatologia associada à pneumonia, a melhoria da capacidade de exercício e da capacidade funcional, com um posterior aumento da participação nas atividades de vida diárias e consequentemente, uma melhoria da qualidade de vida.

Conclusão: O programa de Enfermagem de Reabilitação implementado contribuiu para a melhoria da função respiratória e da funcionalidade da pessoa com doença respiratória aguda.

Descritores: Enfermagem de Reabilitação; Pneumonia; Reeducação Funcional Respiratória

ABSTRACT

Introduction: Pneumonia is a disease where the inflammation of the parenchyma of one or both lungs occurs. It is one of the main reasons for hospitalization due to respiratory disease and is characterized by a restrictive pattern, where there is a decrease in the inspired volume capacity. The treatment of pneumonia is symptomatic and/or pharmacological, depending on the agents involved, and should be complemented with Functional Respiratory Reeducation exercises to optimize ventilation, prevent and correct postural changes, permeabilize the airway and reduce work respiratory.

Objective: To identify the contribution of a Functional Respiratory Reeducation program for people with pneumonia.

Method: Case Study that respects the Case REport guidelines. A Rehabilitation Nursing program was implemented, aimed at the diagnoses identified according to the foreseen objectives and the needs identified in the initial assessment of the person being cared for.

Results: The Functional Respiratory Reeducation techniques used allowed the reduction of symptoms associated with pneumonia, the improvement of exercise capacity and functional capacity, with a subsequent increase in participation in daily life activities and, consequently, an improvement in quality of life.

Conclusions: The Rehabilitation Nursing program implemented contributed to the improvement of respiratory function and functionality of the person in the context of acute respiratory disease.

Descriptors: Pneumonia; Rehabilitation Nursing; Respiratory Functional Reeducation

RESUMEN

Introducción: La neumonía es una enfermedad en la que ocurre la inflamación del parénquima de uno o ambos pulmones. Es uno de los principales motivos de hospitalización por enfermedad respiratoria y se caracteriza por un padrón restrictivo, donde hay una disminución de la capacidad de volumen inspirado. El tratamiento de la neumonía es sintomático y/o farmacológico, dependiendo de los agentes implicados, Y debe complementarse con la realización de ejercicios de Reeducación Respiratoria Funcional para optimizar la ventilación, prevenir y corregir los cambios posturales, permeabilizar la vía aérea y reducir el trabajo respiratorio.

Objetivo: Identificar la contribución de un programa de Reeducación Respiratoria Funcional para personas con neumonía.

Metodología: Estudio de caso que respeta las pautas del Case REport. Se implementó un programa de Enfermería de Rehabilitación orientado a los diagnósticos identificados según los objetivos esperados y las necesidades identificadas en la valoración inicial de la persona cuidada.

Resultados: Las técnicas de Reeducación Funcional Respiratoria utilizadas permitieron la reducción de los síntomas asociados a la neumonía, la mejora de la capacidad de ejercicio ya la capacidad funcional, con un posterior aumento de la participación en actividades de la vida diaria y en consecuencia, una mejora en la calidad de vida.

Conclusión: El programa de Enfermería de Rehabilitación implementado contribuyó a mejorar la función y funcionalidad respiratoria de la persona en el contexto de enfermedad respiratoria aguda.

Descriptores: Enfermería de Rehabilitación; Neumonía; Reeducación Funcional Respiratoria

INTRODUCTION

Pneumonia, from the Greek "Pneumon", is a disease where all or part of the alveoli are filled with fluid and erythrocytes, reducing lung and/or rib cage compliance and increasing respiratory frequency, reducing tidal volume and ventilation-perfusion index [1–5]. It's characterized by a restrictive pattern, in which there is a decrease in the inspired volume capacity, the causes of pneumonia may originate from pathogenic agents; chemical agents; physical agents; and blood circulation disorders[1–3,6].

This disease is the second leading cause of death in Portugal, after lung cancer, and is the main reason for hospitalization due to respiratory disease[7]. Age greater than or equal to 75 years-old, living in a nursing home, having cerebrovascular and/or cardiac disease, renal failure, dementia, reduced mobility, cachexia, metastatic disease or sepsis upon hospital admission, are comorbidities that increase the risk of death from pneumonia during hospitalization[6,7].

Commonly, a person with pneumonia presents chest pain, dyspnea, fever, sputum and the presence of adventitious sounds on lung auscultation, more intense in the inspiratory phase. The diagnosis is made through the person's clinical history and physical evaluation, chest x-ray, laboratory analyzes and isolation of etiological agents from sputum. Chest radiography is essential as it provides information about the lung parenchyma, mediastinum, soft tissues and bone structures, allowing the extent of the disease to be assessed and distinguished from other infectious processes. However, radiological results are not specific enough to define its origin, making it necessary to obtain an etiological diagnosis through laboratory analyzes and bacteriological examination of sputum[1,2,5,6].

The treatment of pneumonia must be complemented by performing Respiratory Functional Reeducation [RFR] exercises, and identifying the stage of the disease is necessary to define the RFR intervention to follow[4,5]. In the initial phase, treatment aims to reduce the ventilation-perfusion index, reverse the decrease in volume in adjacent lung segments and prevent atelectasis. As pneumonia progresses, lung consolidation ends up reducing and the cough becomes productive, making it necessary to carry out interventions to effectively clean the airways[2,4,5].

In this sense, the importance of the intervention of the Specialist Nurse in Rehabilitation Nursing [SNRN] becomes clear, as a professional who has skills to design, implement and monitor differentiated Rehabilitation Nursing [RN] plans based on the real and potential problems of people[8].

A therapeutic plan that includes RFR sessions has a beneficial effect both on the prognosis of the disease and on reducing the number of exacerbations and lower mortality[5]. In this sense, this Case Study was developed about a person with pneumonia, admitted to an internal medicine service. Taking into account the morbidity and mortality associated with this respiratory disease, this clinical case becomes even more relevant and interesting, allowing an in-depth analysis of the results obtained and paralleling the most recent scientific evidence.

In view of the above, the guiding question of this case study is presented: "What is the contribution of the SNRN to the respiratory function of people with pneumonia?".

The general objective of the study was then defined as: identifying the sensitive results of a therapeutic plan that included RFR sessions, carried out by an SNRN, aimed at people with pneumonia. To this end, the specific objectives of the SNRN intervention were defined as: Identifying changes in the respiratory functionality of the person being cared for; Performing an RN diagnostic assessment; Planning RN interventions; Implementing RN interventions; Evaluating the outcomes of RN care; Evaluating the effectiveness of implementing an RFR program.

METHODOLOGY

The case study consists of a research method, which allows the researcher to study individual or group phenomena, in real contexts. Being an empirical study, when the limits between a phenomenon and the context are not evident, the objective is to explore, describe and explain an event based on the research problem, comprising a phenomenon[9].

Thus, in line with the above and also using the Yin and Stake references, the present study is structured in six stages: Definition of the problem; Definition of the case; Theoretical foundation; Preparation of the study protocol; Data collection; Analysis and discussion of results[9].

In this case study, a person hospitalized with a diagnosis of pneumonia is presented, and addresses the therapeutic plan established during hospitalization, including RFR sessions. This therapeutic plan took place during the month of December 2023, having started on the first day of hospitalization. The results achieved were monitored and 3 assessment moments were carried out: initial assessment, intermediate assessment and final assessment.

To carry out the study, a request for authorization was made to the Ethics Committee of the hospital institution where the inpatient service is located, and it was authorized. Furthermore, associated ethical issues were considered in order to guarantee the rights of self-determination and protection

against harm and discomfort, respecting the principles of Beneficence and Non-Maleficence. The ethical principles of Fidelity, Justice, Veracity and Confidentiality were also complied with[10]. As such, and in order to respect the principles previously outlined, the person cared for will be identified as Ms. D. Maria (fictitious name). Obtaining all the information necessary to carry out the present study was obtained through consultation of the patient's clinical file, observation and physical examination and through a structured interview carried out with the person themselves and their reference family member. Informed consent was obtained before data collection.

The specific instruments to assess respiratory function were based on the Good Practice Guide for Respiratory Rehabilitation of the Order of Nurses[5]. In this sense, the assessment was based on the signs and symptoms of respiratory pathology; chest pain, assessed using the Numerical Pain Scale; dyspnea, assessed using the Modified Borg Scale; cough and expectoration, through the macroscopic aspect; physical exam; arterial blood gas analysis and chest x-ray.

CASE PRESENTATION

Anamnesis

The anamnesis guides the health professional in identifying the diagnosis and subsequent planning and implementation of the intervention plan aimed at the needs found. The present case concerns an 89-year-old person, female, Caucasian and Portuguese nationality. She has been a widow for 10 years and has a daughter who lives close to her home. She was admitted to the emergency department on November 30, 2023, due to hypertensive symptoms, dyspnea with abdominal breathing and supra-clavicular insufficiency and rustling. According to her daughter, Mrs. D. Maria had a productive cough that had lasted three days. When admitted to the emergency department, she was calm, conscious and oriented. Tachypneic, with peripheral oxygen saturation [SpO2] of 85% with inspired oxygen fraction [FiO2] of 21% and with the presence of adventitious sounds in the lower third of the lung bilaterally. Supplemental oxygen supply [O2] was placed via nasal cannula at 3l/min, and complementary diagnostic tests were carried out, the results of which are shown in Table 1:

Table 1: Results of complementary diagnostic tests performed in the emergency department

Complementary diagnostic tests	Result				
Arterial blood gas analysis	pH 7.43	pCO_2 42.10 mmHg	PO_2 54 mmHg	HCO_3 53 mmHg	Lactates 1.00mmol/L
Blood cultures	Negative				
Streptococcus pneumoniae **and** *legionella* **antigen research**	Negative				
SARS-CoV-2 research	Negative				
Chest x-ray	Effacement of the costophrenic sinuses bilaterally and the cardiac sinus, as well as hypo-transparency in the right lung and the lower left third, showing areas of condensation suggestive of the presence of secretions.				

Given the symptoms she presented and what was observed on the chest X-ray, Ms. D. Maria needed bronchial hygiene in order to guarantee effective gas exchange, prevent atelectasis and increase respiratory capacity. Furthermore, and considering the results of the arterial blood gas analysis, it is possible to verify that she had type 1 respiratory failure, where there is a decrease in the PO2 value with normalized PCO2 values. This result exists due to the impairment of gas exchange, leading to the emergence of hypoxemia. In this sense, Ms. D. Maria was transferred to the hospital for appropriate follow-up and treatment.

As for personal history, Ms. D. Maria has had high blood pressure for 10 years, had a cholecystectomy in 2020 and was hospitalized in June 2022 for pneumonia. She is unaware of allergies.

Regarding performance in activities of daily living, Ms. D. Maria was previously independent until admission to the emergency service, taking short walks on the street where she lives. She lives in an apartment on the first floor of a building with an elevator. In terms of socio-family and housing, it has no economic and ergonomic difficulties.

Rehabilitation Nursing Assessment

To implement an RN program, it is necessary to combine the data collected through anamnesis, the analysis of complementary diagnostic tests and the physical examination carried out on the person. The rehabilitation plan began on December 7th, with the respective interventions being implemented until the 15th, the day he was discharged home.

Regarding respiratory function, an objective and subjective assessment was carried out. In the subjective assessment, Ms. D. Maria had dyspnea and an acute cough with the presence of thick greenish sputum. The peak cough flow was evaluated using the "Peak Flow Meter", which presented a value of 170L/min, showing a weak cough and incapable of effectively eliminating secretions from the airways. For the assessment of dyspnea, it showed a value of 1/10 points at rest and 6/10 points during exertion, according to the modified Borg Scale. Objectively, she was spontaneously ventilated, eupneic with FiO2 at 33%, respiratory rate of 22 cycles per minute and with predominantly thoraco-abdominal, symmetrical, rhythmic and low-amplitude breathing. A physical examination of the chest was performed. Upon inspection, no changes to the thoracic spine, abnormal breathing patterns or deformities of the rib cage were observed. On palpation, no changes were detected in the trachea and chest and symmetry of chest expansion and increased thoraco-vocal thrills in the right and left lower third were observed. Upon percussion, a clear lung sound was heard in the upper third and middle third of both hemithoraces and a massive lung sound in the right and left lower third. Upon lung auscultation, she revealed a globally diminished vesicular murmur, with the presence of crackling sounds in the lower third bilaterally.

Rehabilitation Nursing Diagnoses

After assessing respiratory function and in accordance with the language of the International Classification for Nursing Practice 2019[11], four Nursing diagnoses were identified:

- Functional dyspnea;
- Compromised ventilation;
- Expectorate ineffectively and;
- Intolerance to the present activity.

Respiratory functional re-education sessions

Once the assessment was carried out and RN diagnoses were identified, RN interventions were planned to be implemented during hospitalization, which are shown in Table 2. The resources used to carry out these interventions were: table, articulated bed, armchair, spirometer, encouragement, stick, stethoscope, "Peak Flow Meter", finger oximeter, mirror, walker and cycle ergometer. The interventions were carried out in different sessions, lasting between 30 and 45 minutes.

Table 2: ER diagnostics and interventions

Nursing diagnosis	
Present Dyspnea	
Nursing interventions	- To assess breathing (type of ventilation, breathing pattern, amplitude, symmetry, rhythm and signs or symptoms of respiratory difficulty); - To monitor respiratory rate and SpO2; - To instruct and train appropriate positioning techniques (rest and relaxation technique and postural correction); - To instruct, train and encourage RFR techniques: awareness and control of breathing with a technique of dissociation of breathing times and exhalation with half-closed lips (2 sets of 10 repetitions), diaphragmatic re-education with resistance of 1kg (2 sets of 10 repetitions); - To teach about management of the physical environment and factors that induce worsening dyspnea.

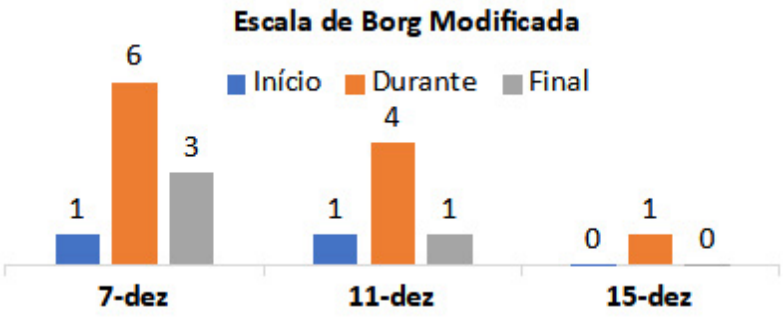
Nursing diagnosis	
Compromised Ventilation	
Nursing interventions	- To assess breathing; - To monitor respiratory rate and SpO2; - To auscultate the chest; - To assess signs of ventilation compromise (adventitious noises and changes in inspiratory and/or expiratory times); - To evaluate changes in the mobility of the rib cage (amplitude, deformities); - To instruct and train appropriate positioning techniques (rest and relaxation technique and postural correction); - To instruct, train and encourage RFR techniques: awareness and control of breathing with a technique of dissociation of respiratory times and exhalation with half-closed lips, diaphragmatic re-education and global costal re-education with a stick (2 sets of 10 repetitions); position therapy (every 2 hours); incentive spirometry (10 repetitions, 3x/day).
Expectorate Ineffective, to a moderate degree	
Nursing interventions	- To assess and stimulate the cough reflex; - To instruct and train RFR techniques: global costal opening; postural drainage (3 to 15 minutes in each position, 1-4x/day); accessory maneuvers such as the percussion technique and thoracic vibrocompression (twice a day for 15 minutes); - To teach about coughing (purpose, phases and triggering mechanisms); - To teach about the advantages of a well-executed cough; - To instruct and train directed and assisted coughing techniques (applied at the end of the RFR program for 5 minutes, series of 5 repetitions depending on tolerance); - To encourage coughing; - To monitor expectoration; - To supervise ventilation; - To encourage fluid intake; - To instruct and train administration of inhalation therapy using an inhaler.
Intolerance to present activity	
Nursing interventions	- To assess intolerance to activity; - To assess knowledge and instruct on exercise habits and energy conservation techniques; - To teach how to manage periods of activity and rest; - To inform and train adaptive equipment for exercise; - To instruct and train rest and relaxation position techniques and musculoarticular exercise; - To plan rest; - To supervise the response to the exercise.

RESULTS

The outlined rehabilitation program was implemented during eight sessions, exclusively by an SNRN. The evaluation of the results took place in accordance with the recommendations of the Good Practice Guide for Respiratory Rehabilitation[5].

During the sessions, Ms. D. Maria did not have any episodes of pain, before and after the interventions carried out. With regard to dyspnea, it was necessary to carry out this assessment at the beginning, during and at the end of all RFR sessions, with the results presented in Graph 1.

Graph 1: Dyspnea assessment results



After analyzing the results shown in Graph 1, Ms. D. Maria demonstrated a significant improvement in effort tolerance during the RFR sessions. Monitoring this parameter did not present limitations during the execution of the outlined techniques.

With regard to cough and sputum, Table 3 shows the results relating to the assessment of cough and its characteristics.

Table 3: Cough assessment results

Date	07/12		11/12		15/12	
	Start	End	Start	End	Start	End
Cough	P/IN	P/IN	P/E	P/E	SE	SE
Peak cough flow (l/min)	170	190	230	270	290	300
Secretions	MP	MP	M	M	AU	AU
Viscosity	ES	ES	V	V	AU	AU

Subtitle: AU – Absent; ES – Thick ; F – Effective ; IN – Ineffective ; M - Mucous; MP – Mucopurulent ; P – Present; SE – Dry ; V – Viscous

In the first evaluation, Ms. D. Maria had an acute cough with the presence of sputum, but which she was unable to expel effectively. After teaching and training RFR techniques, she was able to better mobilize secretions, allowing them to be eliminated.

The assessment of peak cough flow allowed measuring the strength of the cough, being directly related to the ability to generate expiratory pressure[5]. The results demonstrated that Ms. D. Maria initially presented a high risk of developing respiratory complications which, after specialized intervention, improved her ability to effectively eliminate secretions from the airway.

Regarding sputum, Ms. D. Maria initially revealed thick greenish sputum. During the RFR sessions, the amount of secretions eliminated increased and the consistency decreased. At the end of the therapeutic plan, she only had dry coughing attacks, although frequent.

With regard to the assessment of the body process, based on physical examination, some changes were evident with regard to palpation, percussion and auscultation. Table 4 shows the results regarding the assessment resulting from chest percussion.

Table 4: Results of chest percussion assessment

Thoracic percussion of the anterior surface of the thorax						
Date	**07/12**		**11/12**		**15/12**	
	Início	Fim	Início	Fim	Início	Fim
Upper right third	SP	SP	SP	SP	SP	SP
Right middle third	SP	SP	SP	SP	SP	SP
Lower right third	M	M	HO	HO	SP	SP
Upper left third	SP	SP	SP	SP	SP	SP
Left middle third	SP	SP	SP	SP	SP	SP
Lower left third	M	M	HO	HO	SP	SP
Thoracic percussion of the posterior aspect of the thorax						
Date	**07/12**		**11/12**		**15/12**	
	Start	End	Start	End	Start	End
Upper right third	SP	SP	SP	SP	SP	SP
Right middle third	SP	SP	SP	SP	SP	SP
Lower right third	M	M	HO	HO	SP	SP
Upper left third	SP	SP	SP	SP	SP	SP
Left middle third	SP	SP	SP	SP	SP	SP
Lower left third	M	M	HO	HO	SP	SP
Subtitle: HO – Hyposonority ; M – Massive ; SP – Clear lung sound						

This assessment showed different densities of the lung fields. The dullness was present in the lower third of the lungs bilaterally, and only in the last evaluation was there a clear lung sound.

Table 5 refers to the results resulting from the assessment by chest palpation.

Table 5: Results of assessment by chest palpation

Previous aspect of the thorax						
Date	**07/12**		**11/12**		**15/12**	
	Start	End	Start	End	Start	End
	Frémito toraco-vocal					
Upper right third	M	M	M	M	M	M
Right middle third	A	A	M	M	M	M
Lower right third	A	A	A	A	A	A
Upper left third	M	M	M	M	M	M
Left middle third	A	A	A	A	M	M
Lower left third	A	A	A	A	M	M

Posterior aspect of the thorax						
Date	07/12		11/12		15/12	
	Start	End	Start	End	Start	End
	Thoraco-vocal tremor					
Upper right third	M	M	M	M	M	M
Right middle third	A	A	M	M	M	M
Lower right third	A	A	M	M	M	M
Upper left third	M	M	M	M	M	M
Left middle third	A	A	M	M	M	M
Lower left third	A	A	A	A	M	M
Subtitle: A – Increased; M - Maintained						

By palpating the anterior and posterior aspects of the chest, bilaterally, an increase in thoraco-vocal tremor was initially observed, essentially in the right and left lower third. Throughout the RFR sessions, there was an improvement in this assessment, registering a reduction that accompanied the elimination of secretions.

The ER care performed was directed according to the lung auscultation performed before each session, with the results of this assessment shown in Table 6.

Table 6: Results of chest auscultation assessment

Date				07/12		11/12		15/12	
Location				**Left**	**Right**	**Left**	**Right**	**Left**	**Right**
Auscultation	**Murmúrio Vesicular**	**Upper third**	**Start**	D	D	D	D	M	M
			End	D	D	D	D	M	M
		Middle third	**Start**	D	D	D	D	M	M
			End	D	D	D	D	M	M
		Lower third	**Start**	D	D	D	D	D	D
			End	D	D	D	D	D	D
	Ruídos Adventícios	**Upper third**	**Start**	A	A	A	A	A	A
			End	A	A	A	A	A	A
		Middle third	**Start**	FC	FC	FC	FC	A	A
			End	FC	FC	A	A	A	A
		Lower third	**Start**	FC	FC	FC	FC	A	A
			End	FC	FC	FC	FC	A	A
Legend: M – Maintained; D – Decreased; A – Absent; FC – Crackling Fervors									

Crackling fervors were the only adventitious noise present, most evident in the right and left lower third. In the last evaluation, Mrs. D. Maria revealed vesicular murmurs maintained in all lung fields, with the exception of the lower left third, which was slightly reduced, without the presence of adventitious sounds.

With regard to clinical indicators of the person's physiological condition, these have never been limitations or contraindications for the execution of RFR techniques. Table 7 shows the results of the assessment of respiratory rate and SPO2, at the three different moments of assessment.

Table 7: Results of respiratory rate and SPO2 assessment

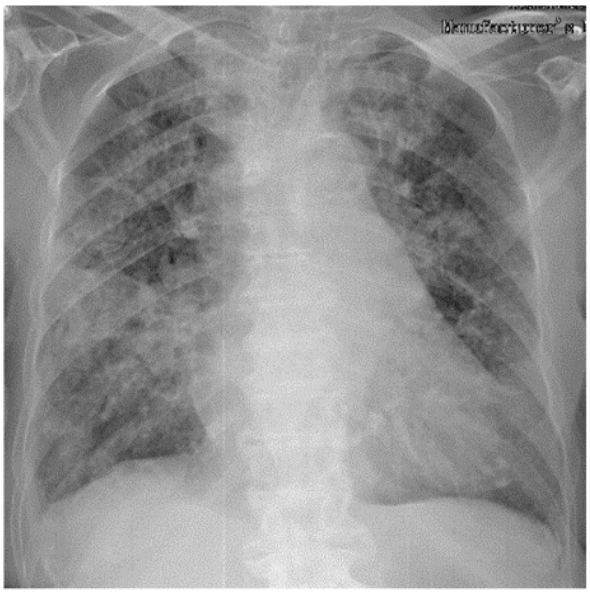
Date	07/12		11/12		15/12	
	Start	End	Start	End	Start	End
Respiratory Rate (cycles/minute)	22	21	20	20	18	18
FiO_2	33%	29%	27%	23%	21%	21%
SPO_2	92%	93%	94%	95%	97%	97%

At the beginning of her hospitalization, Ms. D. Maria was only able to present oximetry values above 90% with supplementary oxygen supply. During the implementation of the RFR plan, it was possible to progressively wean ourselves from supplemental oxygen therapy, and in the last evaluation, the patient already had oximetry values of 97% with FiO2 at 21%, showing a positive evolution.

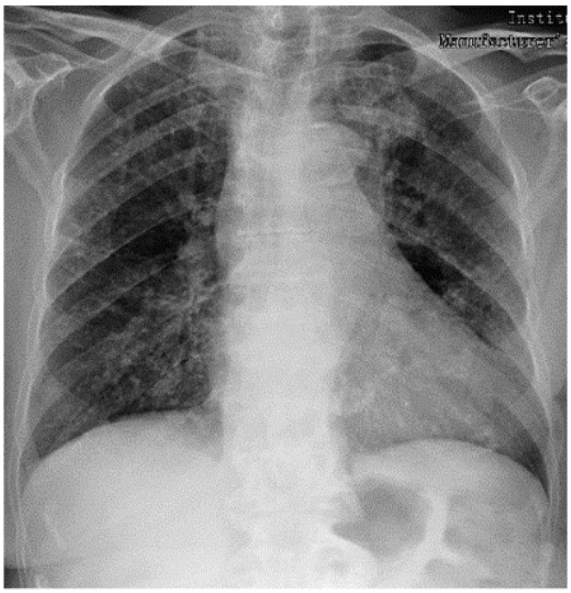
In this type of disease, complementary diagnostic tests are essential to assess respiratory pathology and its evolution. In Figure 1, the imaging evolution is shown through a chest tele-radiography of Ms. D. Maria.

Figure 1: Chest X-ray

07/12



15/12



The first radiological image refers to the first day of hospitalization and the second, to the day of clinical discharge. It is clear that the assessment carried out through lung auscultation is in line with what this examination reveals, with greater consolidation at the level of the right and left lower third. Furthermore, there is an increase in hyper-transparency in both lung fields.

Arterial blood gas analysis is also important, as it assesses oxygen concentrations, ventilation and acid-base balance[5]. Table 8 shows the results of this assessment on the first and last day of Ms. Maria's hospitalization.

Table 8: Arterial blood gas analysis results

Date:	FiO_2 (%)	SPO_2 (%)	pH	pCO_2 (mmHg)	PO_2 (mmHg)	Lactatos (mmol/L)	HCO3 (mmol/L)
30/11	33	90	7,43	42,10	54	1,00	53,10
15/12	21	96	7,39	40,2	76	0,71	27,90

By analyzing the values obtained, there was a general stabilization at the level of all parameters within the limits established by the bibliography[1,2].

In general, the expected results were achieved and there was a favorable evolution in all nursing diagnoses identified, highlighting the benefits of the established therapeutic plan.

DISCUSSION

In the present study, Ms. D. Maria presented a compromised cardiorespiratory system resulting from a restrictive pulmonary pathology. The nursing focuses that are related to cardiorespiratory impairment essentially focus on ventilation, activity intolerance and airway cleaning[12]. In people with pneumonia, therapeutic objectives are outlined according to the initial assessment and symptoms presented, and the purpose of RFR ends up encompassing lung re-expansion, drainage of secretions, promotion of effective coughing and exercise re-education[4,5,12]. In the case of Ms. D. Maria, interventions were initially carried out to provide more efficient ventilation, reduce the symptoms of dyspnea and allow secretions to be expelled effectively. Subsequently, at a more advanced stage of the therapeutic plan of RFR sessions, exercise re-education was carried out, thus increasing respiratory capacity and performance.

Postural correction and position therapy are fundamental for an adequate ventilation/perfusion relationship, increased lung volume and for preventing the appearance of other complications, such as the development of atelectasis, respiratory infections or postural defects[4,5]. For the postural correction technique, a mirror with sufficient dimensions was used to be able to view the entire body surface of Ms. D. Maria, both in an upright position and in a sitting position.

Breathing awareness and control with the technique of dissociation of respiratory times and in the expiratory phase with half-closed lips, aims to become aware of breathing and control it, improving the coordination and effectiveness of the respiratory muscles[4,5,12,13]. This technique was performed using a tissue as visual feedback for the expiratory phase, stimulating its execution.

The use of the breathing technique with half-closed lips in conjunction with others, such as diaphragmatic re-education, improves diaphragmatic excursion and promotes muscle strengthening of the different portions of the diaphragm[4,5,12]. Also, the combination of this technique with the global costal reeducation technique allows for a reduction in dyspnea and an increase in effort tolerance[12]. The latter, in addition to improving thoracic and joint mobility, placing the diaphragm and accessory muscles in a more mechanically advantageous position, contributes to improving ventilation, clearing the airways, improving body posture and reducing chest pain[4,5,12].

By performing the aforementioned techniques and using incentive spirometry, using a volume-oriented spirometer, it was possible to increase inspiratory volumes and improve the performance of the inspiratory muscles. This device helps to restore normal breathing patterns, improves respiratory control and maintains lung function[4,5,12]. Because it presents visual feedback, it was one of the techniques that Ms. Maria ended up performing more times during the day and with better performance. However, at an early stage and due to dyspnea on small exertions, she was not able to exert sufficient inspiratory effort to reach and sustain high inspiratory volumes.

Changes in respiratory function can result not only in pathophysiological changes in the airways, but also in changes in the mucociliary system and the strength of the inspiratory and expiratory muscles[1,2]. These changes lead to a decrease in the effectiveness of coughing, eventually compromising lung ventilation and airway permeability[14]. In order to have an effective expulsion of secretions, it was necessary to implement, in the first instance, the techniques of global costal opening, postural drainage and accessory maneuvers. Subsequently, at the end of the RFR sessions, cough teaching and training took place.

Postural drainage helps mobilize secretions from one or more lung segments to the proximal airways. This technique, when combined with accessory maneuvers, is highly effective, as the latter are characterized by the application of an external force to the chest wall with the aim of enhancing the detachment of secretions and their mobilization[4,5,12].

After mobilizing the secretions, it is necessary to eliminate them. The cough, which corresponds to a forced and explosive exhalation, after a slow and deep inspiration, has three phases: wide inspiration, contraction of the abdominal muscles and expulsion of air at great speed[14]. Teaching coughing is fundamental in a therapeutic plan of RFR sessions, with not only directed coughing but also assisted coughing being performed[4,5,12,14].

With regard to inhalation therapy, this route of administration allows for faster and more effective therapeutic action, using lower doses of therapy, thus associated with fewer adverse effects. Furthermore, it is the preferred route for administering drugs in the treatment of respiratory diseases[4,15]. Teaching how to perform the correct technique for administering inhalation therapy is crucial to obtaining maximum effectiveness of the pharmacological substance[15].

In the face of knowledge, Petronilho[16] emphasizes that learning should be prioritized through teaching, training and observation of behaviors. The Nurse must resort to demonstration, encouraging know-how and achieving a correct answer through training, always reinforcing the learner throughout the execution and learning process.

In general, it was found that the implementation of interventions included in a therapeutic plan of RFR sessions resulted not only in an improvement in Ms. Maria's lung function, but also in an increase in the production and more effective elimination of secretions. In addition, there were also lower values on the dyspnea assessment scale and a reduction in symptoms related to it, less sensation of fatigue, greater tolerance to effort, strengthening of the lung muscles, better maximum inspiratory and expiratory pressures, improvement in auscultation pulmonary and in the analytical results of arterial blood gases and SpO2.

FINAL THOUGHTS

RFR techniques used as a form of non-pharmacological treatment to control symptoms associated with pneumonia, have positive results such as reduced fatigue, decreased dyspnea, increased tolerance to effort, changes in lung volumes and capacities and in pressures, inspiratory and expiratory, maximum. In general, the objectives initially outlined were achieved, and it is safe to say that there is efficacy and safety in implementing a therapeutic plan of RFR sessions for people with pneumonia.

It is hoped that this case study will contribute to giving visibility to the work of the SNRN and the importance of its specialized intervention. It is suggested that more studies be carried out, as there is an evident lack of scientific evidence carried out specifically in the area of RN. Furthermore, it will be interesting to carry out a comparative study of the intervention carried out daily compared to that carried out twice a day, allowing the extraction of relevant data that will serve as a basis for establishing the best care plans.

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