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REVIEW

Post-operative rehabilitation in a hospital setting for people with scoliosis: a narrative review

Rehabilitación postoperatoria, en contexto hospitalario, para personas con escoliosis: revisión narrative

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ABSTRACT

Introduction: idiopathic scoliosis, known as a three-dimensional alteration in the shape and position of the spine, is highly prevalent in children and adolescents. It causes major motor, respiratory, social and psychological limitations. After determining the degree and location of the scoliosis, corrective surgery may be indicated in the most advanced situations.
Objective: identify rehabilitation programs to be implemented for people undergoing corrective surgery for scoliosis, in the post-operative period, in a hospital setting.
Methods: a narrative review was carried out using a bibliographic search on EBSCOhost, with the words: scoliosis, hospitalization, postoperative period, rehabilitation, nursing, functionality, exercises, physical, postural and pulmonary, over the last 5 years.
Results: the 9 studies included were mostly primary, focused on knowledge and instruction for people with scoliosis, the importance of respiratory and motor rehabilitation, body balance and self-care in activities of daily living. Several authors suggest building rehabilitation protocols for people with scoliosis, from pre- to post-surgery, due to the gains in functionality and quality of life that can be achieved.
Conclusions: the core areas of rehabilitation intervention for people undergoing corrective surgery for scoliosis in the post-operative period are functional respiratory re-education, functional motor re-education and re-education of body balance and self-care.

Keywords: Scoliosis; Postoperative Care; Rehabilitation; Empowerment; Exercise.

RESUMEN

Introducción: la escoliosis idiopática, conocida como una alteración tridimensional de la forma y posición de la columna vertebral, es una enfermedad de alta prevalencia en niños y adolescentes, que ocasiona importantes limitaciones motoras, respiratorias, sociales y psicológicas. Tras determinar el grado y la localización de la escoliosis, la cirugía correctora puede estar indicada en las situaciones más avanzadas.

Objetivo: identificar programas de rehabilitación a implementar en personas sometidas a cirugía correctora de escoliosis, en el postoperatorio, en el ámbito hospitalario.
Métodos: se realizó una revisión narrativa mediante una búsqueda bibliográfica en EBSCOhost, con las palabras: escoliosis, hospitalización, postoperatorio, rehabilitación, enfermería, funcionalidad, ejercicios, físicos, posturales y pulmonares, en los últimos 5 años.
Resultados: los 9 estudios incluidos fueron en su mayoría primarios, enfocados en el conocimiento e instrucción a personas con escoliosis, la importancia de la rehabilitación respiratoria y motora, el equilibrio corporal y el autocuidado en las actividades de la vida diaria. Diversos autores sugieren la construcción de protocolos de rehabilitación para personas con escoliosis, desde el pre hasta el postoperatorio, debido a las ganancias en funcionalidad y calidad de vida que se pueden conseguir.
Conclusiones: las áreas centrales de la intervención rehabilitadora para personas sometidas a cirugía correctiva de escoliosis en el postoperatorio son la reeducación funcional respiratoria, la reeducación funcional motora y la reeducación del equilibrio corporal y del autocuidado.

Palabras clave: Escoliosis; Cuidados Postoperatorios; Rehabilitación; Empoderamiento; Ejercicio.

INTRODUCTION

Scoliosis is defined as a three-dimensional alteration in the shape and position of the spine. It is considered idiopathic, as its etiopathogenesis is unknown (around 80%), and it is not correlated to an actual cause or disease that justifies these alterations; however, it is assumed that its cause is multifactorial.[1,2] It is known, however, that they mostly occur in childhood and their progression is accentuated in the growth phases.[1,3]

This pathology has different manifestations in people, depending on their age, stage and characteristics of growth and the angle of the curve.[3] Acceptance of the diagnosis of a chronic illness involves various adaptive measures on the part of the person and their family.[4]

Since the onset and development of scoliosis accompanies a person's growth, it causes physical, psychological and social changes, directly interfering with their functionality and QoL. The most commonly described alterations include a change in body image, psychological manifestations, pain, respiratory alterations, changes in muscular capacity (particularly when performing sporting activities) and alterations in balance, particularly in the vestibular and proprioceptive systems.[2] In terms of the cardiorespiratory system, there are the limitations imposed by the deformity of the rib cage, which directly interferes with the decrease in lung function.[3]

Disorders that can trigger suffering, anxiety, fear, mood swings and isolation, with a negative impact on the young person's quality of life. It is extremely important to include the person in this process of illness, to provide information about the pathology, the possible treatments and the expected results. This information is essential for the person's motivation, acceptance and adherence to the treatment suggested for their situation.[4, 5]

Experts have been working for a long time to develop methods for assessing and classifying scoliosis, although today there are still various methodologies for assessing and categorizing scoliosis, depending on the author. This diversity is justified by the complexity of the disease, its multifactorial component and its association with the development inherent in the age group of the person being diagnosed.[1]

The diagnosis of scoliosis is made through physical assessment, anthropometric parameters (such as weight and height) for clinical examination, imaging tests of the axial spine in association with classification methods.[1,5]

The Cobb angle can be defined in measurements made using the extra-long radiograph. This is the angle formed by the line obtained from the most inclined upper and lower vertebra. This is a necessary assessment for diagnosis and treatment, but it is also fundamental as a predictive factor, since the greater the angle, the greater the likelihood of scoliosis progressing.[3]

It is common to use these measurement methodologies and other clinical assessments to diagnose and treat scoliosis.[1,6] The physical examination also includes an assessment in the orthostatic position, in the coronal and sagittal planes, the presence of asymmetries, the gait pattern and foot support.[7]

Depending on the assessment and the symptoms, the most appropriate treatment is outlined with the person; taking into account the type of scoliosis, the progression, the severity of the associated symptoms, the impact on functionality and the person's quality of life (QoL).[7]

The treatment of people with scoliosis is either conservative, with orthotics and specific exercises, or surgical, depending on the severity and progression of the scoliosis. Progressing disease is usually considered to be a Cobb angle greater than 45°.[8]

Thus, the main objectives of the surgical method are to control the existing deformity along the spine and thorax, promote normal development of lung function, control pain (if any) and improve self-image.[8]

The surgery is performed by posterior approach, with bone fusion made by applying fixation material (screws)

along the entire spine (vertebra by vertebra or by groups of vertebrae), this correction can be performed with or without decompression. In situations of great gibbosity, thoracoplasty (resection of around 1 to 2 cm of rib) may be associated, with greater repercussions on lung function. However, bone fusion can lead to a reduction in the mobility of the instrumented spine and can cause disc alterations in the transition zones between the operated spine and the flexible spine.[8]

The most frequent complications of surgical treatment are: neurological alterations, hemorrhagic loss (tranexanic acid is commonly used in the operating room), paralytic ileus, loss of cerebrospinal fluid, seroma and infection.[8]

In the Portuguese context, a one-week hospital stay is common with return to school/work occurring at the end of the 4th week, with the indication to start physical exercise (without impact) 2 months after surgery and without restrictions after 6 months.[8]

Clinical information about possible treatments is essential for the person, it increases their sense of security, their feeling of control over their situation and increases their autonomy in making decisions about their health plan. Information should be provided in a systematic way, using various resources such as information leaflets, videos, images, etc. It is essential that health professionals provide careful information, depending on the person's needs and cognitive capacity (necessary for each person and their age group).[4]

Physical exercise, within each person's individual capabilities, is extremely beneficial; it reduces anxiety levels, improves mood and sense of well-being, increases a person's physical and ventilatory capacity and has a positive impact on their body image.[4]

According to the World Health Organization (WHO), physical activity plays a key role in controlling non-communicable diseases, recommending a minimum of 60 minutes of daily physical activity for young people aged 5 to 17. This should predominantly include aerobic activity, muscle strengthening exercises and at least 3 times a week, impact activity to promote bone health. Physical activity benefits the cardiorespiratory, cardiovascular, muscular, bone and psychological systems (such as reducing anxiety and depressive symptoms). Physical activity also promotes body and spatial awareness, improving body posture and self-image.[9, 10]

As mentioned by Brás da Silva[9], adolescents/adults with scoliosis participate less in sporting activities than the population of the same age group, which in the adolescent population can lead to a decrease in bone density.

The assessment of the return to physical activity depends on the individual situation of each person, the scoliosis correction surgery (arthrodesis procedure performed) and the opinion of the clinician, however, it is common for it to be indicated after 3 months (non-impact activity), between 6 and 12 months for sports with or without impact. Considering that full consolidation of an arthrodesis can take between 6 months and 1-2 years.[9]

Thus, there are multisystemic alterations in people with scoliosis, with an impact on their motor, respiratory and mental health, on their functionality and subsequently on their QoL, in addition to the rehabilitation needs inherent in the surgical process.

The application of a rehabilitation nursing program in empowering a person who had undergone corrective surgery for scoliosis, in a case study, made it possible to verify gains in the ventilation pattern, muscle strength, mobility, gait, level of independence and functionality. In this clinical case, the rehabilitation nurse established a care plan focusing on knowledge, ventilation, muscle movement, body balance, positioning, standing up and self-care (personal grooming, body hygiene, dressing and undressing and toilet use), intervening with the person to teach, instruct, train and empower them after corrective scoliosis surgery, in a hospital setting, providing gains in knowledge and empowerment for a healthy and safe transition to home.[11]

The aim of this narrative review is to identify the rehabilitation programs to be implemented with people who have undergone corrective surgery for scoliosis in the post-operative period in a hospital setting. This is the starting point for validating a rehabilitation nursing program for this specific population.

METHODS

Taking into account the changes that exist in people with scoliosis, the question arises: "What rehabilitation programs should be implemented for people who have undergone corrective surgery for scoliosis, in the post-operative period, in a hospital setting?".

In order to answer this question, we decided to carry out a narrative review with the aim of reviewing and substantiating the most up-to-date scientific evidence on the subject.[12] This review is essential in order to develop a theoretical basis for the research topic, identify gaps in the literature and encourage the construction/implementation of a rehabilitation program for people undergoing corrective surgery for scoliosis in a hospital setting..

In order to carry out the narrative review, a bibliographic search was carried out on the EBSCOhost platform, selecting resources from CINAHL; Nursing & Allied Health Collection; Cochrane Plus Collection; MedicLatina and MEDLINE, using MeSH (Medical Subject Headings) words and keywords of interest for the topic to be

investigated.

The search was carried out using Scoliosis as the target population; Postoperative period or Hospitalization as the context; Rehabilitation or Nursing or Functionality as the intervention and Exercise or Physical or Postural or Pulmonary as the outcomes. The search was carried out using the Boolean word and between population, context, intervention and results, limited to the last 5 years (search from January 2018 to December 2023). Articles that were not in English, French, Spanish or Portuguese and that were not available for free consultation were excluded. The articles were selected by title, then the selected articles were read in full, and information was collected (in a table) on the methodology, the results obtained and the respective conclusion of the study.

RESULTS

Of the 25 articles obtained, 15 were selected by title, of which 1 was repeated and 2 were excluded due to restricted access. The remaining 12 articles were read in full, but 2 studies had to be excluded because they only dealt with surgical contexts and 1 because it was a study validating a questionnaire on scoliosis. Nine articles were included in the narrative review, two published in 2019, four in 2020, one in 2021, two in 2022, one in Brazil, one in China, one in Ireland, one in Japan, two in Turkey and three in the United States of America.

These studies were essentially randomized and non-randomized primary experimental studies in the areas of pre- and post-surgery education, simulated activity training environment, body balance training, pulmonary function training, functionality and the quality of life of people undergoing corrective scoliosis surgery. The articles were selected using the Preferred Reporting Items for Systematic and Meta-Analysis (PRISMA) method, as described in the figure 1.

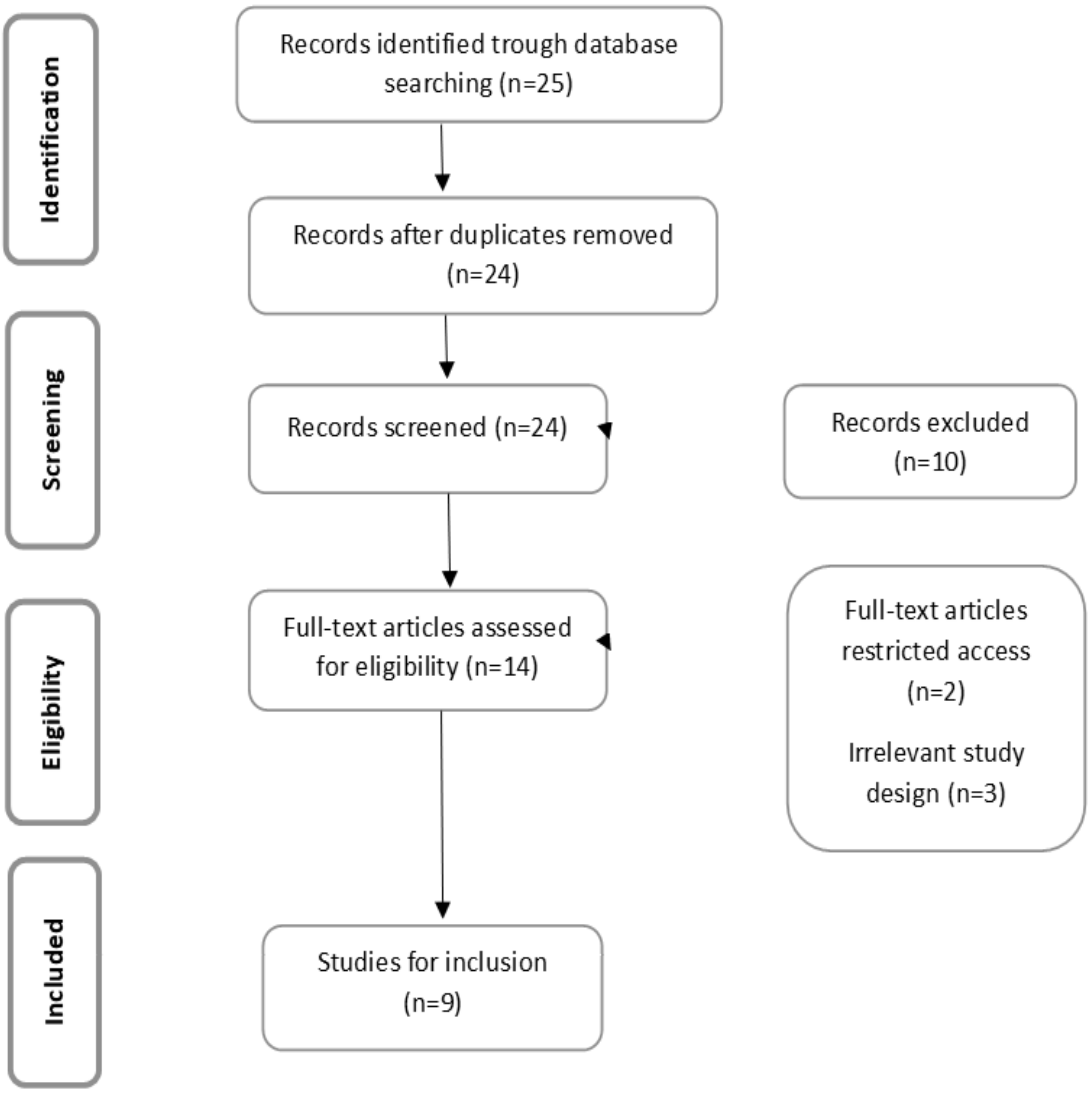

Figure 1. Diagram for selecting articles for the narrative review, according to the PRISMA method

Table 1. Summary of the studies selected for the narrative review

Author, Year, Country	Methodology	Results
Barbosa & Frazão (2020), Brazil[13]	This was an experimental study of people undergoing orthopedic surgery in a hospital setting, with a randomized control and intervention group. The control group was given written guidance on the post-operative period; the intervention group was given the same guidance with demonstration sessions and training in a simulated home environment, performing activities of daily living and instrumental activities.[13]	The study was evaluated using a questionnaire. The questionnaire showed that the intervention group achieved an increase in the person's perception of being able to carry out their activities and their feeling of safety when they returned home, regardless of their level of functionality. This shows the importance of the educational process associated with training people in the process of health-disease transition.[13]
Malik et al. (2019), United States of America[14]	Retrospective study on predictive factors of discharge destination after spinal arthrodesis. Carried out by accessing a database, distinguishing whether the destination after discharge would be home or not home (such as post-operative rehabilitation institutions).[14]	The results showed that the factors that contributed to an institutional fate after hospital discharge were: comorbidities, complex surgery, extensive fixation of the spine and increased length of stay, with a prevalence of females. They concluded that the existence of surgical risk factors increases the need for pre- and post-operative rehabilitation programs.[14]
Quiu et al. (2022), China[15]	A cross-sectional study, with a randomized control and intervention group, on the use of incentive spirometry in the training of peri-operative pulmonary function in people undergoing spinal surgery. The control group performed breathing exercises and the intervention group performed breathing exercises with incentive spirometry.[15]	In the intervention group, the following results were obtained: improved pulmonary function, a reduction in the existence of complications, a reduction in the incidence of atelectasis, a reduction in pulmonary training time, speeding up post-operative rehabilitation and a significant improvement in pulmonary compliance, with a reduction in hospitalization time and an increase in patient satisfaction. This study indicates the importance of incentive spirometry in improving respiratory function and preventing post-operative pulmonary complications.[15]
Bazancir et al. (2021), Turkey[16]	Single-blind randomized clinical trial, over five days in the postoperative period with early ambulation, in the control group standard training and in the intervention group an intensive rehabilitation exercise program.[16]	Evaluations were carried out on pain, thoracic mobility, balance and quality of life. They concluded that an intensive rehabilitation program reduced hospitalization time and achieved greater physical and functional gains in people after scoliosis surgery.[16]
Anari et al. (2020), United States of America[17]	A retrospective longitudinal study of adolescents undergoing posterior arthrodesis for idiopathic scoliosis and its impact on body balance. Evaluations were carried out at 6, 12 and 24 months.[17]	This study shows the alteration in body balance that exists in people with scoliosis; however, it points out the gains in performing body balance exercises in the post-operative period, with greater relevance at 6 months, although with a favorable evolution up to 2 years. They suggest a rehabilitation program that includes specific exercises to improve body balance.[17]
Li et al. (2019), United States of America[18]	A non-randomized experimental study to assess the postural control of people undergoing scoliosis arthrodesis up to the second postoperative year. They selected a control group of people without scoliosis, but with identical anthropometric characteristics to the intervention group, people undergoing arthrodesis for scoliosis.[18]	They describe that people who have undergone arthrodesis for scoliosis show a decrease in direction control and body balance up to 90 days after surgery, and consider it extremely important to have a rehabilitation program in the area of body balance. They consider arthrodesis to be a satisfactory treatment for restoring body balance in people with scoliosis.[18]
Osuka et al. (2022), Japan[19]	Target group study of adolescents with idiopathic scoliosis who underwent a surgical technique (4-dimensional mold) for spinal correction and spinal fusion, evaluating the results in terms of postural stability at one week and six months post-operatively.[19]	They show that the three-dimensional deformities of idiopathic scoliosis result in asymmetrical muscle activity and proprioceptive alterations, resulting in changes in body balance. In people with a Cobb angle greater than 40º, arthrodesis is considered beneficial for body balance. In this study, the greatest body stability was achieved at the sixth post-operative month. They describe the use of unipodal support exercises up to the 10th post-operative day in association with surgical correction, which result in postural and body balance gains for people undergoing scoliosis corrective surgery.[19]

Rafferty et al. (2020), Ireland[20]	Non-randomized retrospective study between a control group (general population) and the intervention group (adolescents undergoing corrective surgery for idiopathic scoliosis), with identical anthropometric characteristics.[20]	Functional deficits were assessed in the post-operative period (12 months), concluding that people with scoliosis had deficits in pulmonary function with reduced ventilatory capacity, recommending training exercises for the inspiratory muscles. They also showed deficits in musculoskeletal function, with a reduction in muscle strength and joint range of motion, recommending rehabilitation programs that include muscle strength and joint range of motion exercises. Reinforcing the importance of returning to physical exercise.[20]
Öztürk et al. (2020), Turquía[21]	Non-randomized cross-sectional case-control study, selecting adolescents with idiopathic scoliosis from the thoracic and lumbar groups. Evaluation carried out at the 1st and 3rd post-operative year.[21]	The relationship between muscle strength and trunk joint range (thoracic and lumbar) and the quality of life of adolescents undergoing corrective surgery for scoliosis was evaluated. No significant differences were found in terms of muscle strength, which the authors attribute to the musculoskeletal immaturity inherent in the age group of the population. A limiting factor was the lack of evaluation prior to surgery. Several benefits were found after surgery (at the 1st and 3rd year), with an improvement in the positive perception of their self-image, greater functionality, a greater sense of well-being, quality of life and satisfaction with their treatment. They suggest the existence of pre- and post-operative rehabilitation programs, focusing on muscle movement, strength, endurance, flexibility and joint amplitude, in order to increase the quality of life of people undergoing corrective surgery for scoliosis.[21]

The areas addressed by the studies include knowledge/teaching and progressively training the person undergoing corrective surgery for scoliosis, as well as the need to design and implement a rehabilitation program that covers the areas of respiratory functional re-education and motor functional re-education, with an emphasis on body balance and self-care.[13, 15, 17, 18, 20, 21]

In view of the initial question and the results obtained in the narrative review, we consider it pertinent to have a rehabilitation nursing program to train the person who has undergone corrective surgery for scoliosis, in a hospital setting, in the areas of ventilation diagnosis, muscle movement, positioning, body balance, standing, walking and self-care (going to the toilet, hygiene, personal grooming and clothing), with interventions in the areas of knowledge and skills. Rehabilitation nursing care plan corroborated by the clinical case study by Sousa et al.[11] Carried out on the basis of ICNP (International Classification for Nursing Practice) language and the Documentary Standard of Nursing Care for the Specialty of Rehabilitation Nursing.[22]

Table 2. Initial and final assessment of people undergoing corrective surgery for scoliosis in a hospital setting

Evaluation 1st Post-Operative Day and Final Evaluation
Evaluation of the Foci Knowledge and Skills/Capabilities (Demonstrated our Not Demonstrated): Ventilation; Muscle Movement; Positioning; Body Balance; Standing; Walking (up and down stairs); Self-care: going to the toilet, hygiene, personal grooming, clothing.
Assessing Vital Signs
Assess muscle strength in the upper and lower limbs (use an assessment instrument/scale): Medical Research Council
Evaluate body balance (use assessment instrument/scale): Present, Decreased or absent in position: Static sitting, Dynamic sitting; Static orthostatic; Dynamic orthostatic.
Evaluate Gait (use an assessment instrument/scale): Timed up and Go test.
Assess Level of Independence (use assessment instrument/scale): Barthel Index
Assess Functionality Level (use an assessment instrument/scale): Functional Independence Measure

Table 3. Rehabilitation Nursing Care Plan for the training of people undergoing corrective surgery for scoliosis in a hospital setting

1st postoperative day
Breathing exercise techniques Muscle and joint movement exercise techniques (in bed) Bed positioning exercise technique Standing exercise technique (at the bedside) Walking exercise technique (bedside)
** Performing the exercise techniques with full or partial help from the Rehabilitation Nurse Specialist (RNS).*
2nd postoperative day
Breathing exercise techniques Muscle and joint movement exercise techniques (in bed) Bed positioning exercise technique Standing exercise technique Walking exercise technique (in the bedroom or corridor) Toilet training
** Performing the exercise techniques with partial help from the Rehabilitation Nurse Specialist.* ** Increased frequency and number of repetitions, depending on tolerance.*
3º Dia pós-operatório
Breathing exercise techniques Muscle and joint movement exercise techniques Bed positioning exercise technique Standing exercise technique Walking exercise technique (in the bedroom or corridor) Toilet training Training for hygiene Personal grooming training Training to get dressed
* Performing the exercise techniques with partial help or supervision from the RNS * Increasing the frequency and number of repetitions, depending on tolerance.
4th postoperative day and beyond (until hospital discharge)
Maintain the rehabilitation nursing plan (day 3), with a gradual increase in frequency, number of repetitions and activity training until the person is as functionally independent and capable as possible.

DISCUSSION

In order to answer the question: "What rehabilitation programs should be implemented for people undergoing corrective surgery for scoliosis, in the post-operative period, in a hospital setting?", 9 articles were included in the narrative review. There was a lack of rehabilitation protocols for people undergoing corrective surgery for scoliosis; there was only reference to a few exercises carried out depending on the study area. These studies corroborate the rest of the literature regarding the areas of rehabilitation to intervene with people undergoing corrective surgery for scoliosis, but show a lack of structured programs.[1, 6]

The articles selected show the importance of information, teaching and training the person throughout their surgical process (from the surgical indication to returning home after surgery), the importance of breathing exercises, body balance and early mobilization, and some studies address post-operative functional deficits and the relationship between corrective surgery for scoliosis and the person's quality of life.[13, 15, 17, 18, 20, 21]

There were several limitations in the studies, mainly in terms of the type of rehabilitation exercises they carried out, or in suggesting rehabilitation programs that should be implemented. Thus, given the lack of specific indications of rehabilitation programs and their exercises, verified through this narrative review, and noting the needs of people undergoing corrective surgery for scoliosis, a Rehabilitation Nursing Care Plan was constructed for people undergoing corrective surgery for scoliosis, in a hospital setting.

The importance of the therapeutic relationship and the transmission of information (from the health professional to the person with scoliosis) is highlighted, as these are factors that promote greater safety and reduce anxiety in the person throughout this process of acceptance and adaptation to their new health-disease situation. Personalized, person-centred care promotes the process of awareness and autonomy in decision-making, increasing motivation and adherence to the proposed treatment. Teaching, training and enabling them to carry out activities in the post-operative period encourages them to return home, anticipating difficulties and adaptation processes. [11]

Thus, this Rehabilitation Nursing Care Plan, in a hospital setting, for a person undergoing corrective surgery for scoliosis aims to improve the person's knowledge and skills in the area of ventilation, muscle movement, body balance, positioning, standing, walking and self-care (personal arrangement, body hygiene, dressing and undressing and toilet use), with favorable results in their level of dependence, functionality and quality of life, culminating in the person's satisfaction, health promotion and prevention of complications.

Needs that meet the competencies of the Rehabilitation Nurse Specialist, in which their intervention is extremely important in accompanying the person and their family in their health-disease transition process.[23]

Limitations include the fact that this is a narrative review and that it includes articles published in the last five years and accessed via EBSCOhost.

CONCLUSIONS

People with scoliosis have profound musculoskeletal and respiratory alterations, causing changes in image, functionality and, subsequently, quality of life. This reality highlights the importance of a rehabilitation nursing care plan for people undergoing corrective surgery for scoliosis.

The articles selected in this narrative review address the various areas of rehabilitation to be intervened in, such as respiratory functional re-education and motor functional re-education, with an emphasis on muscle strengthening, joint range and body balance, including the educational process and empowerment of the person throughout this transition in order to improve functionality and self-care capacity in the person undergoing corrective surgery for scoliosis.

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