





## Physical activity undergoing angioplasty: development and validation of educational material\*

Atividade física após angioplastia coronária: elaboração e validação de material educativo

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### ABSTRACT

**Objective:** to develop and validate educational material on physical activity for patients undergoing angioplasty. **Methods:** material was prepared in a booklet format, considering the steps: survey of the literature, textual development relevant to cardiac rehabilitation and creation of illustrations. Six specialists and six participants from the target audience performed the content and appearance validation. A pre-test was carried out with 10 other patients who were awaiting angioplasty. Data analyzed descriptively. **Results:** the material included instructions and exercises to be performed in all phases of rehabilitation (warm-up, exercises, stretches, relaxation). The evaluators considered the content pertinent and the suggestions on appearance were accepted. Patients, participants in the validation and pre-test, considered that the material would facilitate the understanding of the exercises. **Conclusion:** the material was considered suitable for use in patients submitted to angioplasty. **Descriptors:** Validation Studies; Health Education; Cardiac Rehabilitation.

### RESUMO

**Objetivo:** elaborar e validar material educativo sobre a realização de atividade física para pacientes submetidos à angioplastia. **Métodos:** elaborou-se material em formato de cartilha, considerando-se as etapas: levantamento da literatura, elaboração textual pertinente à reabilitação cardíaca e criação de ilustrações. A validação de conteúdo e aparência foi realizada por seis especialistas e seis participantes do público-alvo. Realizou-se pré-teste com outros 10 pacientes que aguardavam a angioplastia. Dados analisados descritivamente. **Resultados:** o material incluiu instruções e exercícios a serem realizados em todas as fases da reabilitação (aquecimento, exercícios, alongamentos, relaxamento). Os avaliadores consideraram o conteúdo pertinente e acataram-se as sugestões sobre a aparência. Pacientes, participantes da validação e do pré-teste consideraram que o material facilitaria a compreensão dos exercícios. **Conclusão:** o material foi considerado adequado para uso em pacientes submetidos à angioplastia.

**Descritores:** Estudos de Validação; Educação em Saúde; Reabilitação Cardíaca.

## Introduction

Cardiovascular diseases represent one of the main causes of premature death in people under 70 years of age, in low and middle income countries, in addition, they result in a high rate of disability of the individual and economic impact on health<sup>(1)</sup>. Among cardiovascular diseases, coronary artery disease leads, with 31.0%, the causes of death from cardiovascular diseases, in Brazil, for 50 years<sup>(2)</sup>. The main risk factors for cardiovascular diseases are related to lifestyle, such as smoking, alcohol abuse, unhealthy eating and physical inactivity<sup>(1-2)</sup>.

One of the ways of treating coronary artery disease is secondary prevention, which includes cardiac rehabilitation programs, which are often scarce in low- and middle-income countries, such as Brazil. Researchers have identified, from the perspective of health administrators, cardiac rehabilitation providers and cardiac patients, in a context with few resources, barriers to access cardiac rehabilitation. The most common are: high maintenance cost and lack of transport and access due to distance. Despite positive perceptions about cardiac rehabilitation, the knowledge of professionals and the resources to maintain a rehabilitation center are insufficient. Another point cited as a major barrier was the lack of referral of patients to cardiac rehabilitation programs by the doctor<sup>(3)</sup>. Considered as a public utility program, cardiac rehabilitation should be widely disseminated to the assisted population.

The World Health Organization, in view of the increase in the number of individuals affected by chronic non-communicable diseases and the breadth of the age range affected, suggested the implementation of educational processes that encourage the generation of knowledge, autonomy and the capacity for self-management of the health-disease-care process<sup>(4)</sup>. Educational interventions related to cardiac care increase knowledge and are shown to facilitate changes in behavior in patients with coronary artery disease<sup>(5)</sup>.

Educational materials are part of the process called health technology, a set of instruments that aims at health promotion, prevention, treatment of diseases and rehabilitation of people<sup>(6)</sup>. A Clinical, controlled and randomized trial has shown that interventions that use educational material can have positive results in performing physical activity in people with coronary artery disease<sup>(7)</sup>.

Subjects diagnosed with coronary artery disease are, in general, over 60 years old and have no habit of performing physical activity. In this sense, written materials can help with lifestyle changes, contributing to secondary prevention of coronary artery disease<sup>(4)</sup>. In order to narrow the gap between the misinformation of patients with coronary artery disease and access to cardiac rehabilitation, it was proposed to prepare educational material, focusing on physical activity, and to validate the material, in relation to content and appearance. The material, intended for patients who undergo the first angioplasty procedure and are not referred to a cardiac rehabilitation program, offers information about the importance of physical activity, covering the steps of a rehabilitation program: warming up before exercising, exercises itself, stretching and relaxation.

In view of the possible health complications of patients who do not undergo cardiac rehabilitation and excessive expenses with readmissions, the planning of care strategies is justified, based on the use of scientific principles to motivate patients regarding the development of self-care. Educational materials are important tools to help individuals, improving the understanding of the health-disease process and helping to follow the paths for recovery<sup>(8-9)</sup>. These materials need to be appropriate to the characteristics of the target population for which they are intended. For that, an alternative is the refinement of these, through content and appearance validation. Thus, this study aimed to develop and validate educational material on physical activity for patients undergoing angioplasty.

## Methods

Methodological study, which included content and appearance validation, through which the adequacy of the presentation was verified, aiming at understanding the items and the educational material as a whole and the contents covered, taking as a basis the objectives proposed for the material and adequacy of this to the target audience<sup>(10)</sup>.

The principles proposed by the literature<sup>(8,11)</sup> were considered for the stages of preparation and validation of the educational material, carried out in six phases: survey of the content, selection and recording of the content found, textual elaboration, creation of illustrations, diagramming and formulation of the project and submission to the Research Ethics Committee. The validation stage was developed in five phases: evaluation by the expert committee, review of the material with evaluation and inclusion of suggestions, evaluation by the target audience, review of the material with evaluation and inclusion of suggestions, grammatical review and printing of the material for pre-test.

The bibliographic survey began, seeking to identify the content to be addressed in relation to the practice of physical activity, in the four phases of cardiac rehabilitation, focusing on individuals with coronary artery disease, after angioplasty. The search was performed in the specialized literature, in the databases Medical Literature Analysis and Retrieval System Online (MEDLINE), Web of Science and Scientific Electronic Library Online (SciELO), using the keywords cardiac rehabilitation, physical activity, therapeutic exercises and material educational, with the respective Boolean operators *AND*, *OR* and *NOT*. The words were adequate according to the databases. This search offered subsidies for the preparation of the material.

The articles were analyzed and the content on physical activity divided into categories considered relevant to the rehabilitation process of patients undergoing angioplasty, as described below, definition and purpose of cardiac rehabilitation and physical

activity, frequency and benefits of physical activity, general guidelines to practice physical activity, after angioplasty, and description of the exercises. In the latter, the phases of heating, strengthening, relaxation and stretching were considered. A calendar was added to the final pages of the educational material for the patient to note the frequency of recommended physical activity and a free page for notes of observations (such as manifestations perceived during the exercises), doubts or suggestions to the research team.

For the preparation of the educational material and description of the exercises, cursive texts were used in the description and in the drawings pertinent to the Kisner and Colby framework, aimed at rehabilitation. It was proposed to a designer to transform the images of exercises with human beings<sup>(12)</sup> into figurative illustrations in the shape of a heart. This type of image had been applied in a previous study<sup>(13)</sup> that used educational materials aimed at the same audience and served as a reference for the creation of the current study, with authorization from the author. The program used in this step was Corel Draw Graphics-Suite-X5 to vectorize the images. For diagramming and application of the vectors, the Adobe InDesign CS6 program was used.

To validate the content and appearance of the educational material, a committee of specialists was formed, composed of six professionals<sup>(14)</sup>, using the following criteria: having at least a master's degree and working in an area related to the area of cardiology and education of the patient and one of the members working in the communication area. Thus, the sample consisted of a doctor professor, with experience in the area of appearance and content validation; a nurse, doctoral student, with a thesis in the field of cardiology; a master physical therapist and cardiac rehabilitation specialist; a physical therapist, master of health sciences, with experience in patient education; a master nurse in science, with research in the field of cardiology; and a communications professional to assess presentation and readability.

The material was delivered individually to the

members of this committee, accompanied by a questionnaire prepared by the researcher, with topics that provided open answers that should be based on the knowledge and expertise of each: pertinence and relevance of the content to achieve the objectives; clarity of the drawings to facilitate the performance of the exercises, order of presentation of the activities/exercises; cultural adequacy, language adequacy for people with an average age of 60 years and other observations. The specialists were informed that they could report doubts, observations and suggestions in the educational material itself and return material and answers to the researcher.

After the insertion of the modifications suggested by the specialists, the educational material was sent to the target audience for assessment of understanding of the content and appearance: six patients, over 18 years of age who were awaiting angioplasty, with preserved cognitive condition assessed, considering the responses to questions extracted from the literature that included name, current date, day of the week, place where he was, age and place of birth, confirmed by the participant's identification document. The participant was excluded if he missed more than two questions<sup>(15)</sup>. The results of the content and appearance validation stage by experts and target audience were analyzed descriptively, considering the relative frequency of responses.

The researcher performed a preliminary reading of the material individually, face to face, with each of the six participants and then asked the participants to point out words/figures that were difficult to understand. The evaluation of the understanding of the content occurred through the following questions: Can you explain to me what you understood from this information? Is that drawing clear to you? Is there any information that is difficult to understand? Is there an image that is difficult to understand? Did you understand how to fill the calendar? Do you have any observations or suggestions for people in the same situation as you to better understand this material? The researcher noted the comments in the material itself.

A grammatical review was carried out, with the contribution of the communication professional who participated in the evaluation of appearance and content and, after this stage, the material was again sent to the creative professional for the last adjustments.

The resulting version was printed and pre-tested to assess whether the content was understandable to the target population. This stage was performed with 10 patients who were awaiting angioplasty and selected, considering the same inclusion/exclusion criteria used for selection of those, six who participated in the appearance validation. Before angioplasty, in the waiting room, patients and family members were more available to listen to the instructions contained in the material and answer the researcher's questions; the pre-test was performed, at this moment, with 10 patients. The researcher carried out the educational program, using the educational material individually with each patient, initially, after the angioplasty procedure. However, it was found that, at that moment, the patients were uncomfortable to respond, inattentive and anxious to return home, as, often, transportation to the city of origin was already waiting for them. Because of this situation, the pre-test of the educational material was performed before the procedure with the 10 patients.

The project that gave rise to this study was approved by the Ethics Committee for Research with Human Beings, at the Escola de Enfermagem de Ribeirão Preto, Universidade de São Paulo, Brazil, according to opinion nº 1,496,633/2016 and Presentation Certificate for Ethical Appreciation nº 51805715,0.0000,5393.

## Results

The content of the educational material, entitled "How to practice physical activities", includes, in the final version, light exercises that can be performed at home. These exercises include the phases of rehabilitation: Phase 1 (during hospitalization), the focus should be on patient education and the beginning of physical activity. Phase 2, to increase physical capa-

city, with a minimum duration of three months, starting immediately after discharge; Phase 3, period of physical adaptation with an expected duration of six months to one year; and Phase 4, which has a variable duration and acts to maintain the gains obtained. Patients classified as low risk and intermediate risk are candidates for distance cardiac rehabilitation programs, due to the high demand for patients eligible for this type of program. To perform the exercises proposed in any of the phases, the patient does not require direct supervision. The goal is to increase or maintain physical fitness and help establish a healthier lifestyle.

In addition to the initial explanations on the definition, objectives and benefits of cardiac rehabilitation and physical activity, duration and intensity of the proposed exercises, the material also includes general guidelines for the practice of physical activity and an accurate description of each exercise. The exercises are presented according to the purpose and order in which they should be performed (warm-up, strengthening, relaxation and stretching). The description is made by means of text and illustrations, with the sequence of movements (beginning of the movement and end of the movement), in order to facilitate the visualization and understanding of the exercise. The figures are heart-shaped to represent the topic addressed, care for the heart, after angioplasty.

The experts' assessments regarding the topics assessed in the questionnaire: general appearance of the material, pertinence and content to achieve the objectives; clarity of the drawings to facilitate the performance of the exercises; order of presentation of activities/exercises; cultural and language suitability for the target population are described below. All suggestions were included in the educational material.

General appearance: in relation to the general presentation of the material, 100.0% of the experts suggested to increase the font size of the text from 12 to 14 and to place each step of the exercises on separate pages.

Relevance and content to achieve the objectives: 100.0% of the evaluators considered the items

and the pertinent calendar. Although they considered the timetable pertinent, one of the evaluators suggested that additional explanations be included, when using the educational material, informing about the completion of the periodicity of physical activities and providing instructions on this process. Additionally, all of them also requested that the ideal amount of daily physical activity be specified and that the text more clearly describe the need to repeat the series, emphasizing the importance of each exercise.

Clarity of the drawings to facilitate the performance of the exercises: the illustrations were considered clear by the specialists, except for a stretch figure, considered little elucidative by a specialist who recommended the modification.

Order of presentation of activities/exercises: this item was considered appropriate by the specialists, and adjustments are not necessary.

Cultural and language adequacy for the target population: although the information was considered legible, understandable and clear by 100.0% of the evaluators, this item received the most suggestions by the specialists. There was a recommendation to replace the terms: control with prevention (a specialist); surgery with angioplasty (a specialist); improved blood circulation by improving blood circulation (a specialist); dose per daily dose and to indicate in brackets the meaning of calf, as calf (a specialist). Some topics were considered succinct (an expert), so they were detailed.

The content was rigorously reviewed and corrected, according to the evaluators' opinions. The material was organized in such a way that it was attractive, objective, comprehensive and contained the necessary information for the target audience, in order to stimulate reading. The illustrations aimed to make reading less tiring and more relaxed, in addition to facilitating the understanding of the information. The grammatical review of the material was carried out in the latest version, after the inclusion of the suggestions provided by the experts. This step counted on the contribution of a trained professional, with exper-

rience in the communication area. Figure 1, contains two pages of the educational material, in the final version, in a reduced format, only for black and white illustration. In the final version, the educational material was edited with a white background, descriptive text in black and drawings in red.

The six participants of the target audience answered the six questions about the understanding of the content and the appearance of the educational material (described in the method). Furthermore, they reported that the material was adequate, clear and easy to understand in relation to the images and descriptions of the exercises.

They reported difficulty in understanding the calendar (inserted at the end of the material) in relation to the frequency of physical activity. The calendar has been maintained, but using it will require additional explanations, with examples. There were no divergences or reports of misunderstanding of the exercises among the patients who evaluated the educational material. The 10 patients who participated in the pre-test did not present any suggestions for changes and did not report any difficulty in understanding the content. Regarding the calendar, with the inclusion of explanations, when providing educational material, patients did not report any difficulties in understanding this process.

1 - Standing, support your hands on a fixed piece of furniture and make the movement to stand on tiptoe and return. Exercise strengthens your calf muscles and helps with circulation. You should do this exercise 10 times. Repeat this sequence 3 times.



10 repetitions



3 turns

2 - Holding a fixed piece of furniture, rest on one leg and bend the knee and hip of the other leg, with a movement up and down, then do it with the other leg. The exercise strengthens the front of the leg. You should do this exercise 10 times with one leg and 10 times with the other. Repeat this sequence 3 times.



10 repetitions



3 turns

3 - Sitting and getting up from a fixed chair, trying to keep your back straight, helps to strengthen the back and front leg muscles. You should do this exercise 10 times. Repeat the sequence 3 times.



10 repetitions



3 turns

4 - Sitting in a chair, hold a 500ml bottle full of water in each hand and make open and close movements as shown in the image below. You should do this exercise 10 times. Repeat this sequence 3 times.



10 repetitions



3 turns

**Figure 1** – Pages of educational material, with layout after evaluation of appearance and content. Ribeirão Preto, SP, Brazil, 2016-2017

## Discussion

This study describes the development and validation of an educational material in the form of a booklet on physical activity for patients with coronary artery disease after angioplasty, containing relevant information, using simple language and explanatory phrases, although it may have limitations, such as qualitative assessment of the responses of specialists and patients. In this evaluation, we did not use an answer scale, but open responses to questions that allowed us to review aspects related to content, appearance, and the instrument. The best time to apply this material can also be better explored in future studies.

It is noteworthy that patient education should be initiated before procedures, preferably when they are more available to listen<sup>(16)</sup>. The expectation is that this educational material will be used in distance cardiac rehabilitation programs, for patients with coronary artery disease, undergoing angioplasty, contributing to changes in lifestyle in relation to the practice of physical activity and secondary prevention of this disease. It can be used as an instrument for patient education, in order to facilitate behavioral changes, which play a major role in the control of coronary artery disease.

The adequacy of language was an important stage of this study, since people from other areas of expertise often poorly understand the technical-scientific language in the academic environment; therefore, the participation of different evaluators in the validation process enriched the process and favored the target audience's understanding of the material. Written material, combined with direct contact, through the language used in everyday life, can facilitate the teaching of health practices, based on scientific knowledge. The illustrations, with ambience based on known elements, favor this interlocution<sup>(11,17)</sup>.

The lack of validation by a specialist in the communication area was presented as a limitation in a previous study<sup>(17)</sup>. In the present study, the appearance and content validation process was carried out

with the participation of professionals from different specialties, in order to cover various aspects contained in a material for home use, by patients with coronary artery disease, after angioplasty. The participation of different professionals in this type of validation makes it possible to obtain and value different opinions on the topic<sup>(8)</sup>.

Illustrations were used to make the textual information clearer, in addition to stimulating and facilitating the patient's reading. Another validation study of an educational manual for patients with head and neck cancer also used illustrations and captions, in order to stimulate reading and facilitate the understanding of the content<sup>(14)</sup>. As in the present study, the authors inserted color images so that the material became more relaxed, as in this study, considered one of the positive points. The proposal was to build educational material to standardize and formalize patient care practices in cardiac rehabilitation, with a focus on physical activity, based on literature and multi-professional opinions, including patients themselves in this construction, as it is with the target population that real adaptation needs are known.

There was a low participation (39.0%) in rehabilitation programs for patients undergoing angioplasty<sup>(18)</sup>, a result consistent with a previous study conducted in European countries, in which less than half of coronary patients (40.0%) accessed cardiac prevention and rehabilitation programs<sup>(19)</sup>. In Brazil, a small fraction, between 5.0 to 30.0% of patients, is eligible to participate in a cardiac rehabilitation program<sup>(20)</sup>.

The educational material proposed in this study can contribute to adherence to cardiac rehabilitation programs, focusing on physical activity, by those who do not have access to this type of program, promoting physical activity at home, self-managed by the individual. In the process of correcting the material, the initial evaluation by experts contributed to the positive results found in the final evaluation by the target audience.

## Conclusion

The educational material proposed in this study was validated in terms of appearance and content, to be used with patients with coronary artery disease who underwent angioplasty. This conclusion is based on the positive evaluation, obtained from the six patients who evaluated the material and based on the results of the pre-test carried out with the target audience.

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## Collaborations

Pitta NC and Rossi LA contributed to the conception and design, analysis and interpretation of data, writing of the article, relevant critical review of the intellectual content and final approval of the version to be published. Gonçalves ER and Furuya RK collaborated with a relevant critical review of the intellectual content and final approval of the version to be published.

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