

# Development of an Audiovisual Tool on Peripheral Arterial Disease and Preliminary Suitability Assessment

Susana Pedras<sup>a</sup> Rafaela Oliveira<sup>a</sup> Ivone Silva<sup>a, b, c</sup>

<sup>a</sup>Angiology and Vascular Surgery Department, Centro Hospitalar Universitário do Porto, Porto, Portugal; <sup>b</sup>UMIB - Unit for Multidisciplinary Research in Biomedicine, ICBAS - School of Medicine and Biomedical Sciences, University of Porto, Porto, Portugal; <sup>c</sup>ITR - Laboratory for Integrative and Translational Research in Population Health, Porto, Portugal

## Keywords

Audiovisual tool · Suitable assessment of material · Peripheral arterial disease · Health literacy · Behavior change

## Abstract

**Background:** Increasing health literacy in people with chronic illness is essential to prevent disease complications and to promote responsible and conscious decision-making. Therefore, an audiovisual tool was developed to promote literacy about peripheral arterial disease (PAD) in a hospital setting, and a preliminary evaluation of the tool's suitability was carried out. **Material and Methods:** The tool was developed by a multidisciplinary team. The preliminary assessment of the suitability study of an audiovisual tool was carried out with a sample of 7 patients with PAD admitted to an Angiology and Vascular Surgery Service and with a group of four professionals specialized in the subject (health literacy and PAD). The design, elaboration, and production of the audiovisual tool were based on a literature review, an informal focus group with patients, a communication model, and an empirical model of behavioral change. Through this preliminary suitability assessment

study, we identified the suitability characteristics of this audiovisual tool that can be transmitted in waiting rooms and vascular surgery hospitalizations. The Suitable Assessment of Material (SAM) was used by professionals and patients to obtain different appropriateness factors for each of the 11 videos. **Results:** The audiovisual tool developed and built for patients with PAD proved to be accessible, understandable, and attractive for people with low levels of education. The patients were satisfied with the audiovisual tool and highlighted positive points, also reporting some suggestions for changes. Health professionals evaluated the 11 videos with a high level of adequacy ranging from 82% to 93.05% adequacy. Out of 19 factors (from the SAM), the quality of the illustrations, the presence of tables and lists, and stimulation and incentive to learning were the two dimensions scored as least appropriate/used. **Conclusion:** The audiovisual tool developed to improve health literacy on PAD presented preliminary suitability characteristics that make it a high-quality material to be used in future studies that evaluate the effectiveness of the tool with this population.

© 2024 The Author(s). Published by S. Karger AG, Basel on behalf of NOVA National School of Public Health

## Desenvolvimento de um instrumento audiovisual sobre doença arterial periférica e avaliação preliminar da sua adequação

### Palavras Chave

Ferramenta audiovisual · Avaliação da adequação do material · Doença arterial periférica · Literacia em saúde · Mudança comportamental

### Resumo

**Antecedentes:** O aumento da literacia em saúde em pessoas com doenças crónicas é essencial para evitar complicações e promover a tomada de decisões responsável e consciente. Assim, foi desenhada uma ferramenta audiovisual para promover a literacia sobre doença arterial periférica (DAP) em ambiente hospitalar, e foi realizada uma avaliação preliminar da adequação da ferramenta. **Material e Métodos:** A ferramenta foi desenvolvida por uma equipa multidisciplinar. A avaliação preliminar do estudo de adequação de uma ferramenta audiovisual foi realizada com uma amostra de sete doentes com DAP internados num Serviço de Angiologia e Cirurgia Vascular e com um grupo de quatro profissionais especializados na matéria (literacia em saúde e DAP). A conceção, elaboração e produção da ferramenta audiovisual basearam-se numa revisão de literatura, num grupo focal informal com doentes, num modelo de comunicação e num modelo empírico de mudança comportamental. Através deste estudo preliminar de avaliação de adequação, identificamos as características de adequação desta ferramenta audiovisual, que poderá ser transmitida em salas de espera e no internamento de um departamento de cirurgia vascular. O Teste de Adequação de Informação de Saúde Escrita (TAISE) foi usado por profissionais e doentes para obter diferentes fatores de adequação para cada um dos 11 vídeos. **Resultados:** A ferramenta audiovisual desenvolvida e criada para doentes com DAP mostrou-se acessível, compreensível e atraente para pessoas com baixos níveis de educação. Os doentes ficaram satisfeitos com a ferramenta audiovisual e destacaram pontos positivos, relatando também algumas sugestões de alterações. Os profissionais de saúde avaliaram os 11 vídeos com um alto nível de adequação variando de 82% a 93.05% de adequação. Dos 19 fatores (do TAISE), a qualidade das ilustrações, a presença de tabelas e listas e a estimulação e o incentivo ao aprendizado foram as duas dimensões pontuadas como menos apropriadas/usadas. **Conclusão:** A ferramenta audiovi-

sual desenvolvida para melhorar a literacia em saúde sobre a DAP apresentou características preliminares de adequação que a tornam um material de alta qualidade para ser utilizado em futuros estudos de avaliação de eficácia desta ferramenta com esta população.

© 2024 The Author(s). Published by S. Karger AG, Basel on behalf of NOVA National School of Public Health

### Introduction

Peripheral arterial disease (PAD) is a common cardiovascular disease that affects 27 million people in Europe and the USA [1]. The most disabling main symptom is intermittent claudication (IC). IC is the pain and discomfort felt in the calves while walking, which seriously compromises the functional capacity of the person, although it relieves with rest [2]. The discomfort related to IC contributes to a sedentary lifestyle, decreasing the level of physical fitness, potentiating cardiovascular risk factors, and increasing rates of loss of mobility, leading to disease deterioration and significant functional decline. Quality of life (QoL) is reduced, and morbidity and mortality rates are high [3], also because PAD can trigger a lower limb amputation [4].

In addition to oral medication, physical exercise has been recommended as a first-line therapy for patients with PAD and IC [5] to improve ambulation, functional status, and health-related QoL. However, adherence rates to the practice of physical exercise are low [6]. One of the main factors contributing to nonadherence is the lack of knowledge and awareness about the severity of the disease, not only among patients but also among nonspecialist physicians [7–9]. Both the public (including patients with PAD) and health professionals (medical students and medical trainees) have a great lack of knowledge and understanding about PAD (disease awareness) [10]. Inadequate health literacy is prevalent in 76.7% of patients with PAD, with a significantly higher prevalence in patients over 65 years of age and with less education [11]. Furthermore, a recent study by Dar et al. [12], published in the *European Journal of Vascular and Endovascular Surgery*, evaluated the information available on the internet for patients with PAD and amputees and concluded that the educational quality and reliability of written and video information were low, emphasizing the need to invest in the quality of information made available to patients on the internet. Also, in a study that examined the readability of articles available via Google on cardiovascular disease, it was found that all articles were written above the appropriate reading levels for patients

[13]. Finally, two other factors that contribute to non-adherence to the recommendation for the practice of physical exercise in patients with PAD are the lack of knowledge about the effectiveness of physical exercise and the erroneous belief that the pain caused by physical exercise will damage the legs [14]. In this sense, it is urgent to investigate the best methods to transmit and share clinical information about PAD not only to patients with PAD but also to people at risk and vulnerable to developing PAD.

It is known that knowledge alone is not enough, but it is crucial to increase health literacy, change behaviors, help patients make informed decisions, and promote disease self-management [15]. Health literacy is defined as the skills (cognitive and social) that allow a person to access, understand, and use information that benefits health and the ability to make informed decisions in daily life [16]. An inadequate level of health literacy has significant implications for health outcomes, the use of health services, and, consequently, health expenditures [17, 18], as well as, not least, a significant impact on the QoL and well-being of individuals [19]. Therefore, all efforts that are made to increase the health literacy of people with a chronic illness are welcome because this means empowering and making people co-responsible for taking care of their health during illness, i.e., promoting health while living with a chronic disease.

Of the various ways of developing initiatives that promote knowledge and health literacy, the transmission and sharing of audiovisual material are one of the most used as it is accessible to patients with little or no qualifications, and with low literacy; in addition, it is an inclusive tool given that the texts can be heard and not just read, through sound reading. Studies that evaluate the effectiveness of interventions carried out through the reproduction of videos have shown to be effective in modifying health behaviors in the short and long term [20, 21]. There are studies on the effectiveness of educational videos when compared to leaflet reading or group reading, in promoting breast self-examination, prostate cancer screening, adherence to sunscreen, self-care in patients with heart failure, HIV testing, adherence to treatments, adherence to female condom use, informed decision-making about bariatric surgery, increased knowledge about fertility and stroke [22–27]. In patients with PAD, there is only one study from 2009, in which a group of patients watched an educational video to increase the practice of unsupervised physical activity and the other group received a face-to-face intervention, and the results indicated that the only statistical significant difference between the groups was found in walking speed [28], therefore, not being conclusive as to the effect on increasing literacy on PAD.

The production of health materials must be based on the Plain Language methodology, which focuses on four

main components: adaptation to the target population, language and style, organization, layout, and design [29, 30, 31, 32]. Furthermore, the type of language used must be based on the ACP model – assertiveness, clarity, and positivity [33]. Assertiveness, clear language, and information constructed and presented in a positive framework are key and strategic elements for optimizing health literacy and clinical practices. Messages written with a focus on gain rather than a focus on loss reinforce each person’s ability to adopt a new behavior [29, 30].

Moreover, interventions to change health-related behaviors are more effective if grounded in appropriate empirical theory. Thus, the Health Action Process Approach (HAPA) [34, 35] allows the prediction of behavior by explaining how behavioral change can happen, as well as understanding the mechanisms involved in behavior change. According to the HAPA Model, the behavioral change process takes place in two stages. First comes the motivation phase, in which people develop intentions to act. Second, people move from deliberation to action, i.e., people enter the volitional phase, where a change in mindset occurs.

Therefore, considering the absence of materials and respective studies that evaluate the suitability of materials and educational tools to promote health literacy in PAD, this study presents the development of an audiovisual tool on PAD and the preliminary assessment of suitability.

## Materials and Methods

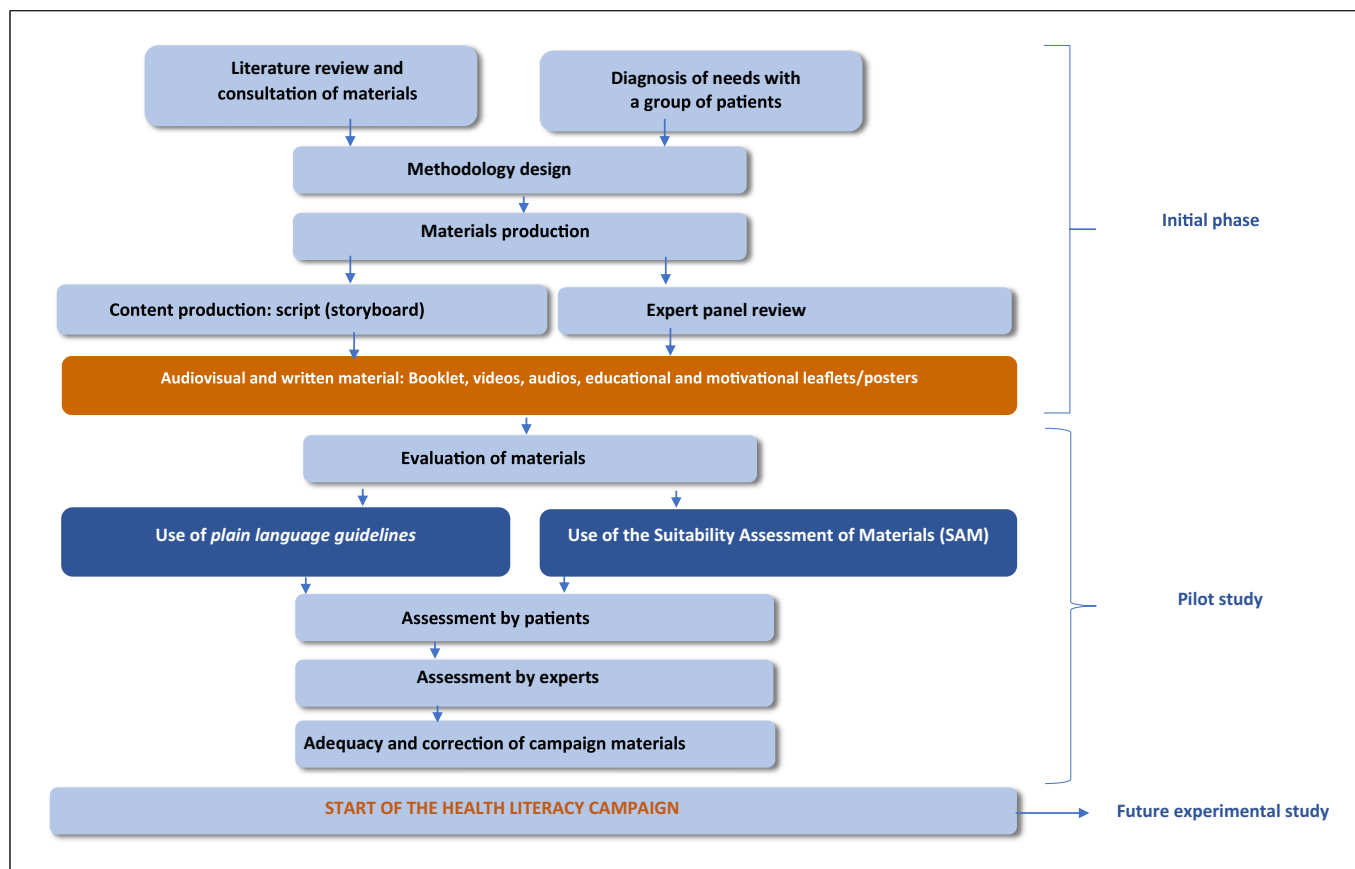
The audiovisual tool was created by a multidisciplinary team and evaluated by patients and a panel of experts. A preliminary suitability study was performed including a convenience sample of patients admitted to an Angiology and Vascular Surgery Service in the North of Portugal with indications for intervention in the lower limbs due to PAD, who were invited to try the tool and carry out its evaluation. In addition, a sample of experts on the topic (health literacy and PAD) was invited to view the tool and evaluate it according to a standardized and validated instrument for evaluating materials to promote health literacy.

This study precedes an experimental study that will be implemented later to evaluate the effectiveness of this audiovisual tool in increasing literacy about PAD and promoting behavior change.

### *Development of the Audiovisual Tool*

The process began with a review of the literature and a diagnosis of needs carried out with a group of patients (Fig. 1). Figure 1 shows the process of planning, construction, and validation of the audiovisual tool.

The development of the audiovisual tool and the preliminary assessment of suitability is part of a larger study that aimed to promote physical exercise in PAD patients (published trial reference, blinded for review purposes). The Research Ethics Committee approved the “parent” trial on October 22, 2019 (reference: 069-DEFI/068-CES).



**Fig. 1.** Process of planning, construction, and validation of the audiovisual tool.

To be eligible, participants had to be over 18 years old, have a diagnosis of PAD, and present a cognitive state that allowed them to participate in the study. Exclusion criteria included the absence of cognitive, verbal, or auditory skills that would allow viewing the audiovisual tool and answering a questionnaire to assess the suitability of the tool.

The development of this tool was accompanied by a multidisciplinary panel of experts (including a vascular surgery physician, a health psychologist, a nurse specialist in surgical medicine, and a podiatrist) who systematically evaluated and monitored its development in terms of content and form. It also included the work of a graphic design and multimedia consultant.

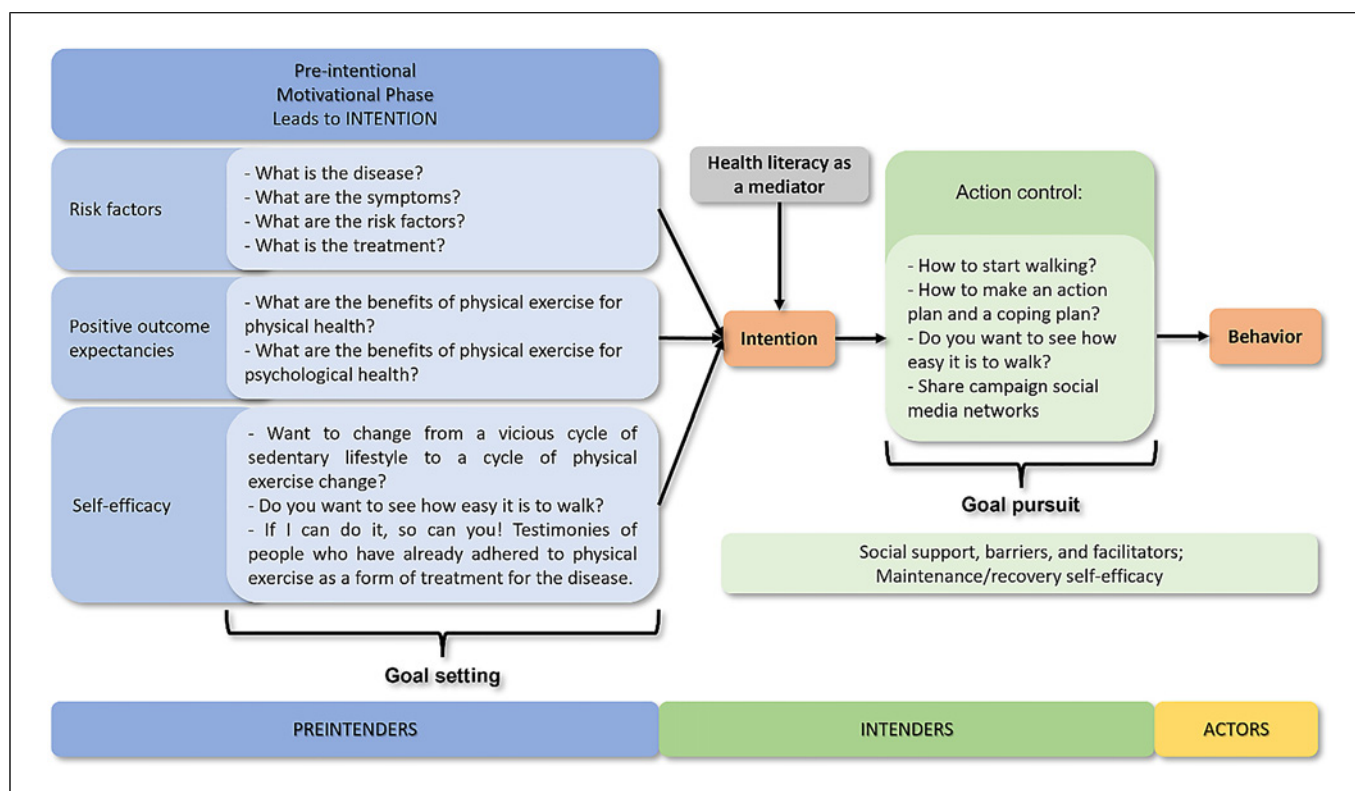
#### *Theoretical Model Underlying the Audiovisual Tool*

The audiovisual tool was built based on the HAPA [34, 35] and Figure 2 shows the adaptation of the original HAPA Model to the design and construction of the audiovisual tool.

In the first phase - the motivational phase - the predictors of behavior are risk perception (e.g., “I am at risk of developing complications from the disease”), expectations of positive outcomes (e.g., “if I walk, I will be able to maintain my level of independence and autonomy”) and perceived self-efficacy (e.g., “I already managed to go for a walk on a cold day, so I will also be able to go today”). These predictors are essential

at this stage when people weigh the pros and cons of certain behaviors.

In the second phase - the volitional phase - the person is already motivated to adopt a certain health behavior, being necessary (1) to detail the instructions on how to perform the behavior and (2) to maintain the adopted behavior, resisting other motivations and conflicting intentions. In this phase, people begin a post-intentional process in which intentions are converted into behaviors. However, although people often feel motivated to change their behavior, this motivation does not always translate into actual behavioral change (“intention-behavior gap”) [36]. The intention-behavior gap is the result of high knowledge but low behavior. To reduce this “gap” between the intention to change behavior and behavior, it is necessary to promote self-regulatory strategies, which play a key role here. The person needs to translate the general intention into proximal and specific goals (i.e., action planning) and decide how to deal with possible barriers (i.e., coping planning). If, e.g., the intention is to start walking, the person must plan how to do it, i.e., when, on what days, at what time, with whom, and where. The more specific and personalized the description of the behavior to be adopted, the greater the probability of adherence to this behavior. Next, it is necessary to discriminate the barriers and obstacles that the person is expected to encounter and create a plan to deal with them. Self-efficacy



**Fig. 2.** Approach to Health Action Processes used in the design and construction of the audiovisual tool adapted from the original model by Schwarzer (2016).

beliefs also strongly influence the cognitive construction of specific action plans as the number and quality of action plans depend on each person's perception of competence and previous experience. According to this approach, people are either in the motivational phase or in the volitional phase and go through different ways of thinking (mindset) about the path they must take to change their behavior. Thus, interventions are more effective when more adapted to these specific ways of thinking (mindset).

#### *Design and Construction of the Audiovisual Tool*

The videos storyboard was built based on the behavioral determinants of the HAPA approach: self-efficacy, outcome expectations, risk perception, intention, action planning, coping planning, identification of resources, and barriers to behavior change (physical exercise, starting to practice walking). Therefore, the videos have clear objectives associated with health effects and behavioral outcomes, and instructional strategies built under a well-oriented theoretical approach. Like, the purpose of this audiovisual tool was not only to improve health literacy but also to promote behavioral change, and we have included pre-intentional and post-intentional constructs (such as planning and voluntary self-efficacy) as proximal predictors of performance. Appeals to fear are of limited value. Thus, coping information aimed at increasing perceptions of response effectiveness and especially self-efficacy is more important in promoting protective action than presenting threatening health information aimed at increasing risk

perceptions and fear arousal [37]. Thus, this audiovisual tool consists of a set of 11 videos, with images, sounds, and subtitles, with an average duration of 30 min in total (3 min for each video), which aims to increase knowledge about PAD, promote the intention to change behavior and the motivation to start walking as a first-line therapeutic measure for the treatment of IC. The videos are the following: (1) What is PAD?; (2) What are the symptoms?; (3) How to take care of feet?; (4) What is the treatment?; (5) What are the risk factors?; (6) What are the psychological benefits of exercise?; (7) What are the physical benefits of exercise?; (8) What is the cycle of physical inactivity?; (9) Let's make an action plan!; (10) Walking is easier than it seems; and (11) Testimonials from those who have already started.

#### *Preliminary Assessment of Suitability by Patients*

After the patient's admission to the Angiology and Vascular Surgery Department, one of the members of the research team, consisting of five rehabilitation nurses, a psychologist, and a doctor specializing in vascular surgery, invited the patient to participate in this pilot study, explaining the reason and the pertinence of their participation as well as guaranteeing its voluntary character and the signing of an informed consent. After acceptance, a tablet was given to the patient so that he could view the set of videos that make up the audiovisual tool. As the videos were viewed, a member of the research team was at his side to help him maneuver the tablet or clarify any doubts that arose.

### *Preliminary Assessment of Suitability by Experts*

Four health professionals recognized as experts in their areas of expertise (a vascular surgery physician, a health psychologist, a nurse specialist in surgical medicine, and a podiatrist) were invited to participate in the expert panel to assess the suitability of this tool. Health professionals assessed the initial storyboard, and then, the set of 11 videos was sent by email along with the questionnaire answer sheet (see online suppl. attachment 1: Suitable Assessment of Material [SAM] instrument and scoring sheet; for all online suppl. material, see <https://doi.org/10.1159/000539072>).

### *Description of the Tools That Were Used for Evaluation*

To validate the suitability of the audiovisual tool, the SAM (Portuguese version: Teste de Avaliação de Informação de Saúde [TAISE]) was used [38, 39] in two versions. The original version validated in Portugal was used by health professionals. An adapted and simplified version was used by patients.

### *Health Professional's Version*

SAM evaluates the suitability of written health information for target populations through an evaluation guide of 19 factors organized into six dimensions or categories, namely: (1) type of content, (2) level of literacy required, (3) quality of illustrations, the presence of tables and lists, (4) layout and typography, (5) stimulation and encouragement to learning, and (6) adaptation to the cultural environment (see online suppl. attachment 1). Each factor is scored between 0 “not adequate,” 1 “adequate,” and 2 “very adequate,” and the score ranges between 0 and 38 points. The test result is provided through the total adequacy score, which corresponds to the ratio between the sum of the revenues obtained in each category of information and the number of factors evaluated multiplied by the maximum score as described in the instrument guidelines [38, 39]. The score can be categorized into the following categories that reveal the adequacy of the materials: 0–39 – inappropriate material; 40–69 – suitable material; 70–100 – top quality material.

### *Patient's Version*

Considering the low level of education of this population [40], we reduced the complexity of the assessment instrument by simplifying the questions but maintaining the same six dimensions or assessment categories (see online suppl. attachment 2). The patient's version was scored according to the six dimensions (and not according to the 19 factors like the health professional's version). Thus, each dimension was nominally scored as 0 “no” and 1 “yes.” There was also the possibility that patients would rate “I don't know” = 0. Furthermore, in addition to the nominal score, open questions were asked: What are the videos about? What do you remember seeing in the videos? If you could, what would you do differently in the videos?

### *How the Analysis Was Performed*

Data analysis was performed using the IBM SPSS V.27 software. Descriptive analysis was used to characterize the sample regarding sociodemographic and clinical data.

The evaluation of health professionals, on each factor of each video, was calculated by adding the results obtained in each category of information and the number of factors multiplied by the maximum score, presenting the results in percentages for each video (ranging between 0 and 100%). Furthermore, the videos were classified into quality categories that reveal the suitability of the materials. Then, patients' SAM responses, due to the small sample size, were only analyzed qualitatively and described in the text.

## **Results**

### *Patients' Characterization*

The study sample consisted of 7 patients admitted to an Angiology and Vascular Surgery Department. Of the seven participants, 5 patients were male, with an average age of 63 years (SD = 11.67) and 5 years of schooling (SD = 1.81), 4 of whom were retired and married. The participants already had a history of surgeries, hospitalizations, and endovascular and surgical interventions and were hospitalized for infected stumps, limb ischemia, pain at rest, and gangrene in the fingers.

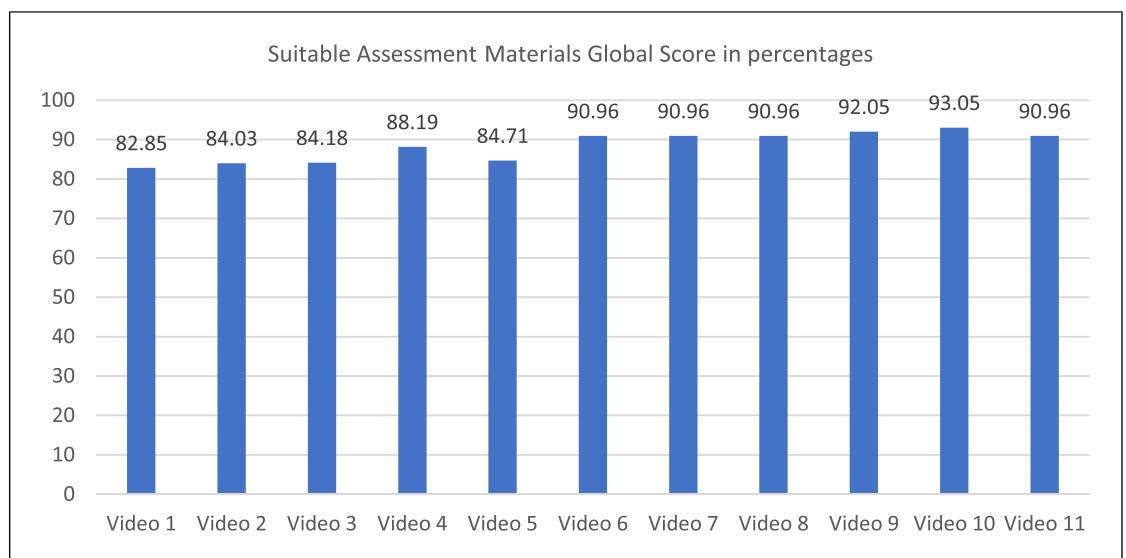
### *Health Professionals' Assessment of the Audiovisual Tool Suitability*

Table 1 presents the expert panel results according to SAM in percentages calculated for each video. The video with the lowest punctuation was video 1 (82%) “What is PAD?” and the video with the higher punctuation was video 10 (93.05%) “Walking is easier than it seems!” (Table 1; Fig. 3), indicating that the audiovisual tool made up of 11 videos was scored as a top-quality material.

Out of 19 factors, the quality of the illustrations; the presence of tables and lists (factor 3); stimulation and incentive to learning (motivation, modeling, and interaction) (factor 5) were the two dimensions scored as least appropriate (lower scores). Regarding qualitative suggestions, experts report the following aspects: the use of technical terms such as “flushed” (ruborizados) in video 2 was identified as a term that should be replaced by “reddish” (avermelhados). In video 3, the indication of “dermal mycoses” may not be clear, with the term “skin lesions such as blisters, fissures, or redness” (“lesões na pele como bolhas, fissuras ou vermelhidão”) being suggested. Also in video 3, it is useful to correct the indication that moisturizing cream should not be applied to the toes, effectively avoiding application in the interdigital spaces, but the cream should be applied to the remaining space of the foot and should be replaced by the recommendation to use a cream based on urea (keratolytic action). In video 5, a change was suggested in the order of placement of the images illustrating the risk factors. Since Diabetes Mellitus is the second most relevant risk factor, it should be placed in 2nd place in the sequential illustrations of the factors (before advanced age), so that it would be more consistent with what is reported. It was also suggested to change the image illustrating a sedentary lifestyle, in video 5 “What are the risk factors?” because the current one is not suitable. In video 8, the term “atherosclerosis plaques” must be translated into everyday language, as in previous videos (cholesterol deposits or fat in vessels).

**Table 1.** Health professionals’ assessment of the audiovisual tool suitability in percentages calculated for each video (N = 4)

	Expert 1	Expert 2	Expert 3	Expert 4	Total
Video 1: What is PAD?	74.28	68.57	88.57	100	82.85
Video 2: What are the symptoms?	80.55	69.44	86.11	100	84.03
Video 3: How to take care of feet?	86.11	77.77	86.11	88.88	84.18
Video 4: What is the treatment?	80.55	77.77	94.44	100	88.19
Video 5: What are the risk factors?	86.11	66.66	88.88	97.22	84.71
Video 6: What are the psychological benefits of exercise?	91.66	77.77	94.44	100	90.96
Video 7: What are the physical benefits of exercise?	94.44	77.77	94.44	97.22	90.96
Video 8: What is the cycle of physical inactivity?	94.44	77.77	94.44	97.22	90.96
Video 9: Let’s make an action plan!	100	77.77	94.44	97.22	92.05
Video 10: Walking is easier than it seems!	100	77.77	94.44	100	93.05
Video 11: Testimonials from those who have already started	100	77.77	94.44	91.66	90.96



**Fig. 3.** Overall score in percentage made by healthcare professionals for each video.

Some poorly constructed sentences were identified. As for the layout, the colors of the letters and the background cover are not suitable, especially on smaller reading devices such as mobile phones.

#### Patients’ Assessment of Audiovisual Tool Suitability

After starting to watch the videos, 2 patients refused to continue; “I’m going to be terrified after watching this” and “I’m not in the mood for watching videos.” Therefore, SAM was completed by 5 patients. The only dimension where all patients were satisfied and positively assessed the dimension was dimension 5 – “Stimulation and encouragement to learning.” In the other dimensions: 1 – “Type of content,” 2 – “Level of literacy required,”

3 – “Quality of illustrations, the presence of tables and lists,” 4 – “Layout and typography,” and 6 – “Adaptation to the cultural environment,” 1 patient presented disagreement, i.e., not agreeing with the existence and the presence of this dimension in the audiovisual tool.

#### Patients’ Responses to Qualitative Questions

*What are the videos about?* When asked about what the videos were about, the answers were clear and met the objective for which they were built: “leg diseases, circulation in the legs, and you should walk.”

*What do you remember seeing in the videos?* When asked about what they remember seeing in the videos, the patients mentioned the following: “how to treat their legs, difficulties

in walking, and sores on the legs progress very quickly,” “I only need to walk for 30 min,” and “clogged veins.”

*If you could, what would you do differently in the videos?* As for what they would do differently, if they could, the patients suggested “I would speak more simply and use a larger font”; “they (the videos) should talk about tobacco and how to stop smoking!”; “We need to talk about tobacco!”; “I don’t need to see dolls. We are not children!”; “The dark red font is not well read and perceived”; “Small font size to read on TV”; “Words with white dashed lines look bad. . .”

Furthermore, patients reported feeling motivated to start walking and stop smoking when they were discharged and made some positive comments such as “I liked the blood circulating in the arteries,” “I wish I had known before I was amputated,” “I stopped smoking 3 years ago and it wasn’t as difficult as I thought,” “I didn’t know anything about this! I’m glad I saw it!,” “It was very useful,” “I don’t smoke because I’m going to the operating room, but I think I’m going to stop smoking after the surgery. . .,” “I wish I had this information 3 years ago!”

## Discussion

This study presents the development of an audiovisual tool on PAD and a preliminary assessment of suitability. This is the first and only Portuguese audiovisual tool built from scratch by a multidisciplinary team and evaluated for its suitability. The audiovisual tool was built based on the guidelines of the plain language methodology [29–32] and the ACP model – assertiveness, clarity, and positivity [33]. Furthermore, to potentially promote behavior change, an appropriate theoretical and empirical approach was used –HAPA [34, 35]. Then, before initiating an experimental study to evaluate the effectiveness of this audiovisual tool in promoting health literacy and behavioral change, a preliminary assessment of the tool’s suitability was carried out. This preliminary suitability study was essential to understand whether the audiovisual tool is suitable for the target population because the literature states that most educational materials are not adapted to the population they are made for because they are written above the educational level [12, 13].

To our knowledge, there are no studies on the process of developing and evaluating the suitability of an educational tool for patients with PAD. Typically, studies present the constructed tool and the study of the tool’s effectiveness in different outcomes (health literacy, smoking reduction, vaccination, among others) [20–26]. However, in these studies, it is not possible to know

whether the lack of effectiveness of the tools used is due to the lack of suitability of the tool for the population because a pilot suitability study is not carried out as it normally requires a lot of time and resources that could be used for the experimental study of the effectiveness of the tool). Thus, this study shows the preliminary results of the suitability of an audiovisual tool, evaluated by health professionals as high-quality material and by patients as comprehensible and adequate, suggesting that they understood the main message of the audiovisual tool.

Concerning health professionals, the assessment made by the expert panel according to the SAM, the video with the lowest score was video 1 (82%) “What is PAD?” and the video with the highest score was video 10 (93.05%) “Walking is easier than it looks” which is a video that includes several coping strategies to overcome the barriers that the patient will possibly encounter in order not to go for a walk or while walking. Out of 19 factors, the quality of the illustrations, the presence of tables and lists, and stimulation and incentive to learning (motivation, modeling, and interaction) were the two dimensions scored in the SAM as least adequate. The illustrations are drawings and seem to be of poor quality according to experts. In the videos, there are no tables or lists, but we are going to change some videos so that the symptoms appear in a list format because it makes it easier to read and remember the information in the future [29–32]. Regarding the incentive to learning (motivation, modeling, and interaction), the score was low, and we believe that this result is associated with the fact that we did not use human models to present modeling and interaction [41]. Qualitative suggestions from the expert panel will all be addressed and will involve new audio recordings, wording and color changes, layout changes, positions, and other suggested changes that will enrich the tool as a whole.

Regarding the qualitative assessment made by patients, their suggestions will be considered regarding the layout (size of the letters, colors) to make it easier to read. The need to address tobacco consumption is indeed a very important suggestion, and in the future, a set of videos focusing on each risk factor will be planned and built. At the moment, this audiovisual tool only has a single video entitled Global Risk Factors, but it does not detail each one of them. Given the number of patients who smoke and need to stop as soon as possible, it is extremely important to include a video about this (and other) risk factors. The message that it is important (if not mandatory) to start walking to improve walking ability and reduce claudication pain seems to have been taken in by patients.



### Limitations

This study has several limitations that must be acknowledged. This is the initial phase of a larger study that presents the development and construction of an audiovisual tool to improve literacy about PAD. The sample of patients was collected conveniently (i.e., consecutively, patients who were admitted to the hospital for a specific period of time and who met the inclusion criteria were asked if they would like to participate in this study). If the tool was not suitable, an efficacy study would not be carried out. In the future, to carry out an effectiveness study of the audiovisual tool, it will be crucial to define a sample size that guarantees the results' internal and external validity, as well as the suitability and usability of the tool. The preliminary results of the suitability of this tool were evaluated by professionals from the north of the country and by a convenience sample of patients collected in a single hospital, which limits the generalization of the results.

### Implications

This work has important implications for clinical practice and future studies. First, this study shows that this audiovisual tool developed and built for patients with PAD has an excellent level of suitability and is considered top-quality material by a panel of experts. Patients considered the instrument understandable and appropriate. Therefore, this audiovisual tool can be used as an active health education strategy [42], shared and adopted by other clinical centers and departments, transforming the waiting room into a passive intervention environment to promote health literacy on PAD [43].

Second, the audiovisual tool presents the necessary quality to be used in futures randomized clinical trials that should be carried out to evaluate the effectiveness of the tool in improving health literacy about PAD and promoting behavior change. In addition, it will be important to explore the differences between those patients who visualize the tool alone and those who have a guided visualization by a health professional. Furthermore, specific videos should be planned and created for each risk factor for the worsening of PAD as suggested by patients (especially on tobacco consumption).

### Conclusion

PAD is a chronic disease with a significant impact on the patient's QoL, especially on motor and functional functioning. Patients have low levels of information and

understanding about PAD and physical exercise, as the first therapeutic measure, is often underestimated. Thus, an audiovisual tool was created to be transmitted in waiting rooms and during hospital admissions in an Angiology and Vascular Surgery Service and evaluated by patients and health professionals regarding its preliminary suitability characteristics. The results of this preliminary suitability assessment study show that the audiovisual tool has the potential to be a low-cost, practical, and useful opportunity to increase literacy about PAD and, consequently, motivate intention to change behavior to improve the management of this chronic disease. Both patients and experts assessed the suitability of the material as ready for use and of superior quality. The results constitute a novelty for the area of vascular medicine, rehabilitation nursing, and health psychology as it is the first study in Portugal to construct, develop, and evaluate the suitability of an audiovisual tool to promote patients' literacy about PAD for use in clinical environments, considered privileged places for health education and promotion of behavioral changes. This tool will also contribute to the implementation of self-sustainable and scalable health literacy interventions in clinical settings.

### Statement of Ethics

The Research Ethics Committee approved the "parent" trial, in which this study is included, on October 22, 2019 (reference: 069-DEFI/068-CES). The research was conducted ethically following the World Medical Association Declaration of Helsinki. Written informed consent was obtained from participants to participate in the study.

### Conflict of Interest Statement

The authors have no conflicts of interest to declare.

### Funding Sources

This study is financed by the FEDER – European Regional Development Fund through NORTE 2020 – Northern Regional Operational Program, under PORTUGAL 2020 and by national funds, through the FCT – Foundation for Science and Technology. Grant No: NORTE-01-0145-FEDER-031161-PTDC/MEC-VAS/31161/2017.

### Author Contributions

Susana Pedras: conception and design of the study; acquisition, analysis, and interpretation of data for the work; elaboration of the work; final approval of the version to be published; and agreement

to be responsible for all aspects of the work, ensuring that questions regarding the accuracy or completeness of any part of the work are properly investigated and resolved. Rafaela Oliveira conception of the study; acquisition, analysis, and interpretation of data for the work; and elaboration of the work in its audiovisual format. Ivone Silva: analysis and interpretation of data for the work; critical revision for the important intellectual content of the manuscript; final approval of the version to be published; and agreement to be accountable for all aspects of the work in ensuring

that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All the authors approved the final manuscript.

## Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author.

## References

- Townsend N, Kazakiewicz D, Lucy Wright F, Timmis A, Huculeci R, Torbica A, et al. Epidemiology of cardiovascular disease in Europe. *Nat Rev Cardiol*. 2022;19(2):133–43. <https://doi.org/10.1038/s41569-021-00607-3>
- Conte SM, Vale PR. Peripheral arterial disease. *Heart Lung Circ*. 2018;27(4):427–32. <https://doi.org/10.1016/j.hlc.2017.10.014>
- McDermott MM, Criqui MH, Greenland P, Guralnik JM, Liu K, Pearce WH, et al. Leg strength in peripheral arterial disease: associations with disease severity and lower-extremity performance. *J Vasc Surg*. 2004;39(3):523–30. <https://doi.org/10.1016/j.jvs.2003.08.038>
- Swaminathan A, Vemulapalli S, Patel MR, Jones WS. Lower extremity amputation in peripheral artery disease: improving patient outcomes. *Vasc Health Risk Manag*. 2014;10:417–24. <https://doi.org/10.2147/VHRM.S50588>
- Aboyans V, Ricco JB, Bartelink MLEL, Björck M, Brodmann M, Cohnert T, et al. Editor's Choice: 2017 ESC guidelines on the diagnosis and treatment of peripheral arterial diseases, in collaboration with the European Society for Vascular Surgery (ESVS). *Eur J Vasc Endovasc Surg*. 2018;55(3):305–68. <https://doi.org/10.1016/j.ejvs.2017.07.018>
- Elgersma KM, Brown RJJ, Salisbury DL, Stigen L, Gildea L, Larson K, et al. Adherence and exercise mode in supervised exercise therapy for peripheral artery disease. *J Vasc Nurs*. 2020;38(3):108–17. <https://doi.org/10.1016/j.jvn.2020.07.002>
- Ayedd SB, Hussain MA, AlHamzah M, Al-Omran M. Poor knowledge of peripheral arterial disease among the Saudi population: a cross-sectional study. *Vascular*. 2017;25(1):86–91. <https://doi.org/10.1177/1708538116649801>
- Cronin CT, McCartan DP, McMonagle M, Cross KS, Dowdall JF. Peripheral artery disease: a marked lack of awareness in Ireland. *Eur J Vasc Endovasc Surg*. 2015;49(5):556–62. <https://doi.org/10.1016/j.ejvs.2014.12.017>
- Eyholzer S, Perrenoud B, Dwyer AA. Patient perceptions of peripheral artery disease: a cross-sectional study of hospitalized adults. *J Vasc Nurs*. 2019;37(3):188–93. <https://doi.org/10.1016/j.jvn.2019.04.001>
- Bridgwood BM, Nickinson AT, Houghton JS, Pepper CJ, Sayers RD. Knowledge of peripheral artery disease: what do the public, healthcare practitioners, and trainees know? *Vasc Med*. 2020;25(3):263–73. <https://doi.org/10.1177/1358863X19893003>
- Strijbos RM, Hinnen JW, van den Haak RF, Verhoeven BA, Koning OH. Inadequate health literacy in patients with arterial vascular disease. *Eur J Vasc Endovasc Surg*. 2018;56(2):239–45. <https://doi.org/10.1016/j.ejvs.2018.04.015>
- Dar T, Chowdhury MM, Coughlin PA. An assessment of available information on the World Wide Web for patients with lower limb arterial disease. *Eur J Vasc Endovasc Surg*. 2021;61(4):620–7. <https://doi.org/10.1016/j.ejvs.2021.01.002>
- Ayyaswami V, Padmanabhan D, Patel M, Prabhu AV, Hansberry DR, Agarwal N, et al. A readability analysis of online cardiovascular disease-related health education materials. *HLRP*. 2019;3(2):e74–80. <https://doi.org/10.3928/24748307-20190306-03>
- Sharath SE, Koungias P, Barshes NR. The influence of pain-related beliefs on physical activity and health attitudes in patients with claudication: a pilot study. *Vasc Med*. 2017;22(5):378–84. <https://doi.org/10.1177/1358863X17709944>
- Arlinghaus KR, Johnston CA. Advocating for behavior change with education. *Am J Lifestyle Med*. 2018;12(2):113–6. <https://doi.org/10.1177/1559827617745479>
- Sørensen K, Brouke SV, Fullam J, Doyle G, Pelikan J, Slonska Z, et al. Health literacy and public health: a systematic review and integration of definitions and models. *BMC Publ Health*. 2012;12:1–13.
- Von Korff M, Gruman J, Schaefer J, Curry SJ, Wagner EH. Collaborative management of chronic illness. *Ann Intern Med*. 1997;127(12):1097–102. <https://doi.org/10.7326/0003-4819-127-12-199712150-00008>
- Berkman ND, Sheridan SL, Donahue KE, Halpern DJ, Crotty K. Low Health literacy and health outcomes: an updated systematic review. *Ann Intern Med*. 2011;155(2):97–107. <https://doi.org/10.7326/0003-4819-155-2-201107190-00005>
- Kottke TE, Stiefel MP, Pronk NP. “Well-Being in All Policies”: promoting cross-sectoral collaboration to improve people's lives. *Prev Chronic Dis*. 2016;13:e52. <https://doi.org/10.5888/pcd13.160155>
- Armstrong AW, Idriss NZ, Kim RH. Effects of video-based, online education on behavioral and knowledge outcomes in sunscreen use: a randomized controlled trial. *Patient Educ Couns*. 2011;83(2):273–7. <https://doi.org/10.1016/j.pec.2010.04.033>
- Lichtenstein E, Boles SM, Lee ME, Hampson SE, Glasgow RE, Fellows J. Using radon risk to motivate smoking reduction II: randomized evaluation of brief telephone counseling and a targeted video. *Health Educ Res*. 2008;23(2):191–201. <https://doi.org/10.1093/her/cym016>
- Arterburn DE, Westbrook EO, Bogart TA, Sepucha KR, Bock SN, Weppner WG. Randomized trial of a video-based patient decision aid for bariatric surgery. *Obesity*. 2011;19(8):1669–75. <https://doi.org/10.1038/oby.2011.65>
- Conceição C, Pedro J, Martins MV. Effectiveness of a video intervention on fertility knowledge among university students: a randomised pre-test/post-test study. *Eur J Contracept Reprod Health Care*. 2017;22(2):107–13. <https://doi.org/10.1080/13625187.2017.1288903>
- Eubelen C, Brendel F, Belche JL, Freyans A, Vanbelle S, Giet D. Effect of an audiovisual message for tetanus booster vaccination broadcast in the waiting room. *BMC Fam Pract*. 2011;12(12):104. <https://doi.org/10.1186/1471-2296-12-104>
- Kreuter MW, Holmes K, Alcaraz K, Kalesan B, Rath S, Richert M, et al. Comparing narrative and informational videos to increase mammography in low-income African American women. *Patient Educ Couns*. 2010;81(Suppl 1):S6–S14. <https://doi.org/10.1016/j.pec.2010.09.008>
- Tuong W, Larsen ER, Armstrong AW. Videos to influence: a systematic review of effectiveness of video-based education in modifying health behaviors. *J Behav Med*. 2014;37(2):218–33. <https://doi.org/10.1007/s10865-012-9480-7>
- Deshpande N, Wu M, Kelly C, Woodrick N, Werner DA, Volerman A, et al. Video-based educational interventions for patients with chronic illnesses: systematic review. *J Med Internet Res*. 2023;25(1):e41092. <https://doi.org/10.2196/41092>

- 28 Collins TC, Krueger PN, Kroll TL, Sharf BF. Face-to-Face interaction compared with video watching on use of physical activity in peripheral arterial disease: a pilot trial. *Angiology*. 2009;60(1):21–30. <https://doi.org/10.1177/0003319708318382>
- 29 U.S. Department of Health & Human Services. Centers for Disease Control and Prevention. Health literacy: guidance & tools [Internet]. Atlanta: CDC; 2021. [cited 15.03.2023]. Available from: <https://www.cdc.gov/healthliteracy/developmaterials/guidancestandards.html>
- 30 U.S. Department of Health & Human Services. Centers for Disease Control and Prevention. The health communicator's social media Toolkit [internet]. Atlanta: CDC; 2011.
- 31 Petelin R. Considering plain language: issues and initiatives. *CCIJ*. 2010;15(2):205–16. <https://doi.org/10.1108/13563281011037964>
- 32 Grene M, Cleary Y, Marcus-Quinn A. Use of plain-language guidelines to promote health literacy. *IEEE Trans*. 2017;60(4):384–400. <https://doi.org/10.1109/tpc.2017.2761578>
- 33 Belim C, Almeida CV. Healthy thanks to communication: a model of communication competencies to optimize health literacy; assertiveness, clear language, and positivity. In: Papalois VE, Theodosopoulos M, editors. *Optimizing health literacy for improved clinical practices*. Hershey, PA: IGI Global; 2018. p. 124–52.
- 34 Schwarzer R. Health Action Process Approach (HAPA) as a theoretical framework to understand behavior change. *Actual Psicol*. 2016;30(121):119–30. <https://doi.org/10.15517/ap.v30i121.23458>
- 35 Schwarzer R. Modeling health behavior change: how to predict and modify the adoption and maintenance of health behaviors. *Appl Psychol*. 2008;57(1):1–29. <https://doi.org/10.1111/j.1464-0597.2007.00325.x>
- 36 Sutton S. Health behavior: psychosocial theories. In: Smelser NJ, Baltes PB, editors. *International encyclopedia of the social & behavioral sciences*. Oxford: Pergamon Press; 2004. p. 6499–506.
- 37 Ruitter RA, Kessels LT, Peters GJ, Kok G. Sixty years of fear appeal research: current state of the evidence. *Int J Psychol*. 2014;49(2):63–70. <https://doi.org/10.1002/ijop.12042>
- 38 Doak CC, Doak LG, Root JH, Doak CC, Doak LG, Root JH, et al. Assessing suitability of materials. In: *Teaching patients with low literacy skills*. Philadelphia, PA: Lippincott; 1996; p. 41–59.
- 39 Pimentel RF. Avaliação, adequação e simplificação de informação de saúde [Evaluation, adequacy and simplification of health information]. Lisboa: Escola Nacional de Saúde Pública. Universidade Nova de Lisboa; 2018. Doutoramento em Saúde Pública.
- 40 Vaz C, Duarte VM, Santos AR, Valente P, Paúl C, Bastos R, et al. doença arterial periférica e qualidade de vida [Peripheral arterial disease and quality of life]. *Angiologia e Cirurgia Vascular*. 2014;9(1):17–23.
- 41 Bandura A. Influence of models' reinforcement contingencies on the acquisition of imitative responses. *J Pers Soc Psychol*. 1965;1(6):589–95. <https://doi.org/10.1037/h0022070>
- 42 Gignon M, Idris H, Manaouil C, Ganry O. The waiting room: vector for health education? The general practitioner's point of view. *BMC Res Notes*. 2012;5:511. <https://doi.org/10.1186/1756-0500-5-511>
- 43 Cass SJ, Ball LE, Leveritt MD. Passive interventions in primary healthcare waiting rooms are effective in promoting healthy lifestyle behaviours: an integrative review. *Aust J Prim Health*. 2016;22(3):198–210. <https://doi.org/10.1071/PY15043>