

Construction and validation of educational booklet about spirometry for users

Construção e validação de cartilha educativa sobre espirometria para usuários

DOI:10.34119/bjhrv5n5-164

Recebimento dos originais: 30/08/2022

Aceitação para publicação: 28/09/2022

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ABSTRACT

Spirometry should be performed to diagnose ventilatory changes and measure their severity in patients with signs and symptoms. The objective was to develop a booklet to guide users on spirometry. This is a methodological study that was carried out in the pulmonary function laboratory of the Walter Cantídio hospital, located in Fortaleza-Ceará-Brazil, after institutional consent. Ten users of the spirometry exam, who were present at the pulmonary function outpatient clinic of the referred hospital, were interviewed, and those who agreed to participate in the study, who had or did not perform the spirometry exam previously and aged > 18 years, were selected. For validation of the booklet, six judges issued their opinion. The results revealed that most users have performed the exam before, but do not know the precautions that must be taken before, during and after the exam. Therefore, the content of the booklet was constructed based on these considerations of the users, as well as the validation of the courts and was adapted. The technology built will facilitate the service of the multiprofessional team that will have more time to assist in the health problem situation. Therefore, the use of this educational resource opens the way for the management of care and approximation of these data to the process of planning care actions by the team.

Keywords: spirometry, health promotion, health education.

RESUMO

A espirometria deve ser realizada para diagnosticar alterações ventilatórias e medir sua severidade em pacientes com sinais e sintomas. Objetivou-se desenvolver uma cartilha para orientação de usuários sobre espirometria. Trata-se de um estudo metodológico que foi realizado no laboratório de função pulmonar do hospital Walter Cantídio, localizado em Fortaleza-Ceará-Brasil, após anuência institucional. Foram entrevistados dez usuários do exame da espirometria, presentes no ambulatório de função pulmonar do referido hospital, sendo selecionados aqueles que aceitaram participar do estudo, que já realizaram ou não o exame de espirometria anteriormente e com idade ≥ 18 anos. Para validação da cartilha seis juízes emitiram seu parecer. Os resultados revelaram que maioria dos usuários já realizaram o exame anteriormente, porém não sabem os cuidados que devem ser tomados antes, durante e após o exame. Sendo assim, o conteúdo da cartilha foi construído mediante essas considerações dos usuários, bem como validação dos juízes e ficou adequadado. A tecnologia construída facilitará o serviço da equipe multiprofissional que terá mais tempo para a assistência na situação-problema de saúde. Portanto, a utilização deste recurso educativo abre caminho para a gestão do cuidado e aproximação destes dados ao processo de planejamento das ações de cuidado pela equipe.

Palavras-chave: espirometria, promoção da saúde, educação em saúde.

1 INTRODUCTION

Coming from the Latin *spiare*=breathe+*metrum*=measurement, spirometry is a test that measures the volume of air that the individual breathes in or out as a function of time (BARBARA, 2017). Currently, spirometry is considered one of the best ways to assess lung function, also used in the diagnosis and monitoring of many lung diseases (PRATA et al., 2018).

Spirometry should be performed to diagnose ventilatory disorders and measure their severity in patients with signs and symptoms (dyspnea, dust, cough, stridor, chest tightness, among others) or abnormal laboratory tests. It is useful in distinguishing between respiratory and cardiac disease, because, especially when the patient has dyspnea, it has the function of measuring the effect that a given disease has on lung function, distinguishing between lung disease in individuals at risk (age >40 years+ respiratory symptoms and reported exposure to risk factors). This test also makes it possible to assess preoperative risk, make a prognosis of changes, as well as assess pulmonary function before starting an intense program of physical activity (MONTEIRO et al., 2020).

Spirometry is a safe procedure, but it can generate increased intracranial pressure, syncope, dizziness, chest pain, paroxysmal cough, risk of infections, bronchospasm and pneumothorax². Furthermore, since spirometry is a test that only allows the measurement of mobilized lung volumes and debits, there are non-obstructive changes whose diagnosis cannot be determined with this test alone (SCANLAN.; WILKINS; STOLLER, 2000).

Spirometry measures the volume and airflows derived from forced or slow maximal inspiratory and expiratory maneuvers. Several parameters can be derived, being most used in clinical practice: Vital Capacity (VC); Forced expiratory volume in the first second (FEV1); FEV1/CV ratio; Intermediate forced expiratory flow (FEF25-75%); Peak expiratory flow (PEF); Flow-volume curve (TRINDADE; SOUSA; ALBUQUERQUE, 2015).

In order to value the spirometric test, it is necessary to present acceptable and reproducible curves, without the presence of artifacts, according to the guidelines published by the American Thoracic Society (SCALCO; MINSK; SCHIVINSKI, 2017). The test is standardized and well defined for adults and preschoolers, basically following the same criteria for adults and children over six years of age. However, the child has technical difficulties to perform the maneuvers, with a lack of attention and difficulty in understanding and cooperation during the exam being frequently observed, events justified by age (SCANLAN.; WILKINS; STOLLER, 2000).

Performing the spirometry test requires the patient, in addition to respiratory muscle strength, to understand the technique to assimilate the steps of the test. Some factors can affect

this ability, such as age, sex, family system factors, living standards, adequacy, and availability of resources, which may generate guidance needs on the exam (PRATA et al., 2028).

The difficulty for patients to remember/understand the instructions received during the appointment of the exam, as well as to assimilate the technique during its execution, can harm or even postpone the performance of the exam. Considering the relevance of spirometry in the diagnosis of numerous lung diseases and other conditions, the interest in carrying out this study emerged, because during my work in the area I have noticed the need for an explanatory booklet to guide patients in relation to spirometry and everything that involves its realization. Thus, this Dissertation aims to create this educational material to guide users on the subject. The development of an educational booklet will serve as a contribution to patients who will undergo the exam, reducing the number of exams not performed.

Therefore, the general objective was to develop a booklet to guide users on spirometry, and specifically it was intended to describe relevant historical aspects of spirometry, its procedures, and recommendations; analyze users' knowledge needs about the exam; prepare an educational booklet on the subject and validate the content and appearance of the educational booklet with experts.

2 METHOD

This is a methodological study that was carried out in the pulmonary function laboratory of the Walter Cantídio hospital, located in Fortaleza-Ceará-Brasil.

This study was approved by the Research Ethics Committee of the State University of Ceará (UECE) under protocol number: 4.164.029. Participants were invited and instructed on how to participate in the research, agreeing or not with their inclusion in the study. With consent, they signed the Free and Informed Consent Term (FICT) for the study.

Ten users of the spirometry test, present at the pulmonary function clinic of the hospital, were interviewed, and those who agreed to participate in the study were selected, who had or had not performed the spirometry test before and were >18 years of age. This number of respondents was reached by the saturation criterion, which consists of stopping data collection when information becomes sufficient or repetitive⁸. Those who were not in physical condition to be interviewed were excluded.

Data collection was carried out in four phases: 1st Stage - Integrative Review: For the construction of the integrative review, the database of the Virtual Health Library (VHL) was used through Latin American and Caribbean Literature on Health Sciences (LILACS) and Medical Literature Analysis and Retrieval System Online (MEDLINE). In addition to these

databases, the Scientific Electronic Library Online (SciELO) was also used with the Boolean operators “and/or” (in Portuguese) and “and/or” (in English) used with the following descriptors in Portuguese: Spirometry; Respiratory diseases; Users. These descriptors were used in combination in the indicated databases. In this way, the study sought to answer the following research question: how did the accuracy of spirometry occur over time?

This review was carried out from April 2019 to May 2019, in which the research selected to compose the study obeyed the following inclusion criteria: to portray the historical evolution of spirometry, as well as its forms of realization and interpretation, in Portuguese it is in English. Original research, available in its entirety, master's and doctoral thesis were also selected. Studies that did not address the topic in question, duplications and review research were excluded. Only 26 (LILACS=13; MEDLINE=10; SCIELO=03) articles were identified in the selected databases, of which only 11 studies responded to the proposed objectives.

2nd Stage- Semi-structured interview: At first, verbal contact was established with the patients. After clarifications regarding the research purposes, an invitation to participate was made and the signature of a Free and Informed Consent Term (FICT) was requested. Then, a semi-structured interview with a maximum duration of 20 minutes was carried out, in the morning and afternoon shifts, to identify what the participants who were waiting for the spirometric test had doubts about this test.

The study variables were sociodemographic (gender, age, marital status, education, professional activity, who they live with, whether they receive support from someone, how many years they have had the disease, presence or not of economic difficulties) and clinical (takes the exam for why, how long have you been able to perform spirometry, what are your doubts in the preparation before the exam and your difficulties during the technique).

3rd Stage- Construction of the booklet: The construction of this booklet was permeated by the results of the contents of the interviews and by the validation of the judges. In the development of the booklet, attention was paid to the adequacy of the language, characterized by the identification of technical terms and their transformation into popular language, to facilitate the understanding of the booklet by users, as care regarding the adequacy of language is relevant in related works. to education and health promotion. Illustrations were also included in the booklet to make reading relaxed and easy to understand.

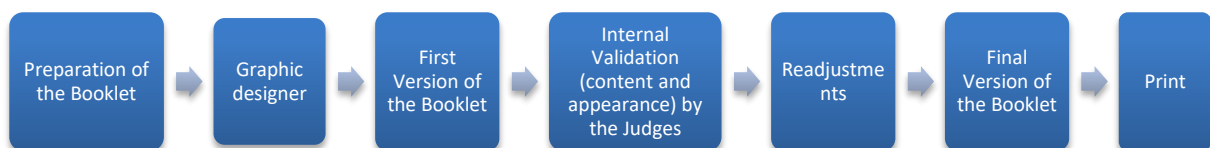
Phase 4-Internal validation: content and appearance validity were carried out by the analysis of a committee, made up of judges, with notable knowledge on the subject. Alexandre and Coluci (2011) explain that some studies recommend five to ten judges, while others mention six to twenty experts⁹. In the present study, we chose a minimum of six judges, who

were selected according to the following criteria: having experience in performing the spirometry test, working at the research institution for more than six months, having a graduate, master's, or doctorate degree in the area. These judges were initially contacted by telephone and the contents of the booklet, as well as the invitation letter, were sent by email. In an invitation letter, the title, study objectives and justifications for the validation process were explained, as well as contributions they could make to the study. A TCLE, a copy of the first version of the booklet, a questionnaire to characterize the participant (with their qualification and professional trajectory), as well as an evaluation instrument, were also sent. A period of 15 days was stipulated for returning this material.

The judges evaluated the following criteria regarding appearance: clarity in understanding the engravings and the content, relevance, and degree of relevance of them, association with the proposed theme and feasibility of application, in addition to space for observations and suggestions for modification. Data related to the evaluation of the content and appearance of the Educational Booklet by the judges were collected in an individual questionnaire on a Likert Scale, and the agreement/disagreement of the responses was measured (DE OLIVEIRA KAIZER; DOMINGUES, 2019; GALDEANO; ROSSI, 2006).

With the evaluations in hand, statistical calculations were performed to evaluate the concordance index (CI) between the judges and, later, a new contact was made with the graphic designer to carry out the necessary adjustments, according to the suggestions presented. The following is a graphic scheme, which details the stages of this phase of the study:

Figure 1: Flow of the booklet elaboration and validation process.



Source: Own elaboration.

The records were processed in Microsoft Excel spreadsheets and in the statistical program Predictive Analytics Software (PASW) version 20.0. To validate the booklet by the judges, the Agreement Index (CI) was used, which measures the proportion of judges in agreement on certain aspects of an instrument and its items.

Each item was analyzed separately and then the instrument as a whole. A Likert-type scale was used to assess the relevance and representativeness of the items and the answers will

include four options: 1) irrelevant, 2) little relevant, 3) very relevant, 4) extremely relevant. The index was calculated by means of the agreement sums of the items marked by 3 or 4 by the judges. Items with a score of 1 or 2 were eliminated or revised. Content validity not having approval below 0.78%, that is, items with a CVI equal to or greater than 0.78% by three or more experts can be considered as evidence of good content validity (POLITCK; BACK; OWEN, 2007).

Formula for calculating CI:

$$CI = \frac{\text{Number of responses 3 or 4}}{\text{Total number of responses}}$$

3 RESULTS AND DISCUSSION

3.1 SOCIODEMOGRAPHIC CHARACTERIZATION OF RESPONDENTS

Ten users were interviewed in the analysis of the booklet's requirements, most of them female (60%), aged between 46 and 60 years (60%), five of them (50%) with 1 to 5 years of study, 6 married and 6 of the Catholic religion (60%). It was possible to identify that the participants of this study are mostly retired (40%), have 3 to 4 children (50%) and live with 5 to 7 people (60%) and 3 of them receive one to two salaries. minimums.

3.2 USERS' PERCEPTION OF THE REQUIREMENTS OF THE SPIROMETRY BOOKLET

Regarding the spirometry test, all patients reported that they perform it at least once a year, and the main diagnosis observed in the participants of this study was bronchial asthma, affecting 5 patients, followed by three cases of Chronic Obstructive Pulmonary Disease (COPD) and two cases of restrictive respiratory disorder (RVD). A similar result was evidenced in a study carried out with 161 participants in the United States of America, in which the main diagnoses formulated were reclassified into four categories: asthma, COPD, no signs of respiratory disease and others (which includes overlapping asthma/COPD (OAC), restrictive disease, unclear diagnosis and other diagnoses) (PRATA et al., 2018).

Studies report that spirometry is essential for the diagnosis of airway obstruction and monitoring of chronic respiratory diseases and is recommended in national and international guidelines (GLOBAL INITIATIVE FOR ASTHMA, 2020; SNOEK, 2015).

This exam helps in the clinical identification of several pathologies, such as: obstructive ventilatory disorder (OVD) (characterized by reduced expiratory flow in relation to expired lung volume); DVR (defined as the reduction in total lung capacity and maintenance of a normal

or increased FEVt/FVC ratio. Spirometry may suggest DVR when there is a significant reduction in VC associated with a normal or increased FEVt/FVC ratio), asthma. Spirometry is also used as a functional assessment in all candidates for lung resection, upper abdominal surgery, head and neck surgery, or any other surgery involving prolonged surgical time (TRINDADE; SOUSA; ALBUQUERQUE, 2015).

Thus, it emphasizes that spirometry has the objective of detecting obstructive pulmonary disorders early; detect or confirm restrictive pulmonary dysfunctions; to differentiate a functional obstructive disease from an organic obstructive one; evaluate the clinical evolution of a lung disease and parameterize therapeutic resources through pre- and post-therapeutic intervention tests (SCALCO; MINSKY; SCHIVINSKI, 2015).

Currently, there is a wide variety of equipment used in spirometry, of different types and brands. All spirometers must provide information on capacity, accuracy of accuracy, linearity, durability, and throughput. The margin of error of each equipment must always be informed. There are closed-circuit and open-circuit spirometers. In closed circuits, the individual breathes completely within a circuit where concentrations of O₂ are added through a flowmeter, while the CO₂ is removed by an absorber; a pump added to the system makes the gas mixture circulate (HILDEBRANDT et al., 2011).

All evaluated patients had performed the exam in the last 12 months. In a large survey of the Australian population (2001–2014), it was possible to identify different results, as the majority of study participants (82%) had started taking medication for chronic airway diseases and had not had a pulmonary function test in the last 12 months, before or after the initial prescription. (HILDEBRANDT et al., 2011).

As for the guidelines and knowledge regarding spirometry, most of them do not know what care is before the exam, but they know how it is performed, as they have done it before. In relation to doubts or difficulties, the following were mentioned:

E1; E2; E;3; E4; E6; E10: You don't know what the exam is for.

E1; E2; E;3; E4; E6; E10: Fear of using the pump (bronchodilator).

E1; E2; E;3; E4; E6; E8; E10: They find it difficult to blow out the six seconds, they find it difficult to keep exhaling.

E1; E2; E;3; E4; E5; E6; E7; E10: Difficulty in remembering the warnings prior to the exam, as they do not receive any paper that informs what cannot be ingested before the exam.

Many studies recommend that patients who will be submitted to spirometry prepare themselves properly for the test, be properly oriented and instructed how it will be performed, because for patients who return for spirometry, a long consultation is necessary to prepare them

about pre and post spirometry, post-bronchodilator^{1, 17-18}. (OVEREND et al., 2001; RUFINO et al., 2017).

There are some recommendations for spirometry to be reliable, such as: patient understanding and cooperation; technical knowledge of the person performing the test; command voice (loud, clarifying, encouraging, standardized and, whenever possible, by the same operator); good quality and properly calibrated equipment; environmental control of temperature, relative air humidity and barometric pressure (BTPS) (BASTOS et al., 2018).

The American Thoracic Society (ATS) or the British Thoracic Society (BTS) recommends that each spirometric test be repeated at least three times, to ensure that there are no errors, especially due to lack of patient understanding. Most equipment (spirometers) is calibrated before each test. It is recommended to know the origins, as well as verify the quality control approved by ATS or BTS (HILDEBRANDT et al., 2011).

In order to perform the test, some care must be taken: suspension of short-acting bronchodilators for 4 hours and long-acting bronchodilators for 12 hours before the test, avoid coffee and tea in the last six hours due to the bronchodilator effect of these drinks, ban smoking twice hours before the exam (due to increased airflow resistance), alcohol should not be ingested in the last four hours before the exam and large meals should be avoided one hour before the tests (DE LIMA AZAMBUJA; LOPES, 2018).

3.3 CONSTRUCTION OF AN EDUCATIONAL BOOKLET ON SPIROMETRY FOR USERS

For the construction of the first version of the booklet, all the knowledge acquired in the integrative review and in the construction of the thesis was used, with great attention to the chosen language, with the minimum use of technical terms, always thinking about the best way for patients to understand the guidelines contained in the booklet. Some illustrations were also included in the booklet, with the aim of making reading relaxed and easy to understand.

In the context of health programs, educational materials, as part of the culture of public health services and due to their material condition, act as devices in the dynamics of mediation between health policies and practices, legitimizing medical-sanitary discourses and procedures, such as diagnosis, treatment, case surveillance and the doctor-patient relationship. Therefore, they socialize the knowledge, customs and values established by health professionals, by various institutions and by social segments (ALVES DE BRITO GUIMARÃES et al., 2015).

The educational booklet consists of printed educational material that aims to communicate information that helps patients, family members, caregivers, communities to

make more assertive decisions about their health. To prepare a booklet, it is necessary to consider some principles: clear and objective language; light and attractive look; suitability for the public to which it is addressed; reliability of information (SABINO, 2016).

Thus, to prepare a booklet, it is necessary to follow some steps: definition of the theme; definition of the topics that will compose the booklet; bibliographic research; elaboration of the script; development of the booklet and printing of the pilot. In this last step, it is recommended to validate the booklet with a sample of the target audience and with experts on the subject (ALVES DE BRITO GUIMARÃES et al., 2015).

Another study, which validated a booklet on healthy eating during pregnancy, also found agreement among the judges about the applicability of the educational material. It is important that studies involving educational technologies investigate whether they apply to the context in which they will be used, since, even if their content is valid and understandable, it is necessary that the technology is applicable so that its use is viable (GALINDO et al., 2017).

The feasibility of using educational booklets involves the reader's understanding of the content presented in the material. Results of a study carried out in Sweden show that 29% of the educational materials provided in 27 hospitals to patients undergoing colorectal cancer surgery were difficult to understand and the authors point out that investigating the opinion of the target audience can contribute to obtaining educational materials more suited to the reader's language (SMITH et al., 2014). Regarding the understanding of an educational booklet, a study carried out in East Africa, which evaluated the impact of health education at school on schistosomiasis, points out that 75% of readers did not understand information contained in an educational booklet (STOTHARD, 2016).

The booklet in online or digital format was presented as an important resource for readers' access, not being adjusted for the population that attends public health units and SUS users, who are usually people who do not have access to the digital environment, making it necessary to use printed materials (ALVES DE BRITO GUIMARAES et al., 2015).

Upon recognition of the interviewees' speeches and their doubts regarding spirometry, the first version of the informative booklet was built in this follow-up, as shown below:

Figure 2: Initial version of the booklet on Spirometry. Fortaleza-Ceará-Brazil, 2020.



CARTILHA SOBRE ESPIROMETRIA

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ESCRITO: CYNTHIA DE OLIVEIRA VAZ

1ª edição
Fortaleza

Elaboração:
Esta cartilha foi desenvolvida por Cynthia de Oliveira Vaz, como produto da dissertação apresentada ao programa de Pós-Graduação em Saúde Coletiva- Mestrado Profissional em Gestão em Saúde - Universidade Estadual do Ceará (UECE) na cidade de Fortaleza- CE, no período de abril a setembro de 2020.

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Ilustração e Diagramação
Utopia Estúdio

ISBN: Faltou após a aprovação do projeto gráfico

Índice

| | |
|----------------------|----|
| Agradecimentos | 6 |
| Apresentação | 7 |
| O que é espirometria | 8 |
| Para que serve | 10 |
| Orientações prévias | 12 |
| Como realizar | 14 |
| Contra indicações | 16 |

Índice

| | |
|----------------------|----|
| Agradecimentos | 6 |
| Apresentação | 7 |
| O que é espirometria | 8 |
| Para que serve | 10 |
| Orientações prévias | 12 |
| Como realizar | 14 |
| Contra indicações | 16 |

Apresentação

A espirometria constitui um dos exames de função pulmonar mais importantes para a avaliação do pulmão. Deve ser realizada com o objetivo de diagnosticar alterações ventilatórias e medir a sua severidade em pacientes com sinais, sintomas (dispnéia, pieira, tosse, estridor, aperto no peito, entre outros).
Essa cartilha foi criada para melhorar a qualidade dos exames, na qual contém orientações e desenhos que auxiliará o paciente na sua realização.

O que é espirometria
É um exame que mede a quantidade de ar que um indivíduo é capaz de colocar para dentro e para fora dos pulmões.

A espirometria
Também é chamada de **exame do sopra**, não dói e dura cerca de meia hora.

Para que serve?

Diagnosticar e medir a gravidade de problemas pulmonares em pacientes com sinais e sintomas como: dispnéia, pieira, tosse, estridor, aperto no peito, entre outros;
Medir o efeito que determinada doença tem na função pulmonar;
Fazer uma avaliação de risco pré-operatório; fazer um prognóstico de determinada alteração; assim como fazer uma avaliação da função pulmonar antes do começo de um programa intenso de atividade física;
Monitorização, acompanhando a história natural e a progressão de doenças respiratórias já diagnosticadas, avaliando as intervenções terapêuticas e orientando-os de acordo com a resposta do paciente ao tratamento;
Acompanhamento de pessoas expostas a agentes prejudiciais, nomeadamente nos ambientes ocupacionais;
Avaliação de incapacidades, avaliando os pacientes que estão em reabilitação pulmonar;

Orientações prévias ao exame

01 Proibido fumar, no mínimo por 2 horas antes do exame.

02 Proibido ingerir café, chá, bebidas alcoólicas 4 horas, refrigerantes que contêm cafeína 5 horas antes do exame.

03 Proibido fazer refeições volumosas 2 horas antes do exame.

04 Proibido fazer exercícios físicos antes do exame.

05 Proibido usar roupas quentes durante o exame.

06 Proibido usar bombinha 12 horas antes do exame.

Indicações que interferem no resultado do exame devem ser suspensas

B2 agonista de curta duração (4-6 horas antes),
B2 agonista de longa duração (12 horas antes),
xantinas de curta duração (6-8 horas antes),
xantinas de longa duração (24 horas antes),
alfa-1AB (24 horas antes), brometo de ipratrópio (6-8 horas antes), antileucotrínicos (24 horas antes), anti-histamínicos de curta duração (48 horas antes), cromoglicato (48 horas antes).

Como realizar o exame

A execução do exame pode ser dividida em três etapas:

- 1) "Encha o pulmão" (Inspiração máxima);
- 2) "Sopre forte e rápido o máximo que puder" (estorço máximo para a expiração);
- 3) "Sopre prolongado e de forma contínua até o comando de parar do técnico que está realizando o exame."

Um clipe nasal é colocado no nariz, para evitar escape de ar. Depois da primeira fase, o profissional da saúde irá aplicar a bombinha no paciente, nos casos em que houver esta recomendação do médico, e repetir o exame após cerca de 15 minutos.

ATENÇÃO AO COMANDO DO TÉCNICO!

sopre por **6** segundos

Contra Indicações

1. Infarto agudo do miocárdio recente (< 1 mês).
2. Impedimento cognitivo (dificuldade de compreensão das manobras).
3. Incapacidade de utilização adequada de peça bucal devido a dor ou paralisia facial.
4. Hemoptise, vômitos, diarreia.
5. Dor torácica ou abdominal (particularmente se for ventilatório-dependente).
6. Dispnéia importante (repouso).
7. Pacientes traqueostomizados.
8. Pneumotórax.
9. Status cardiovascular instável (angina).
10. Hipertensão arterial sistêmica não controlada.
11. Aneurisma.
12. Descolamento de retina (<6cm solicitar parecer da oftalmologia).
13. Cirurgia oftalmológica, neurológica, torácica ou abdominal recente (<5 semanas).
14. Pneumonia (<3 semanas).
15. Plaquetopenia (<10.000, solicitar parecer da hematologia para liberação).

Este manual foi concebido para diagnosticar alterações ventilatórias e medir a sua severidade em pacientes com sinais, sintomas (dispnéia, pieira, tosse, estridor, aperto no peito, entre outros) ou exames laboratoriais anormais, sendo útil na distinção entre doença respiratória e cardíaca, nomeadamente quando o paciente apresenta dispnéia.

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Characterization of the Judges and their first appreciation of the booklet

Six judges were invited to participate in the study, three physicians and three physical therapists, all of whom had worked in the field and had four or more years of professional experience, as shown in Table 1.

Table 1: Characterization of Judges. Fortaleza-Ceará-Brazil, 2020.

| Name | Category | Specialization | Service time |
|---------|-----------------|--|--------------|
| JUDGE 1 | DOCTOR | Pulmonology specialist | 09 years old |
| JUDGE 2 | DOCTOR | Pulmonology specialist | 20 years old |
| JUDGE 3 | DOCTOR | Pulmonology specialist | 17 years old |
| JUDGE 4 | Physiotherapist | Specialization in Respiratory Rehabilitation | 5 years old |
| JUDGE 5 | Physiotherapist | Specialization in Respiratory Rehabilitation | 7 years old |
| JUDGE 6 | Physiotherapist | Specialization in Respiratory Rehabilitation | 4 years old |

Then, the online version was shown to each judge and their opinion was measured according to the purposes of the booklet, the general organization, structure, content presentation strategy, as well as the coherence of the text and formatting, to the aspects that evaluate the degree of significance of the booklet and the characteristics of the figures/drawings. The evaluated scores are identified as follows: 1- I totally disagree, 2- I disagree, 3- I agree, 4- I totally agree, as shown in table 2 below:

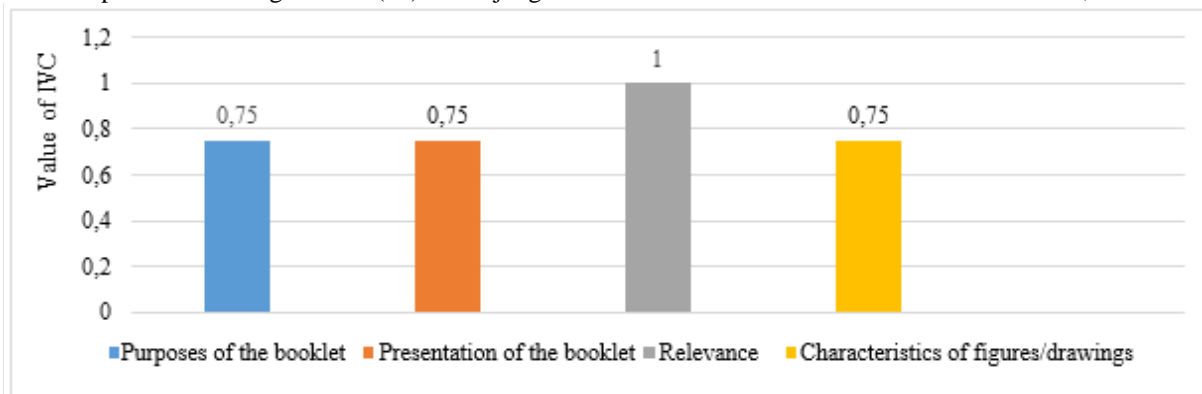
Table 2: Evaluation of the judges regarding the booklet.

| 1 – OBJECTIVES - Refers to the purposes of the booklet | | | | | | |
|--|----|----|----|----|----|----|
| JUDGES | J1 | J2 | J3 | J4 | J5 | J6 |
| 1.1) The content is or is suited to the needs of the target audience. | 4 | 3 | 3 | 4 | 3 | 4 |
| 1.2) The content helps to guide the spirometry exam. | 4 | 3 | 3 | 4 | 4 | 4 |
| 1.3) The content favors changes in behavior and attitudes of the target audience. | 4 | 3 | 3 | 4 | 4 | 4 |
| 1.4) The content allows the discussion of the theme in the scientific environment. | 4 | 3 | 3 | 4 | 4 | 4 |
| 1.5) The content helps to promote health education in institutions that serve the target audience. | 4 | 3 | 3 | 4 | 3 | 4 |
| If the text doesn't seem clear and understandable, add your suggestions below: J1, J5 and J6: Some spelling errors need to be noted. | | | | | | |
| 2 – STRUCTURE AND PRESENTATION – Refers to the general organization, structure, content presentation strategy, as well as the coherence of the text and formatting. | | | | | | |
| 2.1) Educational technology is appropriate for the target audience. | 4 | 4 | 4 | 4 | 3 | 4 |
| 2.2) The content is presented clearly and objectively | 4 | 4 | 4 | 4 | 4 | 4 |
| 2.3) The content presented is scientifically based. | 4 | 4 | 4 | 4 | 4 | 4 |
| 2.4) Educational technology can be used for all audiences, regardless of educational and sociocultural level. | 4 | 3 | 3 | 4 | 4 | 4 |
| 2.5) There is a logical sequence of the presented content. | 4 | 3 | 3 | 4 | 3 | 4 |
| 2.6) The content is well structured in concordance and spelling. | 4 | 4 | 4 | 4 | 3 | 4 |
| 2.7) The wording corresponds to the level of knowledge of the target audience. | 4 | 4 | 4 | 4 | 4 | 4 |
| 2.8) The font size of the title and topics are adequate. | 4 | 4 | 4 | 4 | 4 | 4 |
| 2.9) The number of pages is adequate. | 4 | 3 | 3 | 4 | 4 | 4 |

| | | | | | | |
|---|---|---|---|---|---|---|
| If the text does not seem clear and understandable, add your suggestions below: All judges requested references at the end of the booklet. | | | | | | |
| 3- RELEVANCE - Refers to the aspects that assess the degree of significance of the booklet | | | | | | |
| 3.1) The content addresses key aspects that should be strengthened. | 4 | 4 | 4 | 4 | 3 | 4 |
| 3.2) Educational technology allows its use in other educational contexts. | 4 | 4 | 4 | 4 | 4 | 4 |
| 3.3) Educational technology proposes the construction and exchange of knowledge. | 4 | 4 | 4 | 4 | 4 | 4 |
| 3.4) Educational technology addresses important issues for the knowledge of the target audience. | 4 | 3 | 3 | 4 | 4 | 4 |
| 3.5) Educational technology is suitable for use by any professional with the target audience. | 4 | 3 | 3 | 4 | 3 | 4 |
| If the text does not seem clear and understandable, please add your suggestions below: there were no comments on these items. | | | | | | |
| 4 - CHARACTERISTICS OF THE FIGURES/DRAWINGS | | | | | | |
| 4.1) The figures/drawings are appropriate for the target audience. | 4 | 4 | 4 | 4 | 4 | 4 |
| 4.2) The figures/drawings are clear and convey ease of understanding. | 4 | 4 | 4 | 4 | 4 | 4 |
| 4.3) The figures/drawings are in adequate quantity and sizes in the booklet. | 4 | 4 | 4 | 4 | 4 | 4 |
| 4.4) The figures/drawings used are related to the text of the booklet and elucidate the content. | 4 | 3 | 3 | 4 | 4 | 4 |
| 4.5) The colors and shapes of the figures/drawings are suitable for the type of material. | 4 | 4 | 4 | 4 | 4 | 4 |
| 4.6) The figures/drawings depict the daily lives of people who perform spirometry. | 4 | 4 | 4 | 4 | 4 | 4 |
| 4.7) The arrangement of figures/drawings is in harmony with the text. | 4 | 4 | 4 | 4 | 4 | 4 |
| 4.8) The figures/drawings help to expose the theme and are in a logical sequence. | 4 | 4 | 4 | 4 | 4 | 4 |
| 4.9) The figures/drawings help to change the behavior and attitudes of the target audience. | 4 | 3 | 3 | 4 | 4 | 4 |
| 4.10) The figures/drawings are relevant to the understanding of the content by the target audience. | 4 | 4 | 4 | 4 | 4 | 4 |
| If the text does not seem clear and understandable, please add your suggestions below: there were no comments on these items. | | | | | | |

Graph 1 shows the result of the CI in the first version of the booklet, in relation to the following items: purposes of the booklet; presentation of the booklet; relevance; features of figures and drawings.

Graph 1: Index of agreement (CI) of the judges on the first version of the booklet. Fortaleza-CE, 2020.



In all items evaluated, the judges agreed or fully agreed, being mentioned by them spelling errors and the absence of the list of bibliographic references. In this way, the second version of the booklet underwent a thorough spelling review, as well as the list of bibliographic references used in its construction, resulting in the following version:

Figure 3: Final version of the booklet on Spirometry. Fortaleza-Ceará-Brazil, 2020.



Orientações prévias ao exame

01 Proibido fumar no mínimo por 2 horas antes do exame.

02 Proibido ingerir café, chá, bebidas alcoólicas 4 horas antes do exame; refrigerantes que contenham cafeína 6 horas antes do exame.

03 Proibido fazer refeições volumosas 2 horas antes do exame.

Espirometria

04 Proibido fazer exercícios físicos antes do exame.

05 Proibido usar roupas apertadas durante o exame.

06 Medicamentos brônquodilatadores interferem no resultado do exame e por isso devem ser suspensos antes da sua realização.

Medicações brônquodilatadoras que interferem no resultado do exame que devem ser suspensas:

- B2 agonista de curta duração (4-6 horas antes);
- B2 agonista de longa duração (12 horas antes);
- Xantinas de curta duração (6-8 horas antes);
- Xantinas de longa duração (24 horas antes);
- Ultra-LABA (24 horas antes);
- Brometo de ipratrópio (6-8 horas antes);
- Anticolinérgicos de curta duração (48 horas antes);
- Cromoglicato (48 horas antes).

Como realizar o exame?

Um clipe nasal é colocado no nariz, para evitar escape de ar.

ATENÇÃO AO COMANDO DO TÉCNICO!

- 1) "Encha o pulmão" (Inspiração máxima);
- 2) "Sopre forte e rápido o máximo que puder por 6 (seis) segundos sem parar" (esforço máximo para a expiração);
- 3) "Sopro prolongado e contínuo até o comando de parar do técnico que está realizando o exame."



ATENÇÃO AO COMANDO DO TÉCNICO!

Contra Indicações

1. Infarto agudo do miocárdio recente (< 1 mês);
2. Impedimento cognitivo (dificuldade de compreensão das manobras);
3. Incapacidade de utilização adequada de pega bucal devido a dor ou parafuso facial;
4. Hemoptise, vômitos, diarreia;
5. Dor torácica ou abdominal (particularmente se for ventilatório-dependente);
6. Dispnéia importante (repouso);
7. Pacientes traqueostomizados;
8. Pneumotórax;
9. Sítus cardiovascular instável (angina);
10. Hipertensão arterial sistêmica (pressão alta) não controlada;
11. Aneurisma;
12. Descolamento de retina (< 6 meses solicitar parecer do oftalmologista);
13. Cirurgia oftalmológica, neurológica, torácica ou abdominal recente (desanestesiado);
14. Pneumonia (<3 semanas);
15. Rastreamento de 10.000, solicitar parecer da hematologia para liberação;

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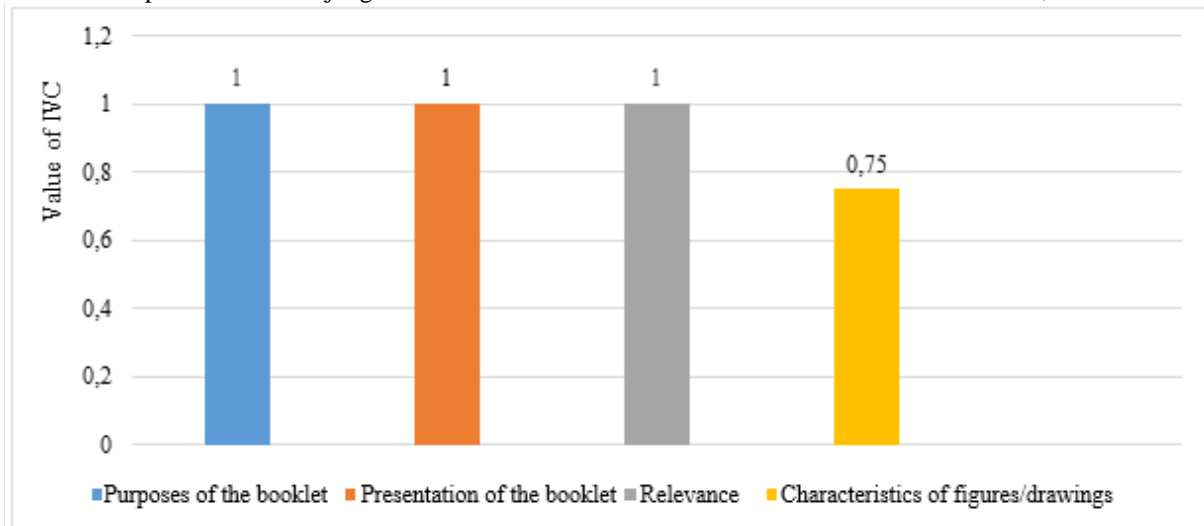
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The judges were once again invited to analyze the version of the booklet with the requested adjustments, also online, under the same criteria previously. The evaluated scores are identified as follows: 1- I totally disagree, 2- I disagree, 3- I agree, 4- I totally agree, as shown in table 2 below:

Considering the high rate of total agreement in the items evaluated in the booklet by the judges, there was no need to produce a third version of it.

Graph 2 shows the result of the CVI in the second version of the booklet with regard to the following items: purposes of the booklet; presentation of the booklet; relevance; features of figures and drawings.

Graph 2: IVC of the judges in the second version of the booklet. Fortaleza-Ceará-Brazil, 2020.



4 CONCLUSION

With the development of this study, it was possible to build a booklet that was validated in terms of content and appearance. The path to the development of this booklet was not easy, as it was a challenge to build something that was educational, easy to understand, with clear and objective language. In this way, with the bibliographic survey about spirometry and the recognition of the importance of educational methods in this segment, as well as the evaluation of the judges, this path became easier, and it was possible to build a booklet to guide users on spirometry.

In this perspective, the knowledge needs of users about the aforementioned exam were taken into account, in which most of them said they had already performed the exam before but did not know the care that should be taken before, during and after the exam. Therefore, the content of the booklet was validated through these user considerations.

The strategy of creating an educational material advance by allowing users the possibility of resorting to something didactic that allows them to guide them to the service in relation to the spirometry test, thus facilitating the service of the multidisciplinary team that will have more time to assist in the situation -health problem. The use of this educational resource opens the way for care management and approximation of this data to the team's planning process.

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