





Validation of educational technology for the prevention and control of contact-borne infections*

Validação de tecnologia educacional para prevenção e controle de infecções transmitidas por contato

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ABSTRACT

Objective: to build and validate the content and appearance of the booklet on prevention and control of contact-borne infections. **Methods:** methodological study, developed from the validation of an educational booklet by expert judges and by the target audience. The validation was performed by seventeen judges from different Brazilian regions and seven companions. The agreement index between the evaluators was calculated, with a minimum of 80.0% being necessary to guarantee the validation of the material. **Results:** most of the items obtained agreement rates above the recommended. The changes were made according to the judges' suggestions, giving rise to the second version of the booklet, which was submitted to the appearance validation by the target audience, culminating in changes in the cover and language. **Conclusion:** the booklet was considered valid by specialists and by the target audience, and could be technology used for companions of patients kept in contact isolation.

Descriptors: Educational Technology; Validation Study; Nursing Care; Cross Infection; Infection Control.

Objetivo: construir e validar o conteúdo e a aparência de cartilha sobre prevenção e controle de infecções transmitidas por contato. **Métodos:** estudo metodológico, desenvolvido a partir da validação de cartilha educativa por juízes especialistas e pelo público-alvo. A validação foi realizada por dezessete juízes de diferentes regiões brasileiras e sete acompanhantes. Calculou-se o índice de concordância entre os avaliadores, sendo necessário, no mínimo, 80,0% para garantir a validação do material. **Resultados:** a maioria dos itens obteve índices de concordâncias acima do preconizado. As alterações foram realizadas conforme as sugestões dos juízes, dando origem a segunda versão da cartilha, a qual submetida à validação de aparência pelo público-alvo, culminando em modificações na capa e linguagem. **Conclusão:** a cartilha foi considerada válida pelos especialistas e pelo público-alvo, podendo ser tecnologia utilizada para acompanhantes de pacientes mantidos em isolamento de contato.

Descritores: Tecnologia Educacional; Estudo de Validação; Cuidados de Enfermagem; Infecção Hospitalar; Controle de Infecções.

Introduction

Transmission of Health Care-Related Infections, which are of worldwide relevance due to high rates⁽¹⁾, can happen in different ways, by contact, droplets and aerosols. In this study, contact transmission is highlighted, whose microorganisms spread from one person to another, through contaminated inanimate objects and/or hands. When the patient acquires a microorganism different from the resident flora, it can be colonized, remaining asymptomatic or showing signs and symptoms, when it evolves to an infection⁽²⁾.

In view of the magnitude of Health Care-Related Infections, especially those transmitted by contact, the need to apply educational strategies for prevention and health promotion, which have been growing recently and have brought satisfactory results in the field of action, stands out nurses, in different settings and audiences.

In the search for patient safety and reduction of infections transmitted by contact, nurses must also encourage the active participation and involvement of patients and families in this continuous process, by reducing damage to the hospital environment. Therefore, it has become a major challenge for health services to prevent and control healthcare-related infections, and empowering patients and their families in care can be an important tool to make care safe and efficient⁽³⁾.

In view of this, there was a research question: is a booklet for the prevention of infections transmitted by contact valid in terms of content and appearance, with good applicability to companions of hospitalized patients?

Thus, this study aimed to build and validate the content and appearance of the booklet on prevention and control of infections transmitted by contact.

Methods

Methodological study, based on two theoretical-methodological references: elaboration of guidance manuals for health care⁽⁴⁾ and study of development

and validation of educational guidelines for specific precautions to avoid the transmission of microorganisms⁽⁵⁾.

The booklet construction and validation process took place from August 2018 to January 2019, in four stages: 1) Integrative Literature Review; 2) Development of educational technology; 3) Content validation by specialists; 4) Validation of appearance with the target audience.

In the first stage, the specialized literature was searched for existing scientific knowledge on the subject, using the integrative review method, associated with the main manuals on the topics of patient safety and hospital infection, in addition to following the guidelines of the script and validated for the elaboration of educational actions for individuals under specific precautions⁽⁴⁾, with a view to defining the relevant contents to be addressed in the booklet.

The review was carried out in the databases of Latin American and Caribbean Literature in Health Sciences (LILACS), Nursing Database (BDENF) and Medical Literature Analysis and Retrieval System Online (MEDLINE), using the descriptors: materials of teaching, validation studies, health education, educational technology and nursing care, in January 2018.

The PICO strategy (Patient, Intervention, Comparison and Outcomes) was followed, P: Patients, companions and health professionals in hospital units; I: Technology/educational intervention to prevent contact-borne infections; C: No other educational technology, a different educational technology or with traditional explanations; O: Contributions for preventing contact-borne infections. The guiding question was considered: what educational technologies were built/validated by nurses and their contributions to the prevention of infections related to health care?

Eligible studies had to meet the inclusion criteria: primary observational (cohort and case control), interventional (clinical trial) or methodological studies, published and available in full in English, Spanish or Portuguese, from January 2013 to January 2018, carried out in hospital institutions with patients, health professionals or accompanying hospitalized pa-

tients, who referred to some educational technology on prevention of infections transmitted by contact. Outbreak studies, secondary studies, dissertations, theses, protocols and guidelines were excluded.

Six studies were included, which included the main results that contributed to the composition of the booklet's content: definition of Infections Related to Health Care; diagnostic measures; means of contamination; definition of contact transmission; prevention of infections transmitted by contact and hand hygiene.

In addition, two meetings were held with the companions, in the form of round conversation, in two tertiary hospitals in the city of Fortaleza-CE, Brazil, totaling the participation of 17 people, to verify the needs and possible suggestions in the selection of content of the booklet. In this stage, the active participation of the companions was encouraged, who provided significant suggestions for the elaboration of the content of the educational material⁽⁵⁾, including topics such as the form of transmission and prevention of infections transmitted by contact.

In the second stage, after selecting the content, the booklet texts were elaborated, using a dialogue accessible to the target audience and following the language, images and layout guidelines⁽⁶⁾. The illustrations were created by a designer, who used Adobe Illustrator® and Corel Draw® to edit the images, and another design professional that was responsible for the layout of the serial album, using Photoshop®.

In the third stage, the content and appearance of the booklet were validated with the expert judges on the theme hospital infection/patient safety, using the selection criteria, based on academic background and area of expertise⁽⁷⁾.

In the fourth stage, the second version of the booklet was subjected to appearance validation with seven companions of the target audience, in order to obtain the booklet's evaluation by the audience that will use it.

The number of judges followed the recommendation⁽⁸⁾ of six to twenty specialists, also used in other studies with validation of educational materials in the

health area⁽⁷⁻⁹⁾. These were selected using the net or snowball sampling method⁽¹⁰⁻¹¹⁾.

To perform the analysis of the material, the booklet, the consent form and a questionnaire consisting of 38 items were sent to the judges, via email, distributed by objective, content, language, relevance, illustrations, layout, motivation and culture, to which they were answered in the form of a Likert scale, with 1 = totally disagree, 2 = disagree, 3 = neither disagree nor agree, 4 = agree and 5 = totally agree.

The criteria used for inclusion of the target audience in the sample, considering the recommendation of six to twenty⁽⁸⁾, were people aged 18 years or older, who were in the condition of accompanying patients in contact isolation, during the period of data collect. And the exclusion criteria were having any cognitive or behavioral difficulties that make communication impossible and/or answering the instrument's questions.

For validation with the target audience, information was provided on the objectives of that stage of the research and a copy of the booklet was given to the companions with an assessment instrument that included topics on objectives, organization, language, motivation and appearance of the booklet.

After evaluating the judges and the target audience, the second version of the booklet was prepared, which was submitted for review in Portuguese. Subsequently, the Flesch Readability Index (FRI) was calculated, which evaluates the degree of legibility of the texts, in a scale with a percentage from zero to 100. The texts were selected and evaluated by the text analysis program, available at Microsoft Office Word, version 2010, being measured the FRI of each domain of the booklet and judgments with FRI between 50-100.0% were considered acceptable. The FRI between 75-100.0% is classified as very easy, achieving reading schooling from elementary school I; between 50 - 75.0% as easy, covering schooling on average to complete elementary school⁽¹²⁾.

The collected data were inserted into a database in the Excel program and analyzed using descriptive statistics. And, to analyze the content and appearance

validity of the booklet, the Agreement Index (AI) was used. Based on the responses of the judges and the target audience, items with a minimum level of agreement of 80.0% for positive responses were validated, with reference to the values used in another study⁽⁷⁾.

This study was carried out in accordance with the rules of Resolution No. 466/2012 of the National Health Council and approved by the Ethics and Research Committee, according to opinion No. 2,769,952/2018.

Results

The preparation of the booklet took place through a dialogue accessible to the target audience. After completion, the booklet was printed, front and back, on legal size A5 paper and with colored ink, bound, totaling 17 pages. After the corrections, the texts were written in size 18 for the cover and 15 for the text, with Times New Roman font, in black, with the parts of the text being emphasized in bold.

The definitive title chosen, after validation with the judges, was Talking about contact isolation. On the back cover, the names of the authors and the educational institution to which they belong are explained; explain the source of the material and technical data, as well as edition and year. It was decided to reserve a page for notes at the end of the booklet.

The 17 judges who participated in the validation were nurses, with only one male. The average age was 41 years old, ranging from 30 to 53 years old. Most of the judges were from the state of Ceará, Brazil, 11 (61.1%), however, there was the participation of judges from São Paulo, 6 (33.3%), and Minas Gerais, 1 (5.6%).

The average time of training in Nursing was 18 years, varying from nine to 29 years since graduation. The doctorate was the highest degree presented by the judges, with the master's degree making up the rest of the sample, emphasizing that the themes of the theses and/or dissertations were in the area of infectious diseases and/or patient safety. The judges worked in the area of teaching at state and federal universities in the states of Ceará, São Paulo and Minas Gerais, Brazil, in the Hospital Infection Control/Permanent Education Commission and in direct assistance to hospitalized patients.

As for the agreement index (Table 1), it was observed that in the objective domain, the judges considered the objectives of the booklet to be in line with the companions' guidance needs, constituting a tool that can be used for this purpose. However, the judges considered that the booklet alone does not promote changes in the behavior and attitude of the companions, as this process involves other factors that permeate the individual that the booklet alone cannot reach.

Table 1 – Distribution of agreement indexes for the items in the booklet, according to the judges. Fortaleza, CE, Brazil, 2020 (n=17)

Items	Scores 4 or 5 on the Likert scale	Agreement Index (%)
Objective		
1.1 Objectives match the companions' guidance needs	17	100.0
1.2 It is a tool with potential to be used in the companion's orientation process	17	100.0
1.3 The information contained in the booklet promotes a change in behavior and attitude	7	41.0
Content and Language		
2.1 The booklet is suitable for accompanying patients in contact isolation	16	94.0
2.2 The contents are adequate to achieve the objectives of the booklet	14	82.0
2.3 The information presented is clear and understandable	14	82.0
2.4 The writing style corresponds to the level of knowledge of the target audience and is attractive	13	76.0
2.5 The title of the booklet is interesting and appropriate	14	82.0
2.6 The themes portray important points that must be reinforced during the hospitalization of patients in contact isolation	17	100.0
2.7 The booklet proposes that the companion acquire knowledge to carry out prevention activities	16	94.0
2.8 The theme is current and relevant	17	100.0

Regarding the content and language domain (Table 1), the judges totally and/or partially agreed with the selection, logical sequence, scientificity and clarity of the content and considered the relevant topic, however, the item on writing was not considered attractive, which resulted in changes to some phrases and terms in the text.

The title of the booklet, which was initially Talking about hospital infection, was modified, taking into account the judges' suggestions to make it more objective, according to the focus of the booklet which is contact isolation, moving on to Talking about contact isolation.

The motivation aspect (Table 2) obtained all items with total or partial agreement between the judges, emphasizing the importance of the booklet. In the illustrations and layout domain (Table 2), there was

disagreement in relation to the number and monochrome of the illustrations and the size of the letters, with color modifications being made and the images with the lines on each page better suited. The figure of the nurse was reformulated, being drawn with hair tied, white clothes and with apron with long sleeves. And an extra page was created, representing the steps for hand hygiene with alcoholic solution or water and soap.

The judges' responses signaled the need for changes to these items for the final version of the booklet, which were accepted without causing bias in the validation. According to the judges' opinions, some of the responses with an index equal to or above the announced criterion also pointed out the need for adjustments to better present the booklet.

Table 2 – Distribution of agreement indexes for the items in the booklet, according to the judges. Fortaleza, CE, Brazil, 2020 (n=17)

Items	Scores 4 or 5 on the Likert scale	Agreement Index (%)
Illustrations and layout		
4.1 The illustrations used are related to the content of the material	14	82.0
4.2 The number of illustrations is sufficient and adequate	12	70.0
4.3 The characters remind people of the reality that the booklet proposes and are charismatic	15	88.0
4.4 The presentation of the booklet is attractive	16	94.0
4.5 The content is presented with a letter in size and font suitable for reading	12	70.0
4.6 Contrast in different colors is adequate	16	94.0
Motivation		
5.1 The title arouses interest for reading	14	82.0
5.2 The content is motivating and encourages the reader to continue reading	16	94.0

In general, there was agreement among experts for the booklet as a whole and the items individually, characterizing it as a valid booklet in terms of content and appearance by the judges. However, some modifications were suggested to improve the material, as previously described, mainly of the items that obtained AI below the stipulated.

Regarding the validation of appearance by the target audience, seven companions participated in this stage, with an average age of 43 years (minimum 23 and maximum 70 years). Mostly female (71.4%),

single (85.7%) and with incomplete elementary education (85.7%).

Most of the items were evaluated positively by the companions in relation to objectives, organization, language, appearance and motivation of the target audience. The items referring to the cover of the booklet include information on the material and vocabulary, consisting of simple and common words, reached AI below 80.0%.

With regard to the cover, it was considered attractive, but did not include the material information,

in the opinion of the companions, so the graphic designer was contacted again to reformulate the cover, in order to meet the suggestions.

As for the readability of the booklet, reading the topics in the manual was classified as very easy or easy, with the results of the FRI varying between 72.0% and 80.0%. No topic had an FRI of less than 50.0% (difficult or very difficult reading).

The companions commented that the booklet contained information that can help in clarifying patient care in contact isolation. Five companions considered the booklet approved and two, approved with modifications.

Discussion

A limitation presented by the study was that the companions who evaluated the educational material were inserted in the specific context of public hospitals in the state of Ceará, Brazil. Another restriction of the research was the absence of judges from other Brazilian states, so that the suggestions found may not represent the reality of companions from other regions and are users of private health services.

The expectation is that the booklet will awaken in nurses the importance of including companions in the prevention and control of infections within the hospital environment, contributing to the health area in general, and to nursing, which acts strongly in the area of education in health, since it constitutes a validated instrument for use by professionals and the public for which it is intended, favoring access to guidelines that provide improvement in knowledge and in the attitudes of prevention of infections transmitted by contact.

The educational booklet presented in this study converges with the Patients for the Safety of Patients program, which seeks to ensure that the patient's voice is at the center of the global health movement. Thus, it is necessary to improve the competence of nurses for patient-centered care and the creation of a

potential safety climate to promote patient participation, aiming at safer health care⁽¹³⁾.

The booklet Talking about contact isolation was validated by specialists with extensive experience in the area of patient safety/hospital infections and/or educational technologies, as well as by the target audience. This material represents technological innovation in Brazil, bearing in mind that although the topic of infections transmitted by contact is widely discussed in the hospital environment; few validated technologies were found that addressed the theme and none with the patient's companion as the target audience.

It is very important to have the availability of appropriate documents and materials capable of equipping patients and their families, encouraging their participation in the care process⁽¹³⁾, the booklet being an easy-to-use material in health services, as it does not need resources electrical devices for use⁽¹⁴⁾. In addition, positive characteristics of this booklet were the creation of characters and the establishment of dialogue between nurses and companions, which enabled the active participation of the target audience.

The participation of the companions at the moment of construction of the booklet, together with the bibliographic survey, provided the insertion of topics arising from the main questions raised during the meetings, corroborating another study for the construction of educational material on prostate cancer⁽¹⁵⁾, in which the authors obtained positive results when counting on the participation of the target audience in the construction phase, through rounds of conversation.

The sending via e-mail of the evaluation material, together with the educational technology, provided the insertion of state judges from different Brazilian regions, including the experiences and realities experienced in the different regional contexts. This strategy was also used by other authors⁽¹⁰⁾ in the construction of printed educational materials, such as booklets and serial albums, with the purpose of en-

compassing cultural diversity, contributing to greater applicability and credibility of the material in the various locations in the country.

In the stage of validation by the judges, most agreed that the process of changing behavior and attitude depends on several factors that permeate individuals, so the booklet can be a tool that contributes to this change, but it cannot be said that it alone will promote change, also needing a driver with the ability to make the process effective.

The change process does not occur only in the patient-educational technology interaction. The technology aims to add to the guidance offered by nurses and facilitate the process of communication and health education⁽¹⁶⁾, so that the companions, when understanding about infections transmitted by contact, can disseminate the information to others and reflect on particular attitudes and practices.

The development of different health technologies helps professionals, who can take advantage of them as a way of assisting clients and promoting autonomy and independence, by encouraging the development of critical sense, whether in closed institutions, in health education or in any environment⁽¹⁷⁾. In addition, the environment in which the dialogue in the booklet took place was the hospital, with the companion at the patient's bedside, executing the guidelines given by the nurse, encouraging the reader to adopt the same behavior as the character, favoring the public-target visualized their own reality⁽⁶⁾.

When responding to the judges' suggestions, adjustments were made to speeches, reduction of sentences and paragraphs and writing with language easy to understand for laypeople, applying the Flesch Readability Index to verify the ease of reading. Also, adjustments were made to the font size and font. Simple language was used, as well as in other studies, so that individuals with a low level of education can read and understand the material, increasing the reader's motivation through the booklet⁽⁶⁾.

Conclusion

The study achieved the objective by constructing and validating the booklet Talking about contact isolation, by demonstrating the agreement rates between expert judges and the target audience, to be used by nurses in the management of companions of patients in contact isolation, in the hospital environment.

The participation of these two groups, in the booklet validation process, allowed the finalization of an easy-to-read material, with accessible language and usefulness to fulfill the main purpose: to mediate communication between professionals and companions, with regard to the prevention and control of contact-borne infections.

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Collaborations

Souza NPG contributed to the conception and design or analysis and interpretation of data, writing of the article and relevant critical review of the intellectual content. Almeida PC collaborated with data analysis and interpretation. Carvalho REFL participated in data interpretation and relevant critical review of intellectual content. Pereira MLD assisted in the critical review of the intellectual content and final approval of the version to be published.

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