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CONSTRUCTION AND VALIDATION OF EDUCATIONAL TECHNOLOGY ON POST-LIVER TRANSPLANT FOR FAMILY CAREGIVERS

Manuella Coelho Lima[1]
Caroline Araujo Lopes[2]
Virna Ribeiro Feitosa Cestari[3]
Aurenice Lopes Pinheiro[4]
Vera Lúcia Mendes de Paula Pessoa[3]

[1]Universidade Estadual do Ceará. Fortaleza, Ceará, Brasil.
[2]Universidade Estadual do Ceará, Departamento de Enfermagem. Fortaleza, Ceará, Brasil.
[3]Universidade Estadual do Ceará, Programa de Pós-Graduação em Cuidados Clínicos em Enfermagem e Saúde. Fortaleza, Ceará, Brasil.
[4]Hospital Geral de Fortaleza. Fortaleza, Ceará, Brasil.

ABSTRACT

Objective: to construct and validate an educational booklet on post-liver transplant for family caregivers.
Method: a methodological study carried out in two stages from August 2021 to July 2023: 1) Construction of the educational booklet aimed at liver transplant patient's family caregivers; and 2) Content and face validation by expert judges and semantic validity with the target audience. For the experts to analyze the validity data, the Content Validity Index was used (≥0.78 per item and ≥0.80 in total), as well as the Exact Binomial Distribution test (p>0.05 and 0.80) and the Intraclass Correlation Coefficient (95%) for greater reliability. In the semantic evaluation, the *IRaMuTeQ* software was used to guide the analysis of the interviews, using Descending Hierarchical Classification and Word Cloud.
Results: after the bibliographic survey, four axes guided the construction of the booklet. The total Content Validity Index was 0.99 (p>0.05), with excellent reliability (ICC=0.946). The total Face Validity Index was 0.93 (p>0.05), with good reliability (ICC=0.766). In terms of semantics, the analytical categories pointed to a satisfactory level of perception and understanding of the booklet by the target audience.
Conclusion: the technology is innovative, including caregivers in the education process, and is relevant to post-transplant care. The validation process shows the feasibility of understanding the booklet and the need to use it to improve home care.

DESCRIPTORS: Liver transplant. Educational technology. Family. Caregivers. Validation study.

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CONSTRUÇÃO E VALIDAÇÃO DE TECNOLOGIA EDUCACIONAL SOBRE O PÓS-TRANSPLANTE HEPÁTICO PARA O FAMILIAR CUIDADOR

RESUMO

Objetivo: construir e validar uma cartilha educativa sobre o pós-transplante hepático para o familiar cuidador.
Método: estudo metodológico, realizado em duas etapas durante o período de agosto de 2021 a julho de 2023: 1) Construção da cartilha educativa voltada ao familiar cuidador do paciente transplantado hepático e 2) Validação de conteúdo e aparência pelos juízes especialistas e de validade semântica junto ao público-alvo. Para análise dos dados de validade pelos especialistas foi utilizado o Índice de Validade de Conteúdo, ≥ 0,78 por item e ≥ 0,80 no total, além do teste Exato de Distribuição Binomial (p>0,05 e 0,80) e do Coeficiente de Correlação Intraclasse (95%) para maior confiabilidade. Na avaliação semântica, foi utilizado o *software IRaMuTeQ* para nortear a análise das entrevistas, por meio da Classificação Hierárquica Descendente e da Nuvem de Palavras.
Resultados: após o levantamento bibliográfico, quatro eixos nortearam a construção da cartilha. O Índice de Validade de Conteúdo total foi de 0,99 (p>0,05), com excelente confiabilidade (CCI=0,946). O Índice de Validade de Aparência total foi de 0,93 (p>0,05) e boa confiabilidade (CCI=0,766). Na semântica, as categorias analíticas analisadas apontaram um nível satisfatório de percepção e compreensão da cartilha pelo público-alvo.
Conclusão: a tecnologia mostra-se inovadora, incluindo os cuidadores no processo de educação, sendo relevante para o cuidado pós-transplante. O processo de validação denota a viabilidade da compreensão exposta na cartilha e a necessidade de utilização dela para a melhoria do cuidado domiciliar.

DESCRITORES: Transplante de fígado. Tecnologia educacional. Família. Cuidadores. Estudo de validação.

CONSTRUCCIÓN Y VALIDACIÓN DE TECNOLOGÍA EDUCATIVA SOBRE EL PERÍODO POSTERIOR A TRASPLANTES HEPÁTICOS DESTINADA A CUIDADORES FAMILIARES

RESUMEN

Objetivo: construir y validar un folleto educativo sobre el período posterior a trasplantes hepáticos destinado a cuidadores familiares.
Método: estudio metodológico realizado en dos etapas entre agosto de 2021 y julio de 2023: 1) Construcción del folleto educativo destinado a cuidadores familiares de pacientes sometidos a trasplantes hepáticos; y 2) Validación del contenido y la apariencia a cargo de jueces especialistas, además de la validez semántica con el público objetivo. Para el análisis de los datos de validez a cargo de los especialistas se utilizó el Índice de Validez de Contenido (≥ 0,78 por ítem y ≥ 0,80 en el total), además de la prueba Exacta de Distribución Binomial (p>0,05 y 0,80) y del Coeficiente de Correlación Intraclase (95%) para mayor confiabilidad. En la evaluación semántica se empleó el programa de *software IRaMuTeQ* para guiar el análisis de las entrevistas, por medio de la Clasificación Jerárquica Descendente y de una Nube de palabras.
Resultados: después del relevamiento bibliográfico se identificaron cuatro ejes que guiaron la construcción del folleto. El Índice de Validez de Contenido total fue 0,99 (p>0,05), con excelente confiabilidad (CCI=0,946). El Índice de Validez de Apariencia total fue 0,93 (p>0,05), con buen nivel de confiabilidad (CCI=0,766). En el caso de la semántica, las categorías analíticas analizadas señalaron un nivel satisfactorio de percepción y comprensión del folleto entre el público objetivo.
Conclusión: la tecnología demuestra ser innovadora, incluyendo a los cuidadores en el proceso de educación, además de ser relevante para la atención que debe proporcionarse después del trasplante. El proceso de validación denota la viabilidad de la comprensión expuesta en el folleto y la necesidad de emplearlo para mejorar los cuidados domiciliarios.

DESCRIPTORES: Trasplante de hígado. Tecnología educativa. Familia. Cuidadores. Estudio de validación.

INTRODUCTION

Liver transplant is the only curative therapeutic modality available for individuals with end-stage liver disease. This therapy has been underpinned by consolidated public policies, which contributes countless benefits to the community in general and to patients that need the procedure. According to the Brazilian Organ Transplant Association (*Associação Brasileira de Transplante de* Órgãos, ABTO), Brazil is the second country in the world in terms of number of transplants. In 2022,2,118 liver transplants were carried out in the country[1].

The importance of family involvement in supporting a transplant patient stands out. Providing emotional support, most of the time the individual's first line of support, attending consultations and encouraging adherence to the prescribed treatment are scenarios in which the family becomes active in the care field[2].

Flexibility within families regarding roles and tasks is important. On returning home from the hospital, the patient and their support network are faced with the responsibility and commitment of managing post-transplant care and adaptation in the best possible way. In addition, the support offered by the multiprofessional team to help with the new reality of life is essential[3].

It is well known that technologies have led to changes in standards and faster information sharing. In the health sphere, they stand out for being used both in education and in care[4]. Independent educational technologies such as posters, albums, booklets and leaflets are widely used options when electrical resources are not required for their use, providing greater accessibility to the material[5].

Using these technologies to mediate information, especially at hospital discharge, is an excellent strategy for care continuity, with health professionals easing this process, in addition to providing greater interaction with the patient/user and family[6].

Together with other professionals on the liver transplant team, nurses' work must ensure the participation not only of the patient, but also of their family members in the care process. Furthermore, this production is the result of an initiative by nurses with experience in solid organ transplantation and in the production of educationaltechnologies.

It is believed that using educational technology provides a different perspective on health education actions, contributing to the improvement of clinical care and professional education. The booklet's originality is noteworthy, as it addresses family members/caregivers of patients undergoing liver transplants, given the scarcity of scientific production aimed at the population in question.

In the light of the updates and peculiarities of th health care to be provided to these patients and the importance of addressing their health in an integral way, the following question arises: "What elements should make up an educational booklet for family caregivers of people subjected to liver transplants?" In view of the above, the objective was to construct and validate an educational booklet on post-liver transplant for family caregivers.

METHOD

This is a predominantly quantitative methodological study, with some qualitative elements, carried out in two stages from August 2021 to July 2023: 1) Construction of the educational booklet aimed at family caregivers of liver transplant patients; 2) Content and face validation with expert judges, and semantic validation with the target audience.

In the first stage, the booklet construction process was adapted and the following phases were listed: bibliographic survey; selection and summarization of the content; drafting of the text; and creation of images and layout[7].

The bibliographic survey was carried out by means of an integrative review following the parameters set forth in the *Preferred Reporting Items for Systematic Reviews and Meta-Analysis*

(PRISMA) list, which aimed at identifying the liver transplant patients' needs in order to establish multidisciplinary care at their homes. Six stages were followed to ensure validity of the review[8].

The research question was as follows: 'How is multiprofessional home care provided to people subjected to liver transplants?' (using the PICO strategy, where P (Population): transplanted patients; I (Intervention): multiprofessional care; C (Context): home environment; and O (Outcome): adherence to the treatment after liver transplant).

The search was carried out between August and October 2021 in the PubMed, SciELO, Science Direct and Scopus electronic databases, with the help of the Virtual Health Library (*Biblioteca Virtual de Saúde*, BVS) and the Journals portal of the Coordination for the Improvement of Higher Education Personnel (*Coordenação de Aperfeiçoamento de Pessoal de Nível Superior*, CAPES).

The descriptors were selected from the Descriptors in Health Sciences (*Descritores em Ciências da Saúde*, DeCS) and Medical Subject Headings (MeSH), together with the AND Boolean operator, giving rise to the following search equations: "*Transplante hepático AND Equipe multidisciplinar AND Cuidado*" (*SciELO* and BVS) and "*Liver transplant AND Multidisciplinary team AND Care*" (PubMed, Science Direct and Scopus). The articles included were those available in full and free of charge in Portuguese, English or Spanish and published in the last ten years (2011-2021).

During selection, a total of 439 articles met the inclusion criteria. After excluding duplicates, 397 articles remained. After reading the titles and abstracts, 114 studies were chosen for full-reading. At the end of the full-reading, 25 articles were included in the review. It should be noted that the search and selection process at this stage was carried out independently and blindly by two researchers. The data extracted were distributed in charts to better characterize the studies.

Following on from construction of the booklet, selection and summarization of the content included defining the main characteristics of the publications, describing the care needs of people subjeted to liver transplants found in the studies. This encouraged contributions to constructing the technology content.

The text was prepared using language from the literature, which is scientific in nature. To create the illustrations, images and layouts were drawn up, and the diagrams were designed by a professional designer, conferring higher quality and professional look to the booklet.

Once the material was constructed, its content and face were validated by professionals specialized in liver transplants, between June and August 2022. To select judges, six to 20 specialists are recommended for the validation process[9]. In this study, it was decided to work with 11 judges.

The expert judges selected were divided into two different groups: a group of content judges (five researchers/teachers) and a group of technical/face judges (a psychologist, a social worker, a nutritionist, a physician, a nurse and a pharmacist). The division into groups is justified because it allows for a heterogeneous character of professionals from different institutions, experiences and locations in the country. The *Lattes* Platform was used to choose the specialists, based on their teaching or assistance experience in the area of interest, namely: liver transplant, home care, health technology and validation of instruments.

In relation to the selection of the content judges, the following criteria were used[10]: having specialized skill/knowledge that makes the professional an authority on the subject matter; having special skills in a given type of study; passing a specific test to identify judges (degree in the research area); or having a high rating from an authority. The judges were required to meet two of the five criteria in order to take part.

For the selection of the technical/face experts, criteria linked to scores were used: experience in the clinical practice (0.5/year); time working with liver transplant patients (1.0/year); teaching experience (0.5/year); specialization (1.0); participation in events (0.5/event); and presentation of

papers (0.5/work) in the area of interest[11]. The subjects eligible to participate obtained a minimum score of 05 points.

It should be noted that the content experts were chosen by purposive sampling; in other words, when the researcher selects the participants because he or she considers them to be experts in the construct's area of interest. As for the technical judges, it was snowball sampling, in which, on identifying a subject who fits the criteria for taking part in the study, they are asked to suggest other participants[11].

Those selected were invited to take part in the study via email. An electronic form was created and applied on the *Google Forms* platform, containing the evaluation of the instrument and the Informed Consent Form (ICF), and a 15-day a deadline was set for evaluating and returning the material.

For content validation, the Health Education Content Validation Tool (*Instrumento de Validação de Conteúdo Educativo em Saúde*, IVCES)[12] was used, made up of 18 items divided into three domains (Objectives, Structure/Presentation, and Relevance) with answer options using a Likert scale where 0 = I disagree, 1 = I partially agree and 2 = I totally agree. In order to determine the agreement level between the experts, the Content Validity Index (CVI) was calculated for each item and for the total through the mean between them[13], considered satisfactory when CVI ≥0.78 per item and when total CVI≥0.80[14].

For face validation, the Instrument for Validating the Face of Educational Technologies in Health (*Instrumento para Validação de Aparência de Tecnologias Educacionais em Saúde*, IVATES)[15] was applied, consisting of 12 items addressing four domains (Objectives, Organization, Face, and Motivation) with answer options based on a Likert scale from 1 to 5, where 1 = I totally disagree and 5 = I totally agree. The agreement level was measured by means the Face Validity Index (FVI)[15] for each item and the total through the mean between them, both based on the content validation estimation method.

The Exact Binomial Distribution test was carried out to check whether or not the proportion of evaluators was statistically equal to or greater than the predetermined value, with a 5% ($p>0.05$) significance level of and a proportion of 0.80 for agreement[16]. Reliability of the distribution of the scores assigned by the experts was verified by means of the Intraclass Correlation Coefficient (ICC) and its 95% intervals, using a two-way mixed effects model, and defining the consistency relationship. The reference values considered were "poor reliability" (<0.50), "moderate reliability" (between 0.50 and 0.75), "good reliability" (0.75 to 0.90) and "excellent reliability" (>0.90)[17].

After the expert judges validated the booklet, the changes proposed were implemented to improve the material. In order to preserve anonymity, the letter "C" was used to represent the content judges and the letter "F" the technical/face judges, both followed by Arabic numerals.

As for the second stage, after validation with the expert judges, semantic validation was carried out with the target audience. Its objective is to check that the items are understood by the target audience for whom the material is intended[18]. The study took place at a tertiary-level care hospital in the city of Fortaleza/CE, especially in its Hepatitis and Liver Transplant outpatient clinic, and the data were collected in May and June 2023.

The target audience for this stage was comprised by family members/caregivers of patients subjected to liver transplants, who were contacted in person at the follow-up clinic according to the clinic's flow, and remotely, via telephone calls. The subjects included were family members/caregivers responsible for the home care of these patients for at least six months; over 18 years of age; with a family or emotional tie with the patient; and with basic knowledge about using digital resources. Family caregivers/members living in other municipalities or states were excluded.

Following the recommendations[9], there were a total of 11 participants at the end of the collection period, due to discursive recurrence in the eleventh participant. A form was prepared with

questions evaluating the technology, based on semantics, including sociodemographic data. The content of the questions referred to the sessions covered in the booklet, and each participant was asked to describe the topics therein contained, in order to assess the reader's understanding of the information transmitted.

The instrument was applied in person after the ICF had been signed and the booklet appraised. In the remote modality, after an invitation via telephone call, the booklet in digital format, the ICF and the instrument in a *Google Forms* form were sent via email or the WhatsApp social network. Furthermore, the virtual answers were only validated once the ICF had been accepted.

For data analysis, the sociodemographic characteristics were tabulated in the *Microsoft Excel* program. The rest of the participants' answers were transcribed and entered into the *IRaMuTeQ* (*Interface de R pour les Analyses Multidimensionnelles de Textes et de Questionnaires*) software, version 0.7 alpha 2 and R 4.0.3, for processing and organizing the text data.

Word Cloud analysis was used, which graphically organizes words according to their frequency, allowing for a quick identification of keywords. In addition to Descending Hierarchical Classification (DHC), which classifies text segments according to their respective terms and their set is broken down based on the frequency of the forms that have already been reduced[19].

Using the Word Cloud and DHC allows identifying the most recurrent words and terms in the participants' testimonies, thus indicating their understanding of a given subject matter. In order to preserve the participants' anonymity, the letter "P" and Arabic numerals were used to identify and differentiate the statements. The study was approved by the Research Ethics Committee of *Universidade Estadual de Ceará* and the Fortaleza General Hospital.

RESULTS

The integrative review included 25 articles, 20 of which were published in English, four in Portuguese and one in Spanish. As for where the studies were published, eight were from North America, seven from Europe and ten from South America, nine of these latter from Brazil. As for the main authors, there were 12 physicians, six nurses, three psychologists, two nutritionists and two pharmacists.

After a general survey of the relevant content for selecting the topics, four central axes were chosen to construct the booklet: "Recommendations for managing and adhering to pharmacotherapy"; "Daily activities and care"; "Warning signs for possible events at home and harms prevention"; and "Lifestyle changes and the impact of psychosocial support".

The text was written in a language suitable for the target audience, making it more accessible. It was decided to use simple line drawings, illustrations of possible behaviors at home and those that emphasized the main aspects of care for a person receiving a liver transplant. The layout included refinement of the graphic content once it had been approved by the researchers.

At the end of the construction stage, the pilot version of the booklet was made up of nine sections which included the following: an introduction to the liver; lifestyle after transplantation; general care and hygiene; medication after the transplant; warning signs; general guidelines; the hospital pharmacy sector (controlling drug administration); and a table for monitoring vital signs, as well as a presentation of the technology and bibliographical references.

After the judges had assessed the content and face, the indices used to measure validity were applied. In IVCES, the CVI was calculated for each item in each domain; all the items obtained a good index, with 0.83 as the lowest score. The mean variance of the item values for the total CVI was 0.99, with no significant disagreement among the judges ($p>0.05$) and excellent reliability (ICC 95%CI = 0.946 [0.840-0.994]) (Table 1).

Table 1 – Content Validity Index of the educational booklet. Fortaleza, CE, Brazil, 2022.

Domains	Agreement			CVI[§]	p-value[‖]
	D* *f* (%)	PA[†] *f* (%)	TA[‡] *f* (%)		
Objective	–	–	–	**1.00**	–
1. It contemplates the topic of care risk management indicators in Pediatrics	–	01 (20.0)	04 (80.0)	1.00	0.672[a]
2. It is suitable for the teaching-learning process	–	01 (20.0)	04 (80.0)	1.00	0.672[a]
3. It clarifies doubts about the topic proposed	–	02 (40.0)	03 (60.0)	1.00	0.263[a]
4. It provides a reflection on the topic proposed	–	02 (40.0)	03 (60.0)	1.00	0.263[a]
5. It encourages behavioral change in care risk management	–	01 (20.0)	04 (80.0)	1.00	0.672[a]
Structure and presentation	–	–	–	**0.98**	–
6. Suitable language for the target audience	–	03 (60.0)	02 (40.0)	1.00	0.058[a]
7. Suitable language for the digital manual	–	02 (40.0)	03 (60.0)	1.00	0.263[a]
8. Interactive language, allowing active involvement in the educational process	01 (20.0)	–	04 (80.0)	0.83	0.672[a]
9. Correct information	–	03 (60.0)	02 (40.0)	1.00	0.058[a]
10. Objective information	–	03 (60.0)	02 (40.0)	1.00	0.058[a]
11. Clarifying information	–	03 (60.0)	02 (40.0)	1.00	0.058[a]
12. Necessary information	–	02 (40.0)	03 (60.0)	1.00	0.672[a]
13. Logical sequence of ideas	–	03 (60.0)	02 (40.0)	1.00	0.058[a]
14. The topic of care risk management covered in the manual is up to date	–	01 (20.0)	04 (80.0)	1.00	0.672[a]
15. Appropriate text size	–	03 (60.0)	02 (40.0)	1.00	0.058[a]
Relevance	–	–	–	**1.00**	–
16. The digital manual stimulates learning in care risk management	–	01 (20.0)	04 (80.0)	1.00	0.672[a]
17. It contributes to knowledge in the area of care risk indicators in Pediatrics	–	01 (20.0)	04 (80.0)	1.00	0.672[a]
18. It sparks interest in the topic	–	01 (20.0)	04 (80.0)	1.00	0.672[a]
Total CVI	**–**	**–**	**–**	**0.99**	**–**
ICC (95%CI)¶	**0.946 (0.840 – 0.994)**				

*D – Disagree; †PA – Partially Agree; ‡TA – Totally Agree; §CVI – Content Validity Index; ‖p-value – Binomial Exact Test (a: The alternative hypothesis states that the proportion of cases in the first group <0.80); ¶ICC (95%CI) – Intraclass Correlation Coefficient with 95% Confidence Interval.

For face validation, the FVI was estimated in IVATES, with 0.83 as the lowest value in five items of the instrument, whereas the total FVI value was 0.93. ICC reliability was 0.766 (0.649-0.945), considered good, with no items presenting discordant scores among the judges (Table 2).

Table 2 – Face Validity Index of the educational booklet. Fortaleza, CE, Brazil, 2022.

Items	Agreement			FVI[§]	p-value[‖]
	PD* *f* (%)	PA[†] *f* (%)	TA[‡] *f* (%)		
1. The illustrations are suitable for health managers and professionals.	–	02 (33.3)	04 (66.7)	1.00	0.345[a]
2. The illustrations are clear and easy to understand.	–	02 (33.3)	04 (66.7)	1.00	0.345[a]
3. The illustrations are relevant for health managers and professionals to understand the content.	–	01 (16.7)	05 (83.3)	1.00	0.655
4. The colors of the illustrations are appropriate for the type of material.	–	01 (16.7)	05 (83.3)	1.00	0.202[a]
5. The shapes of the illustrations are appropriate for the type of material.	–	02 (33.3)	04 (66.7)	1.00	0.417[a]
6. The illustrations depict the routine of health managers and professionals.	01 (16.7)	04 (66.7)	01 (16.7)	0.83	0.655
7. The layout of the pictures is in harmony with the text.	–	05 (83.3)	01 (16.7)	1.00	0.655[a]
8. The figures used clarify the content of the manual.	01 (16.7)	04 (66.7)	01 (16.7)	0.83	0.655
9. The illustrations help to explain the topic of risk management indicators and are in a logical sequence.	–	05 (83.3)	01 (16.7)	1.00	0.655[a]
10. The illustrations in the manual are adequate.	01 (16.7)	03 (50.0)	02 (33.3)	0.83	0.655
11. The size of illustrations is appropriate in the manual.	01 (16.7)	02 (33.3)	03 (50.0)	0.83	0.655
12. The illustrations help to change the behavior and attitudes of the target audience.	01 (16.7)	04 (66.7)	01 (16.7)	0.83	0.655
Total FVI	**–**	**–**	**–**	**0.93**	**–**
ICC (95%CI)¶	**0.766 (0.649 – 0.945)**				

*PD – Partially Disagree; [†]PA – Partially Agree; [‡]TA – Totally Agree; [§]FVI – Face Validity Index; [‖]p-value – Binomial Exact Test (a: alternative hypothesis states that the proportion of cases in the first group <0.80); ¶ICC (95%CI) – Intraclass Correlation Coefficient with 95% Confidence Interval.

The subjective comments and suggestions made by the experts were taken into account. After evaluating the necessary changes and revising the spelling, the final version of the booklet was produced, consisting of nine sections and 17 pages (Figure 1).

Figure 1 – Booklet cover after the final version. Fortaleza, CE, Brazil, 2022.

In relation to the semantic validation of the booklet with the target audience, there were a total of 11 interviews, three in person and eight remotely. The most prevalent sociodemographic variables were female gender, age group from 40 to 44 years old, married, Complete High School, spouses and/or children, and time devoted to care between 1 and 3 years.

After incorporating the text *corpus* with the participants' testimonies by applying the form, the Word Cloud and DHC were worked on in the *IRaMuTeQ* software, with a 87.04% leverage rate, considered useful for classification[19].

Through the Word Cloud created it was possible to identify terms that refer to the study objective and to the key points of the booklet. The most prominent word was "booklet", accompanied by others such as "understand", "information", "comprehend", "achieve", "lifestyle", "general care", "medication" and "warning signs".

It should be noted that the longer the word, the greater its relevance in the text *corpus*, inferring understanding of the information presented (Figure 2).

The DHC gave rise to 8 classes, which were reduced and named according to their area by the representation of the words generated. They were then grouped and organized into two analytical categories according to their similarity: 1st category – Importance of the booklet and lifestyle changes: Class 4 – Importance of the booklet; Class 7 – Use indication of by the family member; and Classes 5 and 6 – Understanding a new lifestyle; 2nd category – Daily home care management: Class 3 – Main signs of complications; Class 1 – General care; and Classes 2 and 8 – Daily medication use (Figure 3).

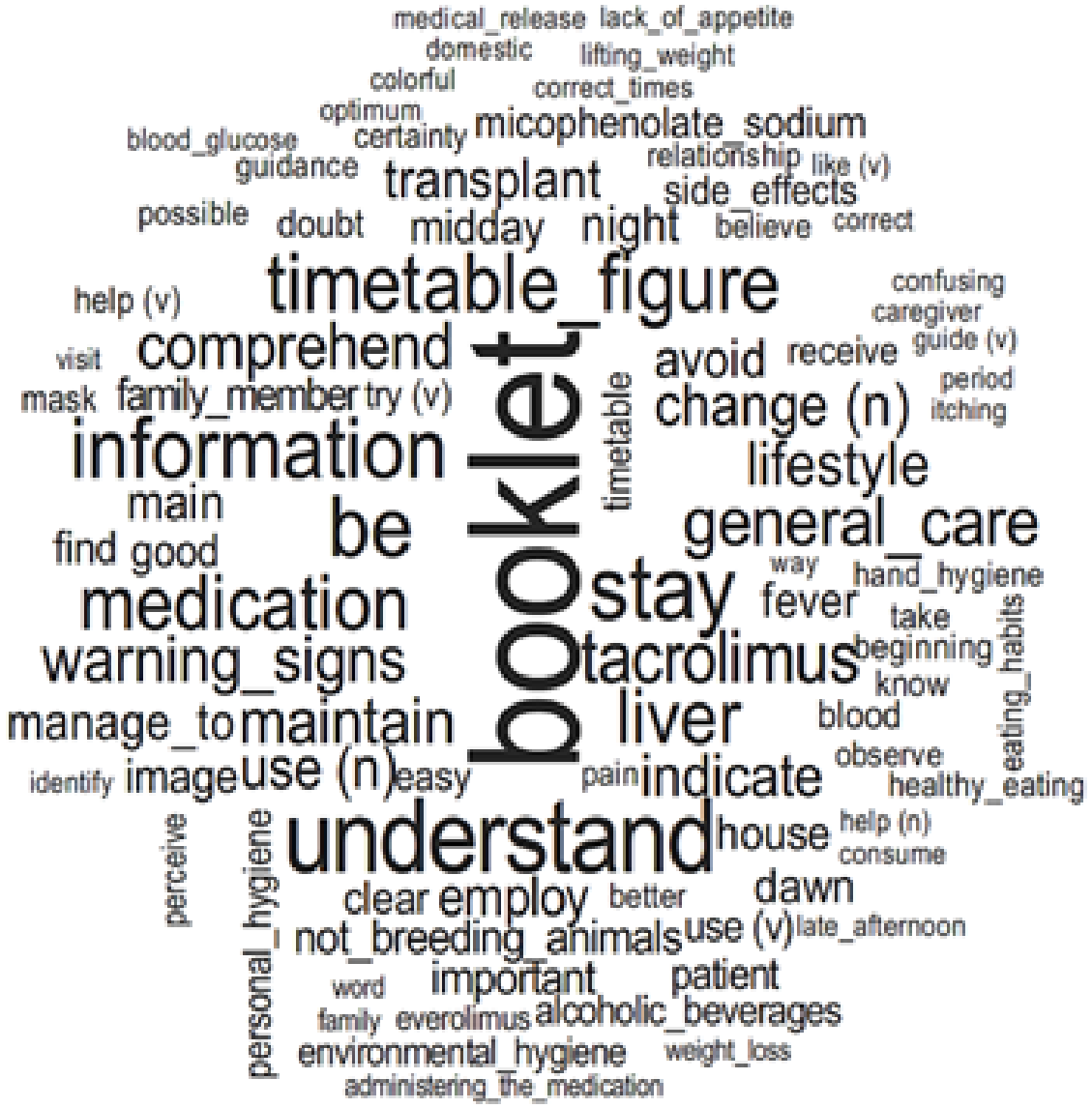

Figure 2 – Word cloud of the text *corpus* generated in the *IRAMuTeQ* software. Fortaleza, CE, Brazil, 2023.

Figure 3 – Structure corresponding to the process of reducing the classes formed by DHC and constructing analytical categories. Fortaleza, CE, Brazil, 2023.

In relation to the first category, the family members' testimonies were positive about the booklet material presented to them, as well as their interest in using it and recommending it to other family members. *The material in the booklet is excellent. All the information provided is valuable for the care to be provided to transplant patients. I thought it was beautiful and very colorful* (P6).

The lifestyle changes are significant, varying from physical to emotional changes. *My husband is calmer now, less stressed. The emotional side has changed a lot. He understood the new lifestyle and he's much better now* (P4).

The second category covers daily care at home, such as personal and environment hygiene, daily drug administration and adequate nutrition, as well as identifying possible warning signs that family members should be aware of in relation to the transplant patient. *The main warning signs that occurred at the beginning were diarrhea, lack of appetite and irritation, but they diminished over the following months* (P8).

After evaluating the statements it was possible to obtain a satisfactory level of perception and understanding from the participants about the booklet. Undoubtedly, in the quest for constant improvement, some of the main aspects of the material deserved to be adjusted based on the participants' assessment, such as the topics on lifestyle and medication and spelling corrections.

DISCUSSION

The general survey of valid content for the construction of the booklet resulted in the four central axes already mentioned. In the focus on "recommendations for managing and adhering to drug treatment", one study states that the participating professionals described the care information provided to patients in relation to medication therapy, mainly related to immunosuppressants, due to the disastrous consequences when not properly used[20].

In terms of "daily activities and care", returning to the patient's home after the liver transplant requires constant adaptation. In particular, in relation to cleaning the environment, nutrition, weight maintenance, glycemic control, drug administration and weekly tests and visits to the multiprofessional team in the first two months[20].

As for "warning signs of possible events at home and harms prevention", both patients and families should be able to identify fever, persistent cough, pain or difficulty breathing, palpitations, pain or burning when urinating, tremors, chills, mental confusion, pain at the implant site, decreased diuresis and edema[21].

Finally, in the "lifestyle changes and impact of psychosocial support" axis, it becomes necessary to strengthen the support network before hospital discharge. By relating the psychosocial patterns and the transplant result, it is noticed that multidisciplinary approach, family support and development of the biopsychosocial model are ways to obtain a global benefit for the patients[22].

In relation to the second stage, in the content and face validation with expert judges, the indices proposed for the evaluation were satisfactorily achievement. In terms of content, it is important to add that the "Objective" domain of an instrument is important for understanding the content to be studied. This stage showed partial and total agreement on the items present, which demonstrates success in its production.

As far as the "Structure" domain is concerned, only one of the ten items was rated as "in disagreement" by a judge. However, knowing the importance of presenting a coherent, cohesive and organized structure, the adjustments and changes suggested were implemented. As for "Relevance", four of the five evaluators totally agreed with all the items, which shows consistency with the research objective.

In the face validation process, the total FVI was considered excellent. In addition, as already mentioned, the suggestions and subjective comments made by the expert judges were taken into account and followed-up in order to improve the material.

Continuing with the second stage, the semantic validation process of the booklet endorsed the prospect of safe and reliable material with theoretical and scientific backing for all users.

In relation to the sociodemographic characteristics of the target audience, one of the variables with the greatest difference in numbers was “gender”. Due to sociohistorical and cultural constructions, being a woman is associated with the traditional role of caregiver, especially those who live in the same house as the potential indidivuals to be cared for, which may be their spouse, children or even their parents[23]. In addition, the “marital status” and “kinship with the person subjected to the transplant” variables reflect the statements of the aforementioned authors.

In relation to the first analytical category of the semantic validation, “Importance of the booklet and lifestyle changes”, the understanding and comprehension levels intended by the booklet were achieved, as can be seen in the participants’ statements through the information present in the material. These perceptions can be identified in the terms “comprehend”, “understand”, “information” and “indicate” that are flund in the Word Cloud.

Aware of the importance of an educational material being understood by its target audience, the authors reinforce this value in a methodological study of a booklet carried out with pregnant and puerperal women, meeting their demands and needs through the use of easy-to-understand language, appealing illustrations and organization of the content covered[24].

One of the main lifestyle changes perceived by the family members during data collection was in relation to the emotional sphere. The family support network is fundamental throughout the care process and in the full recovery of a person subjected to a transplant[25]. Thus, being patient, encouraging the adaptive process and stimulating acceptance are measures adopted by the family that help them to face the care challenges, especially at home.

In relation to the second analytical category, “Home care management”, all the general care measures directed at the home, including personal hygiene, the environment, a balanced diet, return to sexual activity, not drinking alcohol and not smoking, were understood by the participants. One study points to the importance of defining plans to introduce healthy lifestyle habits, allied to a rehabilitation plan, with the objective of achieving effective improvements[26].

In total, the material covers six examples of medications. Tacrolimus was the immunosuppressant mentioned by all 11 participants, and this recurrence was confirmed by the Word Cloud analysis. However, three immunosuppressants were not mentioned (Ciclosporin, Mycophenolate Mofetil and Sirolimus), although Sirolimus was mentioned by two interviewees, not present in the booklet.

The complications that can arise after a liver transplant include vascular and biliary. The main vascular ones are related to arterial thrombosis and stenosis. Biliary complications include stenosis and bile leakage. Such implications are associated with graft loss, infections and mortality[27].

According to the participating family members, they all had a good understanding of the warning signs described in the booklet. When asked, they clearly pointed out the likely signs of alteration that could be identified in the patient. They also stated that, as there were so many warning signs, they were not able to remember some of them, expressing their satisfaction at being able to recall them.

In summary, the booklet was well-designed, as was the content and face validation process with the expert judges. In addition, understanding and comprehension of the material presented in the booklet were considered satisfactory, thus underpinning the value of the booklet’s semantics.

The study limitations include having constructed the technology based on the literature, the need for basic reading instruction and the subjectivity of the qualitative analysis. In addition, we should

also mention the small sample of participants and only one applicability scenario in the semantic axis, making it difficult to generalize the findings.

CONCLUSION

An educational booklet with nine sessions and 17 pages was constructed based on the available scientific literature and was considered to be a technology with good content, face and semantic validity. It is considered that the technology is innovative, including caregivers in the education process, in addition to being relevant to post-transplant care.

In their role, nurses should encourage family members to take part in the process of caring for individuals subjected to transplants, encouraging use of the booklet as a resource for solving doubts and a source of closer contact with important information about care.

In view of the development of the educational booklet aimed at family members and caregivers of patients subjected to liver transplants, it was noticed that there are few publications addressing and informing the support network of these patients. Consolidating the adjustments required was essential for improving the material.

In view of future studies, it is recommended to carry out periodic updates based on the literature, with the objective of maintaining reliability of the booklet, as well as spreading it to other liver transplant centers in order to expand the population benefiting from it.

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NOTES

ORIGIN OF THE ARTICLE

Article extracted from the dissertation – "Construction and validation of educational technology for family caregivers of patients after liver transplants", presented to the Professional Master's Degree course in Transplantation of *Universidade Estadual de Ceará* in 2022; material was also extracted from the monograph – "Semantic validation of educational technology for family caregivers of liver transplant patients", presented to the Undergraduate Nursing course of *Universidade Estadual de Ceará*, in 2023

CONTRIBUTION OF AUTHORITY

Study design: Lima MC, Lopes CA.
Data collection: Lima MC, Lopes CA, Pinheiro AL.
Data analysis and interpretation: Lima MC, Lopes CA, Cestari VRF.
Discussion of the results: Lima MC, Lopes CA, Cestari VRF, Pessoa VLMP.
Critical review of the content: Lima MC, Lopes CA, Cestari VRF, Pessoa VLMP.
Review and final approval of the final version: Lima MC, Lopes CA, Cestari VRF, Pinheiro AL, Pessoa VLMP.

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CONFLICT OF INTEREST

There is no conflict of interest.

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Leonardo Parachú.

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CORRESPONDING AUTHOR

Caroline Araujo Lopes.
caroline.lopes1630@gmail.com