Validation of comic book about burn prevention and first aid for adults

Validação de história em quadrinhos sobre prevenção e primeiros socorros às queimaduras para adultos

Validación de cómics sobre prevención y primeros auxilios en quemaduras para adultos

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ABSTRACT

Objective: To develop and validate a comic book for the adult population about prevention and first aid for burns.

Method: Applied quantitative research conducted at a university hospital, guided by the Social Cognitive Theory. A comic book was developed, followed by Content Validation with 12 experts and Semantic Validation with 30 adults. The Educational Content Validation Instrument in Health and Suitability Assessment of Materials were used for data collection and the analysis was carried out by Content Validity Index, with a minimum of 0.8.

Results: The final version has ten pages, both printed and virtual form. The overall agreement rate was 0.963 in content and 0.987 in semantics. The main adjustments were in the language and layout of the cover.

Conclusion: The levels of agreement were satisfactory, determining the validity of the Comic Book, configuring it as a simple and accessible resource for health education about burns for adults.

Keywords: Burns. Accident prevention. First aid. Health education. Translational research, biomedical.

RESUMO

Objetivo: Elaborar e validar uma História em Quadrinhos para a população adulta sobre prevenção e primeiros socorros para queimaduras.

Método: Pesquisa aplicada, quantitativa, conduzida em hospital universitário, norteada pela Teoria Social Cognitiva. Elaborou-se uma História em Quadrinhos, seguida de Validação de Conteúdo com 12especialistas e Validação Semântica com 30 adultos. Utilizou-se o Instrumento de Validação de Conteúdo Educativo em Saúde e *Suitability Assessment of Materials* para coleta dos dados e a análise deu-se por Índice de Validação de Conteúdo, com mínimo de 0,8.

Resultados: A versão final possui dez páginas, na modalidade impressa e virtual. O índice global de concordância foi 0,963 em conteúdo e 0,987 em semântica. As adequações principais foram na linguagem e *layout* da capa.

Conclusão: Os níveis de concordância foram satisfatórios, determinando validade da História em Quadrinhos, configurando-a como recurso simples e acessível para a educação em saúde sobre queimaduras para adultos.

Palavras-chave: Queimaduras. Prevenção de acidentes. Primeiros socorros.Educação em saúde. Pesquisa translacional biomédica.

RESUMEN

Objetivo: Desarrollar y validar un Comics para población adulta sobre prevención y primeros auxilios para quemaduras.

Método: Investigación aplicada, cuantitativa, realizada en un hospital universitario, guiada por la Teoría Social Cognitiva. Se elaboró un Cómic, seguido de Validación de Contenido con 12 expertos y Validación Semántica con 30 adultos. Para la recolección de datos se utilizó el Instrumento de Validación de Contenido Educativo en *Saludy Suitability Assessment of Materials* y el análisis se realizó por Índice de Validación de Contenido, con un mínimo de 0,8.

Resultados: La versión final tiene diez páginas, en forma impresa y virtual La tasa de acuerdo global fue de 0,963 en contenido y 0,987 en semántica. Los principales ajustes fueron en el lenguaje y el diseño de la portada.

Conclusión: Los niveles de acuerdo fueron satisfactorios, determinando la validez de la Historieta, configurando la como un recurso sencillo y accesible para la educación en salud sobre quemaduras para adultos.

Palabras clave: Quemaduras. Prevención de accidentes. Primeros auxilios. Educación en salud. Investigación biomédica traslacional.

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■ INTRODUCTION

Burns are traumatic injuries caused by contact with sources of radiation, electricity, temperature extremes or chemical compounds that result in total or partial destruction of the skin and/or mucous membranes[1].

Regarding their typology, these injuries are considered as some of the most devastating because they commonly result in permanent physical sequelae and psychological disorders related to disfigurement, trauma and sudden change in life habits[1-3]. In the long term, they also have a socioeconomic impact, as the sequelae reduce the individual's productive capacity and generate high costs with recovery[2].

On a global scale, they occupy fourth place in the ranking of most common traumas[2] and in Brazil, according to data from the Health Information System of the Unified Health System (*Sistema de Informação de Saúde do Sistema Único de Saúde* – SIS-SUS)[4] there were more than five thousand hospitalizations due to exposure to smoke and flames in 2020, which resulted in more than 15 million BRL spent and 207 deaths of people between 10 and 59 years old[4].

Prevention measures to reduce morbidity and mortality caused by this injury are essential, since 90% of incidents can be avoided with health education strategies[2]. There is also a strong incentive for the correct provision of first aid, which can contribute to less severe injuries and a better prognosis for patients[2].

Thus, nurses and physicians who are in contact with the patient, Community Health Agents (CHA) who correspond to the links between the service guidance and the population, as well as other health professionals, continually strive to provide health education about burns to the community[5-6]. However, a major challenge for adequate health information on burns is the feasibility of transmitting such complex knowledge to the general public, so that it presents applicability in daily practice[7].

In addition, the low availability of technologies, infrastructure or effective strategies for the control of burns allows the population to have incipient knowledge or merely supported by empirical practices, often arising from popular sayings, which, instead of assisting the patient, can worsen their condition[7].

Based on this dictate, the use of comic books (comics), with an informative character in the health area, has been highlighted for motivating reflection on everyday situations and allowing the sharing of complex knowledge in a clear and playful way[8]. This is due to the characteristic of this material in integrating written and visual language, favoring the interaction between the reader and the text[9].

New research have showed the change in the perception that comics offer little to the adult public or to health area and have emphasized the educational aspects that this media presents, both directly to the user and as a health promotion tool for health professionals[8-10].

Thus, aiming at the expansion, practical dissemination of such complex and important knowledge as burns and distancing from empiricism rooted in society, the research question was elaborated: Is the development of a comic book for teaching about prevention and first aid for burns a valid instrument regarding content and design, to be used as an educational tool for adults?

Thus, this study aimed to develop and validate a comic book for the adult population about prevention and first aid for burns.

■ METHOD

Applied study[11], with quantitative approach, which aims to produce scientific knowledge with practical application, aimed at the solution of concrete and previously defined problems, and its results are new products or technological processes[11-12]. An applied study is different from a methodological study, since the second involves the investigation of methods for obtaining and organizing data or conducting research and its results are the tools used in the methodology of fundamental research[11-12].

It was carried out in three stages: 1) Development of the educational technology in comic book format; 2) Comic book Content Validation with experts in the field of health and education and 3) Comic book Semantic Validation with members of general adult population. The entire process was grounded on the Social Cognitive Theory, which assumes that human thinking and behavior are influenced by socio-structural aspects, maintaining a broad, direct, and dynamic relationship between personal, behavioral and environmental components. Therefore, health strategies and interventions that interfere with these aspects can be developed[13].

First stage

The development of the comic book started with an analysis of the scientific literature, both national and international gray productions (books, protocols, manuals, others), in order to supply the biological, pathophysiological and social aspects associated with burns, as well as scientific articles published between December 2016 and January 2021, to obtain updated scientific evidence on the theme under study.

The Online Medical Literature Search and Analysis System (MEDLINE), Cumulative Index to Nursing and Allied Health Literature (CINAHL) and Excerpta Medica (EMBASE) were used. The search was performed with the descriptors "burns", "first aid", "accident prevention", "prevention", selected in the Medical Subject Headings (MESH) and combined with the Boolean operators AND and OR, following the formatting of each database, as follows: "burns" AND "first aid" OR "burns" AND "accident prevention" OR "burns" AND "prevention".

Technical information was organized in a structured script with aspects for health education on burns, which are: definition, epidemiology, etiology, pathophysiology, clinical repercussions, prevention measures and first aid.

In the plot of the story, a structured plan was followed with the presentation of the main characters, development, climax and ending, maintaining the objective of demonstrating the prevention and first aid strategies for the most recurrent burn etiologies, as pointed out by the related literature, focused on the adult population. Thus, the story was organized using the storyboard technique to compose a graphic narrative. The illustrations, characters and scenarios were designed by the authors, with the support of an illustrator, using the Adobe Photoshop® software.

Second stage

The comic book was content validated by experts in the health area. This stage took place in a virtual setting, allowing to send content to judges from different Brazilian states. It is recommended the participation of five to twenty judges[14]. Therefore, the experts were selected in a consecutive non-probabilistic way, through analysis of the curriculum on the Lattes/CNPq platform, in the search mode for "burns" in "Subject (title or keyword of the production)".

The authors chose experts of Brazilian nationality, who met at least three of the following inclusion criteria: being a health professional with a at least a specialist title; have experience in health education; have practical experience in assisting burned patients for at least one year; have practical experience in urgency/emergency care or intensive care or have experience in applied or methodological studies. The experts were invited to participate in the research through an invitation letter, sent to the e-mail address available in the profile of the Lattes/CNPq platform.

An electronic form on the Google Forms platform (https://forms.google.com), was structured, with the research presentation, participation guidelines, questions of socio-demographic data of the judges and the assessment of the comic book, following the Educational Content Validation Instrument in Health (ECVIH)[15], which is structured in three domains and eighteen items, with a Likert-type scale from zero to two (0=inadequate item; 1=partially adequate item; 2=adequate item). Experts should justify the instrument items judged as partially adequate or inadequate so that it was possible to adjust them before proceeding to the semantic validation.

Data collection took place between April and May 2021. The experts had the deadline of 20 days to fill out the electronic form, from the sending of the e-mail, being sent again, with the same deadline. By not filling out it was understood as refusal.

The comic book was adjusted, according to experts' orientation, before moving on to the third stage.

Third stage

Once adjusted, the comic book was submitted to semantic validation with adults between June and September 2021, in a Burn Treatment Center (BTC), which has hospitalization, intensive care, surgical center and outpatient clinic, located in a large public university hospital in northern Paraná, Brazil.

Participants were chosen in a consecutive non-probabilistic way, following the inclusion criteria to participate in the study: being 18 years of age or older, being literate, being a companion or a patient hospitalized for at least one week at the BTC and having clinical and cognitive conditions at the time of data collection.

Cognitive assessment was performed using the Verbal Fluency Test (VFT), considering the semantic group "animals" and a 60-second deadline[16]. The minimum score of 12 points for schooling between one and eight years and 13 points for schooling over nine was defined, according to the literature[16]. If the participant (if patient) performed any procedure at the time of collection or immediately before, the collection was ended and restarted at another moment, with the same person.

A face-to-face and individual approach was carried out, with the presentation of the comic book for reading and analysis by the participant. Then, a questionnaire was applied with questions to characterize the participant and a structured instrument based on the Suitability Assessment of Materials (SAM)[17], containing five domains, 32 items and a Likert-type scale from zero to two (where 0=inadequate item; 1=partially adequate item; 2=adequate item). As in the second stage, the participants had to justify each item of the instrument judged as partially adequate or inadequate so that it was possible to adjust the comic book. Data collection took place between June and September 2021.

Data analysis

Data analysis, in the second and third stages, was performed using descriptive statistics and the Content Validity Index (CVI) per item (I-CVI) and overall scale (S-CVI) in each instrument with the support of the Statistical Package for the Social Sciences (SPSS).

The CVI measures the proportion of participants who agree with the relevance of the items[12]. This was calculated by the ratio between the answers "2" and the total number of answers, considering a minimum agreement percentage of 0.8. If any item or domain of the instruments used did not reach the minimum percentage, a new round of validation would be carried out, with new experts or participants from the target audience, after adjusting the comic book with the suggestions provided in the first assessment. Figure 1 shows the complete methodological operationalization of the study.

This research was approved by the Research Ethics Committee (REC) of the institution, under opinion no.4,416,099 and CAAE 40087520,7,0000,5231. Signing the Free and Informed Consent Form (FICF) was requested at all stages. Specifically at the second stage, which took place in a virtual setting, the recommendations proposed in Circular Letter CONEP no. 02/2021 were followed[18], and the acceptance to participate in the research was given by the experts when by clicking on the option "I declare that I have read and understood all the information in the FICF and I agree to participate in the research".
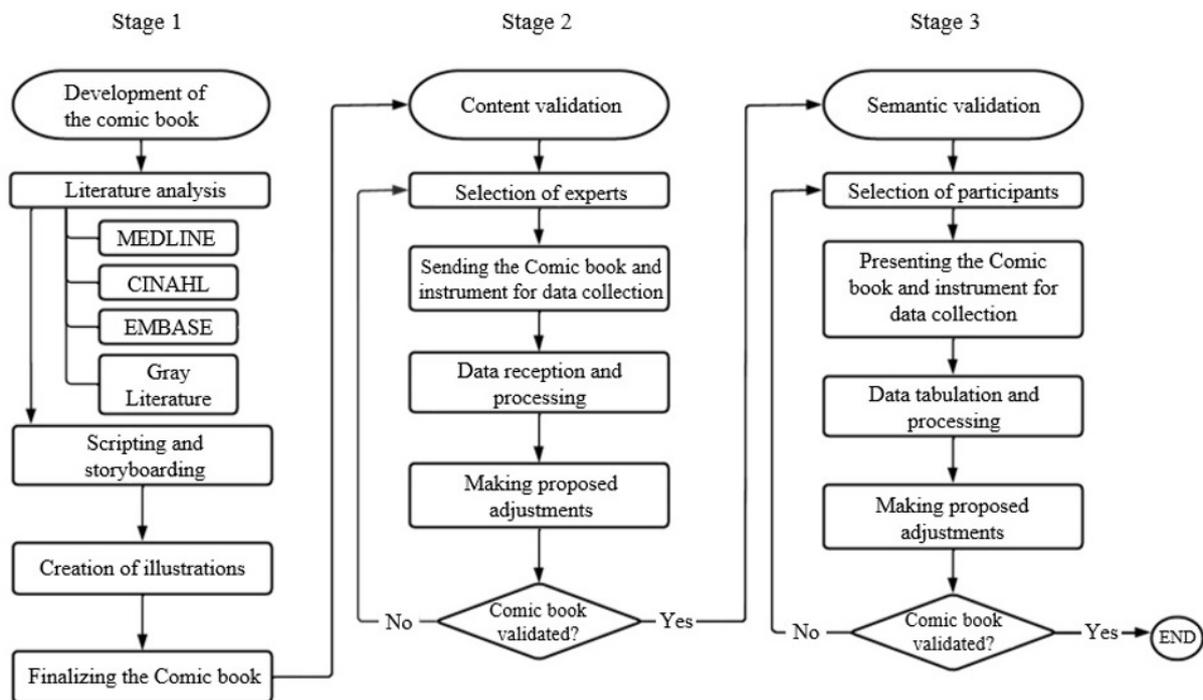

Figure 1 – Representative flowchart of the operationalization stages of the study. Londrina, Paraná, Brazil, 2021
Source: The authors.

■ RESULTS

In the first stage, the narrative is about a girl named Ana who, together with her colleagues, goes on a school trip to a training service with virtual reality. The playful narrative transports the main character to different everyday situations involving the main etiologies of burns, learning, with a health professional, ways to prevent and manage the accident correctly, if it occurs. To illustrate the injuries resulting from burns, a character without human characteristics was created.

The language was adapted to the popular one, displayed in balloons and combined with the illustrations

of the scenarios, showing the passage of time and of the characters, with facial expressions, gestures and change of situation clothes. Idiom expressions were used to help the reader understand the guidance and identify with the characters in moments of doubt, surprise, nervousness, relief and happiness.

The comic book version in the first stage measures 148 x 210 mm (A5 paper size), font size 20, with ten pages, available in printed and digital form, containing: cover, back cover, narrative, references for consultation and emergency numbers. Understanding that in some states, in addition to the Mobile Emergency Care Service (*Serviço de Atendimento Móvel de Urgência* – SAMU – 192), there is a specialized service for trauma care integrated into the Fire Department (SIATE – 193), the comic book was formulated in two versions, with changes in the service numbers.

For the second stage, 67 invitation letters were sent, with 55 refusals for not filling out during the time determined in both attempts, totaling 12 experts.

The categorization of experts showed that the mean age was 46.5 years, ranging between 3 5 and 60 years. Regarding regionality, around 33.3% were in the southern region of the country, 25.0% in the southeast region; in the Midwest and Northeast regions, 16.7% of experts participated equally and in the North region, only 8.30%.

On average, these experts had 25 years of training, ranging from 12-41 years, with 66.7% being nurses, 25% physical therapists and 8.3% physicians, with doctorate degree (66.7%), master's (16.7%) and specialization (16.7%).

Regarding the experience with burns, 91.7% revealed having already experienced direct care for burns, with 54.5% working for more than 10 years and 58.3% still working at the time of data collection. In addition, 75% stated they had never experienced a traumatic personal experience related to such injury.

Regarding the work environment, 83.3% had practical experience in urgency and emergency (3) or intensive care (7) and about 16.6% worked in Primary Care. In addition, 75% reported having experience in health education, mostly nurses (88.9%), in the modality of virtual activities (33.3%) and in-person (66.7%). None of them were familiar with applied or methodological studies.

The experts assessed the comic book positively. The S-CVI at this stage was 0.963 and the I-CVI were greater than 0.8, ending the content validation process with only one round. Chart 1 details the I-CVI values and the suggestions in each item of the instrument.

Regarding the adjustments of the comic book, following the experts' suggestion, in the "Objectives" domain, there was justification in the item "Encourages behavior change", about the importance of showing statistical data about burns to impact the reader. This suggestion was accepted, adding information gathered during the initial review, in supplementary material in the comic book.

The "Structure and Presentation" domain was the one with the highest number of suggestions. In the items that refer to the language used, the justifications were to replace the word "game" and "complications", being changed to "game" and "problems", respectively. In addition, there were suggestions to add an interactive activity to fixation of knowledge, word search were chosen, formulated by the authors with the most important keywords from the comic book.

In the items that refer to the information contained in the comic book, further clarification was requested on skin cooling, adding to the guidance the average time the affected area remains in running water and explanations about the cooling process. It was also suggested to point out that adults should accompany the elderly in the kitchen, first aid in case of fire and not to throw water on burns due to electric shock, points highlighted with different font and color in the balloons.

Still in this domain, an expert considered that the text size was partially adequate, but the suggestion was not understood, therefore, it was rejected, and the text was maintained, since the agreement index was adequate in the item in question. Another suggested adding an index for consulting first aid actions, but it was impossible to meet this request, since, as it is a comic book, the guidance take place through the complete narrative, and it is not possible to extract specific information.

In the "Relevance" domain, there was unanimity of agreement, with two suggestions. One of them mentioned that he did not like the design of the characters that illustrate burn injuries, but did not present suggestions for improvement, being rejected and maintained the initial design.

Another expert suggested expanding the content of the material so that the reader could have more details about burn prevention strategies and first aid, thus, a blog was created (https://queimadurasnuncamais.blogspot.com), integrated with the comic book by a QR-code (Figure 2), which directs the reader to supplementary contents. To expand the comic book offering, we use the same environment to display its digital version.

Items	Adequate (n[*])	Partially Adequate (n)	Inadequate (n)	I-CVI[†]
Objectives				
Educational Technology includes the proposed theme.	12	0	0	1
The information/contents are adequate for the teaching-learning process.	12	0	0	1
Clarifies possible doubts about the theme addressed.	12	0	0	1
Provides reflection on the theme.	12	0	0	1
Encourages behavior change.	11	1	0	0.92
Structure and Presentation				
Messages are presented in appropriate language to the target audience	10	2	0	0.83
Appropriate language for educational material	12	0	0	1
Interactive language, allowing active involvement in the educational process	10	2	0	0.83
The information is correct	11	1	0	0.92
The information is objective	12	0	0	1
The information is enlightening	11	1	0	0.92
The information is necessary	12	0	0	1
The ideas are in logical sequence	12	0	0	1
The theme is up to date	12	0	0	1
Text size is adequate	11	1	0	0.92
Relevance				
Educational Technology encourages learning about burns.	12	0	0	1
Contributes to knowledge in the area.	12	0	0	1
Arouses interest in the theme.	12	0	0	1

Chart 1 – Assessment of the comic book by experts, according to I-CVI, according to the data collection instrument. Londrina, Paraná, Brazil, 2021

Source: Research data.

*: number of experts; †: Content Validity Index per item

Figure 2 – QR-code of supplementary information and virtual availability of the comic book. Londrina, Paraná, Brazil, 2021
Source: The authors.

In the third stage, 38 participants were approached, of which two were illiterate, three refused to participate, one was unable to complete the VFT due to mental confusion and two presented procedures at the time of collection, then were transferred to the Intensive Care Unit (ICU), making participation impossible. Thus, the sample consisted of 30 participants, being 21 patients and nine companions.

The categorization of these participants showed a distribution of equivalent gender between men (53.3%) and women (46.7%) and a mean age of 39.8 years, ranging from 18 to 71 years. As for marital status, they showed equal proportions (26.7%) for being single, cohabiting or married, with only 13.3% divorced and 6.7% widowed.

Regarding education level, 40% had completed high school education, 24% had completed primary education, 13% reported incomplete high school, 10% had incomplete primary education, 10% attended higher education and 3% had completed higher education.

In addition, 50% of the participants reported never having received guidance on prevention and/or first aid for burns, 46.7% reported having received this guidance related only to the work environment and one participant did not remember.

Participants in this stage also positively assessed the comic book. The S-CVI of the third stage was 0.987 and the I-CVI were greater than 0.8, ending the semantic validation process with just one round. Chart 2 details the I-CVI values and the suggestions for each item of the instrument.

Regarding the adjustments of the comic book, following the suggestion of the participants of the semantic validation, there was unanimity in the agreement among them in the domains of "Objectives", "Language" and "Design", with no reservations arising.

In the "Organization" domain, one of them understood the item "The material has adequate size" as partially adequate. This was rejected, as there was no presentation of justification for improvement, therefore, it was maintained in the initial size.

Moreover, all justifications presented by respondents in this domain were related to the cover of the comic book. Thus, a participant was asked to change the layout in which the title is presented in the item "the cover is attractive", as well as to increase the font size of the title and subtitle by two other participants in the item "The size of the title and content in the topics is adequate".

Regarding the elements on the cover, it was requested by six participants to add more flames and other elements that refer to the burns and to the story, in order to transmit to the reader the content to be addressed, distributed in the following items: "The cover includes the material information" and "There is consistency between the information on the cover, presentation, summary and content". All suggestions were changed in accordance with the suggestions as shown in Figure 3, in which version 1 corresponds to the cover that was presented to the participants and version 2 to the cover of the comic after the reformulation.

In turn, in the "Motivation" domain, one participant concluded the item "The comic book arouses interest and curiosity" as partially adequate, justifying that people who do not like to read would not enjoy the material. Thus, there was no change in the material as it is an unmodifiable point, but it encourages the conversion of the comic book to other graphic formats.

Items	Adequate(n[*])	Partially Adequate (n)	Inadequate (n)	I-CVI[†]
Objectives				
The comic book helps the population to understand about prevention and first aid for burns.	30	0	0	1
It is able to promote reflection on the necessary care about prevention and first aid for burns	30	0	0	1
Organization				
The cover is attractive.	29	1	0	0.96
The cover includes the material information.	25	3	2	0.83
The size of the title and the content in the topics is adequate.	28	2	0	0.93
Themes portray important key aspects.	30	0	0	1
There is consistency between the information on the cover, presentation, summary and content.	29	1	0	0.96
The paper of the printed material is adequate.	30	0	0	1
The number of pages is adequate.	30	0	0	1
The material has adequate size.	29	1	0	0.96
Language				
The text is in adequate style.	30	0	0	1
The text is vivid and interesting.	30	0	0	1
Vocabulary is accessible with simple and common words.	30	0	0	1
All the important concepts are addressed clearly and objectively.	30	0	0	1
There is an association between the theme of each session and the corresponding text.	30	0	0	1
The text presents interaction with guidance between professional and target audience.	30	0	0	1

Chart 2 – Assessment of the comic book by the semantic validation participants, according to I-CVI, according to the data collection instrument. Londrina, Paraná, Brazil, 2021

Items	Adequate(n*)	Partially Adequate (n)	Inadequate (n)	I-CVI[†]
The text is written in a way that the target audience is the center of attention, that is, the patient is most important.	30	0	0	1
Design				
The visual composition is attractive.	30	0	0	1
Pages or sessions are organized.	30	0	0	1
The number of figures is sufficient.	30	0	0	1
Figures are presented in adequate size.	30	0	0	1
The figures are simple, adequate, and easy to understand.	30	0	0	1
The figures are self-explanatory.	30	0	0	1
The figures are familiar to readers.	30	0	0	1
Figures are integrated into the text (well located).	30	0	0	1
The comic book is adequate for their age, gender, and culture.	30	0	0	1
Motivation				
The comic presents a logical sequence on care for prevention and first aid for burns.	30	0	0	1
The comic book arouses interest and curiosity.	29	1	0	0.96
The comic book promotes change in behavior and attitude.	30	0	0	1
The comic book content maintains reading dynamics.	30	0	0	1
The comic book content motivates reading until the end.	30	0	0	1
The use of the comic book becomes relevant.	30	0	0	1

Chart 2 – Cont.
Source: Research data.
*: number of participants; †: Content Validity Index per item

Figure 3 – Comic book cover before and after reformulation. Londrina, Paraná, Brazil, 2021
Source: Research data.

■ DISCUSSION

The first stage of the research consisted of the development of a comic book that contemplates, among other aspects, prevention strategies and first aid for burns. The approach of this content for adults was relevant, as it makes the guidance practical, bringing evidence-based health education closer to the general population, ensuring health promotion andknowledge translation about burns.

The use of comics to promote health education is internationally encouraged[19–20] due to the reader's approach to the content, making they recognize in the characters and connect with the transmitted information, often without noticing the educational nature of the material.

This issue was evidenced in a research that applied comics to explain complex clinical concepts during a medical internship, and approximately 80% of the participants obtained an understanding of the information and 74% indicated that they would certainly review the material in comic book format, but would not do with traditional materials[20].

Thus, when developing an educational material, special attention should be paid to adapting scientific language to lay and popular terms. This aspect should be considered at each stage of validation of an educational material, since, to occur properly one must seek to understand the cultural, demographic and social aspects experienced by the target population[21].

It should be noticed that comics are tools in which communication with the reader does not happen only through the text, but also through the illustrations and idiomatic expressions used in each comic (balloon format, characters' expression, scenario, font used, others)[19]. Therefore, the greater the connection between the text and the figurative aspects, the more representative the message becomes for the reader[19].

In view of this, the characters must have memorable names and demonstrate attitudes, behaviors and fears similar to the reality of the reader regarding the theme studied, generating identity between them and making the reader part of the narrative[19]. However, in themes that can cause negative meanings, such as estrangement or anguish, undefined characters can be used, that is, that despite being close to the human being do not have characteristics that determine them, it is possible to base knowledge, in this case

about burns, without causing astonishment or discomfort in readers[19].

In addition to what was previously discussed, during the second stage the experts suggested increasing interactive activity at the end of the narrative for fixation of the reader's knowledge. Making use of playful strategies such as hobbies (word searches, crossword puzzles, labyrinths and others) consolidates the exposed content in a pleasant way and stimulates the search for the knowledge provided[22].

It is noticed that, on a daily basis, these activities are used in children during the literacy period, to develop logical reasoning and problem-solving skills, however, these strategies can also be applied to adults and are being increasingly used within work processes, as effective means of enhancing learning and fixing content during training[23].

Experts also suggested adding an index to the pages so that readers could seek specific guidance on a burn etiology in daily life. However, since the purpose of a comic book is to provide information through the plot, the reader needs to go through all the moments of the story to understand the transmitted content and the complementarity of the guidance[21]. Materials that have means of quick consultation, by specific content, are manuals, guides and consensus.

In this sense, it is worth appreciating the evidence of the memorization potential that comics demonstrated, in a study that compared the learning level of a traditional text material and a comic book in more than 90 adult participants. The results showed that the memorization of content in the group that received the comic book reached the maximum percentage studied, while in the other, the levels were regular[24].

The experts' suggestion to expand the content in the comic book to provide the reader with a detail of the transmitted information was pointed out by the participants of a research[20], regarding the lack of depth in the content addressed. However, the comic books are materials that, despite being limited by objectivity, have an informative character and aim to convey the guidance in the clearest and most succinct way possible, as long as, in this way, the reader can understand and replicate the information and, also, to feel instigated to seek more about what was exposed in other means[20,24].

So, to supply this observation, a blog was linked to the comic book as a tool for expanding the content. The blog consists of a virtual environment that includes publications with texts and interactive media resources. With technological advances and the demand for content available online, blogs have been used to promote the teaching-learning process in an attractive way, both for lay people and health professionals[24].

In the third stage, even with unanimity of agreement among the participants in three of the five domains, there was evidence of conceptions that were fully approved by the experts and not by the target audience. The semantic assessment is essential for the validation of an educational technology, since, through this, it is possible to glimpse the action of technology in the daily life of the target audience and identify strengths and weaknesses of the various elements[11,13].

The suggestions of this stage were related to the cover of the comic book, which is among the most important components of a comic book due to its potential to attract or not the reader[20–21]. Thus, it was completely reformulated during the semantic validation, making it more eye-catching and consistent with what was addressed in the narrative.

In short, one of the participants raised the limitations that the comic book presents, as it is a textual material, it does not cover all populations, whether due to deprivation due to illiteracy, visual impairments, or lack of familiarity with reading. These can be solved by reformulating the narrative exposed in the comic book to other dynamic audiovisual media, such as short films, audiobooks and writing in braille, leaving these possibilities as suggestions for other studies.

Moreover, the content validation process of an educational material requires the inclusion of experts from different regions of a country or macro-region to guarantee the functionality of the text, keeping the content and language suitable to the different sociocultural spheres[12,19]. From this perspective, carrying out semantic validation should also follow this principle, since this stage involves the target audience in the construction of a material and strengthens the relationship between the population and the research product, making the material more accessible and encouraging public-material interaction[20].

This study brings advances in the framework of possibilities of health education and knowledge translation about burns. It provides a financially viable didactic material, based on scientific evidence, with relevant age group range in its use and with easy physical and virtual dissemination. Even so, there is a need for studies that assess the applicability and semantic validity of the comic book for prevention and first aid for burns in other realities and cultures, as this was limited to the southern region of Brazil.

■ CONCLUSION

The present study showed satisfactory levels of agreement during Content and Semantic Validation, determining the validity of the comic book developed. Thus, the comic book consists of a simple and accessible resource to transmit burn prevention and first aid guidance for adults.

■ REFERENCES

1. Cavalcante IS, Lopes MS, Mendes JPS, Techi LC, Lima DA, Oliveira JEN, et al. Care and management of burned patients: integrative review. Res Soc Dev. 2021;10(7):e0210716308. doi: https://doi.org/10.33448/rsd-v10i7.16308

2. Padua GAC, Nascimento JM, Quadrado ALD, Perrone RP, Silva Junior SC. Epidemiology of burn cases hospitalized at the Plastic Surgery and Burns Service of Santa Casa de Misericórdia de Santos, Brazil. Rev Bras Cir Plást. 2017;32(4):550-5. doi: http://www.doi.org/10.5935/2177-1235.2017RBCP0089

3. Chin TL, Carrougher GJ, Amtmann D, McMullen K, Herndon DN, Holavanahalli R, et al. Trends 10 years after burn injury: a burn model system national database study. Burns. 2018;44(8):1882-6. doi: http://www.doi.org/10.1016/j.burns.2018.09.033

4. SIHSUS – Sistema de Informações Hospitalares do SUS [Internet]. Brasília: Ministério da Saúde. 2020. [cited 2021 Oct 04]. Available from: https://datasus.saude.gov.br/acesso-a-informacao/morbidade-hospitalar-do-sus-sih-sus/

5. Barreto ACO, Rebouças CBA, Aguiar MIF, Barbosa RB, Rocha SR, Cordeiro LM, et al. Perception of the Primary Care multiprofessional team on health education. Rev Bras Enferm. 2019;72(Suppl 1):266-73. doi: https://doi.org/10.1590/0034-7167-2017-0702

6. Silva JMA, Batista BD, Carmo AP, Gadelha MMT, Andrade ME, Fernandes MC. Dificuldades experienciadas pelos agentes comunitários de saúde na realização da educação em saúde. Enferm Foco. 2019;10(3):82-7. doi: https://doi.org/10.21675/2357-707X.2019.v10.n3.1818

7. Xun H, Mafla LM, Cox CA, Cooney C, Duraes E, Javia V, et al. 87 identification of critical burn knowledge gaps within the USA population: a survey and education on burn prevention and preparedness. J Burn Care Res. 2021;42(Supplement 1):S60-S61. doi: https://doi.org/10.1093/jbcr/irab032.091

8. Brito MJM, Caram CS, Moreira DA, Rezende LC, Cardoso CML, et al. Comic book technique as a methodological resource applied in nursing. Rev Baiana Enferm. 2020;33:e29895. doi: https://doi.org/10.18471/rbe.v33.29895

9. Trindade RFC, Nery LMR, Silva RRSM, Almeida TG, Vasconcelos EL. Tecnologia educacional em formato de histórias em quadrinhos. Res Soc Dev. 2022;11(6);e0611626923. doi: http://doi.org/10.33448/rsd-v11i6.26923

10. Ashwal G, Thomas A. Are comic books appropriate health education formats to offer adult patients? AMA J Ethics. 2018;20(1):134-40. doi: http://doi.org/10.1001/journalofethics.2018.20.2.ecas1-1802

11. Polit DF, Beck CT. Fundamentos de pesquisa em enfermagem: avaliação de evidências para a prática da enfermagem. 9. ed. Porto Alegre: Artmed; 2019.

12. Boissel JP. Planning of clinical trials. J Intern Med. 2004;255(4):427-38. doi: https://doi.org/10.1111/j.1365-2796.2004.01311.x

13. Bandura A, Azzi RG, Polydoro S. Teoria Social Cognitiva: conceitos básicos. Porto Alegre: Artmed, 2008.

14. Alexandre NMC, Coluci MZO. Validade de conteúdo nos processos de construção e adaptação de instrumentos de medidas. Ciênc Saúde Colet. 2011;16(7):3061-8. doi: https://doi.org/10.1590/S1413-81232011000800006

15. Leite SS, Áfio ACE, Carvalho LV, Silva JM, Almeida PC, Pagliuca LMF. Construction and validation of an Educational Content Validation Instrument in Health. Rev Bras Enferm. 2018;71(Suppl 4):1635-41. doi: https://doi.org/10.1590/0034-7167-2017-0648

16. Montiel JM, Cecato JF, Bartholomeu D, Martinelli JE. Testes do desenho do relógio e de fluência verbal: contribuição diagnóstica para o Alzheimer. Psicol Teor Prát. 2014[cited 2022 Sep 24];16(1):169-80. Available from: http://pepsic.bvsalud.org/pdf/ptp/v16n1/14.pdf

17. Ximenes MAM, Fontenele NAO, Bastos IB, Macêdo TS, Galindo Neto NM, Caetano JA, et al. Construction and validation of educational booklet content for fall prevention in hospitals. Acta Paul Enferm. 2019;32(4):433-41. doi: https://doi.org/10.1590/1982-0194201900059

18. Ministério da Saúde (BR). Secretaria-Executiva do Conselho Nacional de Saúde. Comissão Nacional de Ética em Pesquisa. Ofício Circular nº 2, de 24 de fevereiro de 2021. Orientações para procedimentos em pesquisas com qualquer etapa em ambiente virtual. Brasília. 2021 [cited 24 Apr 2021]. Available from: http://conselho.saude.gov.br/images/Oficio_Circular_2_24fev2021.pdf

19. Golding S, Verrier D. Teaching people to read comics: the impact of a visual literacy intervention on comprehension of educational comics. J Grap Novels Comics. 2020;12(4):924-36. doi: https://doi.org/10.1080/21504857.2020.1786419

20. Joshi A, Hillwig-Garcia J, Joshi M, Lehman E, Khan A, Llorente A, et al. Comics as an educational tool on a clinical clerkship. Acad Psychiatry. 2019;43(3):290-3. doi: https://doi.org/10.1007/s40596-018-1016-1

21. Liniasari AAAM, Yudiana K, Dibia IK. Comic-based learning media with the topic of natural resources. Int J Elem Educ. 2021;5(1):80-8. doi: https://doi.org/10.23887/ijee.v5i1.34327

22. Santos ABI, Azevedo BV, Francisco LAC, Costa CA. Revista passatempo como instrumento educativo frente aos crimes ambientais. Braz J Develop. 2020;6(11):89675-81. doi: https://doi.org/10.34117/bjdv6n11-399

23. Coelho AC, Lucas DMS, Nunes GK, Neves MP, Silva LA, Tonini T, et al. Criação de personagens lúdicos para capacitação em serviço da equipe de Enfermagem sobre anticoagulantes orais. Res Soc Dev. 2021;10(3):e27110313250. doi: https://doi.org/10.33448/rsd-v10i3.13250

24. Aleixo PA, Sumner K. Memory for biopsychology material presented in comic book format. J Grap Novels Comics. 2017;8(1):79-88. doi: https://doi.org/10.1080/21504857.2016.1219957

25. Manian FA, Hsu F. Writing to learn on the wards: scholarly blog posts by medical students and housestaff at a teaching hospital. Med Educ Online. 2019;24(1):1565044. doi: https://doi.org/10.1080/10872981.2018.1565044

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The authors declare that there is no conflict of interest.

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