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Development and validation of a video on first aid for choking incidents in the school environment

Elaboração e validação de vídeo sobre primeiros socorros em situação de engasgo no ambiente escolar

Elaboración y validación de vídeo sobre primeros auxilios en caso de atragantamiento en el ámbito escolar

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ABSTRACT

Objective: To develop and validate an educational video on first aid for choking incidents in children in the school environment.

Method: Methodological study, conducted between 2021 and 2022, in six stages: search for themes through interviews with 13 teachers and staff members who work in early childhood education in Niterói; theoretical study; development of the video; validation with 17 expert judges; video adaptation and validation with 17 teachers and staff. The interviews were analyzed using the Iramuteq software and the validation through the concordance index, with a desirable value of 70%.

Results: The animated video, lasting 4 minutes and 10 seconds, addressed the identification and management of the child experiencing choking and was validated with a concordance index of 97% among the judges and 96% with target audience.

Conclusion: The video is a validated technology that can be used to develop educational practices with professionals in the school environment.

Descriptors: Child health. Educational technology. Health education. Instructional film and video. First aid. Pediatric nursing.

RESUMO

Objetivo: Elaborar e validar um vídeo educativo sobre primeiros socorros à criança em situação de engasgo no ambiente escolar.

Método: Estudo metodológico, realizado de 2021 a 2022, em seis etapas: busca de temas por meio de entrevistas com 13 professores e funcionários que atuam na educação infantil, em Niterói; estudo teórico; elaboração do vídeo; validação com 17 juízes especialistas; adequação do vídeo e validação com 17 professores e funcionários. As entrevistas foram analisadas com auxílio do software Iramuteq e a validação por meio do índice de concordância, valor desejável 70%.

Resultados: O vídeo animado, com duração de 4 minutos e 10 segundos, abordou a identificação e manejo da criança em situação de engasgo e foi validado com índice de concordância de 97% entre os juízes e 99% com público-alvo.

Conclusão: O vídeo elaborado é uma tecnologia validada que pode ser utilizada para desenvolver práticas educativas junto aos profissionais no ambiente escolar.

Descritores: Saúde da criança. Tecnologia educacional. Educação em saúde. Filme e vídeo educativo. Primeiros socorros. Enfermagem pediátrica.

RESUMEN

Objetivo: Desarrollar y validar un video educativo sobre primeros auxilios para niños en situaciones de atragantamiento en el ámbito escolar.

Método: Estudio metodológico, realizado entre 2021 y 2022, en 6 etapas: búsqueda de temas en entrevistas con 13 profesores y empleados que trabajan en la educación infantil en Niterói; estudio teórico; desarrollo del vídeo; validación con 17 jueces expertos; adaptación y validación del vídeo con 17 profesores y empleados. Las entrevistas se analizaron con ayuda del programa informático Iramuteq y la validación mediante el índice de concordancia, valor deseable 70%.

Resultados: El vídeo animado, de 4 minutos y 10 segundos de duración, abordaba la identificación y el manejo del niño en situación de atragantamiento y fue validado con índice de concordancia del 97% entre los jueces y del 96% con público objetivo.

Conclusión: El vídeo es una tecnología validada que puede utilizarse para desarrollar prácticas educativas con profesionales en el ámbito escolar.

Descriptores: Salud infantil. Tecnología educacional. Educación en salud. Película y video educativos. Primeros auxilios. Enfermería pediátrica.

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INTRODUCTION

Unintentional injuries, also known as accidents, cause social, physical, and psychological impacts on a child's life. Such situation has repercussions on the public health of the country, as there is an estimate of at least 24 hours of hospitalization due to these causes[1]. Among the accidents with the highest incidence, it is observed that upper airway obstruction, popularly known as choking, has a worldwide impact and accounts for 53% of child deaths[2]. In Brazil in 2019, 176 children under five years old died from this cause; however, with proper assistance, these deaths could have been avoided, since it is necessary to carry out coordinated actions to save and preserve the child's life[3].

The contexts in which accidents occur are different, with a predominance in the home and social space, such as parks and schools[4]. The child spends most of their day at school, on average eight hours a day, which is where he/she begins his/her period of socialization and construction as a human being[5]. According to the Law of Guidelines and Bases for National Education (*Lei de Diretrizes e Bases para a Educação Nacional* – LDB) updated in 2019, in its Art. 21 and 22, Basic Education in Brazil comprises early childhood education, primary education and secondary education. Early childhood education is the first stage of basic education and aims at the integral development of children up to the age of five, in their physical, psychological, intellectual and social aspects, combined with actions taken by the family and community[6].

The singularities that make up each phase of child development include aspects that analyze the body structure, as well as the cognitive aspects. Interest in exploring and knowing spaces is seen as a characteristic of childhood, as this is one of the ways children develop[7], however, this also makes them vulnerable to accidents. Therefore, when there is an accident incident at school, teachers and staff are the ones who experience and are responsible for the child in this circumstance, having to provide the first aid and, when necessary, refer them to health care. This experience can be frustrating for them when they do not have basic knowledge of first aid, which can cause significant complications for the child(8).

Some studies found that the team of teachers and staff members does not have the necessary knowledge to provide first aid to children in the school environment, and this knowledge is substantial in order to maintain vital functions and prevent injuries[8,9]. Therefore, health education is presented as an effective strategy for coping with the lack of knowledge about first aid actions for children under emergencies[8]. It is understood that the effectiveness of educational interventions in health implies the availability of materials to be used as teaching resources. Therefore, educational technologies have contributed to improvements in knowledge acquisition, leading to advancements in health prevention and promotion[10].

Among the possibilities of technology, this study addressed the educational video, because an integrative review[11] that surveyed educational technologies in health about choking incidents shows, among the gaps, the lack of materials that specifically address this theme, as the technologies found were associated with other themes. Furthermore, the only 3D animation material found was designed for healthcare students in the United States. Therefore, in addition to addressing the lack of validated technologies on choking incidents, the educational video can contribute to improving the knowledge of teachers and staff about an accident that has a high rate in children, so that when they witness this occurrence, they can offer the necessary care and avoid complications. Thus, the objective of this study was to develop and validate an educational video on first aid for choking incidents in children in the school environment.

METHOD

Methodological research, conducted between August 2021 and June 2022. It was developed in six consecutive stages: 1st search for themes, 2nd theoretical study, 3rd development of the video, 4th validation by expert judges, 5th adequacy of the video and 6th validation with the target audience[12].

Stage 1 – **Search for themes**: this stage was carried out through a semi-structured interview by the first author of the study, with teachers and staff members of the educational segment of early childhood education, in a public school in the city of Niterói, in the state of Rio de Janeiro. The school serves 57 children aged between two and five years 11 months and 29 days. The professional staff consists of a pedagogue, student mediator, capoeira teacher, arts and music teacher, administrative assistant, nurse, doorman, janitor, nutritionist, librarian, educational agent, social worker, and psychologist. At the beginning of the research, the school had a total of 33 professionals; there was a decrease in this staff due to the COVID-19 pandemic, in which some workers such as cooks, maids and general service assistants were removed from the unit's professional staff.

Inclusion criteria were permanent and hired teachers and employees who worked in Early Childhood Education at that institution. Those who were on leave or vacation, and interns and researchers, were excluded because they carried out specific actions at the institution and were not

always involved in daily activities. The invitation was sent individually by email to the 16 potential participants, in which the research objective was elucidated, the way in which participation would occur, and the Informed Consent Form (ICF). For those who agreed to participate and thus responded to the email within a 15-day period, an interview was scheduled on the day and time of their choice.

The decision to conduct the research with 16 participants was made because this number represents 50% of the research universe, which would not make data analysis impossible using the Iramuteq software (*Interface de R pour Analyses Multidimensionnelles de Texte set de Questionneires*) [13]. In addition, other professionals who did not participate in this stage were invited to participate in the validation of the video, which is the sixth stage of the research.

At this stage, 13 participants agreed to participate in the interview, which was made through the Google Meet online platform due to the COVID 19 pandemic, with an average duration of 42 minutes and which, with their previous authorization, was recorded, which allowed the transcription for the material analysis. Each participant was identified by the name of Brazilian writers, such as Cecília Meirelles, Monteiro Lobato, among others, to preserve their identity.

The interview script consisted of two parts, the first had questions that allowed to characterize the participants and the second items concerning the research, namely: Talk about your knowledge in first aid for childcare; Talk about how you acted when you witnessed an accident or incident that required first aid at school. What are the themes that you believe that should be in a video about first aid care?

The texts produced were prepared for analysis using the Iramuteq software. Among the analyzes provided by the software, the Descending Hierarchical Classification (DHC) was chosen, which classifies the text segments according to their respective vocabularies and the set of them is distributed based on the frequency of the reduced forms[13]. Therefore, those with similar characteristics are grouped into their respective classes and categories, which in this case, reached a rate of 87.6%. From the participants' responses, themes related to different situations emerged, such as falls, seizures, dental trauma, choking and injuries. This article addressed the video developed for the choking incident, as it was the most frequent problem in the participants' statements.

Stage 2 – **Theoretical study**: this stage aimed to explore the existing literature, for the scientific ground of the video, in manuals, national and international guidelines and expert guidance on first aid care for children who are choking, with the aim of providing scientific basis for the themes that were listed by the participants for the development of the educational video on first aid.

The search was conducted in the Capes Journals Portal (*Portal de Periódicos Capes*), through access to the Federated Academic Community (*Comunidade Acadêmica Federada* – CAFe), in the Virtual Health Library (VHL) and the descriptors used were: "choking", "child", "first aid", "educational technology", "health education" and "accident prevention". Original articles were selected from 2018 to 2022, which were related to the theme and those that did not have, as participants, professionals who worked in the school setting. Therefore, four studies were selected [14–17] and the São Paulo Mobile Service Manual (*Serviço de Atendimento Móvel* – SAMU) was also included, which portrays the role of lay people in first aid[18].

Stage 3 – Development of the video: the information obtained in the interviews and the literature contributed to support the content of the educational video on choking incident. Thus, a script was initially prepared by the members of the research team to guide the production of the educational technology. This written script, complete, simple and efficient, followed the five-column model that is composed of scene, text, speech indication, lettering (text for insertion in the video) and scene description[19]. Thus, it was possible, based on the organization of information, to describe in detail each scene with the lines of each character and the texts to be displayed.

After finalizing the script, after revision by the authors, a videomaker was hired to create and animate the video based on the defined script. This professional developed a storyboard that is a sequence of the main scenes of a video as if it were a comic book, drawn frame by frame, showing the elements of the scene and the framing through small illustrations, which allowed a preview of the video for approval by the authors. Thus, after requesting adjustments, the storyboard was approved and the videomaker completed the first version of the video with animated scenes and their proper narration.

Stage 4 – Validation with expert judges: in this stage it was necessary to search for expert judges, which took place through the Lattes Platform of the National Council for Scientific and Technological Development (*Conselho Nacional de Desenvolvimento Científico e Tecnológico* – CNPq), using keywords that allowed to identify the professionals who work in the area of interest of the study. The snowball technique was also used, through which the judges indicated or referred other participants to collaborate in the study. However, all participants needed to reach the minimum of five points established in the classification of Fehring's criteria adapted to the expertise in the studied area[12].

The invitation was sent by email, individually, explaining the research along with the ICF. For invitees who showed interest and thus responded to the email within a 15-day

period, the video and the validation instrument used in other research, adapted to the study theme, were sent in Google Forms format. Thus, 17 judges participated in this stage. This number is considered adequate for the validation of technologies in which the estimate is a sample of six to 20 judges[20].

The validation instrument[21] was compiled in Google Forms and it was already used in another study of educational video validation[22]. Its composition has fields that allow to characterize the participant and the evaluation blocks regarding the objective, structure and presentation and relevance of the video, which results in 21 evaluated items. The objective block is evaluated by topics on the information and/or content of the video; as for structure and presentation, among the aspects evaluated are whether the video is appropriate for teachers and staff working in the school environment. As for relevance, questions related to the theme are evaluated.

Each item is evaluated by a scale called Likert, which is a scoring system from 1 to 4 to measure and value the opinion on the theme, being (1) totally adequate, (2) adequate, (3) partially adequate and (4) inadequate. To calculate the concordance index (CI), add the options marked by 1 and 2 and the result of this sum is divided by the total number of possible responses and multiplied by 100. The content is considered valid when the CI reaches values greater than or equal to 70%[21]. Regarding the items marked as (3) partially adequate and (4) inadequate, it will be essential to justify these answers and the modifications.

The inclusion criteria for selecting experts were as follows: nurses who worked in child health care with expertise in school health or pediatric urgency and emergency; pediatricians who worked in child health care with expertise in first aid and/or those who researched and published on the theme, in addition to professionals in the field of social communication. Those who did not return the material sent for validation within a 15-day period were excluded. To preserve the judges' identities, the acronym EJ (expert judge) was used, followed by a number, according to the order of the interviews.

Stage 5 – Adequacy of the educational video: stage in which the items suggested by the judges were evaluated and, as far as possible, adjustments were made.

Stage 6 – Validation with the target audience: in this stage, the inclusion criteria were as follows teachers and staff members, effective and hired who worked in Early Childhood Education. Those who were on leave and vacation, scholarship holders and researchers, as well as those who participated in the first stage of the study (interview) and those who did not return the material within a 15-day period were excluded. To preserve the identity of the participants, the acronym TA (target audience) was used, followed by a number in order of participation.

The invitation was sent to the target audience by email, individually, with an invitation letter as attachment with a detailed explanation of the research, accompanied by the ICF. For invitees who showed interest in participating and responded to the email within a 15-day period, received the video and the validation instrument. The sample had 15 professionals, considered satisfactory for the validation process of educational technology, which requires six to 20 participants[20].

The instrument was compiled in Google Forms, consisting of fields that allowed characterizing the participant and understanding their interpretation, divided into five blocks: objectives; organization; writing style; appearance and motivation. In its entirety, it comprises the evaluation of 26 items per participant, covering aspects ranging from linguistic and understanding of images, among others[21].

The CI calculation was performed in the same way as for the expert judges; the items marked 1 and 2 are added, divided by the total number of responses and multiplied by 100. For the technology to be considered valid, it needs to reach a CI greater than or equal to 70%[21]. Items marked 3 and 4 need to be justified and modified.

The study was submitted for review to the Research Ethics Committee of the *Universidade Federal Fluminense*, under opinion number 4,856,704, CAAE 47530021,7,0000,5243. Therefore, the guidelines established in Resolution No. 466 of December 12, 2012, were followed. Participant data was collected and stored on an external hard disk (HD), and after 5 years, it will be deleted.

RESULTS

The results that comprise each stage of the research that culminated in the development and validation of the educational video entitled "First aid for the choking child" are described below.

Stage 1 – Thirteen professionals participated in the first stage of the study, 11 women and 2 men, seven teachers, four student mediators, one librarian, and one nutritionist, with an average age of 33 years old (Min = 24 years; Maximum = 58 years) and average time working at the school of four years (Min = 5 months; Max = 7 years). As for taking a first aid course, five stated having done so, but three of them explained that the course was held in a driving school, described as superficial, punctuating only some themes related

to trauma, a characteristic identified in traffic accidents, besides the lack of the practical component, essential for a better understanding of this process. It should also be added that this course promoted at the driving school focused on the adult population, which justifies the absence of aspects for the child population.

Data processing in the software took 1 minute and 19 seconds; thus, the DHC originated four classes. In this study, the results of class 4 will be portrayed, which has the most recurrent words: care, maneuver, knowledge, choking, adult, care, bring, choke, feel, coast, find, trust and look. Thus, the analysis conducted by the first author, who exhaustively read the text segments, allowed to identify that the themes that had the most rise in the analysis resulted in: choking; general care in different age groups; welcoming, listening and educating the child who lives in this situation.

Stage 2 – The selected articles greatly contributed to the foundation of the educational video. A research[14] aimed to evaluate the effect of an educational workshop on the prevention and care of choking in children, focusing on the knowledge of healthcare and early childhood education professionals. This was a quasi-experimental study with pre-test and post-test, conducted in São Paulo, at a philanthropic care center and a kindergarten. The proposed and effective intervention was a theoretical-practical educational workshop on prevention and care of choking in children; one questionnaire was directed to the participants, on the theme, before and after this intervention and their knowledge was evaluated in these two stages. The authors concluded that there was an increase of knowledge, both of healthcare professionals and of early childhood education professionals, in the prevention and care of choking in children, highlighting child health care, through intersectoral actions. In another study[15], conducted in Mato Grosso do Sul, the authors aimed to analyze the skill, knowledge and attitude of early childhood education professionals who participated or not in a training course in first aid. They conducted a cross-sectional study with 132 workers, through Google Forms. From these, 67 reported not having previously participated in training on first aid; however, most felt able to provide care in situations of fever, injuries and bleeding. Those who participated in the training provided more correct answers regarding the concepts of fever, convulsions, fainting, trauma, cardiorespiratory arrest, and accidents involving venomous animals and the attitudes they should have in the face of seizures, fainting, choking, falls, traumas and cardiopulmonary arrest. It was concluded that having participated in training provided professionals with greater knowledge and assertiveness regarding the attitudes to be adopted in emergency situations, that is, there was a positive contribution to the knowledge and attitude of these professionals in most of first aid topics. It was found, then, that theoretical knowledge sometimes does not correspond to practical skill and, thus, the practical aspect provided by training was relevant in knowledge acquisition. In Sergipe, an investigation[16] aimed to identify changes in the knowledge of day care center workers after an active educational intervention in first aid to children, in the school environment. A quasi-experimental study, before-and-after, with single-group comparison was performed with 134 employees of six day care centers. The training lasted 16 hours/class, was made by nursing students trained in first aid, through thematic workshops, using active learning methods and a closed questionnaire with simulated situations to assess knowledge before/after. A significant increase in correct answers was observed after cardiorespiratory arrest training; seizure; choke; electric shock; trauma, fall; hemorrhage and intoxication, showing an expansion of knowledge in practically all themes, except for burns; it was also found that nurses may be the most qualified to teach such courses. In Rio de Janeiro[17], the knowledge of early childhood education professionals about airway obstruction by a foreign body in children within the school environment was evaluated. The authors conducted a descriptive, qualitative research in a philanthropic institution, applying questionnaires to daycare and preschool professionals, and the textual corpus was submitted to thematic-categorical analysis. The participants were 64 professionals from early childhood education, who pointed out food and small objects as the main causes of choking incidents. The knowledge of injury prevention was consolidated by the practice of constant vigilance by professionals in activities involving food and games. However, regarding first aid, they showed insecurity and lack of knowledge, which showed the need for training actions. Actions of offering liquids and trying to remove objects were identified, as happened in a research conducted in Sergipe[16]. However, the professionals were knowledgeable about the preventive aspects[17]. As previously explained, the SAMU Manual for first aid provided by lay people was also used at this stage, consisting of official guidelines for those who are not healthcare professionals. Thus, a survey was conducted to identify the key aspects to be addressed in the video, namely: the moment when this accident can happen in the school setting, the confident posture of the teacher during assistance, the attitudes that should be avoided, the presentation of the theoretical and practical content detailing anatomical aspects, assistance at different ages and aspects of health education, of a preventive nature focused for children.

Stage 3 – For the development of the animated video, a script was created containing the description of the scenes, the lines of the characters based on the consulted literature and a written text to be displayed in the video to guide the videomaker. Still in this phase, based on the script, the storyboard was produced, thus allowing a preview of the characters and the sequence of the scenes for the authors' analysis and their approval.

The video scenes show the daily life experienced by the children and the team in a school setting, from the welcome at the entrance to the school until the moment they have a meal, when a child chokes and the teacher performs the Heimlich maneuver. Then, first aid is described for children younger than one year and older than one year. The animated video had three versions, two with the authors' analysis and one after the expert judges' analysis.

Among the improvements made to the video are aspects regarding language, by bringing to the video the formal and informal language of anatomical aspects, the graphic representation of the hands positioning in detail, as to where the xiphoid appendix is highlighted, to the arrows that indicate the direction of the compressions and the representation of the intermammillary space. The final length of the video was 4 minutes and 7 seconds.

Stage 4 – It was observed that, among the 17 judges, 13 are nurses, two are pediatricians and two are social communicators. From these 14 women and three men, the mean age was 36.9 years (Min = 28 years; Max = 60 years). Regarding the time of professional practice, the average was 14 years (Min = 6 years; Max = 30 years); 12 were from the state of Rio de Janeiro and 5 from the other capitals of the country (São Paulo, Bahia, Recife, and Minas Gerais). As for the judges' academic degree, six had a doctorate, nine had a master's degree and two had specialization in the areas of interest to the study. The data collection period was in May 2022 and took 25 days to complete.

The judges' evaluation instrument consisted of 21 evaluative items, so the maximum score attainable in the study would be 357 points (21 items x 17 judges), which would result in a concordance index of 100% if items 1 and 2 were flagged by everyone. In the analyzed video, the concordance index between the judges was 97% (347 points), reaching a value greater than 70%, a cutoff necessary to be considered valid.

Many wove positive aspects to the video in terms of playfulness, the clarity of the aspects presented and the composition of essential information for childcare. However, a judge pointed out that the item in the relevance block that "evaluated whether the video allowed the transfer and generalization of learning to different contexts of education and health promotion" could not be evaluated in this type of study, signaling this item as (3) partially inadequate. Thus, the judge considered that to evaluate this item, a further study would be necessary to verify the applicability of the video in this context.

Chart 1 describes the quantitative analysis performed by the judges in each evaluation block and the overall evaluation of the video.

Stage 5 – In this stage, adjustments were made to the video based on a thorough analysis of contributions from expert judges, who made several suggestions for improvements, mainly about language and the graphical representation of anatomical aspects. The authors evaluated each suggestion and aimed to address those that did not change the theme and were feasible for this educational technology. Therefore, in Chart 2, the qualitative analysis performed by the judges is detailed and the aspects that were addressed, as well as those that were not along with the corresponding justifications.

Stage 6 – After adjusting the video to the requests made by the expert judges, the video was submitted for analysis by the target audience. In the meantime, the collection was conducted in June, in the year 2022, and was completed within approximately 30 days.

The sample of this target audience is mostly composed of 12 women and three men. Regarding age, the average is 33.5 years (Min = 22 years; Max = 58 years), regarding professional activity, two are librarians, 2 student mediators, 2 teachers, 1 janitor, 1 educational agent, 1 cook, 1 doorman, 1 general services assistant, 1 psychologist, 1 social worker, 1 administrative assistant. Regarding the time they work at the school, the average was 5 years (Min: 4 months; Max: 23 years), which represents a team with few years of work at the institution.

Each participant analyzed 26 items for each video, totaling 390 responses (15 participants x 26 items). The result obtained in this evaluation was 386 for the items totally adequate and adequate, so the CI was 99%, which is why it was considered valid for the target audience. In Chart 3 there are data from the evaluation performed by the target audience on each item of the evaluation block included in the instrument.

Chart 1 – Summary of quantitative analysis performed by the expert judges regarding the video on choking. Niterói, Rio de Janeiro, Brazil, 2022

Evaluation of Educational Video on Choking		
Evaluation Block	**Analysis of Judges' Responses**	**Concordance Index**
Objectives	Maximum score: **85** points (5 items X 17 judges) Responses:**73** TA,**12** A,**0** PA,**0** I.	100%
Structure and Presentation	Maximum score: **187** points (11 items x 17 judges) Responses:**146** TA,**34** A,**7** PA e **0** I	96%
Relevance	Maximum score: **85** points (5 items x 17 judges) Responses:**75** TA,**09** A,**1** PA e **0** I.	100%
Overall CI	Maximum score:**357** points (21 items x 17 judges) Responses:**294** TA, **55**A,**8** PA e **0** I	97%

Source: Research Data, 2022.
Notes: TA: Totally Adequate; A: Adequate; PA: Partially Adequate; I: Inadequate; CI: Concordance Index.

Chart 2 – Summary of qualitative analysis of the changes proposed by the expert judges. Niterói, Rio de Janeiro, Brazil, 2022

Judges' suggestion regarding the video objective	Change implemented	Justification
[…] a complementary video can be recorded explaining better about cardiac massage.	Yes	The cardiorespiratory arrest theme at that moment was not part of this video to not become too long.
[…] it could include the information that you can't put your hand in the child's mouth.	No	At minute 1'11" there is information about not putting your hand in the child's mouth to remove food.
[…] I suggest using a (blinking) arrow to draw attention to some details.	No	It was opted to use attention signs, arrows, and highlights in red, blue and black.
Judges' suggestion regarding structure and presentation	**Change implemented**	**Justification**
This video seems longer to me, maybe the introduction in which the school staff introduce themselves could be faster.	No	The intention is to provide that different subjects of the school staff can feel represented.
[…] to highlight that, in the case of cardiac massage, the child should be placed on a steady surface and not performed on the lap, I also suggest talking about the frequency with which cardiac massage should be performed.	No	The objective was to address the theme of choking incident and essential maneuvers in different age groups.
I suggest in the video, when it reports the maneuver in babies, instead of beating, change the speech to hitting (to highlight the intensity).	No	Current scientific evidence suggests that the term beat is the most appropriate.

Chart 2 – Cont.

Judges' suggestion regarding structure and presentation	Change implemented	Justification
[…] I suggest including the direction of blows: direction from the chest to the head.	Yes	Added an arrow with the direction of compression.
[…] the compressions, instead of saying in the intermammillary line say between the nipples.	Yes	Narration changed to "perform the compressions between the nipples".
[…] the idea that the maneuver can be performed for as long as necessary is vague.	No	The literature points out that the maneuver can be performed as many times as necessary.
At 50 seconds, when talking about the teacher who performed a "maneuver" on the student, I think that there, it could explain how the Heimlich maneuver is performed.	No	The aim of the video when it presents the accident is to show that it can occur in different spaces of the school, including the dining hall.
The video is long and can lead the viewer to distraction and disinterest. Although his material has a logic, the ideas are connected.	No	This theme has many specificities, the format presented came with the intention of synthesizing the essential information, as well as the aspects that the participants pointed out as necessary.
Saying younger children and showing a baby limits the understanding of up to what age that maneuver would be indicated and when to use the traditional Heimlich.	No	It is explained at 1'20" after showing a baby, that are children under one year old, as identified in the literature.
[…] put in a drawing, somehow on the baby's body in the video, the exact place to perform the compressions (intermammillary line).	Yes	Scheme representing the location of the intermammillary line.
[…] the compressions represent pushing the chest towards the head and not compressing it. If possible, I suggest modifying the hand in the figure so that it is only from top to bottom and include an arrow in the direction from top to bottom during compressions.	No	This animation format achieves this form of compression.
When the video ends and the paragraph explains the objective of the video and by whom it was produced, there is a small agreement error.	Yes	With the aim of provide a better understanding.
[…] when you say that the child or baby is unconscious, should report that it must have evolved into a respiratory arrest and if it is not attended to immediately, it could evolve into a CRA. After explaining the care until the emergency medical service arrives: perform chest compressions between the nipples (100/120 movements per minute until the emergency medical service arrival)	No	These differences for lay people in a video would be too much information, it was opted for punctual, necessary, and essential information for care.

Chart 2 – Cont.

Judges' suggestion regarding structure and presentation	Change implemented	Justification
[…] I suggest that the speech balloon "I can't breathe" appear before the warning text: sign of suffocation.	No	It was opted that the thought balloon comes after the suffocation signal, to provide the understanding that when this sign appears it is because the child is unable to breathe.
[...] when the SAMU and Firefighter phone numbers appear, it is very close to the existing text. I suggest putting it separately as it appears in the section for children under 1 year old.	No	Phone contacts appear above the image and highlights which does not affect viewing.
In the image that talks about a sign of suffocation and with a little balloon (I can't breathe) it could remove the coughing noise. Because usually at that moment the child can no longer cough.	Yes	The coughing sound was removed.
[…] put an end to the balloon: while we eat, we must not talk.	Yes	In order to provide an adequate understanding.
[…] in the image of the Lucas Law justify or center the text in the chart.	Yes	In order to promote a relevant design to the video.
[…] maybe could remove scientific names of bones, which in a few moments appear in the narration	No	In order for the maneuver to be effective, the names of these anatomical parts need to be cited. To allow the understanding of the representative schemes of these places, the names that are popularly known were exposed and narrated.
Judges' suggestion regarding relevance	**Change**	**Justification**
[…] to inform where to find more information about "first aid" or even ways to plan training on the subject.	No	Disseminating this information is not the purpose of the video, in addition to this insertion increasing the length of the material.
[…] the importance of these professionals being prepared for these incidents should be reinforced, as they occur and can be serious.	No	The video was developed with the representation of different professionals and settings, aiming to raise awareness among professionals.
We cannot state that the video is able to transfer knowledge, this must be measured in another study.	Not applicable	This is an item included in the validation instrument, but studies on the effectiveness and applicability of this technology are necessary.

Source: Research Data 2022.

Chart 3 – Summary of quantitative analysis performed by the target audience regarding the video on choking. Niterói, Rio de Janeiro, Brazil, 2022

Evaluation of educational video on choking (N=15)		
Evaluation Block	**Analysis of target audience responses**	**Concordance Index**
Objectives	Maximum score: **45** points (3 items x 15 target audience) Responses:**41** TA,**3** A,**1** PA,**0** I.	**97%**
Organization	Maximum score: **105** points (7 items x 15 target audience) Responses:**101** TA,**3** A,**1** PA e **0** I	**99%**
Video style	Maximum score: **90** points (6 items x 15 target audience) Responses:**87** TA,**3** A,**0** PA e **0** I.	**100%**
Video appearance	Maximum score: **60** points (4 items x 15 target audience) Responses:**58** TA,**2** A,**0** PA e **0** I	**100%**
Motivation	Maximum score: **90** (6 items x 15 target audience) Responses:**87** TA,**2** A,**1** PA e **0** I	**100%**
Overall CI	Maximum score: **390** (26 items x 15 target audience) Responses:**374** TA,**13** A,**3** PA e **0** I	**99%**

Source: Research Data, 2022.
Notes: TA: Totally Adequate; A: Adequate; PA: Partially Adequate; I: Inadequate; CI: Concordance Index.

In the evaluation performed by the target audience, positive aspects of the video were highlighted, including its playful nature, clarity and the didactic way in presenting information, besides its potential for use with children to teach them preventive measures and first aid care. One participant described that she had already experienced a choking incident with her daughter; at the time of the incident, she had no information on how to act, so she highlighted that she liked the video for its explanatory aspect.

Some participants raised relevant perceptions for the improvement of technology, namely the need for subtitles and sign language interpreters to promote accessibility to the entire school community of this technology. In this sense, the fact that the video is available on YouTube platform, there is the possibility of the subtitles resource. Regarding the inclusion of a sign language interpreter, it is intended to be included in future studies. Another question was about how a teacher who is a wheelchair user could provide first aid care to a choking child. Disability does not preclude first aid, the techniques used are the same. Therefore, no change was made to the video in this regard; that way no adjustments were necessary. In Figure 1 shows some scenes from the video.

The video is available on Youtube platform via the link https://youtu.be/ULP6AK8J2e0 and also through the QR code.

Figure 1 – Images from the educational video. Niterói, Rio de Janeiro, Brazil, 2022
Source: The authors, 2022.

DISCUSSION

Upper airway obstruction (UAO), also popularly known as choking, was indicated in this study as a situation that generates fear and uncertainty regarding the care to be performed. In this same context, the Federal Law, known as the Lucas Law, describes the mandatory training of school staff in first aid, as well as those of childcare recreation centers. This law was enacted after a child died of choking during a school outing[23].

A range of actions and care are necessary during UAO. These sequential steps cause worries in the team, because if such attitudes are not performed with certain promptness, they can result in the death of the child. In this sense, some variables involve this assistance, such as age, body size of child and the necessary pressure on specific anatomical points, so that the action is successful. These singularities are conceived as complex by the team, which does not feel confident to act on these issues. Self-confidence provides the professional with the safety to act in situations witnessed; therefore, it is considered an essential competence in first aid care[24].

International evidence showed that the main interventions for clearing obstructions, such as back blows and abdominal thrusts, are effective in relieving upper airway obstruction by a foreign objects[25]. Therefore, it is understood that the educational technology produced has the possibility of favoring, for the school community, knowledge acquisition on first aid for children. In this way, providing this community with essential skills, solving the doubts it has so that the child has safe care when they need it, are limiting factors for the dissemination of erroneous practices and knowledge.

By listing the themes for the development of the video according to the demand pointed out by teachers and staff members, it was possible to understand their perspectives and the challenges that involve assistance to accidents in the school context. It was observed that part of the themes identified as reception, listening, comfort, looking at and education for the child, translates into the conception that the child has rights and should receive ethical care. These themes cross the national curriculum basis for early childhood education, which demarcates a facet of the formative process of this group[26]. Therefore, the video produced on

first aid care for choking incidents with children in the school environment is articulated with meanings that represent this population, which was only feasible due to the listening undertaken to the participants.

Despite the video achieving the desired evaluation, some adjustments pointed out by the judges were incorporated into it to enhance the technology. It was noticed that an aspect emphasized by the judges referred to the language, in the sense of having a clear and understandable presentation to the target audience, which does not have specific knowledge in the health field. The judges requested to change the statement "perform the compressions in the intermammillary line" to "perform the compressions between the nipples", as well as the need for a scheme that represented, anatomically, this body part. This change was made to favor a better understanding by the target audience, since, in the airway clearance maneuver, the anatomical aspects are essential for its effectiveness[27].

The clarity of the language is something frequently mentioned in the studies, since its suitability for the public favors the sharing of the intended message and, in this way, reaches the desired objective, since the structure of complex sentences does not provide elucidation to the listener[28]. Some judges made notes about the length of the video, considering it to be a little long, and with that, there were suggestions for the removal of some scenes. However, this suggestion was not implemented because the time was adequate for the proposed educational technology, in which it is suggested not to exceed 15 to 20 minutes for instructional videos[12].

The evaluation obtained by the target audience was satisfactory; the items evaluated, mostly, were designated as total adequate and adequate. It is believed that this was due to the modifications that the video had after the validation performed by the judges, which provided greater clarity of the contents presented, as in another investigation, which, despite not addressing the educational context, referred to the development and validation of an educational video for the care of children with catheters[22].

In the present study, during the validation performed by the target audience, a participant asked about how first aid care would be performed by a physically disabled teacher. The aspect cited by the participant is essential to reflect on the need to think about technologies in which this public, with some type of disability, is represented, since it can provide first aid care for the child. It was noticed that this aspect has been incorporated into technologies and one of the examples was evidenced in the study that aimed to develop and validate a video for deaf students on cardiopulmonary resuscitation, noting after the judges' evaluation that the technology developed had inclusive aspects of health education for deaf people[29].

The inclusive aspect of this population was also suggested by a participant who highlighted the need to insert Brazilian Sign Language (LIBRAS) and subtitles in the videos. Although LIBRAS is considered a language of the country and is mandatory in professional and higher education, by promoting communication accessibility for people with hearing impairments, few have this knowledge[30]. In this technology, this language was not included because it is not technically feasible, but it is intended that this need be addressed in future studies.

Although the video produced was the result of a demand from teachers and staff who work in an early childhood education institution, the validation process developed with the participation of experts who work in different regions of Brazil and the target audience, brought contributions that not only served the demand of professionals at this school, but also the demand identified in other studies[8,11,14] and regions of Brazil, which adds significance to the material produced.

The educational video, apart from being a consultation and update material, serves to update knowledge about the subject, provide access across different places and times and quick and timely information[31]. Moreover, educational videos provide visual and auditory information, have the potential to reach a large number of people and provide a consistent message in an economical manner, being effective in improving short-term health literacy goals[25,31].

The school setting requires educational actions that equip its professionals. Because the perception that many have of not being properly able to perform first aid care, despite having numerous occurrences in their daily lives that require this care, it was evidenced by a study conducted in Turkey with teachers[9]. Therefore, it is inferred the relevance of providing this knowledge, since a study in a specialized teaching school found that after training the staff on first aid, through dialogue and practical activity, it promoted significant improvements in knowledge, choking incident is mentioned, which before the training was 42% and increased to 72.5%[32].

The educational video developed contributes to improvements in teaching, management, and research. Regarding teaching, besides the public for which it is intended, it can also be used with family members, as well as in teaching first aid at universities for academics from different courses, such as Pedagogy, Nursing, Medicine, Physical Education, among others, as well as with nurses working in the health care program at school, since the material is composed of a current theoretical framework and includes recommended

practices. With this, it is recommended that new research develop technologies that address other problems that occur in the school setting, appropriating the necessity of this scenario.

As for the study's limitation, the COVID-19 pandemic led to a reduction of staff members at the unit. In this sense, the first stage of the study had a smaller number of participants, which made it hindered to better understand what the demands they might have and whether these would align with those indicated by other participants.

CONCLUSION

The educational video entitled first aid care for the choking child proved to be valid for both the expert judges and target audience, and it was characterized as playful, attractive, and objective by the participants, since the information presented is essential in providing care in choking incidents.

The developed technology has added value by addressing the participants' demand and understanding the specificities of this context; thus, it can be used by teachers and staff members, with the aim of improving their knowledge or even updating it, since the technology can be accessed at any time.

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