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REVIEW

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Technologies for health education about foreign-body airway obstruction: an integrative review

Tecnologias para educação em saúde sobre obstrução das vias aéreas por corpo estranho: revisão integrativa

Tecnologías para la educación en salud sobre la obstrucción de la vía aérea por cuerpo extraño: una revisión integradora

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ABSTRACT

Objective: To analyze technologies developed for health education about airway obstruction. **Method:** Integrative review through search in the databases *Medical Literature Analysis and Retrieval System Online*, *Latin American and Caribbean Health Sciences Literature*, *Cumulative Index to Nursing and Allied Health Literature*, *Web of Science*, and *Scopus*. Original studies, with no time and language restrictions, were selected. The data were extracted by two independent researchers and organized into synoptic tables. Result integration was based on the data reduction method. **Results:** The eight included articles were published in Brazilian and international journals and were predominantly methodological. The identified technologies were applications, online courses, 3D animations, booklet, and website. The theme was approached among the contents of Basic Life Support. An absence of technologies approaching the theme with accessibility was observed. **Conclusion:** The identified technologies were digital and printed, presenting content validity and effectivity for use in education and health. Even so, there is gap in studies highlighting specific educational technologies on airway obstruction.

DESCRIPTORS

Gagging; Airway Obstruction; Health Education; Educational Technology; Teaching Materials; Review.

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INTRODUCTION

Foreign-body airway obstruction (FBAO) may involve partial or complete occlusion of the airways, which, consequently, may compromise the individual's breathing cycle and cause death[1-2].

This emergency commonly afflicts children, representing 53% of childhood accidents worldwide and one of the ten leading causes of pediatric death in Brazil, the first of which is by external cause[3-4]. The incidence is higher among children younger than three years old[2] and the foreign bodies which most often obstruct the airways are grains, food, ironwork, and toys[5]. Although it has a chance of lethality, this emergency is considered avoidable and may be reverted with immediate intervention conducted by people present[6]. For this, there must be a dissemination of contents on this theme, so as to multiply information and contribute with knowledge transmission.

Many strategies provide for the dissemination of information on health to the population, such as leaflets, booklets, applications, websites, and videos. The use of educational technologies favors learning, intellectual development, dissemination of scientific information, and the obtention of new skills[7].

In this sense, identifying, elaborating, and using educational technologies to inform and enable the population on the risks of FBAO, recognition of airways obstruction, and how to perform opening maneuvers is of importance. Through this knowledge, individuals with no health background may detect warning signs and intervene early, contributing thus to a higher survival chance[8].

In this context, orienting and guiding the development of research in the construction, validation, and use of educational technologies about FBAO requires the scientific production to be evaluated and synthesized, suggesting and identifying knowledge gaps which may be the focus of further research.

This analysis/synthesis interests and is beneficial to health professionals, particularly nursing professionals, who, in addition to integrating the multiprofessional team responsible for prevention and care of FBAO emergencies, promote health education in their daily work. In addition, the development of this study may contribute to Evidence-based Practice (EBP) with the intention of broadening the literature and disseminating knowledge on this theme, mainly to nurses, who will acquire resources to identify and use technologies which are more suited to their reality, as well as planning actions for health education.

Given this, the objective of this study was to analyze the health education technologies about airway obstruction.

METHOD

Type of study

This is an integrative review developed in six steps: 1. elaboration of the guiding question; 2. definition of the sources of selection of the primary studies and of the inclusion and exclusion criteria; 3. definition and extraction of the data to be presented; 4. evaluation of the included studies; 5. critical analysis of the results; 6. presentation of the synthesis of found evidence[9]. The procedures in each step had been previously structured in a protocol, built for the conduction of this review.

To elaborate the guiding question, the strategy Population - Interest - Context (PICo) was employed[10], in which: (P) Educational technologies, (I) Airway opening, and (Co) Health education. The guiding question for this study was thus: What are the health education technologies developed about airway obstruction available in scientific literature?

Scenario

The search for the primary studies was performed on the databases *Medical Literature Analysis and Retrieval System Online* (Medline) via *National Center for Biotechnology Information* (NCBI/PubMed), *Latin American and Caribbean Health Sciences Literature* (Lilacs) via *Biblioteca Virtual em Saúde* (BVS), *Cumulative Index to Nursing and Allied Health Literature* (CINAHL) via main collection *Thomson Reuters*, *Web of Science* via main collection (*Clarivate Analytics*), and Scopus (*Elsevier*). A manual search was also performed on the references of the articles included in the sample.

The databases were accessed on February 2020 through the journal website of *Coordenação de Aperfeiçoamento de Pessoal de Nível Superior* (Capes), and remote access of *Comunidade Acadêmica Federada* (CAFe) and registration in the *Universidade da Integração Internacional da Lusofonia Afro-Brasileira* (Unilab).

Selection criteria

For selecting articles composing this review sample, the following inclusion criteria were adopted: primary studies presenting educational technologies about airway obstruction, available in any language and published until February 2020. As exclusion criteria, the following were adopted: being a dissertation, thesis, editorial, or case report.

Data collection

To search the databases, controlled descriptors were used (hierarchically structured terms used for indexation in the bases) of *Medical Subject Headings* (MeSH), Health Science Descriptors (DeCS), and CINAHL Titles. In addition, synonyms of the controlled descriptors have been used; these were named, in this study, uncontrolled descriptors. To proceed to a high sensitivity search in each base, the descriptors for each set of the PICo strategy were combined with one another through the Boolean connector OR and, subsequently, each set was combined with the connector AND. The search strategy was conducted so as to contemplate the peculiarities of each base and no filters were applied for time and language (Chart 1).

Chart 1 – Search strategies for each database – Redenção, CE, Brazil, 2020.

Database	Search strategy
Medline/ PubMed	((((((((((((((("Technology"[Mesh]) OR ("Biomedical Technology"[Mesh])) OR ("Educational Technology"[Mesh])) OR ("Communications Media"[Mesh])) OR ("Education, Distance"[Mesh])) OR ("Instructional Film and Video" [Publication Type])) OR ("Audiovisual Aids"[Mesh])) OR ("Teaching Materials"[Mesh])) OR ("Pamphlets"[Mesh])) OR ("Sustainable Development"[Mesh])) OR ("Patient Education Handout" [Publication Type])) OR ("Audio-Video Demonstration")) OR ("Instructional Technology")) OR ("Online Teaching")) OR ("eLearning")) AND (((((("Airway Obstruction"[Mesh]) OR ("Heimlich Maneuver"[Mesh])) OR ("Foreign Bodies"[Mesh])) OR ("Gagging"[Mesh])) OR ("First Aid"[Mesh])) OR ("Emergency Treatment"[Mesh])) OR ("Emergencies"[Mesh]))) AND ((((((((((((((((((((("Health Education"[Mesh]) OR ("Education"[Mesh])) OR ("Health Communication"[Mesh])) OR ("Education, Special"[Mesh])) OR ("Video-Audio Media" [Publication Type])) OR ("Patient Education as Topic"[Mesh])) OR ("Teaching"[Mesh])) OR ("Population Education")) OR ("Community Health Education")) OR ("Education, Community Health")) OR ("Education, Health")) OR ("Health Education, Community")) OR ("Educational Technics")) OR ("Educational Techniques")) OR ("Technics, Educational")) OR ("Techniques, Educational")) OR ("Training Activities")) OR ("Training Technics")) OR ("Training Techniques")) OR ("Memory Training")) OR ("Education of Patients")) OR ("Education Patient"))
Lilacs/BVS	(tw:((mh:(Technology)) OR (mh:("Biomedical Technology")) OR (mh:("Educational Technology")) OR (mh:("Communications Media")) OR (mh:("Education, Distance")) OR (mh:("Instructional Films and Videos")) OR (mh:("Audiovisual Aids")) OR (mh:("Teaching Materials")) OR (mh:(Pamphlets)) OR (mh:("Technological Development")) OR (mh:("Patient Education Handout")) OR (tw:("Audio-Video Demonstration")) OR (tw:("Instructional Technology")) OR (tw:("Online Teaching")) OR (tw:(eLearning)))) AND (tw:((mh:("Airway Obstruction")) OR (mh:("Heimlich Maneuver")) OR (mh:("Foreign Bodies")) OR (mh:(Gagging)) OR (mh:("First Aid")) OR (mh:("Emergency Treatment")) OR (mh:(Emergencies)))) AND (tw:((mh:("Health Education")) OR (mh:(Education)) OR (mh:("Health Communication")) OR (mh:("Education, Special")) OR (mh:("Video-Audio Media")) OR (mh:("Patient Education as Topic")) OR (mh:(Teaching)) OR (tw:("Population Education")) OR (tw:("Community Health Education")) OR (tw:("Education, Community Health")) OR (tw:("Education, Health")) OR (tw:("Health Education, Community")) OR (tw:("Educational Technics")) OR (tw:("Educational Techniques")) OR (tw:("Technics, Educational")) OR (tw:("Techniques, Educational")) OR (tw:("Training Activities")) OR (tw:("Training Technics")) OR (tw:("Training Techniques")) OR (tw:("Memory Training")) OR (tw:("Education of Patients")) OR (tw:("Education Patient"))))
CINAHL	(MH Technology OR MH "Biomedical Technology" OR MH "Educational Technology" OR MH "Communications Media" OR MH "Education, Distance" OR MH "Instructional Films and Videos" OR MH "Instructional Films and Videos" OR MH "Teaching Materials" OR MH "Pamphlets" OR MH "Technological Development" OR MH "Patient Education Handout" OR TX "Audio-Video Demonstration" OR TX "Instructional Technology" OR TX "Online Teaching" OR TX eLearning) AND (MH "Airway Obstruction" OR MH "Heimlich Maneuver" OR MH "Foreign Bodies" OR MH "Gagging" OR MH "First Aid" OR MH "Emergency Treatment" OR MH "Emergencies") AND (MH "Health Education" OR MH Education OR MH "Health Communication" OR MH "Education, Special" OR MH "Video-Audio Media" OR MH "Patient Education as Topic" OR MH Teaching OR TX "Population Education" OR TX "Community Health Education" OR TX "Education, Community Health" OR TX "Education, Health" OR TX "Health Education, Community" OR TX "Educational Technics" OR TX "Educational Techniques" OR TX "Technics, Educational" OR TX "Techniques, Educational" OR TX "Training Activities" OR TX "Training Technics" OR TX "Training Techniques" OR TX "Memory Training" OR TX "Education of Patients" OR TX "Education Patient")
Web of Science	ALL=(Technology OR "Biomedical Technology" OR "Educational Technology" OR "Communications Media" OR "Education, Distance" OR "Instructional Films and Videos" OR "Audiovisual Aids" OR "Teaching Materials" OR Pamphlets OR "Technological Development" OR "Patient Education Handout" OR "Audio-Video Demonstration" OR "Instructional Technology" OR "Online Teaching" OR eLearning) AND ALL=("Airway Obstruction" OR "Heimlich Maneuver" OR "Foreign Bodies" OR Gagging OR "First Aid" OR "Emergency Treatment" OR Emergencies) AND ALL=("Health Education" OR Education OR "Health Communication" OR "Education, Special" OR "Video-Audio Media" OR "Patient Education as Topic" OR Teaching OR "Population Education" OR "Community Health Education" OR "Education, Community Health" OR "Education, Health" OR "Health Education, Community" OR "Educational Technics" OR "Educational Techniques" OR "Technics, Educational" OR "Techniques, Educational" OR "Training Activities" OR "Training Technics" OR "Training Techniques" OR "Memory Training" OR "Education of Patients" OR "Education Patient")
Scopus	((TITLE-ABS-KEY(Technology) OR TITLE-ABS-KEY("Biomedical Technology") OR TITLE-ABS-KEY("Educational Technology") OR TITLE-ABS-KEY("Communications Media") OR TITLE-ABS-KEY("Education, Distance") OR TITLE-ABS-KEY("Instructional Films and Videos") OR TITLE-ABS-KEY("Audiovisual Aids") OR TITLE-ABS-KEY("Teaching Materials") OR TITLE-ABS-KEY(Pamphlets) OR TITLE-ABS-KEY("Technological Development") OR TITLE-ABS-KEY("Patient Education Handout") OR TITLE-ABS-KEY("Audio-Video Demonstration") OR TITLE-ABS-KEY("Instructional Technology") OR TITLE-ABS-KEY("Online Teaching") OR TITLE-ABS-KEY(eLearning))) AND ((TITLE-ABS-KEY("Airway Obstruction") OR TITLE-ABS-KEY("Heimlich Maneuver") OR TITLE-ABS-KEY("Foreign Bodies") OR TITLE-ABS-KEY(Gagging) OR TITLE-ABS-KEY("First Aid") OR TITLE-ABS-KEY("Emergency Treatment") OR TITLE-ABS-KEY(Emergencies))) AND ((TITLE-ABS-KEY("Health Education") OR TITLE-ABS-KEY(Education) OR TITLE-ABS-KEY("Health Communication") OR TITLE-ABS-KEY("Education, Special") OR TITLE-ABS-KEY("Video-Audio Media") OR TITLE-ABS-KEY("Patient Education as Topic") OR TITLE-ABS-KEY(Teaching) OR TITLE-ABS-KEY("Population Education") OR TITLE-ABS-KEY("Community Health Education") OR TITLE-ABS-KEY("Education, Community Health") OR TITLE-ABS-KEY("Education, Health") OR TITLE-ABS-KEY("Health Education, Community") OR TITLE-ABS-KEY("Educational Technics") OR TITLE-ABS-KEY("Educational Techniques") OR TITLE-ABS-KEY("Technics, Educational") OR TITLE-ABS-KEY("Techniques, Educational") OR TITLE-ABS-KEY("Training Activities") OR TITLE-ABS-KEY("Training Technics") OR TITLE-ABS-KEY("Training Techniques") OR TITLE-ABS-KEY("Memory Training") OR TITLE-ABS-KEY("Education of Patients") OR TITLE-ABS-KEY("Education Patient")))

The studies identified in the databases were imported into *EndNote Web* for organization, ordering, and verification of duplicity in bibliographic references, obtained in different data sources[11].

The search for studies, screening, and data extraction were performed by two researchers, who have standardized the search strategy in each database and conducted it independently, with subsequent comparison of the obtained results.

The screening process of the studies was based on orientation by the *Preferred Reporting Items for Systematic Reviews and Meta-Analyses* (PRISMA) (Figure 1)[12].

The variables of the review were about the information available in the primary studies: year, country, and journal; professional category of the authors; objectives, method, and evidence level; educational technology; presence and type of accessibility of the technology, and main results. To extract

the information of the primary studies, an instrument was elaborated in *Microsoft Office Word* 2019 as a synoptic table to register the 11 previously presented variables.

Assessment of the included studies and evidence levels

The assessment of the methodological quality of the studies was performed through specific tools for each type of study. The studies with experimental outline were evaluated through the *Revised Cochrane Risk-of-bias tool for randomized trials* (RoB 2). This tool considers five domains: randomization, deviation from intended interventions, absence of outcome data, measurement of the outcome and selection of the reported result. The bias risk was classified as low, somewhat worrying, or high[13].

To assess quasi-experimental studies, *Risk of Bias in Non-randomized Studies of Interventions* (ROBINS-I) was used. This tool accounts for seven domains: confounding factors in baseline, selection of study participants, classification of the interventions, deviation of the tested interventions, absent or lost data, measurement of the results, and selection of the presented results. From this assessment, the risk of bias of these studies were classified as low, moderate, severe, or critical[14].

Quality assessment was not performed for methodological studies, due to a gap in available instruments for such. Two researchers have assessed the data separately and with no interaction with one another. Upon result comparison, there was no disagreement between them.

To classify the studies according to evidence level, the following levels were considered: I - studies of meta-analysis of randomized and controlled studies; II - experimental studies; III - quasi-experimental studies; IV - descriptive/non-experimental or qualitative studies; V - experience and case reports; VI - consensus opinions among researchers[15].

Data treatment and analysis

The analysis and integration of results was based on the method of data reduction, through critical reading ad classification of studies in sub-groups, according to the identified types of technology[9]. In addition, the theoretical support for the critical analysis of the results was based on the scientific literature on the topic through studies which were not included in the review. Result presentation was descriptive, aiming at promoting the incorporation of evidence and identification of knowledge gaps.

Ethical aspects

This study's protocol was not submitted to the Research Ethics Committee, since public access studies, available in the international scientific literature, were used.

RESULTS

The identified studies totaled 4,625 and, after the exclusion of 138 duplicates, 4,487 were maintained for analysis: 11 from CINAHL, 79 from Lilacs, 134 from *Web of Science*, 1,696 from Scopus, and 2,567 from Medline. After the application of inclusion and exclusion criteria, eight articles were included in the sample. After manual search, no new studies were added to the sample.

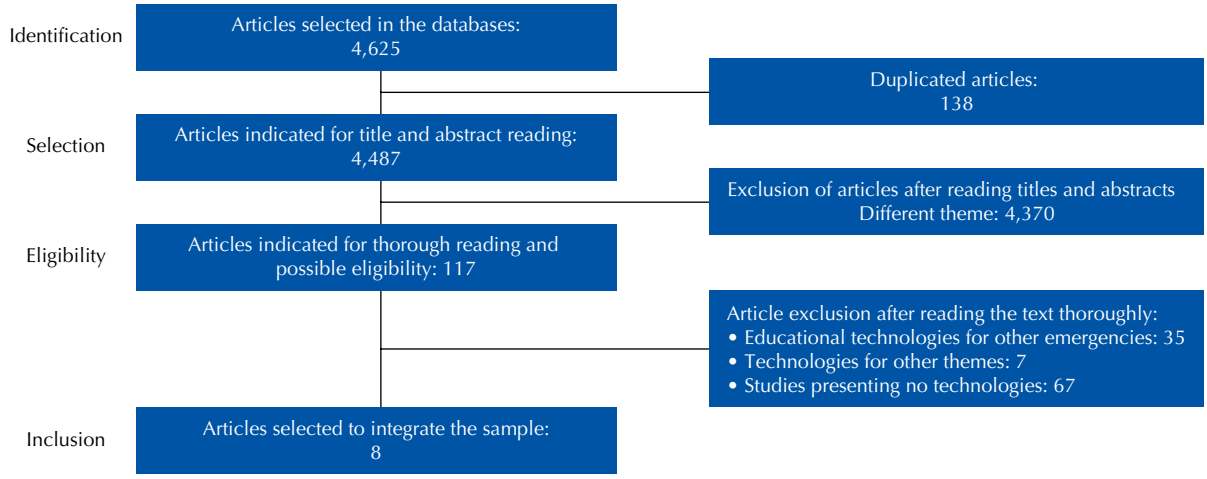

Figure 1 – Flowchart of the process of article selection in the integrative review – Redenção, CE, Brazil, 2020.

Eight articles were included; out of these, one (12.5%) was identified in CINAHL, three (37.5%) in Scopus and four (50.0%) in Web of Science. In addition, five (62.5%) were published in nursing journals, one (12.5%) in computer science, one (12.5%) in medical science, and one (12.5%) in health education. Regarding the professional category, 17 (62.9%) were nurses and for ten (37.1%) this information was not identified.

Concerning the language of the articles, five (62.5%) were published in English and three (37.5%) in Portuguese. Regarding the countries where the studies were conducted, three (37.5%) Brazilian studies, two (25.0%) South Korean, one (12.5%) conducted in the United States of America, one (12.5%) in Indonesia, and one (12.5%) in Turkey were identified.

In relation to the types of study, four (50.0%) were methodological, three (37.5%) were quasi-experimental

and one (12.5%) was a randomized clinical trial. Regarding the levels of evidence, one (12.5%) article with evidence level II (experimental study), three (37.5%) with evidence level III (quasi-experimental) were found, and in fours studies (methodological) classification by evidence level did not apply. In the evaluation of methodological quality, no study was classified as high, severe, or critical risk-of-bias.

Concerning the type of educational technologies, the use of applications was predominant in three (37.5%) articles, followed by two (25.0%) articles with an online course, one (12.5%) with 3D animation, one (12.5%) with booklet, and one (12.5%) with website. Concerning the approach to FBAO, seven (87.5%) technologies approached FBAO among the themes of basic life support (BLS) and only one (12.5%) study focused exclusively on the subject. The aspects of this theme included in the studies were the identification of signs of airway obstruction and the specific conducts for responsive and non-responsive patients among the adults and children. No study was observed to develop educational technologies with accessibility to disabled people.

Chart 2 presents the publication year of each study, their countries, types of educational technologies, objectives, results/conclusion of primary studies, level of evidence, and result of the assessment of methodological quality.

Chart 2 – Synthesis of the articles selected for integrative review – Redenção, CE, Brazil, 2020.

Year/Country/Type of study	Technology	Objective	Results/Conclusion	Level of evidence	Methodological quality
2013/ Brazil/ Methodological[16]	Website	Assess structure, quality of information, and browsing of website on First Aid.	Information Technology and health professionals and nursing students considered the website to have good quality of information and browsing experience.	Unapplicable	Unapplicable
2015/ Turkey/ Quasi-experimental[17]	Online Course	Provide first aid instructions via online technologies for professors-to-be.	The knowledge was superior in the experimental group (online), although control (presential) had also improved before and after the tests.	III	Moderate risk-of-bias*
2016/ South Korea/ Quasi-experimental[18]	Application	To evaluate the effect of application on emergency targeted at school-age children.	The application has improved the children's knowledge for coping with emergencies.	III	Low risk-of-bias*
2017/ Brazil/ Methodological[19]	Booklet	To create and validate an educational booklet for teachers in children's education and primary school cycle I on first aid.	The booklet was created, validated by health professionals, and assessed by teachers as well-illustrated, clear, and enlightening.	Unapplicable	Unapplicable
2017/ South Korea/ Quasi-experimental[20]	Application	To develop and evaluate the efficacy of the application on knowledge, skill, and confidence of nursing students on airway obstruction.	The application was efficient to improve the knowledge, skill, and confidence on foreign-body airway obstruction in children.	III	Low risk-of-bias*
2017/ United States/ Experimental[21]	3D animation	To investigate the efficiency of the animation for education in emergency medicine.	The animation covered drowning, airway obstruction, and fractures. The animation may be used as an additional tool in emergency training.	II	Somewhat worrying**
2018/ Indonesia/ Methodological[22]	Application	To develop an application with first aid orientation for children aged 11 to 14.	The application on airway obstruction, wounds, hemorrhages, and burns can be used for first aid education.	Unapplicable	Unapplicable
2018/ Brazil/ Methodological[23]	Online Course	To create and validate a remote Basic Life Support course.	The course comprised modules on cardiopulmonary resuscitation, automated external defibrillator, airway opening, and presented content validity.	Unapplicable	Unapplicable

**Risk of Bias in Non-randomized Studies of Interventions* (ROBINS-I); ***Revised Cochrane risk-of-bias tool for randomized trials* (RoB 2)

DISCUSSION

The reduced number of studies providing scientific evidence on this theme is emphasized. In this context, considering that nurses provide care in diverse sectors and complexity levels to patients and that their work involves health education, their engagement in studies on FBAO to potentialize care, reflection, valuing, specificities and participation between user and health professionals is relevant[24].

The studies were predominantly published by nurses on Nursing journals. This finding is corroborated by a study developed in Recife, state of Pernambuco, Brazil, which sought to identify the educational technologies used in health education of patients with chronic kidney disease for the promotion of self-care and perceived that most (56.25%) studies were published in Nursing journals[25]. These findings show the critical perspective and interest of the category in contributing scientifically with health education technologies.

Concerning the study's country, Brazil was noteworthy. This finding differs from a literature review

conducted by researchers in Piauí state which sought to identify mobile technologies in the nursing area and whose results show international publications as predominant[26]. This divergence suggests that, although Brazilian nursing does not stand out in the production of mobile technologies, when it comes to those specifically related to FBAO, Brazilian nursing researchers are engaged and productive. This fact points out the possibility of contact among Brazilian researchers for network production and interinstitutional partnerships to strengthen the construction of scientific evidence on educational technologies for FBAO.

In relation to the methodological quality of the studies included in this review, studies with low risk-of-bias have been identified. However, other studies presented methodological worries or a moderate risk-of-bias. The need for developing studies with good methodological quality is thus emphasized, since these ensure result reliability[27] and may offer methodological subsidies for building new technologies on this theme and support their use.

Regarding the evidence level of the selected studies, those which describe the development of technologies is emphasized. Despite the importance of these studies, the relevance of experimental studies for practices in the health system is emphasized, since they enable the establishment of cause and effect for a number of interventions[28]. In this perspective, researchers should make progress in their investigation on the effects of using these technologies for the community and health services.

The studies developed and assessed educational technologies, such as applications, online courses, 3D animation, and website. The efforts used in developing and disseminating electronic educational technologies on identification signs and conducts to be adopted towards FBAO are thus noticeable. This is understandable, given that information technologies, in addition to promoting accessibility, favor knowledge dissemination, present various applicabilities, are attractive, and can be easily and quickly accessed, becoming digital options to be used in various sectors, such as corporate, personal, educational, and health[26].

Most educational technologies identified in this study are noted to provide access through mobile gadgets, which contributes to visualization, reading, and portability. The development of educational technologies which are compatible with mobile gadgets maximizes the opportunities of interaction and access to contents both for professionals and future professionals of the health area and for the population with no health background[26].

Still on access via mobile phone, applications were the type of educational technology about FBAO to be most often approached in the studies. The importance of using teaching applications is observed in a study conducted in Iran, which explored the experiences of health students on learning through mobile gadgets and whose results showed positive experiences in the use of smartphones for educational purposes[29]. A study conducted in South Korea has presented a similar finding by comparing the effects of teaching breast self-examination to women through a smartphone application in conjunction with a practical demonstration, whose results pointed out that the combination of approaches was a useful and efficient strategy in disseminating information and in the development of skills[30]. In this context, the increase in the use of applications in the health area and the conduction of studies by nurses for developing this technology are justified.

Concerning educational technology in the online format, a study conducted in São Paulo assessed the quality of layout, visual identity, and content of the Neonatal Pain Assessment Program, available online, and concluded that the course has presented multiplicativity and may contribute to the preparation and academic and/or professional qualification[31].

A similar result was observed in a study in University of Miami with the Pan American Health Organization and International Network for Nursing and Patient Safety, whose objective was to describe the implementation of an international remote teaching program to enhance knowledge of patient safety for nurses and nursing students and examine the assessments of participants of this approach in 25 countries. The results of this study pointed out adherence among the included countries due to practicality and free access, in addition to the viability of this strategy for teaching[32]. Thus, given the need for teaching and training, online education is pointed as able to contribute with capacitation and update of health professionals in many work areas.

Another technology found to be used for teaching about FBAO was 3D animation. A study conducted in London concluded that this type of animation favored the engagement, involvement, encouragement, and comprehension of medicine academics regarding reporting medical errors[33]. The 3D animation, due to consisting of an attractive visual resource, may impact positively on learning FBAO-related contents, both for the category health professional and laypersons.

Concerning the approach of FBAO in booklet technology, the studies have shown the viability and the validity of the content and appearance of this resource for various types of audience, such mother-child dyad, adolescents, and patients hospitalized in medical clinic[34-36]. Thus, the construction, validation, and assessment of printed technologies about FBAO by nurses are pointed out as pertinent and relevant for multiplication of knowledge on this theme.

Educational technologies of the type website, due to being popular and having access compatibility with many mobile gadgets, corroborate adherence and the reason for being used. This option of technological resource, as a didactic strategy, may promote the flow of information and interaction between users, optimizing thus the construction of knowledge and enabling access to

information[37]. In the context of health education in nursing, the website may favor communication between professional and patient outside the health service, and be used to answer questions, disseminate information, schedule appointments, and provide exam results. Thus, the need for its construction and effectivity assessment to be an object of research, supporting the use of Evidence-based Practice, is pointed out.

Concerning contents on FBAO, which was approached by the technologies, the theme was shown to have been approached, in most technologies, when teaching BLS contents. The main aspects approached on this theme included recognizing signs of airway obstruction and how to intervene in situations with responsive and non-responsive adult and pediatric individuals.

As for the identification of FBAO, the most common signs and symptoms are respiratory difficulties associated to coughing, vomit, noisy breathing, voice loss, agitation, and anxiety, possibly progressing to asphyxia[38-39]. The FBAO may be partial or complete and the victim may be conscious or unconscious. In conscious victims, their ability to breath, speak or cough must be identified; if so, the victim must be encouraged to cough as an attempt to expel the foreign body and be continuously observed[38-39].

In cases of permanence of foreign bodies in conscious victims, conducts for opening the airways must be started. For children under one year old, five hits in the interscapular region are recommended, followed by five thoracic compressions in the middle third of the sternum, in the nipple line. For conscious children over one year old, the aforementioned conduct is recommended or the airway opening maneuver. This is known as the Heimlich maneuver, also recommended for adults, and consists in the first-aid providers being behind victims with their arms on the abdomen level, with one of their hands closed and placed at the epigastric region, whereas the other hand is over the former, with subsequent compression of the abdomen with quick movements, in an anteroposterior direction and upwards[38-39].

The management of unresponsive FBAO patients with or without palpable pulse in the central artery requires that help be requested, with subsequent conduction of cardiopulmonary resuscitation (CPR).

Given this situation, the importance of orientation and training for professionals and laypersons, mainly parents and guardians, on recognition and immediate intervention against FBAO is clear, since, according to a study in the state of Minas Gerais, Brazil, most (42.9%) deaths of children due to FBAO happen at home[40]. In nursing care, teaching and training against FBAO may be included not only among educational interventions on first aid, but also in individual and collective care that comprise nursing work, such as childcare, prenatal, and the school health program[41]. For such, technologies may help with health communication, aiming at contributing to the population's ability so that, once empowered, it may present higher likelihood of performing accordingly when faced with FBAO[39].

Another aspect to be emphasized in the educational technologies about FBAO is the absence of accessibility to disabled people. This finding converges with an integrative review on technologies for health education of deaf people, whose results show that the theme was not included among the technologies with accessibility in Brazilian Sign Language[42]. Over 1 billion people around the world have some kind of disability and, in Brazil, this public represents more than 45 million people[43-44]. In this sense, disabled people may be present during a FBAO situation and must therefore intervene accordingly. In this sense, when considering that assistive technologies (AT) favor social inclusion, due to being adapted to the specificities of each disability[45], they must be objects of further studies to provide scientific evidence on its content and appearance validity and use effectivity.

The results of this review contribute to the practices of health education, since they present evidence on the availability and effect of technologies on FBAO. Thus, the choice of technology to be implemented in actions with the community and/or health services may be based on research results. In addition, this makes nurses and other health professionals aware of technologies not yet available in their countries which may be developed with the application of the scientific method.

A limitation of this study is that, although a broad search and overly sensitive strategy has been employed, other eligible studies may not have been included, due to not being indexed in the databases selected for this review. Other limitations are found in the non-inclusion of grey literature and in the absence of instruments for specific assessment of the quality of methodological studies. The included studies are emphasized to approach FBAO among technologies which dealt with different themes of BLS, which restricts the specification of information on approaching this specific aggravation.

CONCLUSION

The educational technologies on FBAO were digital material, applications, online courses, websites, 3D animation, and booklet. In most, the theme was approached jointly with other topics of basic life support, in predominantly methodological studies.

The identified gaps in knowledge correspond to the lack of studies testing the effectivity of educational technologies about airway opening in randomized trials, as well as the unavailability of educational technologies which approach the theme in an exclusive manner and include accessibility. With that, new studies are suggested to investigate the effectivity and compare different technologies for teaching about FBAO, building and validating technologies on this theme with accessibility for diverse types of disability, such as auditory and visual.

RESUMO

Objetivo: Analisar as tecnologias desenvolvidas para educação em saúde sobre obstrução das vias aéreas. **Método:** Revisão integrativa realizada mediante busca nas bases de dados *Medical Literature Analysis and Retrieval System Online*, *Latin American and Caribbean Health Sciences Literature*, *Cumulative Index to Nursing and Allied Health Literature*, *Web of Science* e *Scopus*. Selecionaram-se estudos originais, sem restrições de tempo e idioma. Os dados foram extraídos por dois pesquisadores independentes e organizados em quadros sinópticos. A integração dos resultados fundamentou-se no método de redução de dados. **Resultados:** Foram incluídos oito artigos, publicados em periódicos nacionais e internacionais, com predominância de estudos metodológicos. As tecnologias evidenciadas foram dos tipos aplicativos, cursos *online*, animação 3D, cartilha e *website*. A temática foi abordada entre os conteúdos do Suporte Básico de Vida. Observou-se ausência de tecnologias que abordassem o tema com acessibilidade. **Conclusão:** As tecnologias identificadas eram no formato digital e impresso e possuíam validade de conteúdo e efetividade para utilização na educação e saúde. Ainda assim, há lacuna de estudos que evidenciem tecnologias educacionais específicas sobre obstrução das vias aéreas.

DESCRITORES

Engasgo; Obstrução das Vias Respiratórias; Educação em Saúde; Tecnologia Educacional; Materiais de Ensino; Revisão.

RESUMEN

Objetivo: Analizar las tecnologías desarrolladas para la educación en salud sobre la obstrucción de la vía aérea. **Método:** Revisión integradora realizada mediante búsquedas en las bases de datos *Medical Literature Analysis and Retrieval System Online*, *Latin American and Caribbean Health Sciences Literature*, *Cumulative Index to Nursing and Allied Health Literature*, *Web of Science* y *Scopus*. Se seleccionaron estudios originales, sin restricciones de tiempo ni de idioma. Los datos fueron extraídos por dos investigadores independientes y organizados en cuadros sinópticos. La integración de los resultados se basó en el método de reducción de datos. **Resultados:** Se incluyeron ocho artículos publicados en revistas brasileñas e internacionales, con predominio de estudios metodológicos. Las tecnologías evidenciadas fueron de los tipos aplicaciones, cursos en línea, animación 3D, cartilla y sitio web. El tema se abordó entre los contenidos del Soporte Vital Básico. Se ha observado la carencia de tecnologías que aborden el tema con accesibilidad. **Conclusión:** Las tecnologías identificadas estaban en formato digital e impreso y tenían validez de contenido y eficacia para su uso en educación y salud. Sin embargo, hay una carencia de estudios que evidencien tecnologías educativas específicas sobre la obstrucción de la vía aérea.

DESCRIPTORES

Atragantamiento; Obstrucción de las Vías Aéreas; Educación en Salud; Tecnología Educacional; Materiales de Enseñanza; Revisión.

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