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Contributions of telesimulation to the knowledge of mothers about foreign body airway obstruction

Contribuições da telessimulação no conhecimento de mães diante obstrução de vias aéreas por corpo estranho

Aportes de la telesimulaciónem el conocimiento de las madres ante La obstrucción de lãsvías aéreas por cuerpoextraño

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ABSTRACT

Objective: To analyze the contributions of telesimulation to the knowledge of mothers faced with foreign body airway obstruction in children under 1 year of age and identify the related factors.

Methods: A quasi-experimental study of the pre- and post-test design carried out between April and September 2021 with 49 mothers from a city in São Paulo. It was organized into four stages: pre-test, telesimulation, immediate and late post-test (60 days later). All steps were carried out remotely via the free online platform *Google Hangouts*® and *Google Forms*®. Data analyzed by descriptive and analytical statistics.

Results: There was a significant difference in the knowledge score between the assessments (p<0.001). Statistically significant relationships were identified between pre-test knowledge and choking experience (p=0.012), promotion of immediate knowledge and another child's choking (p=0.040) and schooling (p=0.006) and promotion of late knowledge with occupation (p=0.012) and choking of another child (p=0.011).

Conclusions: There was a significant improvement in knowledge after telesimulation, especially among those who had never experienced a choking situation and had a higher level of education.

Keywords: Nursing. Simulation training. Knowledge. Air way obstruction. Child. Mothers.

RESUMO

Objetivo: Analisar as contribuições da telessimulação no conhecimento de mães diante situação de obstrução de vias aéreas por corpo estranho em crianças menores de um ano e identificar os fatores relacionados.

Métodos: Estudo quase experimental do tipo pré e pós-teste realizado entre abril e setembro de 2021 com 49 mães de um município paulista. Foi organizado em quatro etapas: pré-teste, telessimulação, pós-teste imediato e tardio (60 dias após). Todas as etapas foram conduzidas remotamente via plataforma on-line de acesso livre *Google Hangouts*® e *Google Forms*®. Os dados foram analisados por estatística descritiva e analítica.

Resultados: Houve diferença significativa na pontuação de conhecimento entre as avaliações (p<0,001). Foram identificadas relações estatisticamente significativas entre conhecimento pré-teste e experiência de engasgo (p=0,012), promoção do conhecimento imediato com engasgo de outra criança (p=0,040) e escolaridade (p=0,006) e promoção do conhecimento tardio com ocupação (p=0,012) e engasgo de outra criança (p=0,011).

Conclusões: Houve melhora significativa no conhecimento após telessimulação, especialmente entre aquelas que nunca vivenciaram situação de engasgo e com maior escolaridade.

Palavras-chave: Enfermagem. Treinamento por simulação. Conhecimento. Obstrução das vias respiratórias. Criança. Mães.

RESUMEN

Objetivo: Analizar las contribuciones de la telesimulación en el conocimiento de las madres en situación de obstrucción de las vias respiratorias por cuerpo extraño em niños menores de un año e identificar los factores relacionados.

Métodos: Estudio cuasi-experimental del tipo pre y post test realizado entre abril y septiembre de 2021 con 49 madres de un municipio de São Paulo. Se organizo en cuatro etapas: pretest, telesimulación, pos test inmediato y tardío (60 días después). Todos los trámites se realizaron de forma remota a través de la plataforma en línea gratuita *Google Hangouts*® y *Google Forms*®. Datos analizados por estadística descriptiva y analítica.

Resultados: Hubo diferencia significativa en la puntuación de conocimiento entre las evaluaciones (p<0,001). Se identificaron relaciones estadísticamente significativas entre pretest conocimiento y experiencia de atragantamiento (p=0,012), promoción de conocimiento inmediato con otro atragantamiento (p=0,040) y escolaridad (p=0,006) y promoción de conocimiento tardio con ocupación (p=0,012). y asfixia por outro niño (p=0,011).

Conclusiones: Hubo una mejora significativa en el conocimiento después de la telesimulación, especialmente entre aquellos que nunca habían experimentado una situación de atragantamiento y tenían un mayor nivel de educación.

Palabras clave: Enfermería. Entrenamiento simulado. Conocimiento. Obstrucción de la vías aéreas. Niño. Madres.

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INTRODUCTION

Regarding domestic accidents, foreign body airway obstruction, commonly known as choking, accounts for 53% of childhood accidents worldwide[1]. It is a medical emergency that may be life-threatening in children, being the main cause of accidental death in children and the fourth among preschoolers ≤5 years old, more frequently between 1 and 2 years of age[2].

The severity of choking in this age group is related to the anatomy and physiology of children (narrower, shorter airways; laryngeal reflex problems; lack of molars that are needed for chewing food properly; suck-swallow incoordination) and to neuropsychomotor development (oral exploration behavior; talking, crying, or moving while eating))[3].

Educational interventions related to choking should besupported to make caregivers aware of ways to manage and prevent accidents. It is recommended that this type of intervention be used before birth, during prenatal appointments. Investing in strategies aimed at increasing the knowledge of parents and caregivers of children directly reduces public health costs with hospitalizations and consequent interventions, in addition to reducing the number of sequelae and/or resulting deaths[4].

According to an integrative review that analyzed the educational technologies developed for health education about airway obstruction, most studies used digital resources with emphasis on applications, websites, online courses and 3D animations[1]. With the support of digital resources, a health education strategy that has become popular, especially in the face of social restrictions caused by the COVID-19 pandemic, is telesimulation. However, so far, no study has been identified that used such a strategy to address the prevention and management of choking bylaypersons, which justifies the innovative nature of the present study.

Telesimulation is defined as a process whereby telecommunication and simulation resources are used concurrently for educational or evaluation purposes [5]. In telesimulation, interaction between participants and facilitator takes place through virtual platforms and learning outcomes focus more on cognitive and behavioral skills than on technical skills[5–8].

Given this context, the present study established the following research question: what are the contributions of telesimulation to the knowledge of mothers faced with foreign body airway obstruction in children under 1 year of age? Thus, the present study aimed to analyze the contributions of telesimulation to the knowledge of mothers faced with foreign body airway obstruction in children under 1 year of age and to identify the related factors.

METHOD

Quasi-experimental study of the pre and post-test design[9] carried out in a medium-sized city located in the inland of the state of São Paulo between April and September 2021. The study included mothers of children younger than one year recruited by convenience. The eligibility criteria were being the mother of a child under one 1 year of age and being over 18 years old. There were no exclusion criteria. The exclusive choice of mothers to participate in the study was intentional, since the maternal figure is primarily responsible for the care of children in the first year of life.

To remotely recruit potential participants, the researchers prepared an invitation containing the study objectives and a link to access a form on the Google Forms® platform. This invitation was publicized on the researchers' social networks (WhatsApp®, Facebook® and Instagram®). When accessing the available link, the participants initially found the Free and Informed Consent Term – TCLE for reading and expression of agreement.

This study was organized into four stages: pre-test, tele-simulation, immediate post-test and late post-test. In the pre-test stage, immediately after reading the TCLE and agreement, the participants responded to two research instruments duly converted to the online format, as follows: the sociodemographic characterization instrument and the knowledge assessment questionnaire. The approximate average time to answer the instruments was 30 minutes.

The sociodemographic characterization instrument was organized with identification data of the mothers, such as email address, date of birth, education, marital status, occupation, number of children, date of birth of the child, previous experience with choking and experience in the health area.

The knowledge assessment questionnaire was elaborated by the researchers themselves and was previously submitted to content validation by ten expert judges in the area of pediatric nursing with academic and/or care experience of at least one year, recruited based on the analysis of the Lattes curriculum[10]. The instrument includes 30 statements subdivided into four themes: knowledge about choking, choking prevention, choking recognition and choking management. For each statement there are three possible answers, which are: true, false or don't know. The answer I don't know is considered a wrong answer. The questionnaire also allows

treating knowledge as a numerical variable, with scores ranging from zero to 30 points.

After completion of the instruments by the participants, some dates and times were made available to them for scheduling the telesimulation. The participants could also decide if they preferred to receive the reading materials and confirmation of the telesimulation via email or WhatsApp®. Based on the means of communication selected, two materials were sent for prior reading. Any guidance, task or activity designed by the educator that occurs prior to the development of the scenario is called prebriefing[11].

Therefore, this study considered the reading of the educational booklet entitled "What to do when your baby chokes? [12 and the folder Care for the baby, produced by the NGO Criança Segura, as strategies to be adopted in the prebriefing stage. It should be noted that, as it is individual reading and therefore difficult to control, this activity was not considered as a criterion for participation in the study. However, when questioned, the mothers generally stated that they had previously read the indicated materials.

The link to access the free online communication platform Google Hangouts® was made available on the day chosen by the participant. It is important to note that a maximum limit of five mothers per virtual meeting was established, in order to provide a better quality of interactions. Initially, still in the prebriefing stage, the mothers introduced themselves and the researcher briefly contextualized the video to be shown, which lasted approximately 10 minutes.

Next, the participants watch a six-minute video regarding the development of the simulated scenario, which addresses measures to prevent and manage foreign body airway obstruction in children under 1 year of age. The construction of the scenario was based on current scientific evidence on the subject as well as on the previous experience of the researchers. The scenario template was also submitted to content validation by nine judges who were experts in simulation and/or pediatric nursing[10].

The scenario developed can be classified as a hybrid scenario, as it had two simulated participants (the baby's mother and a friend) and a low-fidelity manikin to represent the baby. Regarding the realism of the environment, this was developed in a simulated house very similar to a home. Moreover, the researchers were supported by a team of specialists in image and sound.

Immediately after the transmission of the video, the debriefing process was carried out. It is the most important stage of the telesimulation during which discussions take place about the perceptions of the scene watched. These perceptions will generate reflections on the scenario and, above all, enable the joint construction of the intended knowledge[13]. The debriefing was structured around the following guiding questions: how did you feel watching the simulation video? What feelings came to mind while watching the video? Could you describe the scenario you watched? What were the positive points in the participant's performance? Would you do something different at some point? Do you believe that participating in this activity will help in case of a possible choking situation with your child? The duration of the debriefing depended directly on the number of mothers and their interaction, ranging from 20 to 40 minutes.

Shortly after the completion of the telesimulation, a new Google Forms link with the knowledge assessment questionnaire was made available for application, a stage called immediate post-test. Finally, the fourth and final stage called late post-test occurred 60 days later, from the reapplication of the knowledge assessment questionnaire via Google Forms. It should be stressed d that there was no alteration or randomization of the alternatives in the knowledge questionnaire applied in the immediate and late post-test.

Form responses were automatically entered into Excel spreadsheets, for later unification and data categorization. The database was exported to The SAS System for Windows (Statistical Analysis System) – version 9.2, where the analyzes were carried out with the advice of a professional statistician.

The following variables were considered as dependent variables: pre-test knowledge, promotion of immediate knowledge (difference between the score of immediate knowledge and pre-test knowledge) and promotion of late knowledge (difference between the score of pre-test knowledge and late knowledge).

The following independent variables were those obtained by the characterization instrument: mother's age (numerical variable), schooling (categorical variable), number of children (numerical variable), occupation (categorical variable); previous experience with choking with other children (dichotomous categorical variable); previous experience with their child's choking situation (dichotomous categorical variable) and experience as a health professional (dichotomous categorical variable).

In the descriptive phase of the statistical analysis, categorical variables were presented as absolute and relative frequency, while for the description of numerical variables, measures of central tendency, variability and position were

used. Friedman test for related samples was used to compare the knowledge scores in the three moments (pre-test, immediate post-test and late post-test). For comparison of dependent variables (all numerical) between categorical independent variables with two groups, Mann-Whitney test was used and between categorical variables with three or more groups, Kruskal-Wallis test was used. Univariate and multivariate linear regression analysis with Stepwise Backward Wald selection criterion was also applied, with transformation by ranks of variables without normal distribution. The significance level adopted for the statistical tests was 5%, that is, $p<0.05$.

All norms governing research with human beings described in Resolution 466/12 of the National Health Council were observed. The project was approved by the Research Ethics Committee of the researchers' home institution (CAAE: 42738621.5.0000.5504) under protocol number 4.607.633.Participants' anonymity was ensured particularly because in quantitative studies they are not individually identified.

RESULTS

Initially, 93 mothers accessed the online form, agreed to participate in the study and answered the pre-test. However, 44 mothers did not attend the virtual meeting (telesimulation) even after successive contacts by the researcher for a new appointment. There were no dropouts in the third and fourth stages of the study. Therefore, 49 mothers of children younger than one year participated in the study.

The mean age of the participating mothers was 30.2 years. They had, on average, 1.18 children, aged 3.95 months. Regarding experience in the health area, 14 (28.57%) mothers stated that they had previously participated in courses on first aid during their professional training. Among the areas of professional training, the following stand out: caregivers for the elderly, nursing, pharmacy, nutrition, physiotherapy and speech therapy. The detailed characterization of the participants is shown in Table 1.

Friedman test for related samples was applied to analyze the contributions of telesimulation to the knowledge of mothers faced foreign body airway obstruction in children under 1 year of age. The test indicated a significant improvement in knowledge after the educational intervention, as shown in Table 2.

Next, the dependent variables related to knowledge were associated with the sociodemographic variables of interest (Table 3). The following significant differences were identified: higher pre-knowledge score among mothers who claimed to have experienced a situation of choking with other children ($p=0.003$) and among those who had professional experience in the health area ($p=0.007$); participants with complete higher education had greater promotion of immediate knowledge ($p=0.019$); greater promotion of immediate and late knowledge among mothers who had never experienced a choking situation with another child ($p=0.004$ and 0.008, respectively).

Simple linear regression analysis was also used to separately investigate the relationship between knowledge and the dependent variables, as shown in Table 4.

Statistically significant variables entered the multivariate linear regression model using the Stepwise Backward Wald method, in order to verify the relationship between them, as shown in Table 5.

Table 1 – Characterization of mothers of children under 1 year of age (n=49) according to sociodemographic variables. São Carlos, São Paulo, Brazil, 2021

Variables	Frequency	%
Schooling		
Primary/Secondary education	10	20.40
Incomplete higher education	8	16.33
Complete higher education	11	22.45
Postgraduate degree	20	40.82

Table 1 – Cont.

Variables	Frequency	%
Occupation		
Self-employed person	9	18.37
Unemployed	5	10.20
Housewife	8	16.33
Formal employment	27	55.10
Marital status		
With a companion	44	89.80
Without a companion	5	10.20
Choking of her child		
No	34	69.39
Yes	15	30.61
Choking of another child		
No	43	87.76
Yes	6	12.24
Experience in the health area		
No	35	71.43
Yes	14	28.57

Source: Research data, 2021.

Table 2 – Comparative analysis of knowledge scores between the three assessments (pre-test, immediate post-test and late post-test). São Carlos, São Paulo, Brazil, 2021

Knowledge	Mean	sd	Minimum	Q1	Median	Q3	Maximum	*p*
Pre-test	20.88	3.69	13.00	9.00	22.00	24.00	27.00	
Immediate post-test	25.61	2.61	15.00	25.00	26.00	27.00	29.00	<0.001
Late post-test	24.82	2.18	17.00	24.00	25.00	26.00	29.00	

Source: Research data, 2021.

Table 3 – Comparative analysis of knowledge scores between categorical variables (n=49). São Carlos, São Paulo, Brazil, 2021

Variables	Pre-test knowledge			Promotion of immediate knowledge			Promotion of late knowledge		
	Mean (sd)	Median	p	Mean (sd)	Median	p	Mean (sd)	Mean	p
Schooling**			0.264			0.019			0.052
Primary/Secondary	21.50 (3.54)	22.00		2.20 (2.86)	1.50		1.40 (2.41)	1.00	
Incomplete higher education	22.75 (2.92)	24.00		3.25 (3.20)	1.50		3.38 (3.74)	1.50	
Complete higher education	19.91 (3.05)	20.00		6.00 (3.52)	5.00		5.27 (3.93)	4.00	
Postgraduate degree	20.35 (4.25)	22.00		5.90 (4.39)	4.50		4.70 (4.16)	3.50	
Occupation**			0.346			0.093			0.076
Self-employed person	20.22 (4.18)	22.00		5.11 (4.28)	4.00		4.67 (4.77)	4.00	
Unemployed	20.40 (3.85)	19.00		6.40 (2.70)	7.00		5.60 (4.04)	6.00	
Housewife	22.38 (3.93)	23.50		2.13 (4.45)	1.00		1.50 (4.07)	1.00	
Formal employment	20.74 (3.54)	22.00		5.07 (3.79)	4.00		4.11 (3.40)	3.00	
Marital status*			0.842			0.715			0.881
With a companion	20.82 (3.81)	22.00		4.82 (4.06)	4.00		3.95 (3.83)	3.00	
Without a companion	21.40 (2.70)	22.00		4.00 (3.54)	4.00		3.80 (4.97)	3.00	
Choking of her child*			0.844			0.593			0.458
No	20.97 (3.50)	22.00		4.53 (4.02)	4.00		3.53 (3.49)	3.00	
Yes	20.67 (4.22)	22.00		5.20 (3.99)	4.00		4.87 (4.70)	4.00	
Choking of another child*			**0.003**			**0.004**			**0.008**
No	20.37 (3.65)	21.00		5.26 (3.98)	4,00		4.37 (3.98)	4.00	
Yes	24.50 (1.22)	24.00		1.00 (0.63)	1.00		0.83 (0.41)	1.00	
Experience in the health area*			**0.007**			0.161			0.112
No	19.97 (3.85)	20.00		5.31 (4.42)	5.00		4.57 (4.24)	3.00	
Yes	23.14 (1.99)	23.00		3.29 (2.09)	4.00		2.36 (2.31)	2.00	

Source: Research data, 2021.
*Mann-Whitney test **Kruskal-Wallis test.

Table 4 – Relationship between knowledge scores and variables of interest according to a simple linear regression model. São Carlos, São Paulo, Brazil, 2021

Variable	Pre-test knowledge			Promotion of immediate knowledge			Promotion of late knowledge		
	Beta* (SE)†	p-value	R²‡	Beta* (SE)†	p-value	R²‡	Beta* (SE)†	p-value	R²‡
Maternal age	-0.01 (0.17)	0.945	0.0001	-0.04 (0.17)	0.792	0.0016	0.01 (0.17)	0.930	0.0002
Child's age	0.13 (0.17)	0.439	0.0143	-0.19 (0.17)	0.276	0.0282	-0.19 (0.17)	0.266	0.0294
Number of children	0.18 (0.21)	0.412	0.0144	-0.51 (0.20)	**0.016**	0.1165	-0.35 (0.21)	0.103	0.055
Schooling									
Primary/Secondary	-			---			---		
Incomplete higher educ.	5.63 (6.66)	0.403		4.91 (6.19)	0.432		6.80 (6.38)	0.292	
Complete higher educ.	-6.86 (6.14)	0.270	0.0829	15.85 (5.70)	**0.008**	0.2082	15.44 (5.87)	**0.013**	0.1611
Postgraduate degree	-3.38 (5.44)	0.538		14.68 (5.05)	**0.006**		12.80 (5.21)	**0.018**	
Occupation									
Self-employed person	---			---			---		
Unemployed	-1.60 (7.90)	0.840		7.39 (7.61)	0.337		4.11 (7.58)	0.590	
Housewife	10.50 (6.88)	0.134	0.6905	-11.30 (6.63)	0.095	0.1339	-13.95 (6.60)	**0.040**	0.1431
Formal employment	1.72 (5.45)	0.753		0.87 (5.25)	0.869		-0.96 (5.23)	0.855	
Marital status									
With a companion	---			---			---		
Without a companion	1.34 (6.77)	0.844	0.0008	-2.45 (6,76)	0.719	0.0028	-1.00 (6.78)	0.883	0.0005

Table 4 – Cont.

Variable	Pre-test knowledge			Promotion of immediate knowledge			Promotion of late knowledge		
	Beta* (SE) †	p-value	R² ‡	Beta* (SE) †	p-value	R² ‡	Beta* (SE) †	p-value	R² ‡
Choking of her child									
No	---			---			---		
Yes	-0.86 (4.45)	0.847	0.00008	2.35 (4.43)	0.598	0.0060	3.27 (4.43)	0.464	0.0115
Choking of another child									
No	---			---			---		
Yes	18.33 (5.66)	**0.002**	0.1826	-17.66 (5.70)	**0.003**	0.1697	-16.43 (5.78)	**0.007**	0.1466
Exp. in the health area									
No	---			---			---		
Yes	12.20 (4.18)	**0.005**	0.1536	-6.30 (4.44)	0.163	0.0410	-7.15 (4.42)	0.113	0.0527

Source: Research data, 2021.

Table 5 – Relationship between knowledge scores and variables of interest according to a multivariate linear regression model (n=49). São Carlos, São Paulo, Brazil, 2021

	Variables	Categories	Beta* (SE) †	p-value	Partial R^2 ‡
Pre-test knowledge	Choking of another child	No	---		
		Yes	16.84 (6.39)	**0.012**	0.1514
Promotion of immediate knowledge	Choking of another child	No	---		
		Yes	-12.37 (5.80)	**0.040**	0.1473
	Schooling	Primary/Secondary	---		
		Incomplete higher educ	0.65 (6.48)	0.921	
		Complete higher educ	16.27 (5.56)	**0.006**	
		Postgraduate degree	14.04 (4.74)	**0.005**	0.2404
Promotion of lateknowledge	Occupation	Self-employed person	---		
		Unemployed	-4.90 (7.97)	0.543	
		Housewife	-17.42 (6.54)	**0.012**	
		Formal employment	-4.56 (5.48)	0.411	0.1630
	Choking of another child	No	---		
		Yes	-16.27 (6.08)	**0.011**	0.1390

Source: Research data, 2021.
* Beta: estimate value orslope of the regression line; SE: standard error of beta. R^2: coefficient of determination.

DISCUSSION

At first, it should be mentioned that very few studies have used telesimulation or even simulation among laypersons, and particularly among mothers of children. Thus, the discussion will be mostly permeated by studies that used other educational strategies.

According to the results presented, telesimulation promoted knowledge about the prevention and management of choking among mothers of children aged under 1 year old, with a significant difference between the knowledge scores in the different phases of the intervention. Similarly, a quasi-experimental study[14] that used an educational video about the dangers of asphyxia in the kitchen environment also identified significantly higher knowledge scores in the immediate post-test (p=0.001). Furthermore, an Iranian study that attempted to determine the effect of a mobile application on the prevention and management of foreign body aspiration in children also revealed a significant increase (p<0.001) in mothers' mean knowledge scores[15].

In the referred investigation, there was no statistically significant difference between the knowledge score in the immediate post-test and the late post-test. The mean of correct answers remained, respectively, between 25.61 and 24.82, which suggests the maintenance of knowledge over the months. This aspect corroborates again the abovementioned quasi-experimental study where the percentages of correct answers in the immediate post-test and late post-test remained close (77.6 and 72.98%)[14].

On the other hand, in a second study carried out in the inland of the state of São Paulo with 20 mothers of children under three years old, aged 16- 25 years old, after five months of an intervention consisting of eight meetings guided by the themes of the booklet called "Every Time is Time to Care", some themes again had a regular and insufficient rate of correct answers, suggesting the need for continuous educational actions[16].

In the present study, mothers who had completed higher education showed greater promotion of immediate knowledge (p=0.019). However, this difference did not occur in the pre-test. This result shows that telesimulation had a positive impact on mothers with a higher level of education, but that prior knowledge did not differ. In this regard, a study with 256 caregivers of children under 6 years of age in the city of Niterói, Rio de Janeiro, which analyzed knowledge about prevention of domestic accidents in childhood, also did not find a statistically significant relationship between educational level and prior knowledge of caregivers[17]. In contrast, a Turkish study with mothers of children aged 0- 6 years old reported that mothers with a higher educational level had higher scores on knowledge about domestic accidents in childhood[18].

Multivariate linear regression analyzes indicated an association between having experienced another child's choking situation and a higher pre-test knowledge score, as well as never having experienced a choking situation and greater promotion of immediate and late knowledge. This finding allows us to infer that educational strategies mediated by simulation are potentially capable of promoting significant and permanent knowledge among laypersons, as they allow the participants to experience a situation that is very close to reality in a safe and controlled environment, similar to what happens with health students and professionals.

Approximately 30% of the mothers stated that they had already experienced a situation where their own children had choked. However, such experience did not influence knowledge scores. On the other hand, the previously referenced Turkish study reported that mothers with children with no previous history of domestic accidents had higher knowledge scores compared to mothers with children with a previous history of accidents (168.02 and 153.16 points, respectively)[18]. On the other hand, in a second study in Egypt that assessed the effect of an educational intervention on domestic accidents, including choking, among mothers of preschool children living in rural areas, histories of accidents with their children were predictive of mothers' knowledge on the subject[19].

Although the findings of the present study are supported by the literature, its limitations must be pointed out. The first limitation concerns the significant loss of participants between the first and second stages of the study, and the second is related to the infeasibility of control by the researchers on whether or not to carry out the reading prior to the tele-simulation stage. Other limitations of the study are non-inclusion of caregivers other than mothers, lack of criteria that would guarantee greater socioeconomic diversity in the composition of the group and non-randomization of questions or alternatives in the knowledge questionnaire.

CONCLUSIONS

The present study aimed to analyze the contributions of telesimulation to the knowledge of mothers faced with foreign body airway obstruction in children under 1 year of age and identify the related factors. The results shown met the objectives and answered the research questions. In general, telesimulation promoted a significant improvement in the levels of knowledge, especially among those mothers who said they had never experienced a situation of choking before and that had a higher level of education.

The present study has social relevance, particularly due to the potential of this educational intervention in preventing choking, as well as enabling a quick and effective action in the care of a choking child, consequently reducing irreversible sequelae or even death. In view of the above, it is recommended that health professionals incorporate the practice of educational activities that allow, in a safe and controlled environment, exposure of these mothers to a situation of choking, i.e. greater investment in actions mediated by simulation. Finally, the educational intervention developed in this study has great potential for practical application, as the video of the simulated scenario, as well as the guiding questions used in the debriefing, can be made available free of charge to interested health professionals.

REFERENCES

1. Silva FL, Galindo Neto NM, Sá GGM, França MS, Oliveira PMP, Grimaldi MRM. Technologies for health education about foreign-body airway obstruction: an integrative review. Rev Esc Enferm USP. 2021;55:e03778. doi: https://doi.org/10.1590/S1980-220X2020035103778
2. Brkic F, Umihanic S, Altumbabic H, Ramas A, Salkic A, Umihanic S, et al. Death as a consequence of foreign body aspiration in children. Med Arch. 2018;72(3):220-3. doi: https://doi.org/10.5455/medarh.2018.72.220-223
3. Lumsden AJ, Cooper JG. The choking hazard of grapes: a plea for awareness. Arch Dis Child. 2017;102(5):473-4. doi: https://doi.org/10.1136/archdischild-2016-311750
4. Lorenzoni G, Azzolina D, Baldas S, Messi G, Lanera C, French MA, et al. Increasing awareness of food-choking and nutrition in children through education of caregivers: the CHOP community intervention trial study protocol. BMC Public Health. 2019;19(1):1156. doi: https://doi.org/10.1186/s12889-019-7469-7
5. Naik N, Finkelstein RA, Howell J, Rajwani K, Ching K. Telesimulation for COVID-19 ventilator management training with social- distancing restrictions during the coronavirus pandemic. Simul Gaming. 2020;51(4):571-7. doi: https://doi.org/10.1177/1046878120926561
6. Diaz MCG, Walsh BM. Telesimulation-based education during COVID-19. Clin Teach. 2021;18(2):121-5. doi: https://doi.org/10.1111/tct.13273
7. Gutierrez-Barreto SE, Argueta-Muñoz FD, Ramirez-Arias JD, Scherer-Castanedo E, Hernández-Gutiérrez LS, Olvera-Cortés HE. Implementation barriers in telesimulation as an educational strategy: an interpretative description. Cureus. 2021;13(9):e17852. doi: https://doi.org/10.7759/cureus.17852
8. Mileder LP, Bereiter M, Wegscheider T. Telesimulation as a modality for neonatal resuscitation training. Med Educ Online. 2021;26(1):e1892017. doi: https://doi.org/10.1080/10872981.2021.1892017
9. Polit DF, Beck CT. Fundamentos da pesquisa clínica em enfermagem: avaliação da evidência para a prática de enfermagem. 7. ed. Porto Alegre: Artmed; 2011.
10. Camilo BHN. Contribuições da telesimulação na autoeficácia e conhecimento de mães diante obstrução de vias áreas por corpo estranho em crianças menores de um ano [dissertação]. São Carlos: Universidade Federal de São Carlos; 2022 [cited 2022 Jul 25]. Available from: https://repositorio.ufscar.br/handle/ufscar/15868
11. Brennan BA. Prebriefing in healthcare simulation: a concept analysis. Clin Simul Nurs. 2021;56:155-62. doi: http://doi.org/10.1016/j.ecns.2021.04.015
12. Bonetti S, Góes FN. O que fazer quando seu bebê engasgar? [Internet]. Ribeirão Preto: Escola de Enfermagem de Ribeirão Preto/ USP; 2016 [cited 2022 Jul 25]. Available from: https://gruposdepesquisa.eerp.usp.br/gpecca2/wp-content/uploads/2014/06/oque_fazer_quando_seu_bebe_engasgar.pdf
13. Jeffries PR. Simulation in nursing education: from conceptualization to evaluation. 3. ed. Washington: National League for Nursing; 2021.
14. Bentivegna KC, Borrup KT, Clough ME, Schoem SR. Basic choking education to improve parental knowledge. Int J Pediatr Otorhinolaryngol. 2018;113:234-9. doi: https://doi.org/10.1016/j.ijporl.2018.08.002
15. Behboudi F, Pouralizadeh M, Yeganeh MR, Roushan ZA. The effect of education using a mobile application on knowledge and decision of Iranian mothers about prevention of foreign body aspiration and to relieve choking in children: a quasi-experimental study. J Pediatr Nurs. 2022;62:e77-e83. doi: https://doi.org/10.1016/j.pedn.2021.07.007
16. Silva FB, Gondim EC, Henrique NCP, Fonseca LMM, Mello DF. Educational intervention involving young mothers: gaining knowledge on childcare. Acta Paul Enferm. 2018;31(1):32-8. doi: https://doi.org/10.1590/1982-0194201800006
17. Santos RR, Machado MED, Gomes ALM, Aguiar RCB, Christoffel MM. Prevention of domestic accidents in childhood: knowledge of caregivers at a health care facility. Rev Bras Enferm. 2022;75(2):e20210006. doi: https://doi.org/10.1590/0034-7167-2021-0006
18. Kahriman L, Karadeniz H. Effects of a safety-awareness-promoting program targeting mothers of children aged 0-6 years to prevent pediatric injuries in the home environment: implications for nurses. J Trauma Nurs. 2018;25(5):327-35. doi: https://doi.org/10.1097/JTN.0000000000000384
19. El Seifi OS, Mortada EM, Abdo NM. Effect of community-based intervention on knowledge, attitude, and self-efficacy toward home injuries among Egyptian rural mothers having preschool children. PloS One. 2018;13(6):e0198964. doi: https://doi.org/10.1371/journal.pone.0198964

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