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ORIGINAL ARTICLE

KNOWLEDGE OF NURSERY WORKERS ABOUT FIRST AID MEASURES WITH CHILDREN BEFORE AND AFTER ACTIVE TRAINING

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ABSTRACT

Objective: to identify changes in the knowledge of nursery workers after active educational intervention in first aid measures with children in the school environment. **Method**: a quasi-experimental study of the before and after type with a single comparison group composed of 134 workers from the six public nursery centers in a Brazilian municipality, through voluntary adherence offered to the entire study population. First aid training consisted of 16 hours/class and used active learning methods. A closed questionnaire with nine simulated situations assessed the knowledge before and after the intervention. The R Core Team 2020 software was used in the analysis, and a significance level of 5% and the McNemar non-parametric test were used for the purpose of the intervention. **Results:** there was a statistically significant increase in correct answers after training in the following subjects: cardiorespiratory arrest; convulsion; choking; electric shock; trauma, fall; bleeding, and poisoning. The main differences in terms of correct answers before and after were found for choking (77.6% to 98.5%), trauma (75.3% to 94.7%), poisoning by ingestion (70.8% to 86.5%), and convulsion (87.3% to 98.5%). **Conclusions:** the training expanded the knowledge about all the themes, with the exception of burns (p = 0.248). The socio-cultural context must be considered, as well as the workload distributed between theory and practices. Nurses can be the reference professionals to teach such courses.

Keywords: First Aid. Health education. Nurseries. School Teachers. Knowledge.

INTRODUCTION

Law 13,722 was sanctioned in Brazilin October 2018 to give a mandatory character to the provision of training in basic notions of first aid to teachers and employees of public and private education establishments in basic education and child recreation establishments[1].

Among the studies published on this topic in the country, it is observed that since January 2011, health professionals had already pointed out an important deficit in the knowledge about first aid practices in early childhood teachers, as well as the fact that they had already undergone several school situations that needed immediate assistance[2].

A survey conducted in 19 nursery centers in a Brazilian capital showed that 62.8% of the educators had already witnessed accidents with children in a school environment, such as falls, injuries and fractures. However, 98% did not believe that drowning could happen in nursery centers, as well as foreign body aspiration (70.3%), electric shock (93.2%), injuries (52.7%), fractures (80.4%), and others (92.6%)[3].

Brazilian data indicate that the main causes of accidental death in children aged 1 to 4 years are: 1st) Drowning; 2nd) Transit; 3rd) Suffocation; 4th) Burn; 5th) Fall; 6th) Poisoning. And the main reasons for hospitalization for accidents in that age group are: 1st) Falls; 2nd) Burns; 3rd) Transit; 4th) Poisoning; 5th) Suffocation; 6th) Drowning[4].

Compilations of data on the occurrence of these types of accidents in nursery centers and preschools in Brazil are not yet attainable, but it is known that any child or baby can be exposed to life-threatening situations considered preventable

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in these environments, and educators or school staff may be able to provide first aid.

According to the Red Cross, first aid is defined as immediate assistance to a sick or injured person until professional help arrives. Initial care includes physical assistance, but also psychosocial support. Any 'lay person' can obtain basic knowledge and skills to become a first aid provider[5].

According to Law 13.722, first aid courses for teachers and workers of Basic Education and child recreation must be offered by the work establishments themselves and taught by specialized municipal/state entities or by properly qualified professionals[1]. However, the law did not indicate a minimum workload or the type of educational approach recommended for the public.

Authors point out that until today there is no consensus on educational results or measurement tools for basic training with the population on first aid, which differs, for example, from several surveys that recommend active learning methods for training professionals in the field of health[6].

Randomized controlled clinical trial conducted with 502 lay people in first aid measures identified that their knowledge and skills significantly decreased two years after carrying out standard basic training, even despite undergoing refreshing after one year. These levels of knowledge, on the other hand, remained significantly above the previous ones, and the people who participated in the refresher course had better skills retention over time[7].

In the area of health training, a Brazilian randomized clinical trial used an active teaching model associated with problem-based learning in first aid and identified that the intervention was effective in stimulating and mediating knowledge, with significant results for the testedgroup of undergraduate nursing students[8].

In active learning methodologies, the student is an active agent in the construction of knowledge through reflective pedagogical processes. Some are based on problematization as a teaching strategy, have as a starting point the reality of the apprentice's life, are supported by the discovery processes, and the contents are offered in the form of problems[9].

This study considers active methods as possible educational resources in the training of early childhood teachers on first aid measures and aimed to identify changes in the knowledge of nursery workers after an active educational intervention in first aid with children in the school environment.

METHODS

This is a quasi-experimental research of the before/after type with a single comparison group, carried out in all public educational centers known as community nursery centers serving children from 6 months to 5 years of age in a countryside municipality with approximately 95,000 inhabitants, in the state of Sergipe, Brazil.

The six nursery centers housed a total of 167 workers in the professional categories of teacher, caregiver, cook, secretary, caretaker, director, laundress and watchman, with working hours on weekdays of 11 hours a day and total care for 684 children, an average 114 per location.

The research was divided into four stages: 1) Situational diagnosis; 2) Pre-test; 3) Educational intervention; 4) Post-test. The researchers chose to include all workers of the six nursery centers (N = 167) in order to expand the access to knowledge and offer a social return to the municipality. Upon voluntary adherence after the research was released, employees of nursery centers who agreed to participate signed the Informed Consent Form (ICF).

In the situational diagnosis, a questionnaire with open questions was developed by the researchers and applied to 89 workers to obtain data about the main accidents with children in school environments in general, based on previous knowledge and experiences. This stage provided the direction of the themes for planning and executing the educational intervention, as well as for the elaboration of the instrument for assessment of knowledge. Employees who were not present at the day of visiting/collecting data in the nursery center due to absence from work, vacation, leave and unavailability of time were excluded in this stage.

The pre-test (n = 155) and post-test (n = 134) stages consisted of the application of a questionnaire with closed questions, which was subjected to a pilot test with 10 employees, aiming to compare previous and acquired knowledge with educational intervention. The standard time interval between the application of the pre- and post-test was 2 months. Workers who

participated in the pilot test but later went on vacation or requested leave from work were excluded from the pre-test stage and were not included in the intervention stage; and those who did not obtain a minimum frequency of 75% in training were excluded from the post-test.

The knowledge assessment questionnaire applied in the pre-test and post-test was composed of nine objective questions with the description of problem situations with children suffering accidents in the school environment, reviewed by two nursing teachers who are experts in the subject. The questions offered the possibility of choosing a correct first aid action among multiple alternatives. They addressed the following themes: Cardiorespiratory Arrest (CRA) (Number 1); convulsion (Number 2); choking (Number 3); electric shock (Number 4); burn (Number 5), trauma (Number 6); fall and hemorrhage (Number 7); ingestion poisoning (Number 8); and poisoning by contact (Number 9).

The pre-test stage also collected information about the participants' sociodemographic data, realization of previous training on first aid measures, descriptions of accident experiences in the school environment, and number of these events witnessed in the current workplace.

Educational interventions, with a total workload of 16 hours, were carried out from June to August 2016 through thematic workshops conducted by eight nursing students from the 4th and 5th years, trained in first aid measures (40 hours). All were members of the university outreach project "Help in nursery centers: teaching first aid measures to child caregivers" at Campus Prof. Antônio Garcia Filho of the Federal University of Sergipe, which has its eight undergraduate courses in the health field based on active learning methodologies.

The project was coordinated and supervised by an effective professor from the Nursing Department, with expertise in the Urgency and Emergency area. The training of facilitators took place through Team-Based Learning (TBL), an active learning method commonly used in undergraduate courses to strengthen the knowledge on the subject, increase safety levels in conducting and interacting in groups, and standardizing languages for conducting educational workshops.

In the theoretical approach of the subject (8 hours), the facilitators divided the workers into groups by workplace and developed two educational workshops based on the problematization method through contextualization and discussion of cases that portrayed children suffering accidents at nursery centers, according to the themes listed in the stage of situational diagnosis. In the practical approach (8 hours), the workers were divided into 13 subgroups, with an average of 10 participants, to carry out a simulation in first aid, with the helpof didactic resources such as child simulators.

The proportion of theoretical/practical workload distributed by subject was as follows: PCR - 2h/2h; convulsion - 1h/1h; choking 1h/1h; electric shock - 1h/1h; burn 30'/30'; trauma 1h/1h; fall and hemorrhage 1h/1h; and poisoning - 30'/30'.

Data were tabulated in the Microsoft Excel software. Categorical variables were described by means of absolute frequency and relative percentage. The McNemar's nonparametric test, appropriate for binary variables in paired design, was applied to assess the effect of the intervention on the participants' knowledge. Missing data were presented in descriptive statistics, but discarded in the hypothesis tests. The R Core Team 2020 software was used and the significance level of 5% was adopted. The test developed by McNemar assessed the efficiency of "before" and "after" situations, in which each participant was used as his own control.

The study was approved by the Research Ethics Committee of the Federal University of Sergipe, under Opinion nº1,686,057, CAAE nº 58029316.5.0000.5546, and followed the ethical and legal precepts of research involving human beings, keeping the information of the city studied confidential.

RESULTS

The survey's situational diagnosis (n = 89) revealed that 85.3% (n = 76) of workers had already witnessed some type of incident with children in the school environment, with a total of 233 different situations reported. The researchers grouped them as: 130 (55.7%) falls, 16 (6.8%) seizures, 6 (4.6%) fractures, 5 (2.1%) choking cases, and 90 (38.6%) other injuries - cuts, bites, and insertion of foreign bodies. Situations of the type CRA, electric shock, burns, and poisonings were not mentioned by the workers, however they

were considered relevant by the researchers to beincluded in the educational workshops.

The sample was entirely female, 100% (n = 134), with a mean age of 42.06 (± 9.92) years. The majority came from the same city of work, 75% (n = 101), declared themselves to be Catholic, 87.3% (117), reported being married, 39.5% (n = 53), and being a mother, 80.6% (n = 108), with an average of 2.35 (± 1.09) children per woman. Complementary data on the sample's sociodemographic characterization are shown in Table 1.

Table 1. Characterization according to function at work and education of workers of nursery centers participating in the study (n = 134). Sergipe, Brazil, 2016

Characteristic	n	%
Function at work		
Child caregiver	76	56.7
Teacher	10	7.4
Servant	9	6.7
Administrative agent	5	3.7
Attendant at the snackbar	4	2.9
Cook	3	2.2
Director	2	1.5
Washerwoman	1	0.7
Other/Not informed	24	17.8
Education		
Incomplete elementary school	44	32.8
Complete elementary school	3	2.2
Incomplete high school	27	20.1
Complete high school	37	27.6
Incomplete University Education	5	3.7
Complete University Education	16	11.9
Not informed	2	1.4
Total	**134**	**100.0**

As for monthly family income, the majority stated that they earnedup to one minimum wage per month, 71.6% (n = 96). Almost the entire sample, 97.1% (n = 130), had only this employment bondand worked only a single shift per day, with an average of 7.89 years of work at the place.

With regard to previous first aid training, only 5.3% (n = 7) had already taken courses and the training site mentioned was the National Service for Commercial Apprenticeship (SENAC). It is noteworthy that 94.7% (n = 127) had never undergone this type of training.

Regarding information about having witnessed accidents with children at the nursery center where they work, 46.7% (n = 62) reported this experience. The approximate number of incidents per month was also mentioned by the workers and calculated as an average of 1.72 per month.

The McNemar statistical test showed that there was significance ($p < 0.05$) in the increase of correct answers in all the questions investigated, except in the question on burns. Table 2 compares the average of correct answers and errors before and after the intervention.

Table 2. Analysis of nurseryworkers' responses aboutfirst aid measures before and after participating in the educational activity. Sergipe, Brazil, 2016

Question Topic	Before n (%)		After n (%)		Test*
	RIGHT	WRONG	RIGHT	WRONG	
Choking	104 (77.6)	30 (22.4)	132 (98.5)	2 (1.5)	<0.001
Trauma	101 (75.3)	33 (24.7)	127 (94.7)	7 (5.3)	<0.001
Poisoningby ingestion	95 (70.8)	39 (29.2)	116 (86.5)	18 (13.5)	<0.001
Seizure	117 (87.3)	17 (12.7)	132 (98.5)	2 (1.5)	<0.001
Electric shock	122 (91.0)	12 (9.0)	134 (100)	-	0.001
Fall and bleeding	119 (88.8)	15 (11.2)	128 (95.5)	6 (4.5)	0.007
Cardiorespiratory arrest	122 (91.0)	12 (9.0)	128 (95.5)	6 (4.5)	0.041
Poisoning bycontact	99 (73.8)	35 (26.2)	105 (78.3)	29 (21.7)	0.041
Burn	113 (84.3)	21 (15.7)	116 (86.5)	18 (13.5)	0.248

*McNemar test

Before the educational intervention, actionswith the highest rates oferrors were as follows: choking - slapping the choked child on the back (10.4%); fracture - running straight to the hospital (14.9%); poisoning by ingestion - offering milk (14.9%) and inducing vomiting (12.6%); convulsion - containing the child's movements (4.4%) and do nothing (4.4%); electric shock - just waiting for help in cases of electric shock (3.7%); hemorrhage –draining the bleeding lesions (8.2%); CRA – getting desperate and not knowing what to do (7.4%); poisoning by contact: offering milk or other liquids (17.1%); and burn - putting cloth in the burnedsite(4.4%).

After the educational intervention, actionswith the highest rates of errorswere as follows: choking - trying to remove the object causing the choking (1.4%); fracture - performing limb movements in situations of fracture (2.9%); poisoning byingestion - inducing vomiting (15.6%); convulsion - containing the child's movements (1.4%); hemorrhage - tighten the lesions to clean the contaminated blood (5.2%); CRA - getting desperate and not knowing what to do (3.7%); poisoning bycontact - offering milk or other liquids (21.6%); and burn – putting cloth on the burnedsites (14.9%). There were no errors in the themeelectric shock.

Before the intervention, only 1.5% (n = 2) of the participants stated that they were completely able and confident to provide the first aid measuresto help a child who was victim of injury problem at school. This number rose to 28.4% (n = 38) after the intervention, which represents a significant finding in the study.

DISCUSSION

In the present study, 85.3% of the workers had already witnessed some type of accident with children in the school environment in general. This is similar to the findings of a Brazilian studycarried out with early childhood and elementary teachers, in which 71% hadalready witnessed situations of the type of seizure, fainting, venomous animal sting, hemorrhage, electric shock, asthmatic crisis, drowning, burns, intoxications, and CRA in schools[10].

The study participants were all female; it was observed that the presence of women as child educators is linked to the culture of maternal care. However, an observational study identified the same levels of attention, sensitivity and stimulation for children in male and female caregivers from nursery centers[11].

The vast majority (80.6%) of the participants were also mothers. A Brazilian research with a qualitative approach highlighted that the maternal experience positively influenced the knowledge of schoolteachers about first aid[12]. An Iranian quantitative study did not find this relationship, but pointed out that the personal, sociocultural and instructional characteristics of teachers can differ greatly between countries and influence this knowledge in different ways[13].

Even though the participants were working for a reasonable time in nursery centers and, in the case of most of them, hada single job, only 5.3% had taken some kind of previous first aid course. This isa much lower number compared to that found in the survey carried out in 2017 with technical teams from educational centers in the state of Mato Grosso, in which 53.9% of people had already taken first aid training, even before the publication of Law 13.722[14].

The subject choking obtained 77.6% of correct answers in the pre-test and 98.5% in the post-test, which was considered the most significant difference in the study. Actionswith the greatest incidence of errors were 'slapping the choked child on the back', with 10.4% (before), and 'trying to remove the object causing the choking', with 1.4% (after). Choking is a major cause of death from asphyxiation in children. Law 13.722 itself became known as Lei Lucas, after the child died of asphyxiation by food in a school, and the teachers did not perform first aidin the moment[15]. A survey of 50 primary school teachers revealed that most are unaware of first aid measures in cases of suffocation inchildren, but after a simple educational intervention, the average knowledge on the subject went from 17.6 to 24.7 points ($p < 0.05$)[16].

The subject trauma obtained 75.3% of correct answers in the pre-test and 94.7% in the post-test, with the appropriate action 'immobilizing the arm, calming the child and takingitto the hospital'. The main mistakes were 'running straight to the hospital', with 14.9% (before), and 'performing limb movements in situations of

fractures', with 2.9% (after). Research pointed out the main causes of trauma in children seen at an emergency room in the order of prevalence: fall to another level; fall from own height; stumbling against objects; torsion; and cuts with sharp instruments. In addition to knowing first aid measures, adults should consider that most of these risk situations can be easily avoided with protective and preventive measures[17].

The subjects fall, hemorrhage and CRA obtained the same percentage (95.5%) of correct answers after the intervention, which was considered a positive aspect. These workshops totaled 6 hours of training (three theoretical and three practical) and had the largest number of practical simulations in simple problem situations. It appears that the current recommendation is that the teaching process about cardiopulmonary resuscitation (CPR) be simplified in the training of lay people. After a period of 2 months, a randomized clinical trial assessed as significant ($p < 0.01$) the performance of the people who participated in a simple 2-hour class on CPR training compared to the group with standard training[18].

The subject seizure obtained 87.3% correct answers in the pre-test and 98.5% in the post-test, and the conduct 'containing the child's movements' had its errors reduced from 4.4% to 1.4%. Research from Mato Grosso revealed that after an educational intervention with only 90 theoretical minutes and 40-50 practical minuteson various topics related tofirst aid, the knowledge of primary school teachers about seizures increased from 22.4% to 77.6%[14].

The only topic that got all questions correctly answered in the post-test was electric shock. The workers showed great interest on the subject during the workshops and the actionwith the greatest errors in the pre-test was 'just waiting for help in cases of electric shock' (3.7%). Correct handling in situations of electric shock was also the issue with the greatest number of correct answers after an educational intervention with 90 theoretical minutes and 30-50 practical minutes on various topics related to first aid with 162 schoolprofessionals with university educations[19].

The evaluation of the subject poisoning was divided into poisoning by ingestion and by contact (cutaneous and ocular) with toxic substances, with differences in the percentage of correct answers before and after, respectively, from 70.8% to 86.5% ($p < 0.001$) and from73.8% to 78.3% ($p = 0.041$). Nevertheless, the greatest number of errors wasfound in these subjects, and particularly the percentage of errors in the action inducing vomiting' increased from 12.6% to 15.6% and in the action 'offering milk or other liquids' increased from 17.1 to 21.6%. This finding caught the attention of the researchers, as it indicates the need to expand the time dedicated to poisoning during the intervention (> 1h) with an approach in two separate workshops, considering the relevance of these types of accidents among children.

Data from the Toxicological Information and Assistance Center (CIATOX) of Campinas/SP demonstrated the occurrence of 737 cases of exposures of children up to 7 years old to sanitizers for home use, legal and clandestine, in the period of one year. Most cases (79.6%) occurred in children under 3 years old, and the main routes were oral (97.2%) and cutaneous (6.6%). Before contacting the center, family members offered milk, other fluids and food in 76 cases, of which 37 had ingested caustics and 11 hydrocarbons; in 11 patients vomiting was also induced at home[20]. Training should focus on these actions in nursery centers, as these institutions also use sanitizers and are constantly cleaning the environment to maintain hygiene with babies and younger children.

Burns, on the other hand, was the subject that obtained the smallest difference in correct answers before (84.3%) and after (86.5%) the intervention, and the action 'placing cloth on the burned site' had the number of errors increased from 4.4% to 14.9%. This was another fact that calledthe attention of the researchers, considering that all nursery centers had kitchens and served hot preparations to children.

The workshops on burns and poisoning, that is, those that had the lowest practical and theoretical 30'/30' workload among the others, were the ones that had the least changes in the rates of correct answers after the intervention, and presented an increase of errors in specific actions despite improvement in the general knowledge. It is also noteworthy that the cultural factor may have influenced these cases, since the wrong behaviors are strongly rooted in this rural population that values milk as a saving food and witnesses wrong approaches in the various

experiences of burns that occur in the June festivities.

The limitations of this study were related to having been carried out only in public nursery centers, in a single city, without a control group for analysis of changes, and with data collection prior to the publication of the Lucas Law. However, the studyrevealed a local panorama that can serve as a basis for future comparisons with diverse and similar groups, before and after the mandatory training of professionals provided for in the law, and stimulate new studies on the theme focusing on the quality of the educational approach, preferably controlled trials.

CONCLUSION

A simplified 16-hour first aid training in childhood with the use of active learning methods such as problematization and simulations based on problem situations that portray reality and involving subjects previously identified as relevant for workers of the nursery centers was significant to increase in knowledge on all topics addressed, with the exception of burns (p = 0.248).

First aid training for nursery/school workers can be provided by qualified nurses and representa wide field of professional and entrepreneurial scope in Brazil. Nursing can develop new educational approaches, learning technologies and add social value to a much needed job in the country. This fact reinforces the need for training nurses as health educators.

For the development of future studies, it is recommended that a greater workload of the subjects burns and poisonings and the socio-cultural context considered as relevant in this work. It is hoped that further studies will be able to evaluate the maintenance of this knowledge in the medium and long term, also considering the interval for carrying out refreshing courses provided by the institutions.

CONHECIMENTOS DE FUNCIONÁRIOS DE CRECHES SOBRE PRIMEIROS SOCORROS COM CRIANÇAS ANTES E APÓS TREINAMENTO ATIVO

RESUMO

Objetivo: identificar mudanças no conhecimento de funcionários de creches após intervenção educacional ativa em primeiros socorros com crianças no ambiente escolar. **Método:** estudo quase-experimental, do tipo antes e depois, com grupo único de comparação composto por 134 funcionários das seis creches públicas de um município brasileiro, mediante adesão voluntária ofertada a toda população do estudo. O treinamento em primeiros socorros contou com 16 horas/aula e utilizou métodos ativos de aprendizagem. Um questionário fechado com nove situações simuladas avaliou o conhecimento antes/após. Utilizou-se o *software* R Core Team 2020, nível de significância 5% e o teste não paramétrico de McNemar para efeito da intervenção. **Resultados:** houve um aumento estatisticamente significativo de acertos após o treinamento nos seguintes assuntos: parada cardiorrespiratória; convulsão; engasgo; choque elétrico; trauma, queda; hemorragia; e intoxicação. As principais diferenças nos acertos antes e após foram engasgo (77,6% para 98,5%), trauma (75,3% para 94,7%), intoxicação por ingestão (70,8% para 86,5%) e convulsão (87,3% para 98,5%). **Conclusões:** o treinamento ampliou conhecimentos acerca de todas as temáticas, com exceção de queimaduras (p=0,248). O contexto sociocultural deve ser considerado, bem como a carga horária distribuída entre teoria e práticas. Os enfermeiros podem ser os profissionais de referência para ministrar tais cursos.

Palavras-chave: Primeiros Socorros. Educação em Saúde. Creches. Professores Escolares. Conhecimento.

CONOCIMIENTOS DE LOS EMPLEADOS DE GUARDERÍAS SOBRE PRIMEROS AUXILIOS A NIÑOS ANTES Y DESPUÉS DEL ENTRENAMIENTO ACTIVO

Objetivo: identificar cambios en el conocimiento de empleados de guarderías tras intervención educativa activa en primeros auxilios a niños en el ambiente escolar. **Método:** estudio casi-experimental, del tipo antes y después, con grupo único de comparación compuesto por 134 empleados de las seis guarderías públicas de un municipio brasileño, mediante adhesión voluntaria ofrecida a toda población del estudio. El entrenamiento en primeros auxilios contó con 16 horas/clasey utilizó métodos activos de aprendizaje. Un cuestionario cerrado con nueve situaciones simuladas evaluóel conocimiento antes/después. Se utilizó el *softwareR Core Team* 2020, nivel de significancia 5% y la prueba no paramétrica de McNemar para efecto de la intervención. **Resultados:** hubo un aumento estadísticamente significativo de aciertos después del entrenamiento en los siguientes asuntos: paro cardiorrespiratorio; convulsión; atragantamiento; choque eléctrico; trauma, caída; hemorragia; e intoxicación. Las principales diferencias en los aciertos antes y después fueron atragantamiento (77,6% para 98,5%), trauma (75,3% para 94,7%), intoxicación por ingestión (70,8% para 86,5%) y convulsión (87,3% para 98,5%). **Conclusiones:** el entrenamiento amplió conocimientos acerca de todas las temáticas, con excepción de quemaduras (p=0,248). El contexto sociocultural debe ser considerado, así como la carga horaria distribuida entre teoría y prácticas. Los enfermeros pueden ser los profesionales de referencia para dar tales cursos.

Palabras clave: Primeros auxilios. Educación en salud. Guarderías. Profesores escolares. Conocimiento.

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