



Effects of simulation-based education on Ghanaian parents' knowledge, attitude and management of fever control

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Abstract

Background: Childhood fever is very discomforting and most parents are usually anxious when children exhibit fever, leading to unnecessary visits and admissions into pediatric emergency centers.

Objectives: This study aimed to determine the effects of simulation-based education on parents' knowledge, attitude, and management of fever in children.

Methods: A non-randomized quasi-experimental study using convenient sampling was conducted to recruit parents of children aged 3 months to 8 years admitted to the Tamale Teaching Hospital in Tamale, Ghana. The study was conducted from July to September 2019. Eighty parents were equally assigned into an intervention group and a control group and respectively educated using simulation-based and routine education approaches on childhood fever. Data were collected using a four-part questionnaire and analyzed using descriptive statistics, Chi-square, independent samples t, and paired t tests as well as analysis of covariance.

Results: Except for the mean baseline knowledge ($P < 0.0001$), there were no significant differences between the two groups in mean pretest scores. The mean scores of fever knowledge, attitude, and management of parents in the simulation-based education group were 21.63 ± 2.40 , 28.48 ± 6.03 , and 25.15 ± 4.23 at baseline and increased to 26.38 ± 4.36 , 28.48 ± 6.03 , and 32.33 ± 5.18 , respectively ($P < 0.0001$). All mean scores on the posttest were better than on the pretest in both groups. However, at the posttest, mean scores for knowledge, attitude, and management were significantly higher in the simulation-based education than in the routine education group ($P < 0.05$).

Conclusion: Compared with routine education, simulation-based education was more effective in improving parents' knowledge, attitude, and management of fever. We therefore, recommend the use of similar simulation-based methods in educating parents regarding caring for acute fever in their children.

Keywords: Fever, Education, Knowledge, Attitude, Parents, Child.

Introduction

Fever is defined as a body temperature above 38°C and usually results from injuries, infections, and immune responses.^[1,2] It is the main reason for up to 70% of pediatric emergencies.^[3] Fever is usually benign and useful in producing antibodies, and usually resolves without complications, except in severe bacterial infections.^[4] However, parents are anxious when children have fever.^[5]

About 32% to 56% of children with fever often come to health facilities for management,^[6] and about 4% experience febrile convulsions.^[7] Some studies in Africa have shown that most parents self-diagnose and self-medicate for fever in their children. They usually use physical methods such as sponging with cold water, herbal medicines (grounded garlic), and homeopathic medicines to treat fever.^[8,9] The revised Integrated Management of

Childhood Illnesses Strategy is the protocol used to manage all fever-related childhood illnesses.^[10,11] Despite the existence of the protocol, parents and healthcare workers still express fears about managing fever.^[12] Innovative care approaches and parental education on childhood fever are therefore necessary.^[1,13]

Simulation-based education methods mimic and amplify real-life experiences with guided experiences that replicate substantial aspects of the real world in interactive environments.^[14] Nurses can use simulation-based education in the form of experiments, scenarios, role playing/modeling, standardized patients, high human fidelity, videos, and other technological innovations, to educate their peers, clients, and students.^[15]

While traditional face-to-face education methods are still useful, simulation methods offer additional benefits by improving parents' information, motivation, and behavioral skills.^[16-20]

Many parents still lack appropriate knowledge, attitudes, and skills in managing fever in children.^[3,21] As a result, several studies have sought the best educational methods that impact knowledge, attitude, and practice of fever management.^[21] Consistently, positive outcomes have been revealed with patient satisfaction, improved fever knowledge, and positive attitudes even though the forms of education used varied.^[20,22-24] In a study, fever awareness increased by 68% in the group that was exposed to educational video messages and by 25% in the group that received a standard pamphlet.^[25] In another study, caregivers who had received a fever management video demonstrated better knowledge and attitude about fever in children than the group who watched a video about child safety.^[26] Another study by Moon *et al.*,^[27] showed that parents' knowledge improved better after watching short video messages than those who received text messages.^[28] In all of these studies video education was compared with methods such as educational texts or control videos but was not combined video education with face-to-face interactive methods. Given the lack of adherence to the Integrated Management of Childhood Illness's recommendations about childhood fever, it is necessary to compare the effectiveness of simulation-based education versus routine education on parents' knowledge, attitude, and management of fever control.

Objectives

This study aimed to determine the effects of simulation-based education on parents' knowledge, attitude, and management of fever in children.

Methods

Study design and participants

We conducted a nonrandomized quasi-experimental study at Tamale Teaching Hospital in Ghana. The study was conducted from July to September 2019. The sample size was calculated using the results of a previous study where simulation-based education on fever management in children increased the parental management behavior score from 2.19 ± 1.52 to 3.12 ± 1.3 .^[20] Then, using the formula for the comparison of two means, and considering a power of 0.80, a type one error of 0.05, and a possible dropout of 10%, we estimated that at least 40 participants were needed for each group.

Parents whose children were at least 3 months to 8 years old and were admitted to the pediatric ward due to acute fever were eligible for the study. Parents who declined participation, whose children were diagnosed with chronic fever-related illnesses or triaged to receive emergency care, and who were members of the health care team were excluded. Eligible parents were consecutively enrolled from two pediatric wards at Tamale Teaching Hospital in Ghana. A total of 102 parents were screened for eligibility, of which 80 eligible ones who gave consent were enrolled and equally assigned to two groups.

Data collection Instruments

The study instrument was made by the researcher based on a literature review^[20,29-31] and consists of 13 items on demographics, 15 yes/no or multiple-choice questions on knowledge, four questions on attitude, and 11 single and multiple questions on fever management (some questions have sub-items). In the knowledge section, every correct answer is scored as 1 for single response and 1 to 4 for multiple response questions, and the total score for the knowledge can range between 0 and 30.

The four items in the attitude sections have 14 sub-items and are rated on Likert-type responses ranging between zero and four, so that the total score can vary between 0 and 56. The total score in the management section can range between 0 and 44.

Five academics from the Pediatric Nursing Department of School of Nursing and Midwifery at Tehran University of Medical Sciences and five nurses from the pediatric ward of Tamale Teaching Hospital and Tamale Nursing and Midwifery Training College in Ghana confirmed the content and face validity of the study instrument. After piloting the instrument with 25 parents, The K-R 21 of the knowledge and attitude scales were 0.71 and 0.59, respectively, and the Cronbach's alpha of the management scale was 0.61. The same questionnaire was used for the

pretest and posttest that were conducted at baseline and two weeks after the educational interventions.

Interventions

A 12-minute video was developed by the research team and was viewed by parents in the intervention group. The video depicted a home setting with a mother narrating to her colleagues, her experiences and new fever information she had acquired during a recent visit to a health center. Four scenarios about fever control were presented verbally to help parents to identify and make appropriate decisions regarding likely future events, and lastly, a section of the video demonstrated the use of a thermometer. The video was paused after each section for discussion and debriefing which lasted about 20 minutes each. The entire simulation session lasted up to 60 minutes.^[20] The fever messages were from and in line with the revised Integrated Management of Childhood Illnesses protocol for Ghana. The video was inspired by Abed *et al.*,^[32] and the scenario and role modeling simulations were designed using a gain-framed message format recommended by Tuong *et al.*^[33] The video could be played on laptops, projected on screens, and on mobile phones. A secure and quiet environment was ensured to facilitate clear viewing, listening, and debriefing. Some participants were educated in groups, while others were taught one-on-one. Interventions such as video, scenario and role modeling was done for mothers only once. After each session, debriefing was carried out to determine and to ensure that each person had completed the task of recalling or knowing information that have been packaged for them and were educated with. Data collection was done before and two weeks after the simulation-based education sessions.

The control group received routine education on fever alongside regular care education from ward staff and data collectors. The education was based on the revised Integrated Management of Childhood Illnesses protocol on febrile illnesses to cover all necessary sections of the questionnaire two weeks after education; the parents were invited for the posttest. There was no lost to follow-up, and no parent received a financial reward.

Data analysis

Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 16, and the Kolmogorov-Smirnov test was used to determine normality of the data. Demographic data of parents and children were analyzed descriptively with means, standard deviations, and frequencies and were compared between the two groups using the Chi-square test. We used the independent

samples *t*-test to compare parents' knowledge, attitude, and management of fever in children between the two groups. The paired *t*-test was also used for within-group comparisons of the parents' mean knowledge, attitude, and management of fever. Analysis of covariance was used to examine the effect of baseline knowledge on the outcomes. A significance level of <0.05 was applied.

Ethical considerations

The study received approval from The Ethics and Institutional Review Board of Tehran University of Medical Sciences (IR.TUMS.FNM.REC.1398.126) and the Department of Research and Development of the Tamale Teaching Hospital (TTH/R&D/SR/117). Parents were briefed about the study objectives and were also provided with written consent for participation in the study. They were also assured about voluntary participation and the confidential management of their personal information.

Results

The mean age of parents in the simulation-based and routine education groups were 29.20 ± 6.45 and 30.13 ± 5.98 years, respectively ($P=0.508$). There were no significant differences in the characteristics of parents and children between the two groups [Table 1].

With the exception of mean baseline knowledge ($P<0.0001$), there were no significant differences in the pretest mean scores between the simulation-based and routine education groups. All the posttest mean scores were better than the pretest in both groups. However, on the posttest, the mean scores for knowledge, attitude, and management were significantly higher in the simulation-based education than in the routine education group ($P<0.05$, [Table 2]).

The study revealed that knowledge scores on the pretest were statistically different between the two groups. However, an analysis of covariance failed to demonstrate its effect on the study outcomes.

Discussion

At the end of the study, parents' knowledge, attitude, and management improved better in the simulation-based education group than in the routine education group. Prior knowledge was not found to affect the study outcomes. These findings imply that, even though both groups experienced improvements, simulation-based education could offer better effects on parents' knowledge, attitude, and management of fever in children.

Table 1. Demographic characteristics of parents and children ^a

Variables	Group		P-value
	Simulation-based education	Routine education	
Parent age, year	29.20±6.45	30.13±5.98	0.508
Age of child, month	32.75±20.35	34.75±26.29	0.705
Child's temperature	38.33±0.52	38.43±0.68	0.431
Marital status			0.147
Married	35(87.5)	27 (67.5)	
Single	3 (7.5)	8 (20.0)	
Divorced	2 (5.0)	3 (7.5)	
Widowed	0 (0.0)	2 (5.0)	
Residency			0.176
Urban	19 (47.5)	26 (65.0)	
Rural	21 (52.5)	14 (35.0)	
Level of education			0.364
Basic level	6 (15.0)	5 (12.5)	
High school	7 (17.5)	14 (35.0)	
Tertiary	9 (22.5)	8 (20.0)	
No education	18 (45.0)	13 (32.5)	
Febrile seizure			0.858
Yes	15(37.5)	13 (32.5)	
No	24 (60.0)	25 (62.5)	
I don't know	1(2.5)	2 (5.0)	

^a Data presented as Mean ±SD or n (%)

Table 2. Comparison of pretest and posttest means scores between simulation-based and routine education groups ^a

Variables	Groups		P-value (t-test)
	Simulation-based education	Routine education	
Knowledge			
Pretest	21.63±2.40	23.98±2.57	<0.0001
Post test	26.38±4.36	24.75±2.72	0.048
Change	4.75±5.41	0.78±2.61	<0.000
P-value (Paired t-test)	<0.000	0.068	
Attitude			
Pretest	28.48±6.03	28.33±5.98	0.911
Post test	39.90±8.33	33.40±3.95	<0.0001
Change	11.43±9.00	5.08±6.90	<0.001
P-value (Paired t-test)	<0.000	<0.000	
Management			
Pretest	25.15±4.23	24.43±3.34	0.400
Posttest	32.33±5.18	30.15±4.12	0.040
Change	7.18±7.14	5.72±4.22	0.272
P-value (Paired t-test)	<0.000	<0.000	

^a Data presented as Mean±SD

The findings of Baker *et al.*,^[26] Prawesti *et al.*,^[34] and Ong *et al.*^[25] support our result. These studies compared the effects of education using videos and brochures on maternal health literacy or knowledge regarding fever. Similar to our study, video education resulted in better

outcomes in terms of maternal health literacy or knowledge about fever control in children. The above studies however recommended both methods as being suitable for educating parents to minimize anxiety and reduce pediatric emergency unit visitation by

parents.^[25,26,34] Video presentations produced for a target population by using the language that parents understand are likely to be easily accessible and comprehensible, especially with the use of social media. Literate parents may also have an added advantage if both methods are combined. This would help parents to make better and more informed decisions related to acute health situations of their children, as reported in some earlier studies.^[13,32,35] In some studies in Iran and Egypt, simulation training was also found to be more effective than routine education in improving parents' knowledge, attitude, and practice regarding the prevention of febrile seizures in children.^[36,37] However, a study of inhaler use skills indicated that both face-to-face and video-based education methods could improve the participants' skills, even though the face-to-face method was more effective.^[38] Despite controversies about the effects of different educational methods, the blended simulation-based method used in the present study seems to combine all the effects of face-to-face, video, role playing, and discussion and helps nurses and other healthcare providers understand parents' worries and problems, alleviate their concerns, focus on their educational needs, receive their feedback, correct their misconceptions, and modify their fever management behavior.

The simulation video was produced by the researcher, without having professional expertise in acting and video editing. This may have affected the implementation and hence the outcome of the study. More standardized videos are needed to guide researchers in the implementation and subsequent evaluation of their effects. Another likely limitation was the sampling technique and sample size. Only 80 subjects were selected and non-randomly assigned to the study groups. This could also be a source of limitation in this study.

Conclusions

Simulation-based education is widely used and very effective depending on the objective and target audience. In our study, we found that visual aids such as videos, discussions in the form of scenarios, and role-playing were effective in educating parents about childhood fever. We also noted that the routine methods could also be useful. Perhaps the routine method would be more effective if it is combined with simulation approaches. We would then recommend the use of methods depending on the design and objective of an education process.

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Competing interests

There are no conflicts of interest.

Abbreviations

Statistical Package for Social Sciences: SPSS.

Authors' contributions

All authors read and approved the final manuscript. All authors take responsibility for the integrity of the data and the accuracy of the data analysis.

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Role of the funding source

None.

Availability of data and materials

The data used in this study are available from the corresponding author on request.

Ethics approval and consent to participate

The study received approval from The Ethics and Institutional Review Board of Tehran University of Medical Sciences (IR.TUMS.FNM.REC.1398.126) and the Department of Research and Development of the Tamale Teaching Hospital (TTH/R&D/SR/117). Parents were briefed about the study objectives and were also provided with written consent for participation in the study.

Consent for publication

By submitting this document, the authors declare their consent for the final accepted version of the manuscript to be considered for publication.

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