Original Article

Investigation of the Effect of the Training on Fever and Febrile Convulsion Management Given to Pediatric Nurses on their Knowledge Level

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Abstract

Background: Fever is one of the most common reasons why families apply to the emergency unit and one of the most important symptoms of pediatric diseases.
Aim : The study investigates the effect of the training on fever and febrile convulsion management given to pediatric nurses on their knowledge level.
Methods: A prospective one-group pretest-posttest design. A government university of children's hospital in the southeast, Turkey. The population of the study consists of 126 pediatric nurses who were open to communication worked at children's hospital.The data collection form containing 47 questions and the training booklet containing information about fever and febrile convulsion were used in this pretest posttest intervention study. The data analysis was performed in computer environment and percentage, average and paired samples t test were used.
Findings : Fever and febrile convulsion knowledge, the average score of the pediatric nurses was 32.000±3.779 prior to the training, whereas the average score was 35.396±2.109 after training and the increase was found to be statistically significant (p=.000).
Discussion: For this reason, nurses should have sufficient knowledge related to fever management in order to educate families about fever management. Findings of the present study have been discussed with various studies. Although average scores of the pediatric nurses related to febrile convulsion and fever management both before and after the training were relatively high, it was seen that there were quite a lot of misinformation and incorrect applications.
Conclusion: In conclusion, the training on febrile convulsion and fever management received by the nurses was observed to increase their knowledge level.

Keywords: fever management, febrile convulsion, pediatric nurse, training.

Introduction

Fever is one of the most common reasons why families apply to the emergency unit (Saz et al 2009; Considine et al 2007; Betz et al 2006) and one of the most important symptoms of pediatric diseases (Betz et al 2006; Chang at al 2013). The rate of febrile child brought to emergency unit is 20-30% in the world according to results of studies conducted and this rate is reported to reach 71% in our country (Tastan, 2001).

Fever is very common in 3-year old or younger children (Bakır, 2006). High fever is the response of human body against many events (mostly infections) (Purssell, 2009). Many families express their concerns regarding possible negative results of high fever (Purssell, 2009; Crocetti et al 2001; Walsh et al 2007). According to studies, the normal body temperature value is accepted to be 36.8±0.7°C in axillary measurement, 37.5±0.4°C in tympanic measurement, 37.8±0.5°C in rectal measurement and values above these are regarded as "high fever" (Halıcıoğlu et al 2011). Body temperature varies depending on the place in the body at which the measurement is made, time of day when the measurement is made and individual's circadian rhythm. Also, body temperature

measurement may be affected by exercise, diet, chronic kidney disease, shock and local infection in the body region used for measurement (Bakır, 2006).

High fever is one of the most common problems seen in childhood and one of those which scare the parents the most. Almost all children experience a body temperature between 37.8°C-40°C during their childhood (Yiğit et al 2003; Özkan et al 2013). Although fever is known to be a defense mechanism, it is the symptom that unsettles and scares families the most (Betz et al 2006; Kara, 2003). Many families usually believe that fever causes damage to child's body (Chang et al 2013). That being said, a fever below 41 °C is believed to be harmless considering studies conducted on the subject. Most people are able to tolerate a fever of 41-41.5 °C. Harmful effects are seen when the body temperature exceeds 42 °C (Kara, 2003).

Although high fever is common in childhood, it still causes concern among parents. Various international studies have been conducted on "Fever Phobia", which indicates fear and concern among parents due to fever (Betz et al 2006; Chang et al 2013;Purssell, 2009; Kara, 2003). Schmitt (1980) investigated opinions of eighty-one parents who brought their children to a hospital-based pediatric clinic regarding fever. The author found that the majority of the parents were worried about low-grade fever, with temperatures of 38.9 °C or less. Their attitude toward fever was determined to be "fever phobia." The majority of the parents (52%) thought that moderate fever with a temperature of 40 °C or less could lead to considerable neurological side-effects. For this reason, the majority of the parents dealt with fever in an aggressive manner. 85% of the parents resorted to antipyretics before the temperature exceeded 38.9 °C and 68% of the parents used warm application before the temperature exceeded 39.5 °C. A literature review revealed that the only considerable complications of fever were febrile status epilepticus and heat stroke, which are relatively rare. The great concern of parents regarding fever has no logical basis. Health training aimed at fighting "fever phobia" should be included in routine pediatric care (Schmitt, 1980).

Fever is the primary immune system fighting pathogenic invasion (Broom, 2007). Fever helps the body fight against infection and microorganisms change their ideal reproduction environment (Kara, 2003). Substances that cause endogenous pyrogens to be released are referred to as exogenous pyrogens. These pyrogens causes fever by triggering biochemical changes in the hypothalamus. Exogenous pyrogens are released due to various exogenous or endogenous substances' effect on monocytes and macrophages. Endogenous pyrogenic substances released in monocytes and macrophages are also called pyrogenic cytokines (Tabak, 2006). Cytokines are secreted by toxic gram-negative bacteria and other infections or produced in response to antigenic stimulation and regulate immune events (Chang et al 2013; Tabak, 2006). Cytokines are hormone-like polypeptides secreted mainly from macrophages and activated lymphocytes (Tabak, 2006). Cytokines effective in high fever are interleukin-1, interleukin-6 and tumor necrosis factors (Tastan, 2001).

Benefits and Harms of Fever

It has been supported by various studies for the last 30 years that mild fever is beneficial to the body (Walsh et al 2005). Fever affects multiple tissues, brain in particular. Fever increases intracranial pressure and brain's oxygen requirement. If body temperature exceeds 42°C, permanent neurological damage may occur in brain. Studies report degeneration in brain cells of children deceased due to high fever (Walsh et al 2006; Edwards et al 2003).

Fever is a defense against infection. It has been observed in other animal species as well that fever increases likelihood of survival. Increased body temperature has certain beneficial effects including increased neutrophil migration, increased antibacterial substance (e.g. superoxide anion) production in neutrophils, increased interferon production, increased antiviral and antitumor activity of interferon, increased T cell proliferation, reduced microorganism growth in low-iron environment (Kara, 2003).

In addition to its benefits, fever has harmful effects as well. The most common harmful effects of fever can be classified as temporary and permanent.

Temporary Harms of Fever: Fever has harmful effects such as mild dehydration, restlessness, febrile delirium, simple febrile convulsion (Kara, 2003), brain cell damage and dehydration (Poirier et al 2000; Karwowska et al 2002). *Permanent*

Harms of Fever: These include heat shock, Febrile status epilepticus (Kara, 2003).

***Febrile convulsion*:** It is the most common complication of high fever in young children. Since the body is damaged after a certain temperature and febrile convulsions may occur, the body temperature should be kept below 38 °C with necessary interventions (Karwowska et al 2002). Its incidence is about 4%. The incidence of epilepsy among children with febrile convulsion is 2%. This incidence is higher compared to general epilepsy incidence (1%). Febrile status epilepticus develops in 1-2% of children with febrile convulsion. About 30% of families do not realize the child is febrile at the time of febrile convulsion. In cases of febrile convulsion, the time elapsed after commencement of fever is less than 12 hours in 61% of cases and less than 24 hours in 81% of cases.

Things to be done for fever management in the first stage: Non-pharmacological practices include administering cold fluids (cold fluids may be beneficial), dressing the child with thin clothes and reducing activity (Kara, 2003; Edwards et al 2001) and also applying water with a wet cloth (Edwards et al 2001). Antipyretics should be administered if the child's fever is above 39°C and the child is restless. If the child is not restless, antipyretics are not necessary even if the fever is above 39°C. If cold application is considered, the child must have been administered an antipyretic 30-60 minutes before the application. This application is possible in cases where fever exceeds 40°C. The water temperature should be between 29.4-32.2°C (warm). If the child begins shivering during the cold application, the temperature of the water should be increased (Kara, 2003). Paracetamol is recommended in cases where the child's fever is observed to be around 38.5-39°C, but the child has an upset, miserable and painful appearance (Edwards et al 2001). Even if the febrile child appears to be sleeping and fine, fever should be measured regularly. If the child begins shivering during the warm application, the temperature of the water should be increased. The warm application should begin immediately if the child is diagnosed with delirium, convulsion or hyperpyrexia during the first application. Although warm application is the fastest method to reduce the body temperature, the time body temperature remains below 37 °C (54 minutes) is much shorter compared to antipyretic-paracetamol (129 minutes) or antipyretic + warm application (164 minutes) (Kara, 2003).

Antipyretic Use

Multiple antipyretics may be used consecutively or simultaneously due to fever phobia. Studies show that consecutive antipyretic use has no superiority to paracetamol or ibuprofen alone in terms of reducing the body temperature. Aspirin is traditionally a highly preferred antipyretic for parents. Although an effective antipyretic, aspirin has a lot more side effects compared to paracetamol. For example, it increases the risk of gastritis, ulcer, bleeding and perforation in stomach. Aspirin should not be used to reduce fever in children (Bakır, 2006).

Antipyretic drugs do not return to the body to its normal temperature, but reduce it by 1-2°C. The purpose of administering antipyretics is to relieve the child and reduce pain. Parasetamol and ibuprofenin have identical fever-reducing effects. Paracetamol is the first choice and ibuprofen is the second choice in terms of reducing fever. Multiple antipyretics should not be used consecutively. Inadequate dose is a common reason for ineffectiveness of antipyretics (Bakır, 2006).

Family education

Pediatric nurses have a unique position for training on fever. Nurses must be knowledgeable about benefits, secure management and symptoms fever. Nurses should find out opinions of parents regarding fever in order to determine misconceptions. Risky applications used to deal with fever must be determined and discussed with parents, which include sponge bathing with alcohol and overdosing with antipyretics. It must be ensured that parents understand various dosing regimens of acetaminophen and ibuprofen. The purpose of parental health training is to fight with fever phobia and promoting safe management of fever at the same time (Patricia, 2013). Nurses should provide families with the following information regarding fever:

- Fever cannot be treated and it is rarely harmful.

- Fever is body's response against infections and has certain benefits.

- Fever inhibits the growth of some highly common viruses (Kara, 2003).

It must be ensured that families obtain following knowledge and skills in relation to fever:

- The definition of fever,

- How to monitor the child with fever,

- Possible benefits of fever in case of infection,

- When to administer antipyretics in what dose,

- When to perform warm application,

- Rectal, axillary and oral temperature measurement (Kara, 2003).

Never use the following to reduce fever:

1. Aspirin

2. Cold water

3. Alcohol or vinegar

4. Two antipyretics simultaneously or consecutively (Bakır, 2006).

Fever Management by Nurses

Nurses, emergency nurses in particular, have a key role in managing fever at the hospital and providing information and advice for families with regard to management of fever after discharge (Considine et al 2007; Considine, 2006). It is important that nurses and parents understand the physiological benefits of fever and potential harmful effects of aggressive treatment of fever if febrile children are to be managed safely in hospital and community environments (Considine, 2006). Nurses' decisions about using antipyretics to reduce fever are based on what doctors or relatives expect. Fever management is a daily task for pediatric nurses. However, it is possible to understand why inconsistent nursing practices exist when the literature is examined. Researchers have been debating on harms and benefits of fever as well as effectiveness and necessity of using antipyretics to reduce fever for more twenty years. We cannot possibly say that all studies reach the same conclusion and advice on what is regarded as febrile and proper fever management varies. Nurses keep on reducing fever in order to prevent febrile convulsions and brain damage (Poirier et al 2000; Sarell et al 2002). Nurses as well as other health workers should find out specific parental concerns about fever without making assumptions based on the age and educational levels of parent and respond to accordingly since this study showed that these did not determine whether parents use antipyretics correctly or not (Purssell, 2009). Especially emergency nurses must inform parents of the child to be discharged from the emergency unit about fever management and complications of fever.

This study aims to investigate the effect of the training on fever and febrile convulsion management given to pediatric nurses on their knowledge level.

Research Design and Methods

The pretest-posttest intervention method was employed in the study in order to investigate the effect of the training on fever and febrile convulsion management given to pediatric nurses on their knowledge level. The study was performed in children's hospital located in the city center of the province of diyarbakır between January-July 2016.

Setting and Sample

The population of the study consists of 126 pediatric nurses who were open to communication and collaboration and worked at children's hospital between January-July 2016.

Ethical Consideration

Prior to the study, the necessary ethics board approval was received from faculty of medicine (21.01.2016/64), the necessary permit was received from the administration of children's hospital (27.01.2016/340) and verbal consent was received from nurses. The pediatric nurses were informed about the purpose and significance of the study. The pediatric nurses were explained that they were free to participate or not participate in the study.

Measurements/Instruments

Data collection form: The "Data collection form" consisting of 47 questions was used for data collection. The content of the data collection form contains 7 questions regarding personal details of pediatric nurses (age, gender, marital status, educational status, work place, clinic, working time) and 40 questions regarding convulsion and fever management. The form was prepared by the researcher based on expert opinions and with the help of the literature (http://cnd.org.tr/folders/file/fkd_azemson.pdf). The pediatric nurses were given 1 point for each correct answer and 0 points for each incorrect answer.

Training booklet: The training booklet prepared by the researcher contains information regarding febrile convulsion, what the family and the pediatric nurse should do in case of febrile

convulsion and principles of fever management. The training booklet was prepared with the help of the literature (http://cnd.org.tr/folders/file/fkd_azemson.pdf).

Data Collection

Firstly, children's hospital was visited and the pediatric nurses employed at the hospital were posed the questions related to fever management and febrile convulsion in the data collection form. After administering the form, the training booklet prepared by the researcher was distributed to the pediatric nurses and also a training was held in order to enhance the nurses' knowledge about febrile convulsion and fever management.

In addition, the researcher gave her telephone number so that the nurses may get in touch any time. The questions were asked to the same nurses one more time during the visit made about four weeks later in order to assess the effectiveness of the training on fever management and febrile convulsion.

Data Analysis

Data encoding and necessary statistically analyses were performed in computer environment. Percentage distribution and mean values were used to determine sociodemographic characteristics, paired samples t test was used to measure the knowledge level related to febrile convulsion and fever management before and after the training and one-way ANOVA and independent t-test were used to determine the effect of sociodemographic characteristics on knowledge level.

Results

As shown in Table 1, the average age of the pediatric nurses was 32.976±7.152 years, the average working time was 9.746±7.45 years and 87.3% of the pediatric nurses were university graduates.

Table 1. Sociodemographic Characteristics of The Pediatric Nurses

Characteristics	**N**	**%**
Average Age: *32.976±7.152*		
Average Working (Nursing) Time: *9,746±7,459*		
Marital Status		
Married	76	60.3
Single	50	39.7
Educational Status		
Vocational High School of Health	16	12.7
University	110	87.3
Clinic		
Emergency	24	19.0
Intensive care	52	41.3
Newborn	30	23.8
Pediatric Surgery	2	1.6
Endocrine+minor	5	3.9
Older child	7	5.6
Infection	6	4.8
Total	**126**	**100.0**

Table 2. Comparison of the Pediatric Nurses Knowledge Level Before and After The Training

	X ± SD	t	p
Pretest	32.000±3.779	**-8.543**	**.000**
Posttest	35.396±2.109		

Table 3. Assessment of The Pediatric Nurses' Knowledge Level Related to Febrile Convulsion and Fever Management Before and After The Training

	Pretest		Posttest	
Questions	**True(%)**	**False (%)**	**True(%)**	**False(%)**
Febrile convulsion is age-dependent seizure associated with fever seen in children aged between 6 months and 6 years.	85.7	14.3	99.2	0.8
It is seen in 2-8% of children under five.	60.3	39.7	88.1	11.9
Febrile convulsion usually has a single cause.	65.1	34.9	71.4	28.6
Seizures may be in the form of spasm or shivering in the whole body or in arm or leg in one side of the body.	92.1	7.9	94.4	5.6
A seizure lasting more than 30 minutes causes brain damage.	86.5	13.5	96.8	3.2
Febrile seizures is usually not recurrent.	93.7	6.3	84.9	15.1
Febrile convulsion later leads to epilepsy.	46.0	54.0	68.3	31.7
What can you do during febrile convulsion?				
There should be an oxygen mask at the bedside of the patient.	96.8	3.2	99.2	0.8
Lay the patient on their side to prevent saliva from going into lungs.	96.8	3.2	99.2	0.8
Put your hand or a pillow under the patient's head.	65.1	34.9	92.9	7.1
Do not try to open the patient's mouth, insert a spoon or your finger, you may hurt the patient.	85.7	14.3	98.4	1.6
Keep the airway open.	88.1	11.9	99.2	0.8
Stop the convulsion and establish vascular access.	88.1	11.9	92.9	7.1
Continue fluid intake and reduce the fever.	84.1	15.9	96.0	4.0
Ensure that the child is protected from trauma.	94.4	5.6	100.0	
Wait until the seizure is over and monitor the patient.	82.5	17.5	97.6	2.4
Lastly, inform and relieve the family and make an assessment.	92.1	7.9	99.2	0.8
How should you handle the family in case of febrile child?				
Families should know how to measure the body temperature and reduce fever.	95.2	4.8	99.2	0.8
Families should know what to do during a seizure.	96.0	4.0	99.2	0.8
A digital thermometer should be kept available at home.	95.2	4.8	98.4	1.6
Axillary measurement or rectal measurement in younger children may be performed.	91.3	8.7	100.0	
Axillary region should be thoroughly dried before measurement.	96.0	4.0	98.4	1.6
A wet/sweaty axillary region causes a lower measurement than the actual temperature.	96.0	4.0	98.4	1.6
An ideal temperature measurement takes 3-5 minutes.	92.9	7.1	100.0	
Clothes must be removed prior to measurement.	90.5	9.5	99.2	0.8
Plenty of fluid intake should be ensured.	88.9	11.1	88.9	11.1

What is the reasoning behind warm application?				
Peripheral warm application is effective in reducing fever.	86.5	13.5	99.2	0.8
When the body temperature exceeds normal values, peripheral warm application enables blood flow to skin.	74.6	25.4	88.9	11.1
In case of cooling the body surface too quickly or contact with cold, hypothalamus is stimulated through cold receptors and hairs erect.	77.8	22.2	95.2	4.8
If the patient experiences shivering, heat generation mechanisms are activated and inner temperature increases, thus the objective of reducing the temperature fails.	65.9	34.1	86.5	13.5
Warm fluid (29-33^{o}C) is recommended in case of hyperthermia.	70.6	29.4	92.1	7.9
In applications with very cold water, general and progressive cooling of the body results in hypothermia.	77.0	23.0	96.0	4.0
The body temperature should not be reduced too quickly and more than 1-1.5^{o}C with cold water.	85.7	14.3	93.7	6.3
The fluid should not contain alcohol, cologne or vinegar.	28.6	71.4	21.4	78.6
Warm application alone is enough to reduce the body temperature.	89.7	10.3	87.3	12.7
Administering an antipyretic alone is enough to reduce the body temperature.	95.2	4.8	82.5	17.5
The ideal warm application for febrile children is every 10 minutes.	32.5	67.5	37.3	62.7
Cold application should be performed on body regions where small blood vessels pass.	34.9	65.1	30.2	69.8
Warm application should not be performed on the neck, chest, stomach or ends of extremities.	57.1	42.9	76.6	25.4
Warm application is performed when the body temperature exceeds 38.5^{o}C.	77.0	23.0	85.7	14.3

Knowledge levels of pediatric nurses before and after the training on febrile convulsion and fever management were assessed (Table 2). The findings show that the knowledge level before the training was 32.000±3.779, whilst the knowledge level after the training was 35.396±2.109. This increase in the knowledge level is slight, yet statistically significant (p=.000).

Table 3 presents the pediatric nurses' knowledge level related to febrile convulsion and fever management before and after the training in percentages.

Discussion

Health personnel cannot educate families about fever management if they do not have sufficient knowledge related to the subject (Greensmith, 2013). For this reason, nurses should have sufficient knowledge related to fever management in order to educate families about fever management. Findings of the present study have been discussed with various studies. Although average scores of the pediatric nurses related to febrile convulsion and fever management both before and after the training were relatively high, it was seen that there were quite a lot of misinformation and incorrect applications. Results similar to those obtained in this study can be seen in Sokun's study as well (Sokun, 2014). In the study conducted with 31 emergency nurses, Considine and Brennan asked nurses about their opinions on childhood fever and evidence-based trainings were held, which led to a series of positive changes in opinions of emergency nurses regarding childhood fever (Considine et al 2007). Jeong and Kim (Sun Jeong et al 2014) found that two different training programs received by nurses encouraged evidence-based nursing practices and improved the quality of childhood fever management (Sun Jeong et al 2014). The results of the present study are consistent with similar educational studies (Considine et al 2007; Sun Jeong et al 2014). Such educational studies present opportunities to increase nurses' knowledge of childhood fever management and change certain opinions of nurses regarding childhood fever (Considine et al 2007). For this reason, nurses' being highly knowledgeable will positively affect their clinical decision-making processes. Also, being well informed will allow nurses to provide correct information for families.

Edwards et al. (Edwards et al 2001) found that nurses regarded a body temperature between 37.2-39.0°C to be high fever (Edwards et al 2001). In Sokun's study, it was found that nurses regarded an axillary body temperature of 38.16°C to be hyperthermia (Sokun, 2014). Values below 39°C should not be rushed to reduce. Antipyretic use is suggested in case of high fever (Edwards et al 2003; Watts et al 2003). Nurses in countries such as US, England, Canada and Australia

defined high fever to be around 38°C (Poirier et al 2000; Karwowska et al 2002; Edwards et al 2001). In another study, a large number of nurses and physicians stated that a fever between 38-40°C should be treated immediately (Sarrell et al 2002). In our study, 77% of the pediatric nurses stated that warm application should be immediately performed in case of a fever above 38.5 °C.

In Sokun's study, it was seen that the majority of nurses who participated in the study were university graduates and the knowledge of fever and fever management was observed to increase as the educational status increased (p=0.233) (Sokun, 2014). In the present study, the majority of nurses were university graduates, yet no correlation was found between the educational status of the nurses and the knowledge of febrile convulsion and fever management. It is seen that the majority of nurses who participated in Sokun's (2014) study were intensive care nurses and no significant difference was found between units in terms of the knowledge of fever and fever management. Similar to Sokun's (Sokun, 2014) study, the majority of nurses who participated in the present study were intensive care nurses and no significant difference was found between units in terms of the knowledge of febrile convulsion and fever management (Sokun, 2014).

It was observed that there were inconsistencies in Australian nurses' knowledge of fever and febrile convulsion. For example, 92% of nurses were found to believe that febrile convulsion did not cause neurological damage, 86% believed that fever should be reduced to prevent febrile convulsions, 90% believed that the first febrile convulsion was unpreventable and 72% believed that antipyretics had minimal effect in terms of preventing recurring febrile convulsions. All these findings show that misinformation regarding fever and fever management may lead to inconsistent practices (Walsh et al 2005). Several studies show that nurses accept that high fever causes febrile convulsion (Walsh et al 2005; Poirier et al 2000; Karwowska et al 2002; Sarrell et al 2002). 86% of pediatric nurses believed that aggressive fever management was necessary to prevent febrile convulsion (Edwards et al 2001). The findings of this study are consistent with findings in the literature.

Considering approaches applied by nurses to febrile children in Sokun's study, it was found that the majority of nurses continued warm application until the body temperature reduced by 1.5-2 °C (74.3%), did not add alcohol into the water for warm application (91%) and measured the temperature of the water used for warm application (70%) (Sokun, 2014). In the present study, 93.7% of the nurses stated that the body temperature should not be reduced more than 1.5-2°C, 76.8% stated that the water should not contain alcohol, cologne, ice or water and 92.1% stated that the water should be warm (29-33°C). These findings are consistent with the literature.

Conclusion and Implications

In conclusion, the training on febrile convulsion and fever management received by the nurses was observed to increase their knowledge level. No significant difference was found in terms the nurses' unit, working time and knowledge about fever/febrile convulsion management.

Implications:

Fever management is a universal topic in that it ensures that children receive effective care and nurses provide effective and independent care.

For this reason, national and international studies report that priorities of nurses should be determined and the subject of fever management should be included in continuous education programs (Walsh et al 2005; Poirier et al 2000: Edwards et al 2001). Fever management should be included in adaptation procedures of new nurses. Nurses with a comprehensive understanding and knowledge of fever management practices will be able to educate parents about febrile children and provide continuous improvement in the health of these children (Edwards et al 2001). Fever management protocol should be created and applied especially in health institutions (Sokun, 2014). Also, these protocols should be updated with new evidence-based studies. Nurses should be supported with in-service trainings within institutions. Future researchers may conduct larger scale studies with nurses on fever and febrile convulsion management.

Limitations

It was aimed to reach all pediatric nurses employed at children's hospital. 156 pediatric nurses were reached and participated in the training, however only 126 pediatric nurses participated in the posttest.

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References

Saz, E. U., Koturoglu, G., Duyu, M., Ozananar, Y., Kurugol, Z., & Sever, M. (2009). Fears of fever and fever management in Turkish families/Turk ailelerinin ates yonetimi ile ilgili bilinc duzeyi ve korkulari. *Journal of Pediatric Infection*, 161-165.

Considine, J., & Brennan, D. (2007). Effect of an evidence-based paediatric fever education program on emergency nurses' knowledge. *Accident and emergency nursing*, *15*(1), 10-19.

Betz, M. G., & Grunfeld, A. F. (2006). 'Fever phobia'in the emergency department: a survey of children's caregivers. *European Journal of Emergency Medicine*, *13*(3), 129-133.

Chang, L. C., Liu, C. C., & Huang, M. C. (2013). Parental knowledge, concerns, and management of childhood fever in Taiwan. *Journal of Nursing Research*, *21*(4), 252-260.

Tastan Y. (2001) Child Fever and sepsis. IU Cerrahpasa Medical Faculty Continuous Medical Education Activities Pediatric Aciller Symposium, Istanbul.57-68 (in Turkish)

Bakır M. (2006). Etiological Approach in Childhood Diseases: Diagnosis and Treatment. Istanbul University Cerrahpaşa Medical Faculty Continuous Medical Education Activities. Approach to Hot Patient. Symposium Series.;53: 37-56. (in Turkish)

Purssell, E. (2009). Parental fever phobia and its evolutionary correlates. *Journal of clinical nursing*, *18*(2), 210-218.

Crocetti, M., Moghbeli, N., & Serwint, J. (2001). Fever phobia revisited: have parental misconceptions about fever changed in 20 years?. *Pediatrics*, *107*(6), 1241-1246.

Walsh, A., Edwards, H., & Fraser, J. (2007). Influences on parents' fever management: beliefs, experiences and information sources. *Journal of clinical nursing*, *16*(12), 2331-2340.

Halıcıoğlu, O., Koç, F., Akman, S. A., & Teyin, A. (2011). Children in fever; mother's approach to fever at home, information and sociodemographic characteristics. Journal of Dr Behçet Uz Children's Hospital.1(1):13-19. (in Turkish)

Yiğit, R., Esenay, F., Şen, E., & Serinol, Z. (2003). Information and applications On the subject of high fever *Journal of Anatolia Nursing and Health Sciences*, *6*(3). (in Turkish)

Özkan, H., & Öztürk, S. (2013). Practices used by mothers who applied to two family health centers in a city center in Eastern Anatolia region when their children had fever. *Journal of Dr. Behçet Uz Children's Hospital*, *3*(2), 121-126. (in Turkish)

Kara, B. (2003). Review of Information Related to Fever in Childhood. Continuing Medical Education Journal, 12 : 10-14. . (in Turkish)

Schmitt, B. D. (1980). Fever phobia: misconceptions of parents about fevers. *American journal of diseases of children*, *134*(2),176181.

Broom, M. (2007). Physiology of fever. *Paediatric Care*, *19*(6), 40-45.

Tabak F. (2006). Fever pathogenesis, types of fever and fever management in adulthood. Istanbul University Cerrahpasa Medical Faculty Continuous Medical Education Activities. Approach to Patient with Fever. Symposium Series. 53:27-36. (in Turkish)

Walsh, A. M., Edwards, H. E., Courtney, M. D., Wilson, J. E., & Monaghan, S. J. (2005). Fever management: paediatric nurses' knowledge, attitudes and influencing factors. *Journal of Advanced Nursing*, *49*(5), 453-464.

Walsh, A. M., Edwards, H. E., Courtney, M. D., Wilson, J. E., & Monaghan, S. J. (2006). Paediatric fever management: continuing education for clinical nurses. *Nurse Education Today*, *26*(1), 71-77.

Edwards, H. E., Courtney, M. D., Wilson, J. E., Monaghan, S. J., & Walsh, A. M. (2003). Fever management audit: Australian nurses' antipyretic usage. *Pediatric nursing*, *29*(1), 31.

Poirier, M. P., Davis, P. H., Gonzalez-del Rey, J. A., & Monroe, K. W. (2000). Pediatric emergency department nurses' perspectives on fever in children. *Pediatric emergency care*, *16*(1), 9-12.

Karwowska, A., Nijssen-Jordan, C., Johnson, D., & Davies, H. D. (2002). Parental and health care provider understanding of childhood fever: a Canadian perspective. *Cjem*, *4*(06), 394-400.

Edwards, H. E., Courtney, M. D., Wilson, J. E., Monaghan, S. J., & Walsh, A. M. (2001). Fever management practises: what pediatric nurses say. *Nursing & health sciences*, *3*(3), 119-130.

Patricia, C. (2013). Evidence-based management of childhood fever: what pediatric nurses need to know. *Journal of pediatric nursing*, *29*(4), 372-375.

Considine, J. (2006). Paediatric fever education for emergency nurses. *Australian Nursing and Midwifery Journal*, *14*(6), 39.

Sarrell, M., Cohen, H. A., & Kahan, E. (2002). Physicians', nurses', and parents' attitudes to and knowledge about fever in early childhood. *Patient education and counseling*, *46*(1), 61-65.

Febrile Convulsions Handbook. What is Febrile convulsion? [Internet**]**. İzmir (Turkey): Ege University medical faculty; 2016 [cited 2016 Jan **]**. Available from: http://cnd.org.tr/folders/file/fkd_azemson.pdf. . (in Turkish)

Greensmith, L. (2013). Nurses' knowledge of and attitudes towards fever and fever management in

one Irish children's hospital. *Journal of Child Health Care*, *17*(3), 305-316.

Sokun D. Pediatric nurse' knowledge and attitudes towadrs fever and fever management [Internet]. Version 1. Istanbul: Halic University Institute of Health Sciences; 2014 [cited 2016 Jan**].** Available from:http://acikerisim.aku.edu.tr/

Sun Jeong, Y., & Sun Kim, J. (2014). Childhood fever management program for Korean pediatric nurses: A comparison between blended and face-to-face learning method. *Contemporary nurse*, *49*(1), 35-46.

Watts, R., Robertson, J., & Thomas, G. (2003). Nursing management of fever in children: a systematic review. *International Journal of Nursing Practice*, *9*(1),1