

# Assessment of physicians' knowledge and attitudes in the management of febrile seizures

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## ABSTRACT

**الأهداف:** تقييم المعرفة والمواقف للأطباء في مختلف التخصصات الذين يشاركون في رعاية الأطفال الذين يعانون من FS.

**الطريقة:** قمنا بتقييم المعرفة والمواقف في السيطرة على النوبة حُمويّة (FS) بين الأطباء العاملين في تخصصات مختلفة في المملكة العربية السعودية باستخدام دراسة مستعرضة مستندة إلى الاستبيان أجريت خلال الفترة من سبتمبر إلى ديسمبر 2016م.

**النتائج:** من بين 300 طبيب أجابوا على الاستبيان، كان 178 (59.3%) من الذكور، و 119 (39.7%) من الاستشاريين، و 92 (30.7%) من المتخصصين، و 89 (29.7%) كانوا من السكان. الغالبية هم استشاريون عامون في طب الأطفال. أظهرت دراستنا أن الاستشاريين كانوا أكثر وعياً بتعريف الخدمة الثابتة البسيطة مقارنة بالمجموعات الأخرى من الأطباء، وكان الفرق ذو دلالة إحصائية. ومع ذلك، لم يكن هناك فرق بين أطباء الأعصاب لدى الأطفال وأطباء الأطفال العام. كان هناك فرق ذو دلالة إحصائية بين مختلف التخصصات في الحاجة المدركة لأداء البزل القطني الروتيني، والتصوير العصبي، وتحديد المصل بالكهرباء في تقييم الأطفال الذين يعانون من FS. من ناحية أخرى، لم يكن هناك اختلاف في الحاجة المدركة لإجراء تخطيط كهربية الدماغ بين الأطباء في تخصصات مختلفة.

**الخلاصة:** أبرزت الدراسة الاختلاف الواسع في معرفة واتجاهات الأطباء في تخصصات مختلفة بمستويات مختلفة من الخبرة تجاه السيطرة على FS. سيساعد استخدام إرشادات الممارسة السريرية في تقليل هذا التنوع.

**Objectives:** To assess the knowledge and attitudes of physicians in different specialties who are involved in the care of children with FS.

**Methods:** We assessed knowledge and attitudes in the management of Febrile seizure (FS) among physicians working in different specialties in the Kingdom of Saudi Arabia using a questionnaire-based cross-

sectional study conducted from September-December 2016.

**Results:** Of the 300 physicians who responded to the questionnaire, 178 (59.3%) were males, 119 (39.7%) were consultants, 92 (30.7%) were specialists, and 89 (29.7%) were residents. The majority were general pediatric consultants. Our study showed that the consultants were more aware of the definition of simple FS in comparison to other groups of physicians, and the difference was statistically significant. However, there was no difference between pediatric neurologists and general pediatricians. There was a statistically significant difference among various specialties in the perceived need to perform routine lumbar puncture, neuroimaging, and serum electrolyte determination in the evaluation of children with FS. On the other hand, there was no difference in the perceived need to perform an electroencephalogram among physicians in different specialties.

**Conclusion:** The study highlighted the wide variation in knowledge and attitudes of physicians in different specialties with different levels of experience toward the management of FS. The use of clinical practice guidelines will help minimize this diversity.

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Febrile seizure (FS) is the most common type of seizure leading to an emergency visit among children between 6–60 months of age.<sup>1</sup> Febrile seizure is defined as a seizure associated with fever  $\geq 100.4^{\circ}\text{F}$  ( $38^{\circ}\text{C}$ ) by any measurement method, without evidence of central nervous system (CNS) infection.<sup>2</sup> Febrile seizure is classified into simple and complex types. A simple FS is generalized, ends in less than 15 minutes, and does not recur within the next 24 hours. A complex FS is focal, prolonged more than 15 minutes, and can recur within 24 hours.<sup>2</sup> Simple FS has an excellent prognosis however; it causes extreme fear and anxiety to parents.<sup>3,4</sup> The awareness of physicians regarding definitions and differences between simple and complex FS play a significant role in the selection of an appropriate management plan. There is a wide variation in the management of children with FS among physicians, even within the same specialty.<sup>1,5</sup> Lumbar puncture (LP) is not routinely warranted in the evaluation of a child with FS, but it should be performed in any child who presents with fever, seizures and meningeal symptoms or signs.<sup>6</sup> There is no reported morbidity or mortality in patients with FS, and the prognosis is favorable.<sup>3</sup> Children with FS have a high risk of developing recurrent FS.<sup>7</sup> A minority of patients with FS are at risk of developing epilepsy in the future, but the risk is considered higher than in the general population.<sup>8,9</sup> Our study aimed to assess the knowledge and attitudes of physicians in different specialties who are involved in the care of children with FS.

**Methods.** A quantitative observational cross-sectional approach was used to assess physicians knowledge and attitudes in the management of FS. Online as well as paper-based questionnaires were sent to all members of the Neuroscience Forum, a scientific group on smartphones, and to members of the Saudi Paediatric Association through emails, during the period from September-December 2016.<sup>10</sup> Three hundred physicians responded to the questionnaire, including general practitioners, emergency physicians, general pediatric residents and consultants, and pediatric neurology fellows and consultants. The questionnaire was pilot tested and validated on a group of 10

physicians of various specialties. The self-administered and specially designed questionnaire used for this study was categorized into 3 sections; section 1: included 9 questions about personal data (for example, age, sex, educational level, specialty, years in practice, etc.) (Table 1), section 2: to assess the knowledge which included 8 questions about the definition, types, diagnosis, causes, and treatment of FS (Table 2), and section 3: included 14 questions about the attitude towards management of FS (Table 3). The study was conducted in the Kingdom of Saudi Arabia (KSA).

**Statistical analysis.** Data were analyzed using Statistical Package for the Social Science (SPSS 22) (IBM Corp., Armonk, NY, USA). Continuous variables were expressed as a mean  $\pm$  standard deviation, and

**Table 1** - Distribution of characteristics of study subjects (N=300).

| Characteristics  | n (%)      |
|--|------------|
| <b>Gender</b>  |            |
| Male   | 178 (59.3) |
| Female   | 122 (40.7) |
| <b>Age in years</b>  |            |
| 25-30  | 65 (21.7)  |
| 31-40  | 130 (43.3) |
| 41-50  | 72 (24.0)  |
| 51-60  | 26 (8.7)   |
| >60  | 7 (2.3)    |
| <b>Nationality</b>   |            |
| Saudi  | 199 (66.3) |
| Non-Saudi  | 101 (33.7) |
| <b>Current position</b>                                      |            |
| Consultant   | 119 (39.7) |
| Specialist   | 92 (30.7)  |
| Resident   | 89 (29.7)  |
| <b>Specialty</b>   |            |
| General Pediatrics   | 134 (44.7) |
| Pediatric Neurology  | 63 (21.0)  |
| Family Medicine  | 39 (13.0)  |
| Emergency Physicians   | 64 (21.3)  |
| <b>Years in practice</b>                                     |            |
| <5   | 127 (42.3) |
| 5-10   | 85 (28.3)  |
| 10-15  | 53 (17.7)  |
| 15-20  | 35 (11.7)  |
| <b>Place of work</b>   |            |
| Government hospital  | 269 (89.7) |
| Private hospital   | 31 (10.3)  |
| <b>Level of care</b>   |            |
| Primary care   | 30 (10.0)  |
| Secondary care   | 72 (24.0)  |
| Tertiary care  | 198 (66.0) |
| <b>Aware of guidelines for management of Febrile Seizure</b> |            |
| Yes  | 206 (68.7) |
| No   | 94 (31.3)  |

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**Table 2** - Comparison of correct answers towards knowledge of guidelines for management of febrile seizure in relation to the position of study subjects.

| Items  | Correct answer     |                      |                       | P-value |
|--|--------------------|----------------------|-----------------------|---------|
|  | Resident<br>(n=89) | Specialist<br>(n=92) | Consultant<br>(n=119) |         |
| K1- Febrile seizure is accompanied by fever without intracranial infection, metabolic disturbance, or history of afebrile seizure. | 75(84.3)           | 79(85.9)             | 103(86.6)             | 0.895   |
| K2- In febrile seizure, the temperature is 38°C or above   | 64(71.9)           | 66(71.7)             | 90(75.6)              | 0.766   |
| K3- Febrile seizure occurs at 6-60 months of age.  | 75(84.3)           | 76(82.6)             | 106(89.1)             | 0.374   |
| K4- Febrile seizure is the most common convulsive event in children younger than 60 months of age.                                 | 65(73.0)           | 72(78.3)             | 105(88.2)†            | 0.018*  |
| K5- There are 2 types of febrile seizure: simple and complex.  | 68(76.4)           | 74(80.4)             | 105(88.2)†            | 0.032*  |
| K6- Simple febrile seizure is a generalized seizure, lasts for less than 15 min, and does not recur within 24 hours.               | 69(77.5)           | 79(85.9)             | 106(89.1)†            | 0.044*  |
| K7- Complex febrile seizure is a focal seizure, lasts more than 15 min, and recurs within 24 hours.                                | 70(78.7)           | 73(79.3)             | 100(84.0)             | 0.551   |
| K8- Children who had a simple febrile seizure had no evidence of increased mortality or mental retardation.                        | 74(83.1)           | 72(78.3)             | 106(89.1)             | 0.101   |

\*Statistically significant -  $p < 0.05$  (by  $\chi^2$ -test), †K4 - Significantly higher than Resident & Specialist; K5 - Significantly higher than Resident & Specialist; K6 - Significantly higher than Resident, but not different from Specialist (by residual analysis)

categorical variables were expressed as percentages. One-way analysis of variance was used to compare the mean values of continuous variable followed by Tukey's multiple comparison test and the Pearson's chi-square test was used to compare the categorical variable across the categories of study variable followed by residual analysis. A  $p$ -value  $< 0.05$  was considered statistically significant. The 21 questions used were tested for internal consistency, and the Cronbach's alpha was found to be 0.637, which falls within the acceptable range in testing reliability and internal consistency. The institutional review board and ethical committee of King Saud University, Riyadh, Kingdom of Saudi Arabia (KSA) (KSU-IRB 018E), approved the study.

**Results.** Out of 524 physicians who received the questionnaires, 300 responded, with response rate of 57.3%, 178 (59.3%) were males. The minimum age of interviewed physicians was 25 years, with approximately 2% being older than 60, (43.3%) of the responders aged 31-40 years old, 119 (39.7%) were consultants, 92 (30.7%) were specialists, and 89 (29.7%) were residents. The majority were general pediatric consultants working in secondary care governmental hospitals. About 68.7% of our study subjects were aware of guidelines for management of Febrile seizure (Table 1).

The study showed that 105 (88.2%) of the consultants were aware that FS is the most common febrile event in children younger than 60 months of age, in contrast to 65 (73%) of the residents, with statistically significant ( $p=0.018$ ). Also, significantly higher number of consultants 105 (88.2%) had responded correctly for the statement "there are 2

types of febrile seizure: simple and complex" than the residents 68 (76.4%) and specialists ( $p=0.032$ ). Among those who responded, 106 (89.1%) of the consultants were aware of the definition of simple FS in comparison to 69 (77.5%) of the residents ( $p=0.044$ ). However, there was no difference when compared with specialists 79 (85.9%) (Table 2). The comparison distribution of correct answers towards the 8 statements of knowledge of FS between general pediatricians and pediatric neurologists shows no statistically significant difference (Table 3). The mean attitude scores of 14 statements were compared among the 3 professional categories of study subjects in which the mean scores of 3 statements ("Lumbar puncture should be performed in any infant younger than 12 months, who presents with a seizure and fever, without meningeal signs"; "Electrolytes (calcium, phosphorus, magnesium, blood glucose) and complete cell count should not be performed routinely for the sole purpose of identifying the cause of febrile seizure" and "Neuroimaging should not be performed in the routine evaluation of the child with simple febrile seizure" were significantly different ( $p=0.008$ ,  $p=0.008$  &  $p=0.021$ ). The pairwise comparison shows that the mean scores of 2 statements of specialists were significantly lower than the scores of residents and consultants, whereas the mean score of the third statement of specialists was significantly lower than the scores of consultants but not different from the mean scores of residents (Table 4). Also, the mean attitude scores of 14 statements were compared among the 4 specialty categories (General pediatric, Paediatric Neurology, Family medicine and Emergency medicine) of study subjects, in which the mean scores

**Table 3 -** Comparison of correct answers towards knowledge of guidelines for management of febrile seizure between the study subjects of general pediatrics and pediatric neurology specialties.

| Items  | General pediatrics<br>(n=134) | Pediatric neurology<br>(n=63) | P-value* |
|--|-------------------------------|-------------------------------|----------|
|  | n(%)                          | n(%)                          |          |
| K1- Febrile seizure is accompanied by fever without intracranial infection, metabolic disturbance, or history of afebrile seizure. | 115 (85.8)                    | 55(87.3)                      | 0.778    |
| K2- In febrile seizure, the temperature is 38 °C or above.   | 103 (76.9)                    | 42(66.7)                      | 0.130    |
| K3- Febrile seizure occurs at 6-60 months of age.  | 110(82.1)                     | 57(90.5)                      | 0.127    |
| K4- Febrile seizure is the most common convulsive event in children younger than 60 months of age.                                 | 99(73.9)                      | 53(84.1)                      | 0.110    |
| K5- There are 2 types of febrile seizure: simple and complex.  | 109(81.3)                     | 54(85.7)                      | 0.449    |
| K6- Simple febrile seizure is a generalized seizure, last for less than 15 min, and does not recur within 24 hours.                | 112(83.6)                     | 56(88.9)                      | 0.327    |
| K7- Complex febrile seizure is a focal seizure, lasts more than 15 min, and recur within 24 hours.                                 | 105(78.4)                     | 56(88.9)                      | 0.074    |
| K8- Children who had a simple febrile seizure had no evidence of increased mortality or mental retardation.                        | 115(85.8)                     | 52(82.5)                      | 0.550    |

**Table 4 -** Comparison of mean scores of attitude towards the management of febrile seizure in relation to the professional category of responders.

| Items  | Mean±SD score |            |            | P-value |
|--|---------------|------------|------------|---------|
|  | Resident      | Specialist | Consultant |         |
| A1- Lumbar puncture should be performed in any infant younger than 12 months, who presents with a seizure and fever, without meningeal signs.  | 3.54±1.48     | 2.90±1.57* | 3.47±1.54  | 0.008*  |
| A2- Lumbar puncture is an option in the child who presents with a seizure and fever and was pre-treated with antibiotics.  | 3.10±1.27     | 3.36±1.51  | 3.28±1.40  | 0.449   |
| A3- EEG should not be performed in the evaluation of a neurologically healthy child with a simple febrile seizure.   | 3.93±1.28     | 3.98±1.47  | 4.19±1.32  | 0.325   |
| A4- EEG should not be performed in the evaluation of a neurologically healthy child with a complex febrile seizure.  | 2.51±1.22     | 2.64±1.39  | 2.64±1.30  | 0.720   |
| A5- Electrolytes (calcium, phosphorus, magnesium, blood glucose) and complete cell count should not be performed routinely for the sole purpose of identifying the cause of febrile seizure. | 2.46±1.43*    | 3.09±1.63  | 3.07±1.59  | 0.008*  |
| A6- Neuroimaging should not be performed in the routine evaluation of the child with simple febrile seizure.   | 4.00±1.18*    | 4.27±1.31  | 4.46±1.05  | 0.021*  |
| A7- Neuroimaging should not be performed in the routine evaluation of the child with complex febrile seizure.  | 2.45±1.18     | 2.59±1.39  | 2.79±1.32  | 0.167   |
| A8- Continuous use of phenobarbital is recommended for the treatment of febrile seizure.   | 1.65±0.97     | 1.67±1.19  | 1.59±1.17  | 0.844   |
| A9- Continuous use of levetiracetam is recommended for the treatment of febrile seizure.   | 1.56±0.85     | 1.75±1.20  | 1.63±1.06  | 0.474   |
| A10- Continuous use of valproic acid is recommended for the treatment of febrile seizure.  | 1.60±0.87     | 1.66±1.16  | 1.52(0.95) | 0.591   |
| A11- Intermittent use of oral diazepam during febrile illness is recommended for the treatment of febrile seizure.   | 2.77±1.43     | 2.78±1.61  | 2.71±1.54  | 0.921   |
| A12- Continuous use of antiepileptic drugs is recommended for the treatment of complex febrile seizure.  | 2.40±1.23     | 2.48±1.35  | 2.34±1.27  | 0.728   |
| A13- If seizure is prolonged more than 5 min, the treatment is rectal diazepam or buccal midazolam.  | 4.05±1.08     | 4.13±1.28  | 4.17±1.14  | 0.789   |
| A14- Regular use of antipyretic drugs will prevent febrile seizure.  | 3.00±1.39     | 2.53±1.43  | 2.60±1.54  | 0.065   |

\*Statistically significant -  $p < 0.05$  (by One-way Anova) ‡, A1 - Significantly lower than Resident & Consultant; A5 - Significantly lower than Specialists & Consultant; A6 - Significantly lower than Consultant but not different with specialist (by Tukey's test).

of 7 statements show statistically significant difference. The pairwise comparison indicates that the mean scores of 2 statements (A1 & A11) of Emergency medicine specialty physicians were significantly lower than the mean scores of physicians from other 3 specialties and

the mean scores of 3 statements (A5, A6 & A7) of family medicine physicians were significantly lower than the mean scores of physicians of other 3 specialties. Whereas the mean scores of other 2 statements (A12 & A14) of Pediatric neurology physicians were significantly lower

**Table 5** - Comparison of mean scores of attitude towards the management of febrile seizure in relation to the specialties of study subjects.

| Items  | General pediatric | Pediatric neurology | Family medicine | Emergency  | P-value |
|--|-------------------|---------------------|-----------------|------------|---------|
|  |                   |                     |                 |            |         |
| A1- Lumbar puncture should be performed in any infant younger than 12 months, who presents with a seizure and fever, without meningeal signs.  | 3.53±1.45         | 3.90±1.39           | 3.21±1.59       | 2.36±1.48‡ | <0.001* |
| A2- Lumbar puncture is an option in the child who presents with a seizure and fever and was pre-treated with antibiotics.  | 3.13±1.40         | 3.44±1.43           | 3.10±1.29       | 3.39±1.43  | 0.362   |
| A3- EEG should not be performed in the evaluation of a neurologically healthy child with a simple febrile seizure  | 4.01±1.33         | 4.40±1.20           | 3.67±1.47       | 4.03±1.44  | 0.060   |
| A4- EEG should not be performed in the evaluation of a neurologically healthy child with a complex febrile seizure.  | 2.48±1.22         | 2.83±1.39           | 2.54±1.45       | 2.67±1.31  | 0.344   |
| A5- Electrolytes (calcium, phosphorus, magnesium, blood glucose) and complete cell count should not be performed routinely for the sole purpose of identifying the cause of febrile seizure. | 2.57±1.52         | 3.10±1.60           | 2.38±1.41‡      | 3.67±1.48  | <0.001* |
| A6- Neuroimaging should not be performed in the routine evaluation of the child with simple febrile seizure.   | 4.22±1.15         | 4.52±1.08           | 3.64±1.40‡      | 4.48±1.11  | 0.001*  |
| A7- Neuroimaging should not be performed in the routine evaluation of the child with complex febrile seizure.  | 2.38±1.12‡        | 3.02±1.41           | 2.31±1.42‡      | 2.95±1.36  | 0.001*  |
| A8- Continuous use of phenobarbital is recommended for the treatment of febrile seizure.   | 1.62±1.03         | 1.43±1.03           | 1.92±1.09       | 1.69±1.34  | 0.177   |
| A9- Continuous use of levetiracetam is recommended for the treatment of febrile seizure.   | 1.63±0.95         | 1.48±1.0            | 1.90±0.99       | 1.69±1.30  | 0.263   |
| A10- Continuous use of valproic acid is recommended for the treatment of febrile seizure.  | 1.54±0.89         | 1.41±0.93           | 1.87±1.03       | 1.67±1.22  | 0.122   |
| A11- Intermittent use of oral diazepam during febrile illness is recommended for the treatment of febrile seizure.   | 2.87±1.51         | 2.87±1.62           | 2.97±1.42       | 2.25±1.48‡ | 0.031*  |
| A12- Continuous use of antiepileptic drugs is recommended for the treatment of complex febrile seizure.  | 2.60±1.27         | 1.92±1.18‡          | 2.54±1.27       | 2.36±1.31  | 0.005*  |
| A13- If seizure is prolonged more than 5 min, the treatment is rectal diazepam or buccal midazolam.  | 4.15±1.11         | 4.37±1.11           | 3.74±1.09       | 4.06±1.32  | 0.067   |
| A14- Regular use of antipyretic drugs will prevent febrile seizure.  | 2.90±1.45         | 2.24±1.41‡          | 2.92±1.40       | 2.58±1.54  | 0.017*  |

\*Statistically significant  $p<0.05$  (By One way Anova), †A1- Significantly lower than other 3 specialties, A5- Significantly lower than other 3 specialties, A6- Significantly lower than other 3 specialties, A7- Significantly lower than other 2 specialties, A11- Significantly lower than other 3 specialties, A12- Significantly lower than other 3 specialties, A14- Significantly lower than other 3 specialties (by Tukey's test). EEG - Electroencephalogram, LP - Lumbar puncture

than the mean scores of physicians of other 3 specialties. The data did not show any significant difference in the mean attitude scores of the other 7 statements in relation to the specialties of study subjects (Table 5).

**Discussion.** Febrile seizure is a seizure occurring in a febrile child between the ages of 6-60 months, with no evidence of intracranial infection, metabolic disturbance, or history of a febrile seizures.<sup>2</sup> Febrile seizure affects approximately 2-5% of children, with an overall estimated incidence of 460/100,000 children.<sup>11</sup> There was a wide variation in management of FS among physicians.<sup>1,5</sup> However, there was an insufficient data in the literature regarding this point. In our study, we explored the diversity in the knowledge about the incidence and definition of FS. Consultants

demonstrated statistically significantly more knowledge of types of FS and definition of simple FS compared to residents and specialists ( $p=0.018$  and  $0.032$ ). Interestingly, there was no significant difference between general pediatric physician and pediatric neurologists in knowledge of FS, and this supports the idea that FS can be safely managed by general pediatricians.

There was great diversity regarding the perceived need for doing LP in infant younger than 12 months, who presents with a seizure and fever without meningeal signs as well as the need for requesting electrolytes and performing neuroimages. There is no evidence to support routine LP in well-appearing, immunized children.<sup>2,6,12</sup>

If a decision has been made to perform LP, blood culture and serum glucose testing should be performed

concurrently to increase the sensitivity for detecting bacteria.<sup>6</sup> Our study reflects this diversity; emergency physicians favored not to perform LP in children less than 12 months of age with no meningeal signs, and this is concordant with revised American Academy of Paediatrics recommendations, which link the decision to perform LP to the clinical symptoms and signs in addition to immunization status of the infant. Many studies have suggested that routine blood tests (especially calcium, phosphorus, magnesium, blood glucose, and complete cell count) add little in the evaluation of the child with a simple FS.<sup>6,13,14</sup> Our study showed differences among various specialties regarding the perceived need to perform electrolyte testing for FS. A significant number of family physicians tend to request electrolytes and neuroimages for patients with FS in comparison to other specialties; however, there is no evidence to support routine neuroimages for patients with FS.<sup>6,15</sup> No difference was found between various specialties in performing EEG for both simple and complex FS. The continuous use of an antiepileptic drug for the treatment of complex FS is not recommended because of potential toxicity.<sup>2</sup> This practice varied significantly among different specialties in our study. general pediatricians and family physicians tended to recommend antiepileptic drug use for a complex FS in comparison to Pediatric neurologist ( $p=0.005$ ).

Although the majority of our study population were aware of the existing clinical practice guidelines for management of FS, this was not reflected in their attitudes and practice in managing children with FS.

In conclusion, our study highlighted the wide variation in knowledge and attitudes among physicians in different specialties with different levels of experience in the management of FS. Although many physicians have the adequate basic knowledge, a significant number need more education. The use of clinical practice guidelines will minimize this diversity.

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