

Physician's perceptions of fever in children

Facts and myths

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ABSTRACT

Objective: To ascertain the knowledge and attitude of physicians, regarding fever in children.

Methods: A self-administered questionnaire was mailed to 600 randomly selected pediatricians, family practice physicians, emergency medicine physicians and general practitioners, who practice in Saudi Arabia. Appropriateness of responses to questions was determined on the basis of current medical literature. A rectal temperature of 38.0°C is generally accepted as indicative of fever in children.

Results: Of the 600 physicians surveyed, 419 (70%) completed and returned the questionnaire; 17% of the physicians were consultants, 28% specialists and 55% general practitioners. Fifty-eight percent of the physicians had 10 years or more of experience. A rectal temperature of less than 38.0°C was considered to indicate fever by 38% of physicians. Nearly 84% of physicians would initiate antipyretic therapy at a temperature of 38.5°C or less and 56% cited a temperature of 40.0°C or less to be dangerous. Only 5% believed that fever was not dangerous, while the remaining cited the principal danger of fever to be convulsions (69%), brain damage (35%), or

death (8%). The responses to the main purpose of antipyretic treatment were to prevent convulsions (70%), to make the child comfortable (55%) and to prevent brain damage (29%). Approximately 53% of physicians reported that the most serious consequences of febrile convulsions were brain damage, learning disability, epilepsy, or death. Only 26% of physicians agreed that a sleeping child with fever should be left undisturbed. Approximately 25% advised inappropriate dosage or administration intervals of paracetamol. Almost all physicians recommended sponging or bathing to reduce fever. All respondents try to educate parents regarding fever and its management.

Conclusion: A significant number of the surveyed physicians have demonstrated a serious lack of knowledge of the nature, dangers and management of an extremely common health problem. Physicians differ substantially in their knowledge of, and attitude toward fever in children, which is perhaps attributed to their different background in medical education and clinical training.

Keywords: Convulsion, fever, hyperpyrexia.

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Fever is a common complaint in childhood and is the most common reason parents bring their children to a physician for evaluation.¹ It is not rare for the physician to find himself at odds with a child's parent regarding the significance and proper management of fever. Physicians frequently differ in

their definition and treatment of significant fever.² Hence, physicians may contribute to parental misconception and confusion regarding fever due in part to incomplete and mixed messages. There is greater disparity between the frequency of fever in clinical practice and the amount of formal teaching

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devoted to its pathophysiology and management in medical schools.^{2,3} Virtually little is written about this common symptom, fever, in major pediatric texts.⁴ Rational treatment requires an understanding of body temperature regulation, heat production and conservation, and knowledge of the mechanisms by which various therapeutic measures lower body temperature. This survey was designed to ascertain the knowledge and attitude of primary-care givers, including pediatricians, family practice physicians, emergency medicine physicians and general practitioners, regarding fever in children.

Methods. Physicians who were taking care of pediatric patients in a hospital, or clinic-based setting were eligible for the survey; trainees, interns or residents, were excluded. Physicians comprised pediatricians, family practice physicians, emergency medicine physicians and general practitioners and were randomly selected by the General Health Affairs Directorate in every region of the country, but in proportion to their number in any given area. They had to be practicing in one of the governmental hospitals or primary healthcare centers, or in one of the private hospitals, dispensaries or polyclinics. Physicians were surveyed using a self-administered questionnaire containing open-ended questions to ascertain their knowledge, attitude and management of fever in children with no underlying disease. They were also asked to describe the number of years and setting of practice. Six hundred questionnaires were mailed with an explanatory cover letter. No more than one attempt was made to follow up with the physicians who did not return the questionnaire. All questions regarding specific temperature levels were based on rectal temperatures. Appropriateness of responses to questions was determined on the basis of current medical literature.

Results. Completed questionnaires were returned by 341 (76%) of the physicians practicing in governmental hospitals or dispensaries and 78 (52%) of those in private practice, giving an overall response of 70%. All subsequent analysis was conducted on these 419 respondents. The average respondent was male, in his early 40s, with approximately 10 years of experience in a pediatric care practice. All respondents practice general pediatrics (Table 1). The knowledge of physicians regarding fever is presented in Table 2. More than one-third of physicians selected a temperature less than 38.0°C as indicative of fever and two-thirds of physicians made the recommendation to initiate an antipyretic at temperatures between 38.0°C and 38.5°C, while only 2% treated fever greater than 39.0°C. Fifty-six percent of physicians who believed that fever could be dangerous cited a temperature of 40.0°C or less as significant. When physicians were asked about the principal danger of fever, 69% chose

Table 1 - Demographical characteristics of 419 respondents.

Characteristics	Descriptive statistics
Male gender, No (%)	331 (79)
Age, year (mean ± SD)	39.7 ± 6.0
Years in practice (mean ± SD)	10.5 ± 5.8
Professional status, No (%)	
Consultant	72 (17)
Specialist	117 (28)
General practitioner	230 (55)
Current practice, No (%)	
Hospital inpatient services	176 (42)
Outpatient clinics	149 (36)
Emergency rooms	94 (22)
Practice location, No (%)	
Rural	63 (15)
Suburban	95 (23)
Urban	261 (62)
No = number, SD = standard deviation	

Table 2 - Responses of 419 physicians to selected questions regarding fever in children.

Response item	Number	%
Rectal temperature cut-off level indicating fever		
≤37°C	22	5.0
37.1-37.9°C	137	33.0
38.0°C	164	39.0
38.1-39.0°C	84	20.0
No response	12	3.0
Lowest rectal temperature for initiating an antipyretic		
≤37.9°C	65	15.5
38.0°C	141	34.0
38.1-38.5°C	145	35.0
38.6-39.0°C	50	12.0
>39.0°C	10	2.0
No response	8	2.0
Maximum rectal temperature considered to be dangerous		
<40.0°C	105	25.0
40.0°C	131	31.0
40.1-40.9°C	35	8.0
41.0°C	100	24.0
41.1-41.7°C	21	5.0
42.0-43.0°C	19	4.5
No response	8	2.0
Principal danger of fever		
None	22	5.0
Convulsions	287	68.5
Brain damage	147	35.0
Dehydration	113	27.0
Obtundation	45	11.0
Death	34	8.0
No response	8	2.0
Main purpose of antipyretic therapy		
Prevent convulsions	292	70.0
Make child feel comfortable	232	55.0
Prevent brain damage	122	29.0
Ease concern of parents	55	13.0
No response	5	1.0
Most serious consequence of typical febrile convulsion		
None	185	44.0
Brain damage	166	40.0
Learning disability	62	15.0
Death	17	4.0
Epilepsy	9	2.0
No response	10	2.0

Table 3 - Responses of 419 physicians to selected questions regarding fever in children.

Response item	Number	%
Recommended antipyretic drug		
Paracetamol	413	99.0
Diclofenac	18	4.0
Ibuprofen	9	2.0
Acetylsalicylic acid	3	1.0
Dosage and administration intervals of paracetamol		
10-15mg/kg/dose every 4 hours	161	38.0
10-15mg/kg/dose every 6 hours	135	32.0
10-15mg/kg/dose every 8 hours	27	6.0
20-30mg/kg/dose every 4-6 hours	32	8.0
20-30mg/kg/dose every 8 hours	13	3.0
Others	31	7.0
No response	21	5.0
Preferred route of antipyretic administration		
Oral	202	48.0
Rectal	144	34.0
Both oral and rectal	73	17.0
Awakening the child for antipyretic treatment		
Yes	309	74.0
No	110	26.0
Reasons for waking up the child for treatment		
History of febrile convulsions	246	59.0
Sick child	82	20.0
Prevention of brain damage	63	15.0
Concerns of parents	28	7.0
Recommended other means of reducing high temperature		
Sponging	153	36.5
Bathing	119	28.0
Sponging and bathing	130	31.0
Other	17	4.0
Recommended water's temperature for sponging/bathing		
Warm	5	1.0
Tepid	360	86.0
Cold	50	12.0
Icy	4	1.0
Educational of parents regarding fever and its management included the following:		
Definition of fever	226	54.0
Reasons for fever	205	49.0
When to treat fever	307	73.0
Dangers of fever	201	48.0
Instruction on thermometer use	233	56.0
When to see physician	227	54.0
Appropriate time for education of parents regarding fever		
Sick-child visits	241	57.5
Well-child visits	123	29.0
Both visits	55	13.0

convulsions, 35% brain damage, 27% dehydration, 11% obtundation and 8% death. Most physicians (70%) believed that the main purpose of antipyretic treatment was to prevent febrile convulsions. Just over half of physicians recommended treatment to bring down fever for the comfort of the child. Others indicated that the main purpose was to prevent complications such as brain damage (29%). Nearly half of physicians believed that the most serious consequences of febrile convulsions included brain damage, learning disability, epilepsy and death. Table 3 shows the responses of physicians to selected questions regarding the management of fever in

children. Of all antipyretic agents, paracetamol was the preferred drug by more than 98% at a dose of 10-15 mg/kg every 4 hours (38%) and at a dose of 10-15 mg/kg every 6 hours (32%). However, 25% of physicians recommended dosage, and administration intervals of paracetamol, which were out of the acceptable safe therapeutic ranges. The rectal route of administering an antipyretic was favored by more than 50% of survey physicians. Only a quarter of physicians agreed that a sleeping child with fever should be left undisturbed. Seventy-four percent of physicians would awaken the child to administer antipyretics for a variety of reasons (Table 3). Almost all physicians recommended other means of reducing high temperature including sponging the febrile child by wet compresses covering extremities, trunk or head (68%) or bathing (59%) in conjunction with removal of excessive clothing, adequate hydration and external cooling using a small fan (4%). Tepid water was recommended for sponging or bathing by 86% of physicians and warm water by 1%. Some physicians recommended cold water, or even ice water. All who responded tried to educate the parents regarding fever and its management.

Discussion. In this study, more than two-thirds of the physicians we surveyed, completed and returned the questionnaire; the responses received, anonymous and volunteered, are sufficient in number and geographical diversity to provide an adequate random sample to reflect the knowledge and attitude of practicing physicians regarding fever in children. The results of this survey support the previous findings of other reports^{2,5,6} and demonstrates that physicians differ substantially in their knowledge base of fever in children and its management due to their different background in medical education and clinical practice; this fact is true in Saudi Arabia where approximately 85% of practicing physicians were expatriates. Although 30-40% of the physicians surveyed have an appropriate knowledge of fever, a significant number still have exaggerated concerns. This may be due to the fact that fever pathophysiology is not taught in medical schools and its clinical application and perspective are not well emphasized during clinical training.²

A rectal temperature of 38.0°C is generally accepted as the cut-off level of the definition of fever.⁷⁻⁹ This definition is both useful and necessary in developing a standardized approach to teaching physicians and parents. More than 90% of physicians believed that fever itself could be dangerous to a child, with brain damage and death being the most serious complications of fever; brain damage and death were cited as potential complications of high fever by 35% and 8% of respondents. These numbers are surprisingly high, but similar findings were reported by others.^{2,6} The majority of physicians expressed their concerns about the harmful effects of

fever and approximately 85% of them tended to reduce a rectal temperature level of 38.5°C or less by prescribing an antipyretic. It is recommended to treat a child's fever with antipyretic medications only if the temperature is over 39.0°C and preferably, only if the child is uncomfortable.⁷ Recent data has confirmed the notion that children feel better if their fever is reduced; children treated with paracetamol were more likely to be rated by their parents to show improvement in their level of activity and degree of alertness.¹⁰ In this study, only 55% of the physicians explained that their reason for recommending antipyretics was for the comfort of the child. Although no study has yet proved that vigorous treatment with antipyretics or anticonvulsants is effective in preventing convulsions, approximately 70% of surveyed physicians reported that this was the main purpose of antipyretic therapy. In addition, approximately 30% of respondents recommended antipyretics to children with high fever to prevent brain damage. The fear of brain damage is unfounded. A high fever is defined as a temperature higher than 40.5°C and harm does not occur until temperature is greater than 41.7°C.⁷ The body has a thermo-regulatory set-point that keeps fever from rising above 41.7°C. There have been no cases of documented brain damage from an interleukin-1 mediated fever.¹¹ Brain damage and other neurological complications from fever greater than 41.7°C can result from human error and associated heat stroke as has happened with young children dressed in excessive clothing, left exposed to direct sunlight in warm weather, or left in a crib next to a radiator.¹² Despite there being no evidence to suggest that brain damage, learning disability, death or epilepsy are well documented consequences of typical febrile convulsions,^{13,14} more than 50% of the physicians surveyed considered febrile convulsions a significant danger to the child. Furthermore, it has not been proven that antipyretics or sponging can prevent febrile convulsions or their recurrence.^{15,16} The insistence on obsessional antipyretic measures will only enhance fever phobia in parents.

Paracetamol appears to be the most preferable antipyretic drug among the physicians surveyed. It has been shown that 15 mg/kg is both a safe and a more effective dose than 10 mg/kg¹⁷ and the dosage intervals have been recommended to be 4 hourly rather than 6 hourly, but no more than 5 doses should be given in a 24-hour period. Although paracetamol appears to be a remarkably benign drug at therapeutic doses, liver toxicity with irreversible hepatic injury or acute hepatic failure has been reported in children given a single overdose,¹⁸ or multiple large doses.¹⁹ The possible association of aspirin with increased incidence of Reye's syndrome generally discourages its use. The literature on the use of ibuprofen suggests that it is an effective antipyretic.¹⁷ There is no convincing evidence that rectal administration of antipyretics is superior to the oral route, even though

many physicians and parents believe that the rate and degree of temperature reduction are greater with antipyretic suppositories. Many children become frightened and go berserk when parents try to insert a suppository.

More than two-thirds of the physicians in this survey agreed that a sleeping child with fever should be woken at night to receive antipyretic therapy. This finding is not consistent with the recent recommendation that a sleeping child with fever should be left undisturbed.¹¹ Physical measures are recommended to enhance reduction of fever such as removal of excessive clothing or blankets, adequate hydration and a cooling surrounding environment.²⁰ The role of tepid sponging to promote heat loss is controversial; recent reports have shown a greater fall in temperature when tepid sponging has been combined with paracetamol.^{21,22} Schmitt⁷ recommended sponging the febrile child with water of 37.0°C temperature only if the body temperature is higher than 40.0°C, has not responded to treatment with antipyretics and the patient is uncomfortable. Moreover, the antipyretic drug must be given one hour before sponging or bathing so the hypothalamic set-point will be lowered. If sponging or bathing is administered before the antipyretic is given, the child experiences discomfort and shivering due to the hypothalamus attempts to offset the lowering of the body temperature and the temperature quickly returns to the previous level after the sponging or bathing is discontinued.

Almost all physicians in this study tried to educate parents regarding fever, particularly during sick-child visits. It has been shown that proper educational programs regarding fever and its treatment can change parental perceptions and reduce excessive use of health services.²³ Appropriate education of the parents during the well-child visits may be more effective. In this survey we have confirmed the fact that physician misconceptions regarding fever are indeed common. Most physicians have demonstrated poor knowledge of fever and unjustified fears pertaining to its nature, consequences and management. Fever is common, and therefore an important clinical topic to be included in the undergraduate teaching curriculum of medical schools as well as in the postgraduate training programs. In addition, the misconceptions of the currently practicing physicians might be resolved by well-planned intervention programs to re-educate them regarding the benign nature of fever and its appropriate management.

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