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Pediatrics 2001;107:1241-1246
DOI: 10.1542/peds.107.6.1241

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Fever Phobia Revisited: Have Parental Misconceptions About Fever Changed in 20 Years?

Michael Crocetti, MD*; Nooshi Moghbeli, BA*; and Janet Serwint, MD‡

ABSTRACT. *Objectives.* Fever is one of the most common reasons that parents seek medical attention for their children. Parental concerns arise in part because of the belief that fever is a disease rather than a symptom or sign of illness. Twenty years ago, Barton Schmitt, MD, found that parents had numerous misconceptions about fever. These unrealistic concerns were termed "fever phobia." More recent concerns for occult bacteremia in febrile children have led to more aggressive laboratory testing and treatment. Our objectives for this study were to explore current parental attitudes toward fever, to compare these attitudes with those described by Schmitt in 1980, and to determine whether recent, more aggressive laboratory testing and presumptive treatment for occult bacteremia is associated with increased parental concern regarding fever.

Methods. Between June and September 1999, a single research assistant administered a cross-sectional 29-item questionnaire to caregivers whose children were enrolled in 2 urban hospital-based pediatric clinics in Baltimore, Maryland. The questionnaire was administered before either health maintenance or acute care visits at both sites. Portions of the questionnaire were modeled after Schmitt's and elicited information about definition of fever, concerns about fever, and fever management. Additional information included home fever reduction techniques, frequency of temperature monitoring, and parental recall of past laboratory workup and treatment that these children had received during health care visits for fever.

Results. A total of 340 caregivers were interviewed. Fifty-six percent of caregivers were very worried about the potential harm of fever in their children, 44% considered a temperature of 38.9°C (102°F) to be a "high" fever,

and 7% thought that a temperature could rise to $\geq 43.4^{\circ}\text{C}$ ($\geq 110^{\circ}\text{F}$) if left untreated. Ninety-one percent of caregivers believed that a fever could cause harmful effects; 21% listed brain damage, and 14% listed death. Strikingly, 52% of caregivers said that they would check their child's temperature ≤ 1 hour when their child had a fever, 25% gave antipyretics for temperatures $< 37.8^{\circ}\text{C}$ ($< 100^{\circ}\text{F}$), and 85% would awaken their child to give antipyretics. Fourteen percent of caregivers gave acetaminophen, and 44% gave ibuprofen at too frequent dosing intervals. Of the 73% of caregivers who said that they sponged their child to treat a fever, 24% sponged at temperatures $\leq 37.8^{\circ}\text{C}$ ($\leq 100^{\circ}\text{F}$); 18% used alcohol. Forty-six percent of caregivers listed doctors as their primary resource for information about fever. Caregivers who stated that they were very worried about fever were more likely in the past to have had a child who was evaluated for a fever, to have had blood work performed on their child during a febrile illness, and to have perceived their doctors to be very worried about fever. Compared with 20 years ago, more caregivers listed seizure as a potential harm of fever, woke their children and checked temperatures more often during febrile illnesses, and gave antipyretics or initiated sponging more frequently for possible normal temperatures.

Conclusions. Fever phobia persists. Pediatric health care providers have a unique opportunity to make an impact on parental understanding of fever and its role in illness. Future studies are needed to evaluate educational interventions and to identify the types of medical care practices that foster fever phobia. *Pediatrics* 2001;107:1241-1246; fever, fever phobia, child, children, antipyretics, sponging, health care practices.

Fever is one of the most common reasons that parents seek medical attention for their children. It is estimated that fever is the primary complaint for 30% of patients seen by pediatricians.¹ For a larger percentage of patients, fever is a secondary complaint that prompts numerous office calls and visits.² Villarreal and others found that ~50% of after-hours calls to a pediatric resident group practice were about fever or concerned children who had fever as 1 of their symptoms.^{2,3} Parental concerns

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arise in part because of the belief that fever is a disease rather than a symptom or sign of illness. Viewing fever as a disease process ultimately leads to misconceptions about its role in illness.

Twenty years ago, Barton Schmitt, MD, found that parents had numerous misconceptions about fever in children.⁴ In this initial study, he found that 94% of caregivers believed that fever could cause side effects, 63% of caregivers stated that they worried a great deal about serious harm resulting from fevers, 18% believed that brain damage and other serious consequences could be caused by fevers of 38.9°C (102°F) or less, and 16% believed that temperatures could rise as high as 43.3°C (110°F) to 48.9°C (120°F) if not treated with antipyretics. These unrealistic concerns were termed “fever phobia.”

Separate from these unrealistic fears about fever is concern that some febrile children without an obvious focus of infection may have occult bacteremia and be at risk for developing a serious bacterial disease, such as meningitis, bone or joint infection, urinary tract infection, or pneumonia.⁵ Parameters such as young age, poor clinical appearance, and abnormal laboratory data place children into a higher risk category for these serious infections.⁵ Continued concern regarding occult bacteremia and its potential sequelae in febrile children has led to more aggressive laboratory testing and treatment.^{6,7}

Our objectives for this study were to explore current parental attitudes toward fever, to compare these attitudes with those described by Schmitt in 1980, and to determine whether recent, more aggressive laboratory testing and presumptive treatment for occult bacteremia is associated with increased parental concern of fever.

METHODS

Between June and September 1999, a cross-sectional survey was administered to caregivers whose children were enrolled in 2 urban hospital-based pediatric clinics in Baltimore, Maryland. We selected a convenience sample of patients who were available and who consented to be in the study while a single research assistant was present. The research assistant administered a 29-item questionnaire about fever to caregivers before either health maintenance or acute care visits at both sites. Portions of the questionnaire were modeled after Schmitt's and elicited information about definition of fever, concerns about fever, and fever management.⁴ Additional information included home fever reduction techniques, frequency of temperature monitoring, and parental recall of past laboratory testing and treatment that these children had received during health care visits for fever. All questions were open-ended except those regarding parental worry, resources for fever information, and types of health care practices. To compare results between studies, we used the same temperature cutoffs as Schmitt.⁴ In addition, we examined current parental beliefs to determine whether there was an association between health care practices and parental anxiety about fever. The study was approved by the institutional review board, and verbal informed consent was obtained.

Data analysis was performed with the use of the Statistical Package for the Social Sciences (SPSS Version 10 for Windows; SPSS, Inc, Chicago, IL). Student's *t* test was used for continuous variables; χ^2 analysis and Fisher's exact test were used for dichotomous variables.

RESULTS

Demographics

A total of 340 caregivers, 186 (55%) at site A and 154 (45%) at site B, agreed to be in the study and

were interviewed. Sites A and B differed demographically only by race of the patients (Table 1). At site A, 34% of patients were black and 62% were white; at site B, 85% were black and 11% were white ($P < .001$). The remaining demographic variables were comparable between groups. Mothers accounted for 84% of those interviewed, and the mean age of the caregivers interviewed was 32 years (± 10). Ten percent of the children at the time of the survey were between the ages of 0 and 3 months, 41% were 3 to 36 months, and 49% were older than 36 months. At the time of the interview, children were seen for health maintenance visits (54%), acute visits without fever (29%), acute visits with fever (7%), and follow-up visits (9%).

In Schmitt's study, 10% of the patients were black and 90% were white. Fifty percent of the families seen in Schmitt's clinic were described as medically indigent (uninsured), 40% were part pay, and 10% paid the full fee.⁴ (B. Schmitt, personal communication, June 2000).

Caregiver Definition of Fever and Level of Concern

We found that 56% of caregivers were very worried, 34% were somewhat worried, and 10% were not at all worried about the potential harm of fever in their children. Compared with 20 years ago, we found that more caregivers were not at all worried about fever (1% vs 10%); however, the percentage of caregivers who stated that they were very worried or somewhat worried about fever remained the same. In the current study, fewer caregivers considered a temperature of $\leq 37.8^\circ\text{C}$ ($\leq 100^\circ\text{F}$) to be a high fever (Fig 1) and fewer believed that a temperature could rise to 43.3°C (110°F) or above if left untreated compared with the Schmitt study (Fig 2).

Nintey-one percent of caregivers in the current study believed that fever could cause at least 1 harmful effect (Table 2). Compared with Schmitt's findings, more caregivers in the current study listed sei-

TABLE 1. Demographics of Patients

Variable	Sites A and B
Child's race	
Black	57%*
White	39%*
Other	4%
Mothers interviewed	84%
Mean age of caregiver interviewed (years)	32 \pm 10
Caregivers who completed high school	76%
Total insured	90%
MCO/Medicaid insurance	61%
Child's age	
0-3 Months	10%
3-36 Months	41%
>36 Months	49%
Type of visit at time of interview	
Health maintenance	54%
Acute without fever	29%
Acute with fever	7%
Follow-up	9%

MCO indicates managed care organization.

Sites A and B differed demographically only by race. At site A, 34% of patients were black and 62% were white, whereas at Site B, 85% were black and 11% were white ($P < .001$). In Schmitt's study, 90% of patients were white and 10% were black.

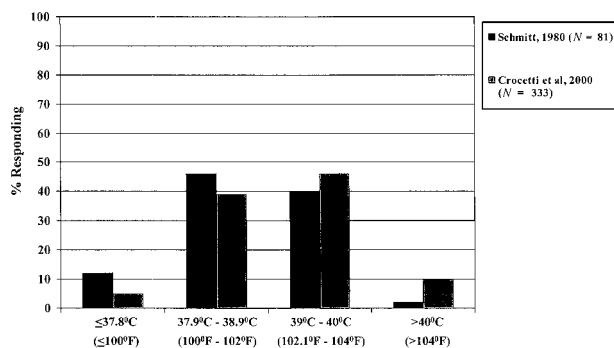


Fig 1. Caregiver's definition of a high fever.

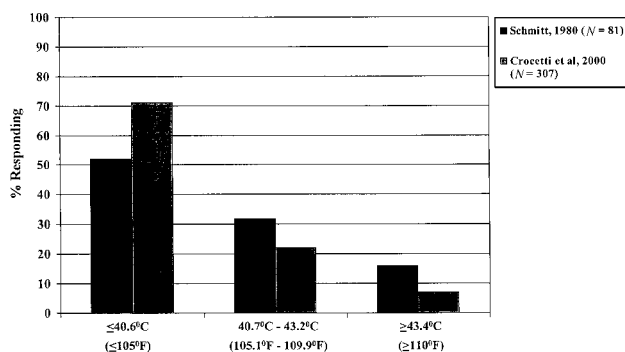


Fig 2. How high a fever can go if left untreated.

TABLE 2. Harmful Effects of Fever

Type	Schmitt (n = 81)	Crocetti et al (n = 340)*
Seizure	15%	32%
Brain damage	45%	21%
Death	8%	14%
Dehydration	4%	4%
Really sick	1%	2%
Coma	4%	2%
Delirium	12%	1%
Blindness	3%	1%
No response	6%	9%
Other	—	14%
Total	100%	100%

* Number-one harm of fever listed by caregiver.

zure as the number 1 harmful effect of fever (15% vs 32%); fewer listed brain damage (45% vs 21%) and delirium (12% vs 1%). In the current study, 14% of caregivers listed death as a potential harm of fever compared with 8% in the Schmitt study.

When we asked caregivers to estimate the lowest temperature required to cause the types of harm listed in Table 2, 76% listed a temperature of 40°C (104°F) or less compared with 52% in the Schmitt study. In addition, 35% of caregivers in our study said that a temperature of ≤37.8°C (≤100°F) could cause the types of harm listed in Table 2 compared with 4% in the Schmitt study.

Temperature Monitoring, Use of Antipyretics, and Fever Reduction Techniques

Regarding temperature monitoring, 23% of caregivers said that they would check their child's temperature every hour during febrile illnesses com-

pared with 8% in the Schmitt study (Table 3). Strikingly, 52% of caregivers said that they would check their child's temperature every hour or less if he or she had a fever.

In the current study, 25% of caregivers said that they would give antipyretics for temperatures <37.8°C (<100°F) compared with 11% in the initial study. We found that 89% of caregivers would give antipyretics before the temperature reached 38.9°C (102°F), which is similar to Schmitt's finding of 85%. Twenty-seven percent of caregivers said that they alternate the use of acetaminophen and ibuprofen. An alarming finding is that caregivers said that they often gave their children antipyretics at incorrect dosing intervals (Fig 3). Although 70% of caregivers gave acetaminophen at 4-hour intervals, 14% gave it every 3 hours or less. Furthermore, only 33% of caregivers gave ibuprofen at 6-hour intervals and 44% gave it every 5 hours or less. Finally, 85% of caregivers in our study said that they would awaken their child to give antipyretics during a febrile illness compared with 48% in the Schmitt study (Fig 3).

In the present study, 73% of caregivers used sponging as a fever-reducing technique. Twenty-four percent said that they would initiate sponging for temperatures ≤37.8°C (≤100°F) compared with 7% in the initial study. Of those who sponged, 68% performed the technique incorrectly using alcohol, cool water, or a cool rag.

Ethnic Variations in Beliefs About Fever

Because there were ethnic differences between the families interviewed in Schmitt's study and the current one, we chose to examine the possibility of ethnic variations in beliefs about fever. In the current study, 96% of those interviewed were either black (57%) or white (39%). We found that there were no differences in responses between these 2 groups regarding definition of fever, harmful effects of fever, antipyretic use, and resources for fever information. However, compared with whites, more black respondents stated that a temperature could rise to ≥43.4°C (≥110°F) if left untreated (30% vs 38%; $P < .001$), more responded that a temperature of ≤37.8°C (≤100°F) could potentially cause harm (18% vs 29%; $P = .05$), and more said that they would wake their febrile children to give antipyretics (74% vs 93%; $P < .001$).

Health Care Practices for Fever During Past Visits and Comparison With Caregiver Worry

A total of 177 caregivers (52%) said that their child had been evaluated for fever by a pediatric health

TABLE 3. How Often Temperature Checked When Child Has Fever

Time (Minutes)	Crocetti et al (n = 305)
≤15	9%
16-30	20%
31-60	23%
61-120	17%
>120	31%
Total	100%

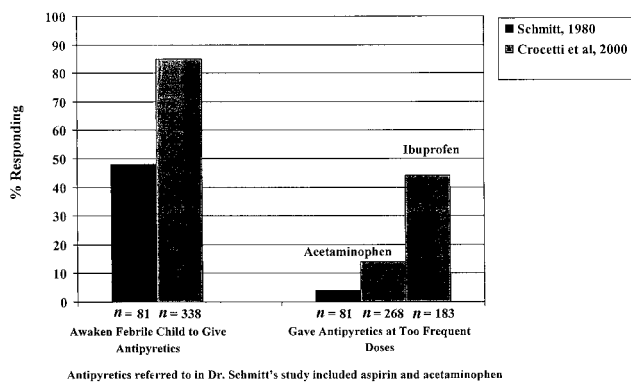


Fig 3. Caregiver's use of antipyretics.

care provider at least once in the past. Caregivers recalled a total of 539 previous visits: 241 (45%) took place in the clinic setting, and 298 (55%) took place in the emergency department setting. Of those who recalled that their child had had an evaluation for fever, 12% stated that the child had been 0 to 3 months old at the time of the visit, 75% stated that the child had been 3 to 36 months old, and 21% stated that the child had been older than 36 months. Caregivers stated that during at least 1 of the visits, 85% of the children had received antipyretics, 53% had had blood work done, 60% had been given a prescription for oral antibiotics, 20% had been given antibiotics by injection, and 12% had had neither blood tests nor antibiotics. Caregivers recalled that the 2 most common diagnoses at the time of the visits were otitis media (38%) and viral infection (18%). As Fig 4 demonstrates, caregivers who stated that they were very worried about fever were more likely to have had a child who was evaluated for fever ($P < .01$), to have had blood work performed on their child during a febrile illness ($P < .05$), and to have perceived their doctors to be very worried about fever ($P < .01$).

Resources for Fever

Caregivers in our study used multiple resources to obtain information about fever (Table 4). However, similar to 20 years ago, caregivers considered doctors and nurses to be their primary resource for information about fever.

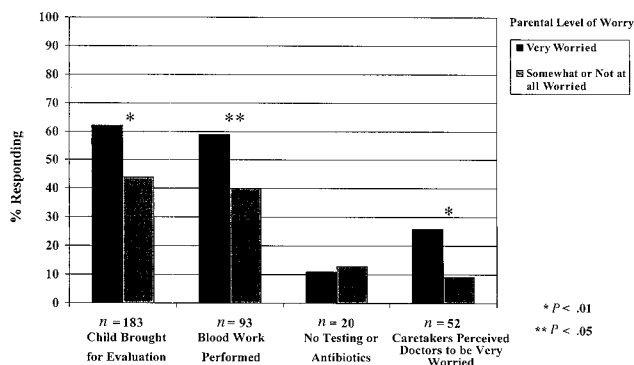


Fig 4. Comparison of caregiver worry about fever by past health care practices.

TABLE 4. Resources For Fever

Resource	Schmitt (n = 81)	Crocetti et al (n = 314)
What doctors and nurses said	34%	46%
What doctors and nurses did	17%	not asked
Friends and relatives	30%	28%
Experience	not asked	14%
Reading	19%	11%
Television	not asked	1%
Total	100%	100%

DISCUSSION

The present study is a descriptive trend analysis of current caregiver beliefs about fever in comparison to the findings of Schmitt in 1980. Because the populations were different between studies, we chose not to perform direct statistical comparisons on the findings but rather to demonstrate trends between the two time periods. We found that parents and other caregivers continue to manifest signs of fever phobia 20 years after Schmitt first described this entity. This is not surprising when one considers the amount of emphasis placed on fever when children are being evaluated for an illness. When obtaining a history about a child's illness, pediatric health care providers often are quick to ask about temperature. The first vital sign obtained in most triage areas is temperature. Discharge instructions to parents after an acute visit to a physician often recommend calling or returning to the site of care if the child's temperature goes beyond a certain value or if a fever persists. Despite the amount of attention paid to fever in children, instructions given to parents regarding management of fever often are incomplete and inconsistent. In one study, May and Bauchner⁸ found that during sick-child visits, 10% of providers almost never discussed the definition of a high fever, 25% almost never discussed the dangers of fever, and 15% almost never discussed the reasons for fever. By placing emphasis on knowing a child's temperature and concurrently giving inadequate information about fever, one may heighten anxiety and perpetuate fever phobia.

Caregiver anxiety about the potential harmful effects of fever may be heightened by the lack of knowledge regarding fever's role in illness. Caregivers need to be educated that fever is a physiologic response to an insult that stimulates the body's inflammatory defenses, and in children the insult most commonly is a viral infection.⁹ Kluger^{10,11} argued that fever is an adaptive response of the host that has evolved as one of the many mechanisms to fight infection and there is evidence that various components of the immune system are enhanced at elevated temperatures.¹² Fever can retard the growth and reproduction of bacterial and viral microorganisms, enhance neutrophil production and T-cell proliferation, and aid the body's acute-phase reaction.⁹

In addition to the beneficial effect that fever has on the immune system, it is important to note that the febrile response is a homeostatic process. Many caregivers are unaware of this process and believe that temperatures will continue to rise to potentially le-

thal levels if left untreated. Caregivers need to know that in the absence of hyperthermic insults, such as dehydration and closed, hot automobiles, and in neurologically normal children, the body does not allow fever to rise out of control to potentially lethal levels.^{9,10} Therefore, in the absence of hyperthermic insults, it is exceedingly rare for a child's temperature to exceed 41.7°C (107°F).⁹ Yet we found that 7% of caregivers thought that a temperature could rise to 43.3°C (110°F) or above if left untreated compared with 16% in Schmitt's study. Despite the current lower percentage, it still is striking that 1 in 15 caregivers believed that a child's temperature could rise to potentially lethal levels in response to infection. The caregivers who hold this belief will continue to treat fever as a life-threatening illness.

Many caregivers in our study believed that fever could have life-threatening or lethal effects. Twenty-one percent of caregivers in the present study listed brain damage as the number 1 harmful effect of fever and 14% listed death. This finding may not be surprising when one considers that many of these beliefs also may be shared by pediatric health care providers. May and Bauchner⁸ found that 65% of pediatricians who responded to a questionnaire believed that an elevated body temperature in and of itself could become dangerous to a child. Sixty percent of these physicians cited a temperature of 40°C (104°F) or above as significant. When asked about the most serious complication of fever, 21% listed brain damage and 26% listed death. Pediatricians and caregivers alike may have concerns about fever and its potential to cause harm in children.

Concern about fever and its potential harmful effects may lead to parental behaviors such as excessive monitoring and treatment. More than half of those interviewed in our study said that they would check a temperature every hour or less when their child had a fever, and 85% of caregivers said that they would awaken their child to give antipyretics during a febrile illness. These behaviors may be considered excessive and intrusive to children during the time that they are recovering from their illness. We found that 73% of caregivers used sponging as a fever-reducing technique; however, two thirds performed the technique incorrectly with alcohol, cool water, or a cool rag. Compared with 20 years ago, more caregivers initiated sponging for normal temperatures ($\leq 37.8^{\circ}\text{C}$ [$\leq 100^{\circ}\text{F}$]). One study showed that sponging was ineffective and may cause discomfort to the child even if an antipyretic is given first.¹³ Cool water can cause significant shivering as a result of an increased temperature setpoint, making the child extremely uncomfortable.³ Alcohol has the potential to cause dehydration and hypoglycemia, particularly in young children, and should not be used.³

In addition to excessive fever monitoring and incorrect sponging, we found that many caregivers are dangerously liberal with their use of antipyretics. Compared with 20 years ago, more caregivers gave antipyretics for normal temperatures ($< 37.8^{\circ}\text{C}$, $< 100^{\circ}\text{F}$) and more caregivers gave these medicines at incorrect dosing intervals (Fig 3). Inappropriate dosing of acetaminophen and ibuprofen places children

at undue risk for toxicity. Contributing to the risk of antipyretic toxicity is the finding that nearly one quarter of those surveyed in our study said that they would alternate the use of acetaminophen and ibuprofen during their child's febrile illness. Alternating the use of acetaminophen and ibuprofen is common despite a lack of evidence to support the efficacy and safety of this practice. Mayoral et al¹⁴ reported that 50% of pediatricians surveyed stated that they advised parents to alternate acetaminophen and ibuprofen using various regimens. Interestingly, 29% of the respondents said that they followed the recommendations of the American Academy of Pediatrics despite that no such policy exists. This information highlights that the potential exists for caregivers to receive incorrect advice regarding the management of fever, and this suggestion by health care providers implies that fever needs to be reduced.

Even if one conscientiously advises parents on the proper management of fever and discusses the benefits and risks of elevated temperature, a certain amount of anxiety will remain. One of the most challenging tasks for a pediatric health care provider is to identify and treat febrile infants and children who are at the highest risk for developing serious bacterial infections. To help pediatric providers confront this challenge, a practice guideline has been developed for children 0 to 36 months of age with fever and no source.⁵ Proponents of the guideline have argued that it was developed to inform pediatric practitioners of the evidence regarding fever without source,¹⁵ but opponents argue that the practice guideline has led to an unnecessary increase in laboratory testing, use of parenteral antibiotics, and may accentuate fever phobia among parents and physicians.⁶

The overall effect that the practice guidelines have had on physicians' treatment of the febrile child and on parents' attitudes toward fever is difficult to quantify. In our study, we attempted to describe and quantify retrospectively certain medical care practices that children had received during previous evaluations for fever. Fifty-two percent of the respondents said that their child had been evaluated for a fever at least once in the past. Visits were distributed equally between the clinic and emergency department settings. When asked what was done for their children during the visits, caregivers stated that 53% of them had had blood work done, 60% had received a prescription for oral antibiotics, 20% had received parenteral antibiotics, but only 12% reported that their children did not receive blood tests or antibiotics during their fever evaluations. We found that caregivers who were very worried about fever were more likely in the past to have had a child who was evaluated for a fever, to have had blood work performed on their child during a febrile illness, and to have perceived their doctor to be very worried about fever. Because we can suggest only an association between these variables, we cannot determine from a cross-sectional study whether children of worried parents undergo more evaluations and testing for fever (parent-directed practice) or parents become more worried about fever after

their children are evaluated (physician-directed practice). Future prospective studies are needed to examine the contribution of parent- and physician-directed behavior on the evaluation and treatment of fever in children.

Future studies also are needed to explore ethnic differences in beliefs about fever. Currently, more black respondents believed that a temperature could rise to potentially lethal levels if left untreated, listed lower temperatures that could cause harm, and woke their children more often to give antipyretics during febrile illnesses. Additional investigations are needed to examine differences that may exist in other ethnic groups regarding fever and its role in illness to help develop suitable ethnicity-sensitive interventions.

There were limitations to this study that warrant additional discussion. Our study was conducted in 2 urban hospital-based clinics, and one may not be able to generalize the results to other patient populations. However, Kramer et al¹⁶ found that caregivers who brought their children to suburban offices with a higher socioeconomic status demonstrated undue fear of fever and aggressively treated their febrile child in the same manner described by Schmitt. Schmitt's study took place in Colorado, and one must consider regional differences in beliefs and practices between there and Baltimore, Maryland. However, both studies took place in an urban setting, and although there was a large proportion of uninsured children in the 1980 study, we believe that many of those children may represent the larger Medicaid population that we observed in the present study. Our study relied on caregiver report, and findings may be limited by recall bias. However, our intent was to document current beliefs about fever in the context of past and present experiences. Only a small percentage of children were being seen for evaluation of fever at the time of the survey. Interestingly, Kramer et al¹⁶ found that parents of children with high fever were less worried about serious sequelae. He reasoned that parents noted an absence of problems in their children when they presented with a high fever, and that resulted in a higher threshold for concern.

CONCLUSION

Fever phobia persists. Compared with 20 years ago, more caregivers listed seizure and fewer listed brain damage as potential harms of fever. Caregivers today checked their child's temperature more often during a febrile illness, woke their children more

often to give antipyretics, gave these medicines at too frequent dosing intervals, and gave antipyretics or initiated sponging more frequently for possible normal temperatures. Caregivers who stated that they were very worried about fever were more likely in the past to have had a child who was evaluated for a fever, to have had blood work performed on their child during a febrile illness, and to have perceived their doctors to be very worried about fever. Caregivers continue to list doctors and nurses as their primary resource for fever information. Therefore, pediatric health care providers have a unique opportunity to make an impact on parental understanding of fever and its role in illness. Educational interventions are needed to dispel caregiver misconceptions about fever and to promote the appropriate antipyretic treatment of the febrile child. Future studies are needed to evaluate the long-term effectiveness of such interventions and to identify the types of medical care practices that foster fever phobia.

ACKNOWLEDGMENTS

We thank Dr Barton Schmitt for providing us with the inspiration to pursue this work. In addition, we thank Adriane King for her expertise in the preparation of this manuscript.

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