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ABSTRACT. Fever in children is a common problem, but one which often alarms parents. Parental misconceptions often lead them to unnecessarily aggressive and inappropriate management of fever in their children. A prospective controlled trial of an educational intervention to improve parental understanding and management of fever, involving the parents of 108 children, aged 6 months to 4 years, was performed in a private group practice. Although the majority of these patients were well educated, most were found to be misinformed about many aspects of the seriousness of fever and its management. Parents in the intervention group received a standardized interview in which the management of fever was discussed, demonstrated, and practiced. In addition, they received a printed information sheet for reinforcement 2 months after the initial interview. Parents in both the control group and intervention group revealed an increase in knowledge about fever over time, but only in the intervention group were inappropriate physician contacts and medication errors reduced. The effectiveness of an active learning approach to anticipatory guidance for the management of transient febrile illness was documented and it is suggested that extension of this approach to other common problems in the private practice setting be examined. *Pediatrics* 1984;73:600–605; *fever, health education, interventions.*

Fever is one of the most common medical problems experienced by children.[1,2] However, parents and primary care physicians frequently differ in their definitions and treatment of significant fever. Pediatricians consider temperatures less than 41°C to be relatively harmless, with the exception of fever in neonates, and they treat children with fever for two reasons: (1) to relieve the discomforts of headache and irritability associated with fever (usually not less than a temperature of 39.5 to 40°C) and (2) to lessen the risk of febrile convulsions in susceptible children.[1] They recognize that more than 90% of acute febrile illnesses in children are of presumed viral etiology and require little more than supportive therapy. The important issue for pediatricians is to focus on the fever's etiology and to rule out serious disease.[3] In contrast, parents are often alarmed by low-grade fever (38.9°C) and believe that moderate fever (40.0°C) can cause serious neurologic sequelae.[4] This "fever phobia" may lead parents to unnecessarily aggressive and sometimes inappropriate management of their child's fever.[4]

Previous work has suggested that such lack of congruence between provider and parent leads to decreased satisfaction and poorer compliance with the management of health problems.[5] Attempts to improve congruence through educational interventions have met with mixed results.[6–8] In part, this lack of success may reflect reliance by office-based pediatricians on relatively passive, one-shot instructional techniques. In this study, we have taken a more active approach suitable for office practice. We combined an intervention with a reinforcement 1 month later, and we then assessed their effectiveness on parental management of fever.

OBJECTIVES

There were four objectives for this study: (1) to dispel parents' misconceptions about fever and to teach them to initiate proper care of their febrile child themselves, (2) to reduce the misuse of antipyretics, (3) to provide parents with a list of serious signs that warrant medical attention, and (4) to decrease inappropriate use of health professionals

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for minor, transient febrile illness.

This study was conducted as a prospective controlled trial of an educational intervention for parents in a private group practice at the Children's Hospital of Philadelphia from September 1980 to September 1981. Subjects included 108 children, aged 6 months to 4 years.

METHODS

The study design is shown in the Figure. The subjects included all consecutive children older than age 6 months scheduled for a routine "well-child" visit at a hospital-based private practice. After completing their medical visit, 106 parents of 108 children were asked to participate in the study. The parents were interviewed by a research assistant using an instrument designed to assess current knowledge about the definition of fever and the use of antipyretic medications, as well as the parents' usual management of fever in their children. The parents were then asked to complete an "illness record" or diary to be used to describe their actions in response to illness in their child over a 2-month period. This illness record included a symptom checklist, a graph to plot temperature, a medication chart, and a question about physician contacts, if any (available upon request).

After giving consent, the patients were then alternately assigned to the intervention or control group. There were 54 children in each group, but 53 parents in each study group because one parent in each group responded for two children. The 53 parents in the intervention group met with one of four research assistants for an educational interview. The elements of this intervention were: (1) the minimum temperature at which a child could be considered to have a "fever," (2) the measurement of a child's temperature, (3) management of fever in a child including appropriate dosage of antipyretic (acetaminophen use only was recommended), and (4) situations requiring evaluation by a physician. On average, the interview required 20 minutes. The consistency of the content of the intervention was assessed through periodic videotaping. Two months after the educational interview, parents in the intervention group received a printed mailed reinforcement summarizing the informational content of the interview and specifying the appropriate dose of acetaminophen for the child.

Outcomes were assessed in terms of changes both in parental knowledge and behavior concerning the management of fever. In order to measure changes in knowledge, participating parents were administered a brief telephone interview with questions similar to those in the base-line questionnaire by research assistants unaware of their intervention status. Behavioral changes were measured in terms of physician contacts and use of antipyretics as reported in illness records and revealed by chart audit. Unaware of the assignment of the patient, one of the investigators (R.C.) reviewed the records; noted all telephone visits, office visits, and antipyretic use; and classified them as appropriate or inappropriate according to pre-set criteria derived from the content of the intervention. For example, if a parent called the physician after a child "felt warm" and asked the dose of antipyretic, this was coded as an inappropriate telephone call. Similarly, if a child's illness record indicated three days of a temperature greater than 38.3°C (101°F) plotted on the graph and the parent had not called a physician, this was also coded as an inappropriate response. Telephone calls noted on the "illness records" were validated when possible against the office record of all weekday calls.

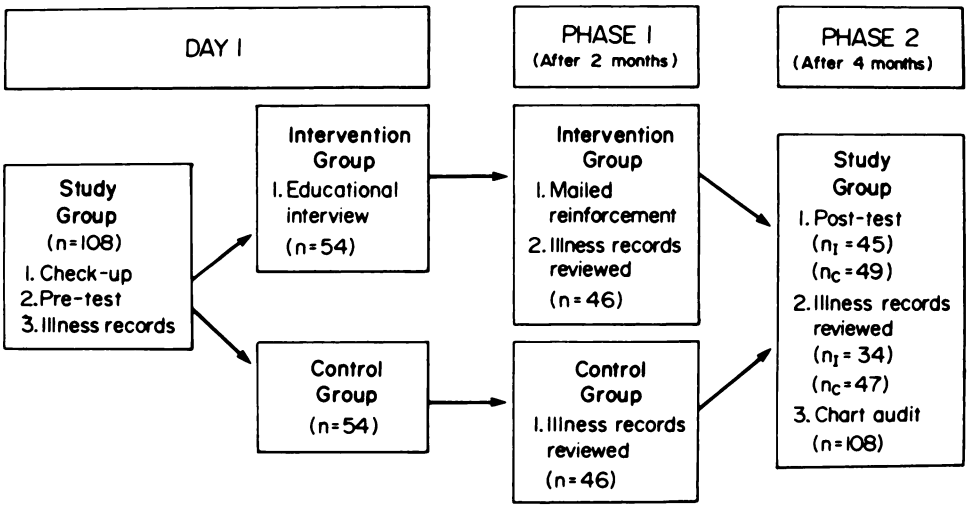

Figure. Study design.

Interviews to assess parental knowledge of fever management at the end of the study were obtained for 94 (88.7%) of the 106 parents. In addition, illness records were returned for 92 (85.2%) of the 108 children at the end of first 2 months; 81 for the next 2 months. Nonrespondents at each phase came equally from study and control groups and were not statistically different in their base-line characteristics.

Differences in sociodemographic characteristics between control and intervention patients were assessed using the χ^2 statistic with the appropriate degrees of freedom. Fisher's exact test and χ^2 statistic were used in the comparison of these groups with respect to inappropriate physician contacts and antipyretic misuse.

RESULTS

Although the private practice was located in a teaching hospital in an urban area, a summary of the sociodemographic characteristics (Table 1) revealed that the study population reflected a relatively well-educated group with small, intact families. The majority of parents participating in the study were mothers in their late twenties or early thirties with more than a high school education, and who were seeing a physician with their only or eldest child. No significant differences in sociodemographic characteristics were seen between study and control groups.

Despite their relatively high educational attainment, the parents in the study population were

TABLE 1. Sociodemographic Characteristics of Study Population

	Intervention Group (n = 54)		Control Group (n = 54)		Total (n = 108)	
	n	%	n	%	n	%
Sex of child						
Male	27	50.0	28	51.9	55	50.9
Female	27	50.0	26	48.1	53	49.1
Race						
White	33	61.1	25	46.3	58	53.7
Black	21	38.9	27	50.0	48	44.4
Indian	0	0.0	2	3.7	2	1.9
Position of child in family						
Only child	21	38.9	22	40.7	43	39.8
1st of other children	16	29.6	16	29.6	32	29.6
2nd or more of others	17	31.5	16	29.6	33	30.6
Age of child						
6–11 mo	21	38.9	19	35.2	40	37.0
12–17 mo	12	22.2	9	16.7	21	19.4
18–23 mo	4	7.4	10	18.5	14	13.0
24+ mo	17	31.5	16	29.6	33	30.6
Parents in home*						
One	10	18.9	10	18.9	20	18.9
Both	43	81.1	43	81.1	86	81.1
Individual who accompanied child to initial visit*						
Mother	49	92.5	50	94.3	99	93.4
Other	4	7.5	3	5.7	7	6.6
Age of accompanying individual*						
≤19 yr	1	1.9	3	5.7	4	3.8
20–24 yr	12	22.6	4	7.5	16	15.1
25–29 yr	17	32.0	17	32.1	34	32.1
30–34 yr	19	35.8	22	41.5	41	38.7
≥35 yr	4	7.5	7	13.2	11	10.4
Educational attainment of accompanying individual*						
Less than high school graduate	4	7.5	4	7.5	8	7.5
High school graduate/vocational	15	28.3	10	18.9	25	23.6
Some college or more	34	64.2	39	73.6	73	68.9

* One parent responded for two children in each group. The denominator for parental characteristics is 53.

misinformed about some aspects of the management of fever. Their responses during the initial interview (Table 2) indicated that the majority could not define "fever" accurately nor the temperature at which harm could occur to the child. In addition, the majority did not know when to start antipyretic therapy, the correct dosage, or the appropriate frequency for checking temperatures and administering subsequent doses. A substantial minority voiced opinions that reflected considerable concern about fever and its significance, as well as a sense of helplessness in the management of fever. No significant differences in patterns of response were seen between intervention and control groups.

Both groups showed evidence of a similar increase in knowledge as indicated by responses to the second interview. The intervention group, however, also had changes in their pattern of management of fever which were not seen in the control groups as summarized in Table 3.

TABLE 2. Study Population Responding Inappropriately to Selected Questions Concerning Management of Fever in Children

Inappropriate Response	% Responding Inappropriately (n = 106)
1. Fever defined as a temperature <38.3°C (101°F)	75.5
2. Damage thought to occur with temperature <41.1°C (106°F)	68.9
3. Not using rectal measurement of temperature (age <4 yr)	22.6
4. Too frequent measurement (< every 4 h)	65.1
5. Start antipyretics at temperature <38.3°C (101°F)	70.8
6. Would not know dose or frequency for use of antipyretics	65.1
7. Parent always very worried about fever	34.9
8. Fever is always a sign of *serious* illness	26.4
9. Most fevers are not self-limiting	56.6
10. Should always call doctor concerning fever	36.8
11. Can tell child's temperature by feeling rather than by measuring	52.8
12. It is unwise to give antipyretics without calling doctor	29.2
13. There is not much parents can do on their own for fever	15.1
14. Should not give cool baths for fever	34.9
15. Aspirin or acetaminophen is not the best antipyretic	35.8

TABLE 3. Physician Contacts and Instances of Antipyretic Medication Use Considered Inappropriate

	Intervention Group		Control Group		*P* Value*
	No. of Events	% Rated Inappropriate	No. of Events	% Rated Inappropriate	
Physician visits					
Phase I	4	25.0	8	37.5	.45
Phase II	17	6.2	5	40.0	.11
Total	21	9.5	13	38.5	.05
Telephone calls to physician					
Phase I	14	21.4	11	63.6	.04
Phase II	9	33.3	5	40.0	.42
Total	23	26.1	16	56.3	.02
Episodes of fever with antipyretic use					
Phase I	46	13.0	33	36.4	.02 ($\chi^2 = 4.69$)
Phase II	25	12.0	28	50.0	<.005 ($\chi^2 = 10.58$)
Total	71	12.7	61	42.6	<.005 ($\chi^2 = 31.70$)

* *P* value calculated directly by Fisher's exact test for physician's visits and telephone calls to physicians and calculated from χ^2 with Yates correction for episodes of fever with antipyretic use.

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