

# After-Hours Management of Febrile Children

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During a nine-month period approximately 15 percent of the children less than ten years of age in a university family practice had an after-hours medical contact for a febrile illness. Children less than two years of age accounted for 55 percent of the encounters. The most frequent diagnoses were upper respiratory tract infection, acute otitis media, and undifferentiated fever. Slightly less than one half of the children were seen by the on-call resident, and age and level of fever did not correlate with the likelihood of being seen. Very few of the children had a white blood cell count obtained, and none had a blood culture or lumbar puncture. In this practice, after-hours management of the febrile infant differed substantially from guidelines in the literature based on experiences in university emergency rooms and walk-in clinics.

The management of febrile children who present outside regular office hours is an important dimension of family practice about which there is little information. Pantell et al have recently reported a retrospective analysis of febrile infants in the first six months of life managed over a four-year period in a university family practice.<sup>1</sup> However, this study did not distinguish between those infants presenting during regular office hours and those encountered after hours.

Clinical issues involved in the after-hours management of febrile children include the adequacy

of telephone assessment, indications for immediate physical examination as opposed to delaying examination until regular office hours, the role of laboratory and radiologic evaluations, indications for antibiotics, and the need for hospitalization. These issues are accentuated by recent reports from university pediatrics services<sup>2-6</sup> and an urban private pediatrics practice<sup>7</sup> that occult bacteremia occurs in some children with undifferentiated febrile illnesses, acute otitis media, or respiratory infections, and that such bacteremia may lead to meningitis. Recognition of the serious complications of bacteremia has occasioned recommendations in the pediatrics literature regarding indications for blood culturing. There is an emerging consensus that children less than two years of age with body temperatures of over 103 F and white blood cell counts of over 15,000/cu mm should have blood cultures, particularly if they appear toxic.<sup>8</sup> The objectives of this study were to describe after-hours contacts with febrile children in a university based

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family practice with respect to demographic characteristics, workup, diagnosis, and treatment, to evaluate management in light of guidelines in the pediatrics literature, and to assess the adequacy of follow-up.

## Methods

The Family Medical Care Center at the University of Missouri-Columbia is open for services from 8 AM to 5 PM Monday through Friday. At other times a family practice resident is available to attend to the medical needs of the center registrants. The following information about an after-hours (nighttime, weekend, or holiday) encounter is recorded by the on-call resident on a special form: date, time, and type of contact, a brief history, noteworthy physical findings, including temperature, any laboratory data, diagnosis, treatment, and planned follow-up. These data are coded and processed by computer.

In this study after-hours encounters involving children less than ten years of age with a recorded temperature of 101 F or higher (oral or rectal) occurring from July 1979 through March 1980 were analyzed. Recorded temperatures that qualified a child for the study were measured by health providers in direct or face-to-face contacts and by a lay informant, usually a parent, in contacts that were limited to the telephone. Statistical significance was determined by the chi-square test.

## Results

During the nine-month study period a temperature of  $\geq 101$  F was noted in 182 of 674 (27 percent) nighttime and weekend contacts with children less

than ten years of age. A total of 136 children, constituting approximately 15 percent of the center users in this age range, with 166 separate febrile illnesses accounted for these encounters.

Of the after-hours fever encounters, 55.5 percent were with females and 44 percent with males. The sex of one child was not recorded. The age distribution was as follows: less than one year, 27 percent; one to two years, 28 percent; two to five years, 27 percent; and six to nine years, 18 percent. The sex distribution of children in the practice is unknown. Children less than two years of age were overrepresented in this series of encounters compared to their proportion of the center's pediatric population.

Of the after-hours fever encounters, 53 percent were managed by the resident entirely over the telephone. In 25 percent of the cases a telephone contact led to a direct contact with the resident, while in 22 percent the child was brought to the emergency room without a preceding telephone contact. Thus, 32 percent of the telephone calls regarding a febrile child resulted in a direct after-hours contact, a direct contact rate that is similar to that for all after-hours telephone calls for all ages and all problems.

The data were analyzed to ascertain if age, sex, or level of temperature affected the likelihood that the child was seen by the resident. As indicated in Table 1, children less than two years of age were no more likely to be seen than those who were two years old or older. Children less than seven months of age were no more likely to be seen than those over six months. There was no difference in the rates of direct contacts for children with temperatures of 103 F or higher and children with temperatures less than 103 F. Combining the variables of age and temperature failed to delineate a group with a higher frequency of being seen. This lack of correlation between age and temperature and direct contacts persisted when encounters consisting of emergency room visits without a preceding telephone call were excluded. Neither age nor temperature seemed consistently to influence physician decision making regarding the need for direct examination of the child.

Interestingly, sex of the child did correlate with patterns of direct contact. Females were more likely to be brought to the emergency room without a telephone call. Twenty-eight of 101 females (28 percent) as compared to twelve of 80 males (15

Table 1. Effect of Age and Temperature on Type of Encounter

Age (years)	Temperature (F)	Percent Seen	Statistical Significance
<2		47	
≥2		47	NS
	<103	45	
	≥103	49.5	NS
<2	<103	49	
<2	≥103	45	NS
≥2	<103	40	
≥2	≥103	54	NS
≤6 months		43	

percent) had an emergency room visit without a preceding phone contact ( $P < .05$ ). However, once telephone contact occurred, males were more likely to be seen. Twenty-seven of 68 males (41 percent) as compared to nineteen of 73 females (26 percent) were seen on the basis of a phone contact ( $P < .10$ ). These findings could not be accounted for by differences in age, temperature, diagnosis, or time of the encounter.

Laboratory tests or x-ray studies were performed in 35 percent of the direct contacts. Throat cultures were obtained in 22 percent, a complete blood count or white blood cell count was obtained in 8 percent, a urinalysis in 8 percent, and a chest x-ray film in 7 percent. No blood cultures were obtained and no lumbar punctures were performed during this period.

In almost all cases only one diagnosis was made per contact. Nineteen different conditions were diagnosed in the 182 contacts. The most frequent diagnoses were acute upper respiratory infection (28 percent), acute otitis media (27 percent), undifferentiated fever (15 percent), viral syndrome (8 percent), and gastroenteritis (6 percent). Direct contacts and telephone-only contacts had different

profiles of diagnoses. The diagnosis was acute otitis media in 47 percent of the direct contacts, while the diagnosis was either upper respiratory infection, undifferentiated fever, or viral syndrome in 72 percent of the telephone encounters.

Therapy consisted of antipyretics in 60 percent, antibiotics in 28 percent, decongestant/antihistamines in 15 percent, and other medications in 4 percent of the encounters, and advice or reassurance only in 12 percent of the encounters. Treatment that consisted only of advice and reassurance was limited to cases that were not seen. One child with pneumonia was admitted to the hospital.

During the study period 112 diagnoses of upper respiratory infection and 95 diagnoses of acute otitis media were made on children during an after-hours encounter. One half of the otitis media encounters occurred in the three winter months of January through March. In 52 percent of the after-hours otitis contacts, and in 46 percent of the after-hours upper respiratory infection contacts the child had a fever. The child was seen in 82 percent of the febrile otitis media contacts and in 35 percent of the febrile upper respiratory infection contacts. Children with an after-hours diag-

nosis of otitis media who were not seen had received that diagnosis at the time of a visit during the preceding one to two days. Children less than two years of age accounted for 42 percent of the acute otitis media cases. The presence of a fever was inversely correlated with age among children with acute otitis media; 83 percent of those less than one year of age had a fever compared to 18 percent of those six to nine years of age. The numerator data do not allow a determination of whether acute otitis media is more likely to produce fever in infants than in older children. Only 12 percent of children diagnosed as having undifferentiated fever were seen at the time of the after-hours contact.

Family Medical Care Center charts of children diagnosed as having acute otitis media or undifferentiated fever after-hours were reviewed to assess adequacy of follow-up. A follow-up visit occurred within three weeks in 60 percent of the febrile acute otitis media cases. Of the children diagnosed as having undifferentiated fever on the basis of an after-hours telephone contact, 64 percent were seen within 48 hours, and in all cases a more specific diagnosis was made; the diagnoses were viral syndrome (5), acute otitis media (4), gastroenteritis (2), pharyngitis (2), and pneumonia (1). The delays in definitive diagnosis ranged from 4 to 45 hours, and there was no evidence in the charts to suggest that any delay resulted in harm. However, no follow-up was available on one third of the children considered to have an undifferentiated fever on the basis of a phone contact alone.

## Discussion

During a nine-month period 15 percent of the children less than ten years of age in a university family practice had an after-hours medical contact for a febrile illness. Slightly less than one half of the children were seen by the physician, and age and level of fever did not correlate with the likelihood of being seen. This finding was surprising,

since concern over occult bacteremia, meningitis, and other potentially life threatening infections has been predominantly directed to infants with high fevers. Very few of the children in this series had a white blood cell count obtained, and no blood cultures were done. No white counts were done on the 49 children under two years of age with a temperature of 103 F or higher. It is evident that in this practice after-hours management of the febrile infant differed substantially from guidelines suggested in the pediatrics literature.

What are the implications of this finding? Extrapolation of the prevalence of occult bacteremia among febrile infants reported from a university center<sup>1</sup> to this sample results in an expectation that two to four children in the present series had bacteremia. The incidence of meningitis among bacteremic children has been reported to be as high as 25 percent.<sup>5</sup> Thus, the absence of a known case of meningitis in this sample may be attributable to relatively small numbers or to incomplete follow-up and ascertainment of outcome and should not be a source of reassurance that the management was appropriate.

On the other hand, there is the question of whether or not the prevalence of bacteremia in a family practice setting is similar to that of a pediatrics walk-in clinic or emergency room in a tertiary care center. Selection factors such as socioeconomic or cultural characteristics may operate to lower the prevalence in a population of family practice patients as compared to users of university walk-in clinics and emergency rooms. The frequency of this condition in a family practice setting has not been determined. Bacteremia has been found in children with undifferentiated febrile illnesses in a private pediatrics practice, indicating that the condition is not limited to users of tertiary care centers.<sup>7</sup> Determination of the prevalence of the condition in different clinical settings will provide a valuable data base for the formulation of strategies for assessing the febrile child.

The finding that the sex of the child was associated with different patterns of illness behavior was unexpected. The explanation of this is not clear from the data. The numbers are small and the finding needs to be confirmed. It does raise the intriguing speculation that the sex of the child affects the response of the parents and/or physician to the child's illness.

The results of this study indicate that most children who presented with fever after regular clinic hours at the Family Medical Care Center, University of Missouri-Columbia had relatively benign self-limited illnesses. The diagnosis was usually established from a history or history and physical examination, with only occasional utilization of laboratory or radiologic services. Management of children who were not seen consisted of instructions regarding the use of antipyretics and general advice and reassurance. Most children who were seen received a medication. Follow-up was variable. Two out of five febrile children with acute otitis media were not rechecked within three weeks. In some cases specific instructions to return to the center were provided by the physician but not followed. In other cases, there was no evidence that follow-up was recommended. It is not known how this compares with the follow-up of acute otitis media cases initially managed during regular hours in this practice.

Several methodologic problems should be mentioned. The availability of information about after-hours encounters depended on the recording behavior of the on-call resident. Such recording is probably not complete, and a few cases may have been missed entirely. Some data from other cases may have been omitted. In addition, some contacts with febrile children may have been missed because of failure to record a temperature. The lack of distinctions between oral and rectal temperatures and between temperatures measured by health providers and by lay persons may have posed minor problems.

This study includes numerator data only. There is no determination of the rates of febrile illness among the Family Medical Care Center pediatric population. This limits inferences from the study. For example, the data do not allow a determination of whether the overrepresentation of infants reflects an increased incidence of illness in the younger age group, or an increased propensity of parents to seek medical care for younger children when illness occurs, or both.

There is little information in the literature about after-hours management of the febrile child, an extremely common clinical activity. This study relates the experiences of a university family practice, primarily for the purposes of quality assessment, and demonstrates a disparity between what is recommended and what is done.

The findings have generated considerable discussion within the department, which has led to some general guidelines that encourage more frequent direct contact with the younger child with fever and the selective use of white blood cell counts and blood cultures to identify those at higher risk for complications. In the three months following the presentation and discussion of these findings at a departmental conference, 91 percent of children less than two years of age with temperatures over 103 F were seen, one third had white blood cell counts obtained, and 18 percent had a blood culture and lumbar puncture. However, it is evident that additional research in the family practice setting is needed to determine the optimal and most cost beneficial management of the febrile child outside regular office hours.

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