

Telephone Management of Febrile Young Children in a Family Practice Setting

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To examine which factors are related to the telephone disposition of febrile children in a university family practice setting, telephone encounter records of a cohort of febrile young children were analyzed. No relationship was found between telephone disposition and a child's sex, age, or temperature, the latter two being well-known risk factors for occult and serious illness in febrile young children. There was a significant relationship between telephone disposition and telephone diagnosis. The lack of association between telephone disposition and either age or temperature of a child should be impetus for staff education concerning the telephone management of febrile children in this family practice.

The increasing use of the telephone in Western medical practice is a well-known but poorly understood phenomenon.^{1,2} In family practice the high frequency of telephone contacts between physicians and patients has been documented both in private practice³ and in university family practice residencies.^{4,5}

Another recent phenomenon has been an appreciation that young, febrile children seen in urban, university-based pediatric settings are at risk for occult bacteremia and other occult illnesses.⁶⁻⁹ These findings have recently been confirmed in private pediatric practices^{10,11} and in suburban hospitals.¹² Recognition that potentially major illnesses can occur in an occult manner (ie, in febrile young children who may appear to be clinically well) has led to a plethora of recommendations for the management of young febrile children.¹³⁻¹⁵ While proposed management protocols differ in specific recommendations, virtually all require the in-person assessment of the febrile child by the physician.

The intersection of these two medical areas, telephone utilization and the management of young febrile children, is of interest. Previous studies have confirmed the difficulty of predicting physician disposition of telephone encounters with patients.¹⁶ In the present study, an attempt was made to elucidate factors that were related to the consequence of a personal physician encounter following a telephone contact regarding a febrile child, all in the context of a university family practice program.

Methods

Children registered to the Family Medical Center (FMC) at the University of Washington were identified by the Network Information Management System (NIMS) computer. All 324 patients recorded by the NIMS computer who were born between January 1, 1979, and December 31, 1980, were identified, and charts were available for 311 of them (96 percent). Review of these charts was undertaken, and all telephone encounters between January 1, 1979, and December 31, 1982, were

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considered for analysis if the patient was aged 0 to 24 months at the time of encounter and the temperature was at least 37.7°C (100°F) or a "tactile" fever was reported. Because daytime calls are usually handled by staff nurses, most recorded telephone interactions concern after-hours calls. This process generated 136 telephone encounters concerning 89 children. After exclusion of episodes of "tactile" fevers and of episodes for which there was an encounter with the FMC (telephone or in-person) in the preceding two weeks, the remaining group included 105 telephone encounters among 79 children. Using the 105 encounters as the units of analysis, the dependent variable was chosen to be disposition following the telephone contact. Although the possible end points were designated as "seen" or "not seen" following a telephone encounter, the true meaning must be clarified. In some situations, physicians clearly noted on the telephone encounter form that the patient was to be seen (and the patient may or may not have come to the FMC). In other situations, patients appeared in the FMC without such a note having been written, and it was unclear whether the parents had been told to bring the child in or had used their own initiative. The telephone disposition was coded as "seen" if (1) the physician had clearly written in the telephone encounter form that the patient was to come in for a visit (this did not include notations such as "come in prn" or "come in if not better"), or (2) a patient was seen in the FMC on the day of or the day following a telephone encounter, even if no note for in-person follow-up had been written in the telephone encounter form.

Variables evaluated as possible predictors of the telephone disposition included the child's sex, age, temperature, and telephone diagnosis. The first three were directly known from the telephone encounter form, and the diagnosis was often stated. When not stated and not clear from the remarks section of the note, the diagnosis was coded as fever without a source. The other two categories of diagnosis were upper respiratory infection and other.

The preliminary analysis consisted of evaluation of frequencies of the stated variables in the study population and cross-tabulations of these variables by the dependent variable (telephone disposition). Following a brief stratified analysis, logistic regression was utilized. Sex, age, tempera-

Table 1. Characteristics of the Study Population

	Category	No. (%)
Sex	Male	46 (44)
	Female	59 (56)
Birthplace	UW	72 (83)
	Not UW	15 (17)
	Unknown	18
Temperature (°C)	37.7-38.9	38 (36)
	38.9-40.0	52 (50)
	≥ 40.0	15 (14)
Age (mo)	0-6	20 (19)
	6-12	36 (34)
	12-24	49 (47)
Diagnosis	URI	14 (13)
	FUO	84 (80)
	Other	7 (7)
Telephone disposition	Not seen	49 (47)
	Seen	56 (53)

UW = University of Washington
URI = upper respiratory tract infection
FUO = fever without a source

ture, and diagnosis were examined separately as possible predictor variables, each being adjusted simultaneously for the effects of all of the other variables by utilizing the logistic model.*

Results

The characteristics of the study population are shown in Table 1. Preliminary analysis examined the crude relationship between each of the predictor variables and telephone disposition. No significant relationship was found between telephone

*A special appendix describing logistic regression and detailing the use of the technique in the current study has been prepared and is available from the author on request.

disposition and sex, age, temperature, or diagnosis. The lack of apparent relationship between telephone disposition and age, temperature, or diagnosis persisted when each of these variables was stratified separately by the other two.

Because of the problems inherent in trying to adjust simultaneously for several variables by traditional stratification in such a small series, and because the outcome variable was dichotomous, it was elected to exploit the ability of logistic regression to account simultaneously for the effects of several variables. In the model, sex of the child was not related to the telephone disposition. Comparing girls with boys, the relative risk of being seen after a telephone encounter was .52 (95 percent confidence interval .18 to 1.54).

Age was also unrelated to telephone disposition. Comparing each group's risk of being seen following a telephone encounter with the 0- to 3-month age group, the relative risk (RR) and 95 percent confidence intervals were as follows: For the 3- to 6-month-old group, RR = .30 (.03 to 3.19). For the 6- to 12-month-old group, RR = 1.24 (.14 to 10.62). For the 12- to 18-month-old group, RR = 2.94 (.33 to 26.53), and for the 18- to 24-month-old group, RR = 3.18 (.15 to 13.75). Similarly, a child's temperature was not significantly related to the telephone disposition. Because temperature was coded as a continuous variable, one can examine the relative risk of being seen for two children with different temperatures (after adjustment for all other factors). For example, comparison of a child with temperature of 40°C (104°F) to one with a temperature of 38°C (100.4°F) reveals a relative risk of being seen of 1.90 (95 percent confidence interval, .37 to 9.76).

Adjusted for temperature, age, sex, and birthplace, a child's telephone diagnosis was significantly related to telephone disposition. Specifically, when compared with children with upper respiratory tract infection, children with fever without a source had a relative risk of 5.95 (95 percent confidence interval, 1.13 to 31.26) of being seen after a telephone encounter. Thus, the telephone diagnosis of fever without a source, when compared with the diagnosis of upper respiratory tract infection, was significantly associated with an increased probability of a child being seen after a telephone encounter with a family physician.

When children with a diagnosis of other were compared with children with upper respiratory

tract infection, the relative risk of being seen by the physician was 1.94 (95 percent confidence interval, .17 to 22.28). These children are not significantly more likely than children with upper respiratory tract infection to be seen by the physician.

Discussion

In reviewing the literature, the author found two very interesting studies that questioned the appropriateness of the telephone management of acute pediatric illness by pediatric residents¹⁷ and by practicing pediatricians.^{17,18} Although a large study done at a university family practice residency noted that fever was the most common symptom recorded for after-hours telephone contacts,⁵ only one previous study was encountered relating potential predictors to the likelihood of a telephone call resulting in a direct visit among febrile children in a family practice setting.¹⁹ This study, which considered 182 encounters for children aged under 10 years, found no relationship between age or degree of temperature elevation and the likelihood of a child being seen. Similarly, the present study of children aged under 2 years found no relationship between age or degree of temperature elevation and the likelihood of a telephone encounter resulting in a visit. Unlike the previous study, however, in the present study sex of the child was not found to be a significant predictor regarding telephone disposition. Diagnosis was a significant predictor, and no other studies were found with which to compare this finding. Although the lack of an association between telephone disposition and sex is not surprising, the lack of association between the telephone disposition and either temperature or age is disturbing. These two variables are well-known risk factors for occult and serious illness in febrile children under two years of age,^{7,13-15} and that temperature and age had no significant effect on telephone disposition brings into question the telephone management of febrile children in this setting. It is known that in all 105 cases the febrile children in this study made uneventful recoveries, but the expected number of serious sequelae in such a small series is very low. Thus, failure to show

negative outcomes from the observed management strategies is no cause for placing confidence in these strategies. The spectrum and extent of occult and serious illness in young febrile children in family practice settings (as opposed to pediatric settings⁶⁻¹²) is undetermined, however, and it is possible that the observed management strategies were appropriate for the patient population being treated.

It is comforting that telephone diagnosis was a significant factor affecting telephone disposition, since young febrile children without a source for fever are known to be at increased risk for occult illness,¹³⁻¹⁵ and they should be seen more frequently than children with upper respiratory tract infection.

Whenever "negative" studies are reported, the question as to whether the study had the required statistical power to detect a significant difference had one existed must be addressed. It appears here that statistical power was adequate (approximately 80 percent) to detect differences that many clinicians would deem to be clinically important had those differences been present.

There are several potential limitations of this study. First, it was necessary to depend on physician charting of telephone encounters. Adequacy of such charting has not been tested, though several clinicians with experience at this clinic and elsewhere feel that charting is fairly thorough. Another concern regards the designation of the categories "seen" and "not seen" for the dependent variable. Although this strategy may have overestimated physician intent to see patients in person, it was felt that "giving the benefit of the doubt" in this manner was the most epidemiologically sound choice.

Perhaps the biggest potential bias of this study is that information may have been lacking on some important variables related to the likelihood of a patient's being seen. For example, if certain unmeasurable or unmeasured variables (such as the proximity of the physician to the hospital when the telephone call is handled or what time of day or night the telephone call is made) were strongly related to the telephone disposition, failure to consider these variables may have biased the results of this study.

Finally, it has already been noted that optimal telephone (or in-person) management strategies for febrile young children in family practice set-

tings have not been determined. For this reason, the temptation to overinterpret data such as these must be resisted, as the consequences of not following specific management protocols are unknown.

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