

# Pagers Combined With Telephones Improve Successful Follow-up From a Pediatric Emergency Department

In K. Kim, MD\*; Karen A. Lanni, MD\*; Edgar Collazo, MD\*; Ed J. Gracely, PhD§; and Robert Belfer, MD‡

**ABSTRACT.** *Objective.* To determine whether there is a significant difference in initial successful contact when attempting follow-up of patients discharged from a pediatric emergency department (ED) using either pagers or the telephone. In addition, to evaluate whether the combination of both pager and telephone follow-up is more successful than telephone follow-up alone when confined to a 2-hour period.

*Design and Setting.* A prospective comparison of intervention and control groups taken from convenience samples of patients seen in an ED of an urban, tertiary care children's hospital.

*Participants.* One hundred eighty-five patients whose families had access to both a pager and a telephone (intervention group) and 112 patients whose families had access to only a telephone (control group) were enrolled.

*Intervention.* Before discharging the patient from the ED, the investigators verified a pager number and/or a best contact telephone number for a follow-up telephone call. Participants were divided into 2 groups. The intervention group consisted of caretakers with both pagers and telephones. The control group consisted of caretakers with only telephones. On even calendar days after ED visits, intervention group caretakers were paged initially from 11:00 AM to 11:59 AM. On odd calendar days, intervention group caretakers were telephoned initially from 11:00 AM to 11:59 AM. Successful contact was defined as communication with a family member or guardian over the age of 18. If the caretaker spoke only Spanish, a translator was used. In a crossover design with the intervention group, if contact was unsuccessful after 1 hour, the alternative mode of communication was used at noon. Control group caretakers were telephoned from 11:00 AM to 11:59 AM. If telephone contact was unsuccessful, they were called again 1 hour later.

*Results.* Two hundred forty-six (36%) of 685 of the convenience sample of caretakers had access to both a pager and a telephone. Fifty-two (55%) of 94 intervention caretakers were contacted initially using pagers versus 47 (52%) of 91 intervention caretakers contacted initially by telephones. Overall successful contact of intervention caretakers (telephones and pagers) was 145 (78%) of 185 when confined to a 2-hour time period. In contrast, over-

all successful contact of control caretakers was 68 (61%) of 112 when confined to a 2-hour time period. Successful contact was greater with the intervention caretakers than with control caretakers (78% vs 61%).

*Conclusions.* No significant difference in successful contact was seen whether paged or telephoned initially. The combination of both pagers and telephone follow-up was more successful than telephone follow-up alone when confined between 11:00 AM to 1:00 PM. *Pediatrics* 2002;110(1). URL: <http://www.pediatrics.org/cgi/content/full/110/1/e1>; follow-up, pediatric emergency department, pagers, telephones.

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ABREVIATION. ED, emergency department.

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Medical use of pagers preceded the public's use of pagers for business and social uses. The rapid expansion of cellular communication services in the 1990s led to nonmedical personnel using pagers. The inexpensive price for pager use (national monthly cost of \$8.90) has contributed to the deep market penetration of pagers to all socioeconomic levels. In 1998, 22 million US households of the estimated 100 million US households used pagers. Demographic data demonstrates that pager ownership is highest among urban "young parents" and "middle-aged parents."<sup>1</sup> Most importantly, this data highlights the increasing use of pagers by households with children.

Unsuccessful telephone follow-up from pediatric emergency departments (EDs) is a common problem. Despite multiple phone calls at numerous times of the day for several days, the unreliability of telephone follow-up in patients discharged from an ED has been well described in both pediatric and adult populations.<sup>2-4</sup> Often, patients or their caretakers provide disconnected telephone numbers, incorrect telephone numbers, or telephone numbers where they can not be reached. Also, these studies illustrate the laborious and time-consuming process of telephone follow-up.

Successful telephone follow-up has been shown to improve care of ED-treated patients. It increases patient satisfaction with the care received and increases compliance with discharge instructions.<sup>5-8</sup> In addition, assurance of follow-up may allow an ED physician a broader selection of choices regarding disposition from the ED. For example, previous studies suggesting outpatient management of febrile young infants and febrile children with sickle cell disease rely heavily on successful follow-up.<sup>9-12</sup> Efficient telephone follow-up has become highly desirable,

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and the importance of adequate follow-up will continue to grow as a result of the emphasis on outpatient management and health care cost containment. Increasing numbers of ED patients will be discharged and managed at home as outpatients rather than as inpatients.

## METHODS

### Study Center

This study was conducted from April 7, 1998, to May 6, 1998, in the pediatric ED of an urban, tertiary care children's hospital located in north Philadelphia. At the time of the study, St Christopher's Hospital for Children had ~45 000 ED patient visits per year. The institutional review board at St Christopher's Hospital for Children approved the study protocol and the informed consent form.

### Eligibility

All patients seen from 1:00 PM to 9:00 PM in the ED over a consecutive 4-week period were eligible for enrollment. Patients were excluded from the study if they were admitted to the hospital or if the caretaker refused to enroll the patient.

### Enrollment and Group Assignment

Before discharge from the ED, the investigators obtained informed consent from the patients' caretaker while verifying a pager number and/or a best contact telephone number for the next 7 days. Best contact telephone number was defined as the number given by the caretaker to the investigator where the caretaker could be contacted. The participants were not asked to keep their pager turned "on" for this study, nor were they informed of a callback number. Participants were not told when or if they would be contacted, and they were not informed of the hypothesis of the study.

The convenience sample of caretakers was divided into 2 groups. The intervention group consisted of caretakers with both pagers and telephones. The control group consisted of caretakers with only telephones. Follow-up occurred the day after recruitment. On even calendar days after ED visits, intervention group caretakers were paged initially from 11:00 AM to 11:59 AM. On odd calendar days, intervention group caretakers were telephoned initially from 11:00 AM to 11:59 AM. Successful contact was defined as communication with a family member or guardian over the age of 18. If the caretaker spoke only Spanish, a translator was used. If an answering machine was encountered, a message was left asking the parent of guardian to contact the physician who telephoned the patient. When the caretaker was paged or a message left on an answering machine, a maximum response time of 1 hour was allowed.

A crossover design was applied to the intervention group. On even days, if pager contact was unsuccessful after 1 hour, the caretaker was telephoned at noon. On odd days, if telephone contact was unsuccessful after 1 hour, the caretaker was paged at noon.

Control caretakers were telephoned from 11:00 AM to 11:59 AM. If contact was unsuccessful, they were telephoned again 1 hour later.

Comparisons were made between intervention and control groups using  $\chi^2$  analysis. For each comparison,  $P < .05$  was considered statistically significant.

## RESULTS

In a convenience sample of 685 families, 246 caretakers (36%) had access to both a pager and a telephone. Forty-six caretakers with access to a pager and a telephone refused to participate. Fifteen patients from the intervention group enrollees were admitted to the hospital, and they were excluded from the study.

One hundred forty-two caretakers with access to a telephone were invited to participate in the control arm. Seventeen caretakers with access to a telephone refused to participate. Thirteen patients from the control group were admitted to the hospital, and they were excluded from the study.

The intervention group sample size was 185 patients, while the control group sample size was 112 patients. Demographic characteristics of patients enrolled are shown in Table 1. There were no significant differences between groups with respect to age, sex, race, or type of insurance.

Table 2 summarizes the intervention group results.

Table 3 summarizes the control group results. Intervention caretakers were contacted at a significantly greater rate compared with control caretakers (78% vs 61%;  $P < .001$ ).

Reasons for unsuccessful contact of participants in the intervention group and the control group are shown in Table 4.

## DISCUSSION

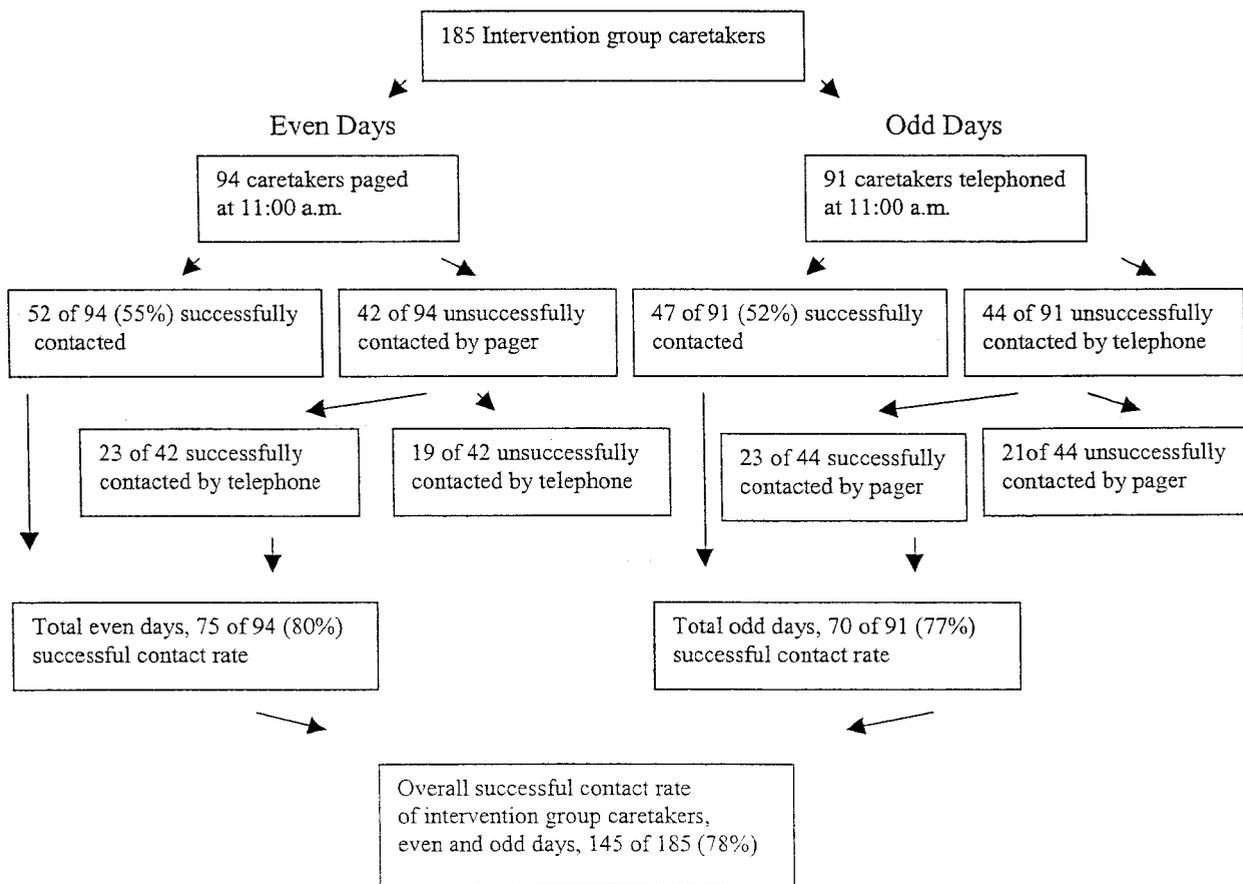
A successful contact rate of 61% was achieved in a control population at St Christopher's Hospital for

**TABLE 1.** Comparison of Demographic Data Between Intervention and Control Groups

	Pager and Telephones Group, Intervention Group	Telephones Only Group, Control Group	P Values
Patient demographics			
Sample size	N = 185	N = 112	
Patient age (y)			
Mean	5.47 (SD 4.76)	5.90 (SD 4.93)	NS
Median	4.00	4.84	NS
Patient sex (% female)	80/185, 43.2%	52/112, 46.4%	NS
Guardian race			
Hispanic	46/185, 24.9%	27/112, 24.1%	NS
Biracial Hispanic	14/185, 7.6%	6/112, 5.4%	NS
African American	56/185, 30.3%	33/112, 29.5%	NS
Caucasian	11/185, 6.0%	11/112, 9.8%	NS
Asian	0/185, 0%	0/112, 0%	NS
Other	1/185, 0.5%	3/112, 2.7%	NS
Unrecorded	57/185, 30.8%	32/112, 28.6%	NS
Insurance distribution			
Medicare	111/185, 60.0%	74/112, 66.1%	NS
Private/HMO	62/185, 33.5%	26/112, 23.2%	NS
Self-pay/other	12/185, 6.5%	12/112, 10.7%	NS

SD indicates standard deviation; NS, not significant.

TABLE 2. Results—Contact Rates of Intervention Group Caretakers



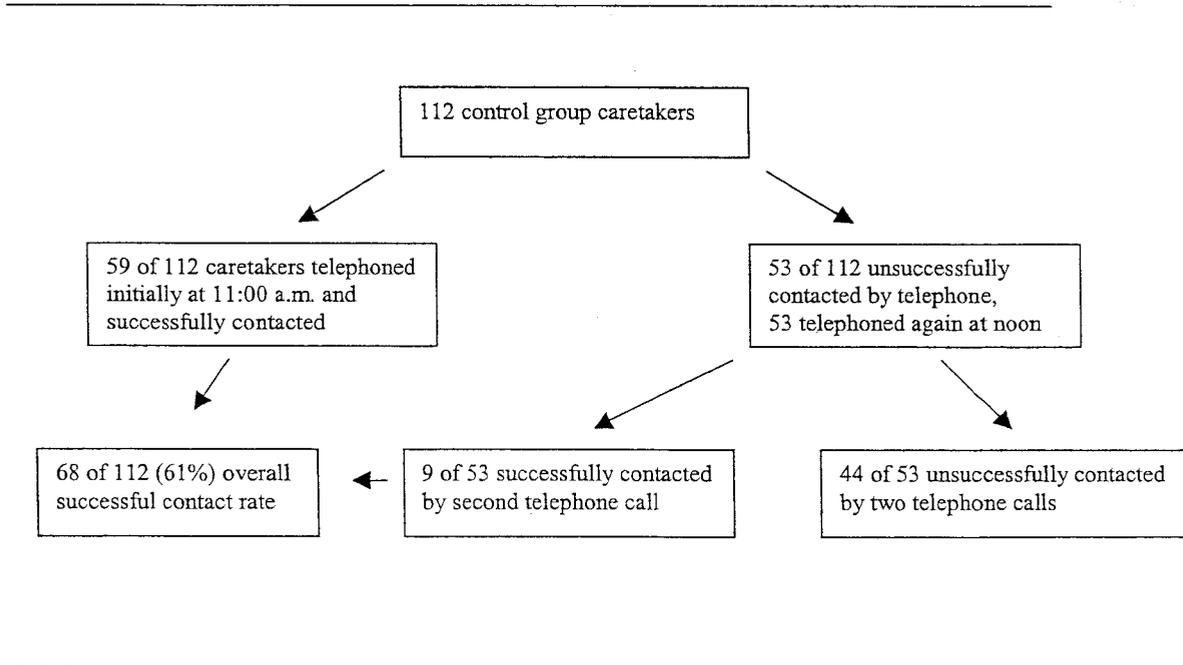
Children ED when confined to a limited time period. Our control contact rate was much less than that achieved by other investigators. Three previous pediatric studies achieved successful contact rates ranging from 71% to 85% (Table 5).<sup>2,13,14</sup> We suspect that our successful contact rate may differ from these 3 pediatric studies' successful contact rates because our methodology differs. It is unclear from these 3 studies methodologies during what hours of the day, how many attempts, and how many days it took to complete successful follow-up.

Most recently, in the pediatric literature, Horne et al<sup>3</sup> noted a successful contact rate of 171 (68.4%) of 250 children seen in a university ED. These investigators made a maximum of 6 attempts per patient within 72 hours of the ED visit with a mean of 1.61 calls and the mean time of 3.14 ( $\pm 7.2$ ) hours required to contact the guardian. Calls were made from 8:00 AM to 8:00 PM, with 2 messages left on answering machines with no >3 attempts in 24 hours. In contrast to this study, our methodology differed significantly in limiting the time frame for follow-up to 2 hours from 11:00 AM to 1:00 PM, with a maximum of 2 attempts to contact the caretaker. Whereas, Horne et al<sup>3</sup> called over a 12-hour period from 8:00 AM to 8:00 PM with a maximum of 6 telephone calls over 3 days. This difference in methodology is notable, be-

cause it illustrates a more time-efficient approach on our part, and it may explain the slightly increased successful contact rate (68%) by Horne et al in comparison to our 61% contact rate in the control group

Issacman et al<sup>15</sup> determined an outstanding successful contact rate using a "best contact" telephone number, which improved successful contact to 129 (93.5%) of 138 at Children's Hospital of Pittsburgh and 48 (96%) of 50 at Children's Hospital of Wisconsin. Follow-up calls, with a maximum of 3 calls, were made within 24 hours of the initial visit during a 14-hour time frame in 3 defined intervals: 8:00 AM to noon, noon to 5:00 PM, and 5:00 PM to 10:00 PM. Again, our methodology differed significantly in limiting the time frame for follow-up to 2 hours from 11:00 AM to 1:00 PM, with a maximum of 2 attempts to contact the caretaker. More important than these differences in methodology is perhaps the setting of these 2 studies. We speculate that the north Philadelphia patient population, which utilizes St Christopher's Hospital for Children, may differ significantly from the populations seen at Children's Hospital of Pittsburgh and Children's Hospital of Wisconsin. Specifically, we speculate that significant differences may exist between the St Christopher's patients, who live in a depressed socioeconomic status and have limited access to telecommunication services, com-

**TABLE 3.** Results—Contact Rates of Control Group Caretakers



**TABLE 4.** Unsuccessful Contact Rates of Intervention and Control Group Caretakers

	Pager and Telephones Group, Intervention Group	Telephones Only Group Control Group
Sample size	N = 40	N = 44
Reasons		
No answer	25	34
Wrong telephone number	8	4
Disconnected telephone number	2	2
Incorrect pager number	3	Not applicable
Communication with a coworker who was not a family member	0	3
Communication with a family member under the age of eighteen who was not a parent or guardian	2	1

**TABLE 5.** Previous Successful Contact Rates, 3 Studies

Successful Contact Rates	Investigators	Setting	Reason for Follow-up
85% (181/214)	Avner JR et al; 1990	Urban pediatric tertiary ED	Determined by the managing emergency physician to require follow-up as part of their care.
71% (77/94)	Green SM et al; 1990	Tertiary care ED	Obtain information regarding persistent symptoms related to ketamine administration.
85% (89/105)	Joffe M, Avner J; 1992	Urban pediatric tertiary ED	To notify parent of a positive blood culture result.

pared with patients who utilize Children’s Hospital of Pittsburgh and Children’s Hospital of Wisconsin. This difference in socioeconomic status and telecommunication access may explain the poor successful contact rate (61%) of our control group compared with Issacman et al’s 93.5% successful contact rate in Pittsburgh and 96% successful contact rate in Wisconsin.

We consider our shorter time frame for contact an important difference from previous studies, because it demonstrates a shorter time commitment on the

part of a busy ED physician, nurse, or pediatric resident who will be doing the follow-up 97% of the time.<sup>16</sup> In addition, we chose this time frame from 11:00 AM to 1:00 PM because it most resembles our clinical experience. Often, at this time, revised radiograph readings and positive culture results are reported, which prompts follow-up to be initiated. Also, the slower nature of the ED in the late morning and early afternoon contrasts to the busier late afternoon and evening hours where clinical demands may significantly increase. This less hectic environ-

ment lends itself for attending to clinical responsibilities such as follow-up.

Our study reports no significant difference in achieving successful follow-up of patients discharged from the ED whether they were paged or telephoned initially. When a combination of both pagers and telephones were used, follow-up was significantly more successful than telephone follow-up alone when confined to a 2-hour time period. We speculate that the use of pagers for follow-up after unsuccessful contact using best contact telephone numbers may free up the busy ED physician or nurse to fulfill other clinical duties. In addition, we envision this simple intervention could take place while recording demographic data during registration or by the physician himself.

An increasing percentage of patients are being managed at home rather than as in-patients. As Issacman et al previously noted, simple interventions to save time are at a premium, especially with increasing time and economic constraints on physicians and nurses.<sup>15</sup> We support Issacman et al's recommendation for ED physicians to verify best contact telephone numbers for caretakers before discharge. In addition, we would extend this recommendation to include pager numbers when available to provide timely successful follow-up.

Additional studies should seek to determine whether a best contact time for caretakers increases successful patient follow-up. Emerging demographics illustrate that both caretakers are often at a workplace during the day. Future studies examining follow-up from 6:00 PM to 8:00 PM may demonstrate increased successful contact if best contact numbers consist primarily of home phone numbers versus work phone numbers. Finally, future studies may expand beyond the ED setting. Assurance of successful follow-up in a primary care setting may offer similar advantages with outpatient management as it does in the ED setting.

Limitations of the study include the following: 1) convenience sampling rather than consecutive sampling of caretakers, 2) limiting follow-up to 2 hours, and 3) limiting enrollment during 4 weeks from April 7 to May 6; follow-up differences may exist in different months based on seasonal usage of the ED.<sup>4</sup> We attempted to minimize the limitation that participants knew that they would be taking part in our study by blinding the participant to when or if the follow-up would take place.

## CONCLUSION

Interventions to assure follow-up are essential for outpatient management strategies. Based on our re-

sults, ED follow-up is enhanced significantly by using a pager number in combination with a best contact phone number for all patients who require follow-up.

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## REFERENCES

1. The Investext Group. *Personal Communications Industry Report*. 1998:2
2. Avner JR, Baker MD. Follow-up in an urban emergency department. How reliable? [abstract] *Pediatr Emerg Care*. 1990;6:221A
3. Horne A, Ros SP. Telephone follow-up of patients discharged from the emergency department: how reliable? *Pediatr Emerg Care*. 1995;11:173-175
4. Adams SL, Thompson DA. Inability to follow-up ED patients by telephone: there must be 50 ways to leave your number. *Acad Emerg Med*. 1996;3:271-273
5. Chande VT, Exum V. Follow-up phone calls after an emergency department visit. *Pediatrics*. 1994;93:513-514
6. Casey R, Rosen B, Glowasky A, Ludwig S. An intervention to improve follow-up of patients with otitis media. *Clin Pediatr (Phila)*. 1985;24:149-152
7. Nelson EW, Van Cleve S, Swartz MK, Kessen W, McCarthy PL. Improving the use of early follow-up care after emergency department visits. A randomized trial. *Am J Dis Child*. 1991;145:440-444
8. Fletcher SW, Appel FA, Bourgeois M. Improving emergency-room patient follow-up in a metropolitan teaching hospital. Effect of a follow-up check. *N Engl J Med*. 1974;291:385-388
9. McCarthy CA, Powell KR, Jaskiewicz JA, et al. Outpatient management of selected infants younger than two months of age evaluated for possible sepsis. *Pediatr Infect Dis J*. 1990;9:385-389
10. Baskin MN, O'Rourke EJ, Fleisher GR. Outpatient treatment of febrile infants 28 to 89 days of age with intramuscular administration of ceftriaxone [see comments]. *J Pediatr*. 1992;120:22-27
11. Baker MD, Bell LM, Avner JR. Outpatient management without antibiotics of fever in selected infants [see comments]. *N Engl J Med*. 1993;329:1437-1441
12. Wilimas JA, Flynn PM, Harris S, et al. A randomized study of outpatient treatment with ceftriaxone for selected febrile children with sickle cell disease [see comments]. *N Engl J Med*. 1993;329:472-476
13. Green SM, Nakamura R, Johnson NE. Ketamine sedation for pediatric procedures: Part 1, A prospective series [see comments]. *Ann Emerg Med*. 1990;19:1024-1032
14. Joffe M, Avner JR. Follow-up of patients with occult bacteremia in pediatric emergency departments. *Pediatr Emerg Care*. 1992;8:258-261
15. Isaacman DJ, Khine H, Losek JD. A simple intervention for improving telephone contact of patients discharged from the emergency department. *Pediatr Emerg Care*. 1997;13:256-258
16. Chamberlain JM, Carraccio CL. Follow-up: who does it and how do they do it? *Pediatr Emerg Care*. 1994;10:320-321

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