

Interrupted Care

The Effects of Paging on Pediatric Resident Activities

Nathan J. Blum, MD, Tracy A. Lieu, MD

● **Objective.**—To determine the content and urgency of pages and their effect on the activities of pediatric residents.

Design.—Prospective survey.

Setting.—University-affiliated teaching hospital.

Participants.—Seventeen pediatric residents on regular pediatric services.

Interventions.—None.

Measurements/Main Results.—On daily logs, interns recorded the activity interrupted by a page and rated the urgency and importance of the page. Almost half of all pages interrupted patient care activities, and 24% interrupted scheduled work rounds or teaching conferences. Interns reported that 34% of pages resulted in a change in patient treatment, but they rated 25% of all pages as unimportant.

Conclusions.—“Beepers” frequently interrupt pediatric residents involved in patient care activities and scheduled educational conferences. Studies of interventions aimed at decreasing unnecessary interruptions by pages are needed. (AJDC. 1992;146:806-808)

Radiofrequency paging systems, or “beepers,” have become a standard hospital technology during the past two decades. Beepers have improved the ability of hospital staff members to contact physicians while allowing house officers more freedom within the hospital. However, the high frequency of paging may disrupt interactions between the physician and the patient and contribute to resident stress.^{1,2} A study in an internal medicine teaching program found that residents were frequently interrupted during patient care activities and educational sessions by pages they evaluated as unimportant.³

We evaluated paging patterns in a pediatric teaching hospital. Our goals were to assess the content and urgency of pages and to evaluate the effects of beeper use on patient care and educational activities.

SUBJECTS AND METHODS

The study was conducted in May and June 1989 at The Children’s Hospital of Philadelphia (Pa), a 284-bed teaching hospital. Three interns per night treated patients on the fifth floor (90

beds among three nursing stations), and three interns per night treated patients on the sixth and seventh floors (111 beds among five nursing stations).

Interns were on call every third night during the study period. Every weekday, work rounds were held at 7:30 AM, an educational conference was held at 8:30 AM, and attending rounds were held at 11 AM. All 18 interns on regular pediatric services were asked to complete beeper logs on three consecutive days. For each intern, these days included: an on-call day (7:30 AM to 7:30 AM the next day), a postcall day (7:30 AM to sign-out), and a swing day (neither on call nor postcall). Interns recorded the time of the page, who initiated the page, the content of the message, and what they were doing when the page was received. Interns also recorded whether the page (1) changed patient treatment; (2) provided useful information, but did not change patient treatment; or (3) was unimportant. They ranked the information conveyed as requiring attention immediately, within 1 hour, within 4 hours, within 1 day, or never.

Data analysis was performed on a microcomputer using SAS. Comparisons between groups were analyzed using the Mann-Whitney *U* (Wilcoxon) test. Correlations were tested using the Spearman rank correlation coefficient.

RESULTS

Seventeen of the 18 interns completed their beeper logs. Logs were completed for 3 days by 16 interns; one additional intern completed a beeper log for only the on-call and postcall days. Interns were paged a mean of 21 times (range, 12 to 37) during on-call days, four times (range, 0 to 15) during postcall days, and seven times (range, four to 14) during swing days. The highest frequency of paging occurred from 11 AM to noon and from 5 to 6 PM.

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Purpose.—This department is intended to share information concerning educational efforts in the broad field of pediatrics. We welcome studies on the following topics: undergraduate and graduate education in medicine and allied health occupations; continuing education of health professionals; education of patients and families; and health education for the general public, the community, and organizations that contribute to the promotion and improvement of the health of children.

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From the Department of Pediatrics, University of Pennsylvania School of Medicine and The Children’s Hospital of Philadelphia, Pa. Reprints not available.

Content of Pages Received by Interns on Regular Pediatric Services, May and June 1989	
Content of Message	No. (%) of Pages
Other caregiver conveys clinical information	136 (26)
Request that intern write an order	64 (12)
Request that intern complete paperwork or clarify an order	58 (11)
Notification of scheduling (eg, of the time for rounds)	36 (7)
Patient is coming or has arrived	36 (7)
Need to clinically assess patient	31 (6)
Other caregiver requests clinical information	29 (6)
Unknown, initiator of page did not answer	27 (5)
Unknown, intern did not answer page	26 (5)
Personal message from friend or family member	23 (4)
Request to talk with a family	17 (3)
Request to perform a procedure	13 (2)
Other	31 (6)
Total	527 (100)

Interns received a total of 527 pages during the study. Almost half of all pages (235, or 45%) interrupted patient care activities, including performing a medical history or physical examination, talking with a family, or completing paperwork. One hundred twenty-six pages (24%) interrupted scheduled work rounds and educational conferences, and 88 pages (17%) interrupted personal care activities, including sleeping (30 pages), eating, and bathroom visits. Ten percent of all pages (n=53) conveyed no information because either the intern did not answer the page or the initiator of the page did not answer the return call.

The most common reasons for paging interns were to convey clinical information, to request an order, and to request completion of paperwork (Table). Requests to assess patients clinically, to admit patients, and to talk with families constituted fewer than 20% of all pages.

Certain types of pages were excluded from the analysis of importance and immediacy: personal messages, pages not answered by the intern or in which the initiator did not answer the return call, and pages from parents of continuity clinic patients outside the hospital. Interns rated the importance of 411 of the 425 inpatient-related pages. One hundred thirty-eight pages (34%) resulted in a change in patient treatment, 172 (42%) provided useful information but did not change patient care, and 101 (25%) were unimportant.

Four hundred nine pages were assessed according to immediacy. Fifty pages (12.2%) were believed to require a response immediately, 143 (35%) within 1 hour, 104 (25.4%) within 4 hours, and 71 (17.4%) within 1 day. Forty-one pages (10%) were believed to not require attention for more than 1 day.

There was a correlation between the perceived impor-

tance and the perceived immediacy of pages ($r = .54$, $P < .001$). For example, of the 101 pages rated unimportant, 35% were for clarification of orders or reminders to do weekly order rewrites or to complete paperwork. Only 12% of pages containing these types of information were believed to require attention within 1 hour. In contrast, of the 67 pages that informed the intern of a new patient or of the need to clinically assess a patient, only five pages were rated unimportant, and in three of these cases, the intern had already received a page containing identical information.

Of the 259 pages that were initiated to exchange patient care information other than the need to clinically assess a patient, 52 (20%) were rated unimportant. Specifically, these pages included 17 of 64 requests for orders, 16 of 136 times another caregiver conveyed clinical information, 14 of 29 times another caregiver requested clinical information, four of 17 requests to speak with parents, and one of 13 requests to perform a procedure. However, there were no obvious distinguishing features between pages rated useful and those rated unimportant.

Nurses initiated 41% of all pages; residents and medical students, 16%; laboratory technicians, 12%; and fellows or attending physicians, 9%. Parents of continuity clinic patients, ward clerks, respiratory therapists, pharmacists, and other hospital personnel accounted for the remaining 15% of pages. Pages from fellow residents and laboratory technicians were more likely to require immediate attention than pages from other individuals ($P < .001$) and were the most likely to result in changes in patient treatment.

There were no significant differences in the perceived urgency or usefulness of the 44 pages sent between midnight and 7 AM compared with pages sent at other times of the day. Likewise, pages that interrupted regularly scheduled conferences or rounds were not ranked as more urgent or useful than pages at other times of the day.

COMMENT

Beepers have been described as a "scourge"⁴ or an "unmitigated curse"¹ in discussions of resident stress. The results of our study suggest that beepers are a mixed blessing. While electronic pages provide a rapid means for communicating information that may require urgent attention, they also frequently interrupt patient care or educational activities. In this study, fewer than half of all pages were believed to require attention either immediately or within 1 hour.

Many of our study's results are strikingly similar to those of Katz and Schroeder,³ who studied paging patterns at a three-hospital internal medicine teaching program. Our study's mean frequency of 21 pages per 24-hour call period is similar to the mean of 26 pages on-call received by interns in the previous study. The proportions of pages that resulted in a change in patient treatment (34% vs 39%), interrupted patient care or educational activities (69% vs 79%), and were rated unimportant (25% vs 26%) in our study were similar to those of Katz and Schroeder.

The fact that pages were self-reported by interns in our study may have affected the reliability of these data in that pages that were forgettable or received at busy times may have gone unrecorded, while irritating or unusual pages may have been recorded more reliably. Overall, the estimate of paging frequency in our study is likely at the low

end of the potential range since the study was conducted in late spring when the hospital census is low and house officers and nurses are most efficient. Despite this, at our hospital, pages actually occurred most frequently during the hour reserved for attending rounds, and pages received during scheduled conferences or rounds had no greater importance or immediacy than those received at other times. This suggests that one approach to reducing interruption of scheduled activities by beepers may be to widely advertise the times of regularly scheduled rounds and conferences and encourage other caregivers to delay paging during these times. In addition, a single physician could be designated to carry all beepers during these times so that only one physician is interrupted at a given conference.

Interventions that reduce the use of beepers for communicating nonurgent information may decrease resident stress, yet still allow beepers to be used for urgent messages. Message or "scut" boards could be used for information that would otherwise be conveyed by paging, but they seemed to have little effect at one other hospital.⁵ Subsequent to our study, message boards were instituted at our hospital, but were discontinued because interns were unable to check the boards regularly. Another potential approach to reducing disruptions from pages would be a system under which the initiator of the page could include a code to indicate how immediately the page needed to be answered. Interns may forget to answer some nonurgent pages. However, under the current system, in which the urgency of the message is not communicated as part of the initial page, 10% of pages are either not answered by the intern or not answered by the initiator of the page at the time the intern responds.

The 25% frequency of pages rated unimportant by interns suggests a need for better communication between interns and other hospital personnel. In fact, fewer than 20% of pages were sent to request an intern's physical

presence on the ward for admissions, clinical assessment, or family conferences. Although the evaluation of pages relied on the subjective opinions of interns, there was high consistency among the ratings of certain types of pages. For example, pages notifying interns of the need to clinically assess a patient were almost universally believed to be important, while the vast majority of pages related to paperwork were believed to not require immediate attention. Unfortunately, there were no other obvious patterns among pages perceived to lack importance or immediacy.

Finally, 55% of pages in this study were initiated so that other caregivers could exchange patient treatment information with interns. If interns had been physically present on the same wards as their patients, many of these pages might have been unnecessary, and interns could more routinely discuss plans with nurses, averting pages for clarification of orders. In our study and that by Katz and Schroeder, each intern treated patients on more than one ward, and sometimes on more than one floor. Organizing resident teams geographically, so that interns could treat patients on only one ward, may facilitate communication between house officers and other caregivers and decrease our current reliance on beepers.

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