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# Can Hospital-Based Cellular Phones Improve On-Call Communication?

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## DESCRIPTION OF THE PROBLEM

Communication is essential to the practice of radiology. Discussions between radiologists and referring physicians can assist in the selection of the proper study and optimal protocol. Communication of patient history and a specific clinical question allow a more targeted interpretation [1]. After interpretation, accurate and timely communication of the results guides patient management.

A formal written report after image interpretation has been the mainstay of communication in radiology for decades. Although this is an important document for record keeping and the communication of routine findings, time-sensitive or important results require direct communication in a timely manner. Individual radiology departments and national professional organizations have recently codified this expectation in the form of policies and practice guidelines, including a published practice guideline by the ACR [2]. Failure to directly notify physicians about urgent or unexpected examination results, as well as other types of miscommunication, are an increasingly common reason for medical malpractice litigation [3] and are clearly detrimental to patient care.

We hypothesized that a hospital-based cellular phone system might improve the timeliness of communication between radiology and referring physicians. Because radiologic studies performed at night are more likely to involve acutely ill patients and demonstrate acute findings, prompt communication is

especially important in the on-call setting. A needs assessment was performed to determine the baseline state of communication between radiology and referring services on call. Neurology was identified as an excellent example of a high-acuity service because rapid communication with radiology is needed in the management of patients with stroke.

## NEEDS ASSESSMENT

All radiology and neurology residents on call over a 4-week interval were invited to participate in voluntary, anonymous needs assessment surveys. With night float systems in place in both departments, 4 radiology residents and 4 neurology residents were eligible, and all completed surveys. Findings were as follows:

- Radiology reported using the hospital pager system to contact neurology.
- Neurology reported using the hospital landline phone system to reach the radiologist on call.
- Four of 4 radiology residents and 3 of 4 neurology residents reported being “satisfied” or “very satisfied” with the ability to contact the other service with these methods.
- Radiology residents reported overall “efficient” or “very efficient” communication.
- Neurology residents, however, were neutral to negative as to the amount of time it took for them to reach radiology and overall felt that some improvement in communication was possible.

Over the same 4-week period, radiology residents were asked to log every radiology-initiated episode of

communication with neurology to assess the need for improvements, with the following findings:

- Over 4 weeks of night float, 34 calls to neurology were logged. The average callback after a page by a neurology resident was 4.2 min (range, 1-12 min).
- Radiology reported that the phone calls often resulted in obtaining more clinical history (91%) and that additional history often aided in the interpretation of imaging studies (68%). The information changed their differential diagnoses in 47% of cases.

In summary, the needs assessment highlighted the importance of direct communication between radiology and high-acuity clinical services and demonstrated room for improvement with the existing pager and landline system. Radiology residents, despite relying on pagers, were overall quite satisfied with the current system. Neurology residents, however, were less satisfied. Neurology residents often used direct lines rather than pagers to reach radiology residents, so any dissatisfaction may have resulted from busy phone lines and/or being tied to a landline for the conversation.

## WHAT WE DID

Our institution's IT department provided the departments of radiology and neurology with hospital-based cellular phones (Ascom, Baar, Switzerland) that were specifically engineered to not pose an electromagnetic interference risk to hospital equipment. Each department issued the phones to on-call house staff. The phones could be

used to call any number in the hospital, though the primary stated purpose was to allow more direct communication between neurology and radiology residents.

### OUTCOMES

Seven months after distributing the hospital-based cell phones, post-implementation surveys were administered to all radiology and neurology residents who had taken call using the cellular phone system.

Twenty-six postgraduate year 3 and 4 radiology residents and 15 postgraduate year 3 and 4 neurology residents were invited to participate. The surveys reassessed overall satisfaction with the ability to contact the other service. Residents from each service were also asked to estimate their use of the phones and to indicate whether they had any preference for using the phones over the preexisting pager system.

#### Radiology Residents

Sixteen of 26 eligible radiology residents (62%) completed the post-implementation survey. Similar to the preimplementation surveys, radiology residents were generally "satisfied" or "very satisfied" regarding communication with neurology residents (87%), and most also reported that the communication was "efficient" or "very efficient" (75%) ( $P = .40$  and  $P = .20$ , respectively, compared with preimplementation surveys). However, radiology residents still reported using the pager system "mostly" or "always," as opposed to initiating contact by directly calling neurologists' cellular phones. We assume that this is due to radiology residents' being accustomed to relying on the pager system for most services in the hospital. We originally hypothesized that residents would have adopted the phones at least in contacting neurology residents, but this did not seem to be the case.

Call logging was not pursued after the implementation of the

cellular phones, as it was found to be cumbersome and because there was little room for improvement (the average neurology callback time was 4 min with the pager system). However, residents reported an average per night call rate similar to the preimplementation frequency.

#### Neurology Residents

Fourteen of 15 eligible neurology residents (93%) completed the postimplementation survey. All of the neurology residents reported being "satisfied" or "very satisfied" with their ability to communicate with radiology, similar to the preimplementation survey ( $P = .40$ ). Most neurology residents (11 of 14 [79%]) reported contacting radiology residents between 3 and 6 times per night. Neurology reported that the length of time required to reach radiology residents was short and that no significant further improvement in communication was possible; these answers were significantly more positive than on the preimplementation surveys ( $P = .02$  and  $P = .009$ , respectively). Thirteen of 14 of the neurology residents (93%) preferred using the cellular phones or pagers, all 14 (100%) reported that the phones improved communication with other services in the hospital as well, and 13 (93%) reported that the phones improved communication with radiology specifically.

The reasons for the perceived improvements in communication were not examined in detail, though they may have been a result of the residents' being able to reach radiology while mobile within the hospital. Additionally, the neurology residents' directly calling the radiology residents' cell phones (for which few people in the hospital had the numbers) likely resulted in fewer busy signals than on the landline.

### DISCUSSION

In this era of value-centered medical care and emphasis on reduced

medical errors, accurate, complete, and timely communication between health care professionals is essential. In addition to communicating urgent results, facilitating physician communication before examination interpretation is also useful. Our needs assessment demonstrated that radiology residents asked neurology for additional patient history before study interpretation with some frequency and that the information affected their interpretations. This concurs with several published reports highlighting the value of preinterpretation communication [1,4]. The need for preinterpretation communication is particularly heightened when the amount of history available from the requisition is lacking, a commonly reported problem [5,6].

To our knowledge, the use of portable phones to improve communication between radiologists and referring physicians has not previously been studied. Few reports in the literature examine the clinical impact of mobile phones in the hospital setting between clinical services. Soto et al [7] surveyed 4,018 anesthesiologists; a minority used mobile phones as their primary means of communication, though mobile phone users reported fewer delays in communication and a lower rate of medical errors. A study examining pager versus cellular phone use to contact surgeons in the operating room demonstrated that cellular phones improved communication times, communication accuracy, and communication satisfaction and minimized intraoperative case interruption [8].

Cellular phones could offer additional benefits, namely, the ability for callers to multitask and talk on the go. Additionally, alerts for missed calls, common on cellular phone systems, allows an easy callback option. This type of feature does not exist in landline systems, meaning that if clinicians

get a busy signal when trying to reach radiology, they simply have to call back, further tying up the phone lines and leading to frustration and delays. A text messaging function on the same device could be a valuable adjunct. “Texting” on text pagers is already widely used, but combining it with a usable phone in the medical setting could be quite valuable. Smart phone—based secure text messaging is already starting to make its way into the medical world [9,10].

In conclusion, the use of cellular phones in this pilot study improved communication satisfaction between radiology and neurology residents on call. Neurology residents, who are on the go, moving through the hospital, found the phones particularly helpful. Issues of secu-

rity, cost, and electrical interference must be considered, but the opportunity for improved communication may ultimately outweigh these factors.

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