mayo

Mayo Clinic Proceedings

January 2001
Volume 76
Number 1

Editorial

Communication Technology: Patient Safety and the Patient-Physician Relationship

The "wired world" envisioned in the 1990s is rapidly evolving into a "wireless world," where the tether of copper and optical cable no longer binds us to a particular geographic location. Wireless devices are available with a dizzying array of features, from the basic cell phone to full-featured personal computers with many devices in between. In recent years some medical institutions have expressed concern over the impact on patient safety of these wireless devices. These concerns range from interference with medical electronics, decrease in clinical vigilance with the use of the devices, and the effect on the institution's bottom line. Some institutions have banned the use by patients and their families of wireless communications devices, despite the fact that little if any data have shown evidence of a risk to patients associated with their use. In this issue of *Mayo Clinic Proceedings*, the article by Tri and colleagues[1] provides some insight that should give us pause as we think about the implications of a wireless world and patient care. As the use of this technology expands, we must ensure that we are not creating an environment that causes harm to our patients.

Tri and colleagues performed a laboratory study of the interaction of a number of external cardiopulmonary monitoring devices and cellular phones. The devices were used in simulator mode, and a number of different cellular phones were tested close to the devices. Any change in the nominal functioning of the equipment was noted as were the distance to the device and the spatial relationship of the cellular phone and the medical device in question. What these authors found was fascinating. In 54.7% of tests, some degree of interference occurred. The interference was deemed clinically important in 7.4% of tests. This interference generally occurred when the phones were placed within 1 to $1^1/_2$ m of the tested device. The majority of the interference was seen in electrocardiographic (ECG) tracings displayed on the physiologic monitor. Most concerning was the ability of a cellular phone to cause 1 brand of ventilator to shut down and restart when the phone was used very close (ie, 5-10 cm) to the ventilator's communication port. Even more alarming is the fact that the ventilator did not recover once the phone was either removed or turned off.

See also page 11.

As with most studies, there are a number of limitations to that done by Tri and colleagues. We do not know to what degree these laboratory findings can be extrapolated to a clinical environment. For example, would the addition of long ECG cables that are attached to the patient via electrodes, potentially acting as an antenna, increase or decrease the degree of interference with a cellular phone? Tri et al refer to "clinically important" interference occurring 7.4% of the time, but it is difficult to estimate how often this interference would be clinically important in a busy clinical environment where physicians and nurses are attempting simultaneously to care for the patient, make important medical decisions, and interact with the electronic equipment. The possibility of synergistic interference generated by the simultaneous use of multiple devices also remains unanswered. The results of this study by Tri and coworkers will surely stimulate further research.

Consideration of the use of wireless devices in a medical environment requires careful analysis of both the direct impact, such as the dangers illuminated in the article by Tri et al, and the indirect impact on the dynamics of patient care. The advantages of instant access to information and instant communication are certainly alluring. Rapid access to medical information about the patient may improve patient safety, and information provided to the clinician as needed may help in the areas of drug dosing, drug interactions, and care protocols. The ability to have this information in a portable manner has driven us to seek these

Address reprint requests and correspondence to David C. Herman, MD, Department of Ophthalmology, Mayo Clinic, 200 First St SW, Rochester, MN 55905 (e-mail: herman.david@mayo.edu).

information solutions using wireless means whenever practical. This desire must be weighed against the high costs of the infrastructure associated with wireless systems even in the smallest hospitals and medical centers. The cellular phone is only the most common of the wireless applications used, and used extensively, by physicians, patients, and patients' families alike.

The risk of electromagnetic interference in the patient care environment must be assessed and steps taken to resolve these issues as they are discovered. But is electromagnetic interference the only danger associated with this technology? Although some dangers have been theorized, the most well-documented danger is that of motor vehicle crashes caused by inattention of a driver using a cellular phone.[2] The prevalence of motor vehicle crashes related to cell phone use has raised awareness of this problem to the status of a public health issue, and laws have been proposed to discourage this practice. Are these same distractions also relevant in the health care environment?

Technological innovations in communications have given us the ability to access each other 24 hours a day, 365 days a year. Does the ability of technology to make this communication possible make such communication necessary or even desirable? Should the technical ability to communicate with each other at any time make it mandatory that we do so? When does the ability for instant communication cease to be helpful and become a distraction to patient care? Is there a point at which patient care is compromised rather than enhanced?

Most physicians and patients consider the patient-physician relationship special. Technology should be used to enhance this relationship, not obstruct or confound it. Wireless communication, the ability to contact someone at any time and at any place, must be used properly. Answering a ringing phone has been used commonly as an example of a task that is urgent, but may or may not be important. Using the same framework, where does face-to-face patient-physician interaction fall on this scale? We hope that each physician and patient would agree that this patient-physician interaction is urgent and important, and anything permitted to interrupt this interaction must carry a greater urgency and importance than the interaction being interrupted.

It is our hope that, when technology is introduced into the patient care environment, the question of electromagnetic interference is addressed and answered so that patient safety is ensured. It is difficult to justify potential electromagnetic interference from cellular phones without documented improvement in patient care associated with their use. Therefore, it would seem reasonable either to limit or to ban the use of cellular phones in the vicinity of medical electronic devices where patients are particularly vulnerable, such as the intensive care unit and operating rooms, until the safety of these devices can be reasonably proven. Considering the distance at which the interference occurred in the study by Tri et al, precluding the use of these devices in a patient's room or procedure area would be a modest precaution. We would also hope that the larger and more important question of the effect of the technology on the patient-physician relationship could also be examined in properly designed studies. Such research could, in time, play a large role in the decisions made on the manner of use of the technology. In 1922, Havelock Ellis[3] wrote, "The greatest task before civilization at present is to make machines what they ought to be, the slaves, instead of the masters of men." The machines of which he spoke have changed, but not the task. Let us not become slaves of the machines we have invented to serve us.

David C. Herman, MD
Department of Ophthalmology

John P. Abenstein, MD
Department of Anesthesiology

Mayo Clinic
Rochester, Minn

1. Tri JL, Hayes DL, Smith TT, Severson RP. Cellular phone interference with external cardiopulmonary monitoring devices. *Mayo Clin Proc*. 2001;76:11-15.
2. Violanti JM. Cellular phones and fatal traffic collisions. *Accid Anal Prev*. 1998;30:519-524.
3. Ellis H. *Little Essays of Love and Virtue*. New York, NY: George H. Doran; 1922.