Use of a Personal Digital Assistant in Reducing Medication Error Rates

Benjamin C. Grasso, M.D.
Robert Genest, R.Ph.

The National Academy of Sciences Institute of Medicine (1) reported in 1999 that more deaths are caused by medication errors than by industrial accidents. A large proportion of patients in state psychiatric hospitals have severe and multiple psychiatric symptoms, chronic illness, significant substance abuse, and comorbid medical conditions. For such patients, the use of multiple medications is common, and medication errors and adverse drug interactions are thus more likely to occur.

A previous column reported on the use of a personal digital assistant (PDA)—the Palm Pilot—to improve electronic sign-out among clinicians (2). In this column we describe the use of a PDA to improve access by medical staff to patient and drug information, with the goal of decreasing medication error rates. Other uses for the device, such as facilitating the documentation of pharmacy interventions, are also described.

The two most common causes of medication errors are a lack of knowledge of the medications being prescribed and a lack of knowledge of the patient's clinical status (3,4). In some state psychiatric hospitals, access to current medication information from the scientific literature is limited. Access to patient-specific information may be compromised by a high ratio of patients to physicians, frequent requests for physicians to care for patients on other units, and competition for the patient's chart from clinicians from multiple disciplines.

The authors are affiliated with the Augusta Mental Health Institute, P.O. Box 724, Augusta, Maine 04332 (e-mail, bgrasso1 @maine.rr.com). ***John H. Greist, M.D.,*** *is editor of this column.*

At the Augusta Mental Health Institute in Augusta, Maine, several problem areas were identified as potentially being linked to medication errors. Pharmacy staff frequently detect transcription errors when multiple medications are recorded on a patient's discharge summary sheet. Pharmacy interventions are problematic because of the manual process used in their execution and documentation. Also, the hospital does not have an electronic record, and we do not have the ability to electronically prescribe or to immediately access patient or pharmacologic data online. Finally, given the annual volume of medication orders—35,000—and doses—515,139—medication errors are likely to occur. Having identified these problem areas, our director of pharmacy proposed the use of a PDA as a solution.

A multidisciplinary performance improvement team was assembled, including the medical director, an attending psychiatrist, the director of nursing, the director of psychology, a midlevel provider, information management staff, pharmacists, the medical records director, and the medical staff coordinator. After a needs assessment was performed, the team concluded that the use of a PDA could accomplish several short-term goals: immediate electronic access to patient and drug information, the ability to easily execute and document pharmacy interventions, and the ability to generate a patient's discharge medication list without the need for manual transcription. Electronic prescription was considered a long-term goal. The PDA we used allows easy access to patients' information, medication profiles, and relevant databases. It is portable, easy to use, and relatively inexpensive, and it is compatible with the personal computer–based network that is used by our medical staff in the absence of a hospitalwide information system.

PDAs—Palm Pilots—were purchased for all full-time medical staff and pharmacists. A medication information database, which included information on drug interactions, was installed. Patients' medication profiles, which were generated by the pharmacy department and updated daily, were formatted for the PDAs, as were dictated discharge summaries. By "hotsynching" daily, PDA users could obtain current medication profiles and could access all discharge summaries that had been dictated within the previous six months. During a hotsynching operation, the PDA is linked to the personal computer and data are simultaneously uploaded and downloaded. The result is that the computers then contain identical data. Passwords were used to protect patient confidentiality, and staff were trained to engage the lock feature when ending a session with the PDA.

Staff were also trained to send the current medication list and dosages directly to a printer via an infrared port at the time of each patient's discharge. The patient's discharge medication list and dosages were then printed out in a user-friendly format, preventing the transcription errors that occurred when this process was done by hand. Using HanDBase software (DDH Software, Inc., Boca Raton, Florida), our pharmacists wrote a clinical intervention database, which simplified both the implementation and the documentation of pharmacy interventions.

In anticipation of resistance from some staff in learning to use an elec-

tronic device, and in recognition of the need for ongoing support, a weekly support group was instituted to facilitate the use of the PDAs. A user-satisfaction survey of the medical staff was conducted both before and after implementation of the new system. Data on the accuracy of medication lists at discharge and on overall medication error rates are still being collected and reported.

The use of the PDA to access patient-specific medication profiles, query a medication information database, and directly print out discharge medication lists is now an integral part of the daily clinical activities of our medical staff. Initial outcomes data have been promising. Results from the user-satisfaction survey were positive: the medical staff reported improvements in all 19 measures of satisfaction after implementation of the new system. The number of pharmacy interventions increased by nearly 60 percent during the first six months of use of the PDA. Requests by the medical staff for drug information decreased by 45 percent during the same period, reflecting better access to such information through the device and thus less need to consult with pharmacists.

Medical staff members, including those who had been most apprehensive about using the new system, became more confident in the use of computer-based technologies as effective tools for improving patient care. Perhaps most significantly, the medical staff are now less fearful about reporting medication errors and are more interested in performance-improvement activities, such as attempts to decrease medication error rates. Another benefit has been the ability to keep an up-to-date calendar with the PDA. Updates are added by clinicians who use the device and by administrative support staff, who can access the network calendar through their desktop computers. Other databases, such as *DSM-IV,* have been easily loaded into the system, as have trended pharmacy data on the hospital's rates of adverse drug events—medical staff should always know whether rates of medication errors or adverse drug reactions are changing.

Another benefit of the PDA has been in meeting regulatory requirements. We presented the project as our hospital's principal performance-improvement initiative when we were surveyed by the Joint Commission on Accreditation of Healthcare Organizations in January 2001. Our presentation was well received—the physician surveyor applauded our efforts and recommended that we publish our project for the benefit of hospitals that do not use electronic records or computerized ordering of medications.

Although cost is always an issue, the direct costs of the new system were kept under $8,000, including the cost of supplying nine full-time medical staff plus pharmacy staff with the devices and all the associated software. We had some initial difficulties in linking the medical staff's personal computers and the hospital server with the pharmacy system, as well as some difficulties in automating the daily transfer of patients' medication profiles from the pharmacy system to the hospital server.

In-house staff from the pharmacy and information systems were able to overcome these difficulties without using outside consultants. The hotsynching process itself is quick and simple, even for the most computer-illiterate physicians. No security breaches have occurred. The hardware has been relatively problem free. We keep a few backup devices in the inevitable event that one is lost or stolen or breaks down.

Future applications will likely include use of the PDAs to report adverse drug reactions and medication errors as well as to carry useful templates—such as treatment planning information—and seclusion and restraint documentation guidelines. We hope to soon have reportable outcomes data on the impact of the devices on discharge medication transcription error rates. We hope eventually to prescribe electronically, which will eliminate human transcription errors and bring us a long way in reducing overall medication error rates. ♦

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