

Development of a Personal Digital Assistant Application for Pharmacy Documentation

GEORGE E. MACKINNON*

Center for the Advancement of Pharmacy Practice, Midwestern University, 19555 N. 59th Avenue, Glendale, AZ 85308, USA

(Received 16 December 2002; In final form 23 January 2003)

As the role of pharmacists becomes more patient-focused and market pressures demand increased accountability of pharmacists, the importance of documenting pharmacists professional activities related to patient care becomes paramount. Efficient means by which to document and transmit such activities of pharmacists have not been fully developed or are not universally applied in professional practice. This paper describes a method for documenting pharmacy student interventions during experiential rotations with personal digital assistants (PDA). The pharmacy student documentation system (PSDS[®]) requires a “point-and-click” action by the user on a pre-programmed electronic form that documents common reasons for interventions, actions taken, recommendations provided, and clinical service provide. Also collected is the time involved, the outcomes of recommendations, what personnel initiated the intervention, medications involved, and the potential impact on patients’ health related quality of life. The use of PDA applications as described within this paper embody the spirit of the recommendations from the US Institute of Medicine (IOM) reports, the Leapfrog Group, and computerized physician order entry (CPOE) systems being implemented. The PSDS[®] and other computer technologies have the potential to increase communication among members of the healthcare team to achieve defined therapeutic outcomes for patients while documenting the various contributions of the respective providers in the delivery of quality healthcare.

Keywords: Documentation; Interventions; Student; Personal Digital Assistant (PDA); Technology

INTRODUCTION

In today’s healthcare arena, that continues to become increasingly litigious, it is essential that all contributions to patients’ well-being be followed by proper

documentation from healthcare providers, including in the pharmacy profession. The second US Institute of Medicine (IOM) report attempted to chart a course for ensuring that the current health system does not inflict harm on those it intends to treat. One particular recommendation relevant to this paper suggests that an environment be created to foster and reward improvement by

1. creating an infrastructure to support evidence based-practice
2. facilitating the use of information technology
3. aligning payment incentives, and
4. preparing the workforce to better serve patients in a world of expanding knowledge and rapid change (Crossing the Quality Chasm, 2001).

The private sector is also insisting upon changes in the healthcare system to ensure optimal health outcomes. For example, the Leapfrog Group, is a coalition of US businesses formed to inform the healthcare industry that significant leaps in patient safety and customer value are desired and will be recognized and rewarded (McCain, 2001). Of the three specific standards set by the Leapfrog Group for hospitals to meet to receive members’ business, the first is implementation of a computerized physician order entry (CPOE) system. The use of personal digital assistant (PDA) applications as described within this paper embody the spirit of the recommendations described above from the IOM and the Leapfrog Group, in particular as they relate to the use of technology.

The pharmacy profession is not immune to these external pressures, which occur in all sectors of

*E-mail: gmacki@arizona.midwestern.edu

the US healthcare system. As the role of pharmacists becomes more patient-focused, or market pressures demand increased accountability of pharmacists, the importance of documenting their professional activities related to patient care becomes paramount. Yet efficient means by which to consistently document and transmit such activities of the profession have not been fully developed, or are not used universally by pharmacy organizations.

The importance of documenting the clinical activities and therapeutic interventions of pharmacists has been extensively described in the pharmacy literature. Reports in the literature have described methods to assess pharmacists interventions related to medication errors (Overhage and Lukes, 1999), the use of computer-based systems (Sauer *et al.*, 1997), and recently the use of PDAs in specific patient care areas (Lau *et al.*, 2001). Yet many of these documentation systems tend to be individualized applications where the transferring of data to other providers is nonexistent or limited. Often these systems focus on the generation of reports for workload analysis or accreditation purposes. Unfortunately, the information gathered and analyzed in such applications does little to improve patient care for the patients from whom the data was collected. After-all, clinical documentation systems and applications must be easy to use, portable, produce useful reports, be replicated by others consistently and allow for knowledge sharing with other providers.

Yet while there are limits to these current programs, other expanding applications of such digital communication technologies could potentially and significantly expand the transparency and communication in the pharmacy profession. Indeed, as digital communication technology, such as PDA's and the Internet, have and will continue to revolutionize our lives, such emerging communication technology may also have a profound effect on healthcare, offering opportunities for the pharmacy profession to maintain constant vigilance relating to the procurement, preparation and distribution of pharmaceuticals while allowing for more consistent provision of pharmaceutical care.

This paper describes the development of an application related to pharmacy documentation specifically with PDA's that may enhance the communication between pharmacists and other healthcare providers.

Pharmacist Documentation in Patient Care

The principle purpose of clinical documentation is to provide a record of what a practitioner does, why it is done, and, where possible, what outcomes are achieved. With respect to the provision of pharmaceutical care it is essential to succinctly document what patient-specific decisions are provided by pharmacists, why these decisions are made and where possible follow-up actions are required (Hepler and Stand, 1990). Functions performed by pharmacists such as obtaining medication histories, counseling patients, performing limited patient assessment and monitoring, conducting drug regimen reviews, providing instructions related to devices and providing drug information all represent services often performed by pharmacists that are not documented.

It can be argued that the provision of these type services and their findings and outcomes by pharmacists need to be documented and communicated on a consistent and timely basis. Payers of healthcare services, other healthcare providers, and employers require documentation to provide reimbursement for services, validate the quality of care or services provided, and justify workloads.

Additionally, documentation that occurs in a vacuum, devoid of dissemination, is futile and ultimately does not benefit patient care in the long run. It is essential that documentation provide a "real-time" trail of care provided to patients (occurring concurrent with their care). Documentation made after the fact. When pharmacists perform documentation associated with their daily activities, this documentation should be conducted with the intent of allowing this information to be used by other healthcare providers.

FIGURE 1 PSDS[®] User Demographics Screen.

FIGURE 2 PSDS[®] Initial Patient Screen. Continuing, the box on the first Reasons page under the subheading of “Drug Regimen Selection” titled “Dose” would be checked as well as “Illegible writing” under the “Order Clarification” subheading (See Fig. 3) given that the prescription was written poorly and the dose appeared incorrect.

USE OF PDA'S IN DOCUMENTATION

PDA's can be used to collect, process, and transmit data that ultimately impacts on the care delivered to patients, though they hold limitations in memory capabilities, screen size, and overall functionality. Most PDA's are powered by one of two operating systems: the Palm-OS (i.e. Palms and Visors) or Microsoft's Pocket-PC (i.e. Casios and HP-Jornadas). There are more widespread applications for Palm-OS in the medical field, yet many pharmacy systems use Microsoft software, thus being more compatible with Pocket-PC.

For the system to accomplish what is intended of it, software and hardware must be made compatible prior to the deployment of an electronic documentation system in any healthcare organization. The inability to interface with other systems creates redundancies that can potentially lead to serious misinterpretations and mistakes in translation of data that can compromise patient care. In choosing an electronic documentation program for pharmacists, consideration must be given for the ability to interface not only with the pharmacy system (billing and automated dispensing) but also the other

electronic records throughout an organization. When a pharmacy system is unable to interface with the laboratory system of the electronic medical records of a hospital, the ability to effectively communicate among providers is reduced.

The need for standardization of nomenclature in this area is apparent. The American Society of Health-System Pharmacists (ASHP) has resources that can be of assistance, especially related to automated medication storage and distribution devices (American Society of Health-System Pharmacists, 1998). In addition, the National Council for Prescription Drug Programs (NCPDP) has developed SCRIPT (NCPDP, 2001/2002) as a standard for the transmission of electronic prescriptions, refills requests, and compliance transactions between prescribers and pharmacies.

Pharmacy Student Documentation System (PSDS[®])

Recognizing that there was a need for an application to document pharmacy student interventions, the PSDS (2001) was created. Research by the author over a 10-year period (that included various paper

FIGURE 3 PSDS[®] Reason for Intervention Screen. As with most interventions by pharmacists, typically there are recommendations made to healthcare providers, patients, or caregivers. Using the previous example with the Warfarin prescription, the box under the recommendation subheading “Medication Related” and indicate “Change dose” (See Fig. 4) would be checked. In this case, additional “Patient Care Related” recommendations could have been made such as the ordering of “laboratory tests” and “therapeutic drug monitoring.”

FIGURE 4 PSDS[®] Intervention Recommendation Screen. The next step would be to check the box under the subheading “contact healthcare provider” to ensure the illegible prescription and incorrect dose would be interpreted correctly and the appropriate medication and strength dispensed to the patient (See Fig. 5).

forms) helped to identify the most common elements of clinical documentation by pharmacy students (MacKinnon, 2003).

The PSDS[®] application is programmed using Microsoft Visual Basic for CE[™] operating with PocketPC[™] that translates collected data into Microsoft Access[™] files. The PSDS[®] operates on the handheld Hewlett Packard Jornada-680[™] and requires students to only “point-and-click” on a pre-programmed electronic form. Common reasons for interventions, actions taken, and provided recommendations are all categorized, in addition to time involved, the outcomes of recommendations, who initiated the intervention, medications involved and the potential impact on patients’ health-related quality of life (HRQOL).

Beyond this, a synchronization application can be written to allow for an automatic link to a website enabling the collation of aggregate data from users. Upon submission of interventions, students, preceptors, and sites can then receive usage reports related to student activity at respective sites as well as comparative reports to other similar type practice sites. No personal patient data would be transmitted to the web server. The first screen encountered in the program captures user demographics (See Fig. 1). A case

study is also provided in the Appendix that contains the various screen captures of the PSDS[®] system.

DISCUSSION

It is important that pharmacists be constantly vigilant to avoid medication-related errors (Kohn *et al.*, 1999) and improve medication use. Documentation systems can improve the detection of potential medication problems and provide evidence of their impact on patient care. However, the activities associated with the identification and avoidance of potential medication-related errors needs to be documented to demonstrate not only the magnitude of the problem, but also the role of pharmacists in resolving these potentially detrimental occurrences from taking place in the health system. The next sections will further define how some of the above recommendations could be addressed with documentation software such as the PSDS[®] system.

Implications for Pharmacy Education

As increased financial constraints are placed on healthcare providers, it may become more difficult for colleges and schools of pharmacy to recruit

FIGURE 5 PSDS[®] Intervention Action Screen. With respect to outcomes, it would be indicated that the prescriber agreed with the interpretation that the prescription was in fact for “Warfarin Sodium 2.5 mg po qd” and not “Warfaring Sodium 25 mg po qd” as written. It would also be noted that the intervention required 10 min of the pharmacist’s time to complete. Lastly, an assumption that this action having an “Anticipated Outcome” of “Increased safety” for the patient would also be indicated (See Fig. 6).

FIGURE 6 PSDS[®] Intervention Outcomes Screen. In a situation where point-of-care diagnostic monitoring for anti-coagulation is available, "Laboratory tests" could be checked under the "Professional Services" subheading (See Fig. 7).

volunteer faculty to assist in the experiential education of students. A lack of experiential sites could pose a significant barrier as programs move to implement the entry-level Pharm.D. Academic pharmacy must create systems to document the contributions pharmacy students make while participating in rotations to facilitate continued use and possible expansion of experiential programs.

Pharmacy educators, practitioners and administrators must not only teach pharmacy students how to practice patient-focused care, but how and why to document services once they have been provided. Students must gain an appreciation and understanding as to why it is essential they document their activities. Professional practice experiences or rotations provide an excellent opportunity for pharmacy students to learn and practice patient-focused care and documentation related to its provision. To adequately prepare future pharmacists, students must be trained in the process of documentation related to patient care activities.

Training Considerations of Pharmacists and Support Staff in Documentation

Often pharmacists appear uncomfortable in documenting their activities related to patient care within

the pharmacy setting and are even more uncomfortable in communicating this information to other healthcare providers. All too often communication from pharmacists with physicians relates to pharmaceutical product usage and restrictions (i.e. non-formulary issues) and does not focus on patient-care related issues. Likewise, communication among pharmacists within a practice as well as between practices is almost nonexistent. Clinical interventions need to be shared with colleagues, at shift changes, transfer of patients from one care area to another or even transfer of patients to new health systems altogether. Though often not the case, pharmacists in community settings must be encouraged to communicate more regularly with hospital pharmacists and vice-versa (Low, 2000; Sexton *et al.*, 2000).

Hence, attention must be directed toward practicing pharmacists and providing them with education and training related to why documentation is necessary, how to document and use of technology to assist in the documentation process. The training of support staff such as pharmacy technicians must not be overlooked, as these individuals can assist in the routine data collection of both pharmaceutical and retrievable patient information (i.e. from medical charts and laboratory reports) that can be presented to pharmacists for assessment and follow-up.

FIGURE 7 PSDS[®] Professional Services Screen. In many instances, the aforementioned interaction and others quite similar take place on a daily basis, but the valuable contribution pharmacy makes in averting a potentially lethal medication-related error is often never capture. More importantly, without this systematic approach to documentation of specific classes of agents, most common reasons for interventions, and the outcomes of recommendations, could not be known or acted upon.

Though the concepts of documentation are consistent irrespective of practice settings, the process by which data is collected and the tools for documentation can be quite different. Thus, the training associated with documentation must be specific for the respective practice environments of the pharmacists. For example, access to healthcare providers, medical records, laboratory data, and patients is more common in hospital pharmacy practice than in community pharmacy practice where direct access to patients is often the only source of data. As a result, the process of collecting data, documentation, and communication with other healthcare providers and patients will vary based on the practice setting.

Additionally, the internal pharmacy environment may dictate the method for data collection and documentation as well. While pharmacists in some practice settings routinely use desktop computers (i.e. PC's), others tend to be more mobile and therefore access to portable technology is more crucial (i.e. laptops PC's and PDA's). For example, a community pharmacist is more likely to document their activities on a PC as opposed to a PDA, as their internal workflow would necessitate this. In contrast, a consultant pharmacist that travels among various long-term care facilities may prefer a portable device for documentation.

CONCLUSION

Computer technologies such as PDA's have the potential to increase communication between members of the healthcare team in achieving defined therapeutic outcomes for patients while documenting and communicating the contribution pharmacists make in the delivery of quality healthcare. By ensuring appropriate medication use in patients, the PSDS[®] documentation system is one such application that could prove to be a convenient way to collect pharmacy intervention data and to share the contributions that pharmacists make in community and institutional practice sites.

Acknowledgements

The author acknowledges the efforts of Lindsay Huxtable, Pharm.D. in providing the screen captures of the software and the assistance of John Van Vleet, Pharm.D. Senior Manger, Clinical

Pharmacy Outcomes Research, Pfizer Pharmaceuticals Group, in support of this project. Continuation of this work is supported by a grant from Pfizer, Inc.

References

- American Society of Health-System Pharmacists (1998) "ASHP guidelines on the safe use of automated medication storage and distribution devices", *American Journal of Health-System Pharmacy* **55**, 1403–1407.
- Crossing the Quality Chasm. A New Health System for the 21st Century (2001) Committee on Quality of Health Care in America. Institute of Medicine (National Academy Press, Washington, DC).
- Hepler, C.D. and Stand, L.M. (1990) "Opportunities and responsibilities in pharmaceutical care", *American Journal of Hospital Pharmacy* **47**, 533–543.
- Kohn, L.T., Corrigan, J.M. and Donaldson, M.S. (1999) To Err is Human. Building a Safer Health System, Committee on Quality of Health Care in America. Institute of Medicine (National Academy Press, Washington, DC).
- Lau, A., Balen, R.M., Lam, R. and Malyuk, D.L. (2001) "Using a personal digital assistant to document clinical pharmacy services in an intensive care unit", *American Journal Health-System Pharmacy* **58**, 1229–1232.
- Low, J. (2000) "Seamless care anyone?", *The Australian Journal of Hospital Pharmacy* **27**, 356–357.
- MacKinnon, III, G.E. (2003) "Documenting Pharmacy Student Interventions via Scannable Patient Care Activity Records (PCAR[®])", *Pharmacy Education* **2**, 4.
- McCain, J. (2001) "Leapfrog Group actions will be felt throughout the health care system", *Managed Care* **10**(6), 26A–26H.
- NCPDP (2001/2002) "SCRIPT Standard", *Council Connection*. **7**, 14–15.
- Overhage, J.M. and Lukes, A. (1999) "Practical, reliable, comprehensive method for characterizing pharmacists' clinical activities", *American Journal Health-System Pharmacy* **56**, 2444–2449.
- "Pharmacy Student Documentation System" (PSDS) (2001) Version 1.0.
- Sauer, B.L., Heeren, D.L., Walker, R.G., King, J.H. and Musallam, N.A. (1997) "Computerized documentation of activities of Pharm.D. clerkship students", *American Journal Health-System Pharmacy* **54**, 1727–1732.
- Sexton, J., Ho, Y.J. and Green, C.F. (2000) "Ensuring seamless care at hospital discharge: a national survey", *Journal of Clinical Pharmacy and Therapeutics* **25**, 385–393.

APPENDIX

A 59-year-old African American male, having a trial fibrillation, presents a handwritten prescription that appears to read, "Warfarin Sodium 25 mg po qd." The pharmacist identifies this as too high of a dose (most likely missing the decimal point) and contacts the prescriber immediately. The pharmacist would proceed to log this intervention as follows (see Fig. 2) (Figs. 3–7).

Journal: GPHE
Article no.: 31004

Author Query Form



COPY FOR AUTHOR

Dear Author,

During the preparation of your manuscript for typesetting some questions have arisen. These are listed below. Please check your typeset proof carefully and mark any corrections in the margin of the proof or compile them as a separate list. This form should then be returned with your marked proof/list of corrections to Alden Multimedia.

Disk use

In some instances we may be unable to process the electronic file of your article and/or artwork. In that case we have, for efficiency reasons, proceeded by using the hard copy of your manuscript. If this is the case the reasons are indicated below:

- Disk damaged Incompatible file format LaTeX file for non-LaTeX journal
- Virus infected Discrepancies between electronic file and (peer-reviewed, therefore definitive) hard copy.
- Other:

We have proceeded as follows:

- Manuscript scanned Manuscript keyed in Artwork scanned
- Files only partly used (parts processed differently:)

Bibliography

If discrepancies were noted between the literature list and the text references, the following may apply:

- The references listed below were noted in the text but appear to be missing from your literature list. Please complete the list or remove the references from the text.
- Uncited references*: This section comprises references which occur in the reference list but not in the body of the text. Please position each reference in the text or, alternatively, delete it. Any reference not dealt with will be retained in this section.

Manuscript page/line	Details required	Author's Response
	Author, figures (1-7) provided are of poor quality, please supply in a disk. Please check the citation of figures 3-7 in the article.	