Documenting pharmacist interventions on an intranet

ARMEN I. SIMONIAN

Abstract: The process of developing and implementing an intranet Web site for clinical intervention documentation is described.

An inpatient pharmacy department initiated an organizationwide effort to improve documentation of interventions by pharmacists at its seven hospitals to achieve real-time capture of meaningful benchmarking data. Standardization of intervention types would allow the health system to contrast and compare medication use, process improvement, and patient care initiatives among its hospitals. After completing a needs assessment and reviewing current methodologies, a computerized tracking tool was developed in-house and integrated with the organization’s intranet. Representatives from all hospitals agreed on content and functionality requirements for the Web site. The site was completed and activated in February 2002.

Before this Web site was established, the most documented intervention types were Renal Adjustment and Clarify Dose, with a daily average of four and three, respectively. After site activation, daily averages for Renal Adjustment remained unchanged, but Clarify Dose is now documented nine times per day. Drug Information and i.v.-to-p.o. intervention types, which previously averaged less than one intervention per day, are now documented an average of four times daily. Approximately 91% of staff pharmacists are using this site. Future plans for this site include enhanced accessibility to the site with wireless personal digital assistants.

The design and implementation of an intranet Web site to document pharmacists’ interventions doubled the rate of intervention documentation and standardized the intervention types among hospitals in the health system.

Index terms: Benchmarking; Clinical pharmacists; Clinical pharmacy; Computers; Documentation; Drug use; Hospitals; Interventions; Networks; Patient care; World Wide Web

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Sharp Healthcare is an integrated regional health care delivery system based in San Diego, California. Sharp’s Institutional Care Division includes four acute care hospitals and three specialty hospitals, with a total of 1851 licensed beds. The organization has struggled for many years to find the best method for documenting pharmacists’ clinical interventions. After a failed effort to document them using the pharmacy information system, each hospital began experimenting with various tools, including manual forms, spreadsheets, and database applications, to find a solution.

A review of the literature reveals a similar picture of mixed methodologies. Articles describe the following tools used for intervention data collection in hospital settings: (1) manual form,1-4 (2) bar-code scanner,5-7 (3) notebook personal computer (PC),8 (4) PC local area network (LAN),9,10 (5) pharmacy information system,11-13 (6) hospital information system (HIS),14-16 (7) electronic medical record (EMR),17 (8) personal organizer,18 and (9) personal digital assistant (PDA).19-22 In hospitals that use automated forms, computer type and network architecture determine the aspects of usability and reporting. PC LANs allow users to access a central database,9,10 but this architecture is best suited to a single department or hospital. In a multihospital setting, such as Sharp Healthcare, data would have to be merged from each hospital’s LAN server. Hand-held devices offer high accessibility but require periodic synchronizations or data downloads to a central database.18-22 EMR, HIS, and pharmacy information systems provide good

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access via PC terminals with immediate data storage into a central database, but hospitals often have software and reporting constraints.\textsuperscript{14-16}

Using HIS methodologies as an example, one hospital entered intervention data codes into a Pharmacist Note field,\textsuperscript{14} another coded data into a Prescription Number field,\textsuperscript{15} and a third developed a set of custom screens\textsuperscript{16} to document interventions within the HIS vendor’s software. At these three hospitals, data were analyzed as a separate step using additional reporting software.

Because of Sharp Healthcare’s increased focus on medication error prevention, process improvement, and quality assurance, a need for more consistent and efficient intervention data collection was recognized. It was decided that another attempt should be made to standardize a tool for pharmacists to document their interventions, building on past experience and using the latest technology. Before this effort, one hospital was using a customized Microsoft Access database (Microsoft Corporation, Redmond, WA), two hospitals were using macro-driven Microsoft Excel spreadsheets, and the remaining hospitals were using various paper forms. In May 2001, Sharp convened an Intervention Task Force composed of pharmacy managers, clinical coordinators, and staff pharmacists. This group’s challenge was to implement a standardized intervention documentation tool that would be acceptable to staff throughout the organization. Everyone agreed at the outset that manual methods were cumbersome, and an automated solution was needed. Even though a few commercially available packages had been evaluated by subgroups of the task force, none were strongly recommended. The group also wanted maximum internal control of software and data.

Mandatory software characteristics initially identified by the group included the following:

1. Simple and easy to use,
2. Documentation can be completed in less than two minutes,
3. Local control of database tables (e.g., security profiles, intervention types),
4. Immediate database updates upon completion of the documentation process,
5. Capability to record and print a physician communication note (M.D. Note), and
6. An easy-to-use report generator that can produce ad hoc queries on any and all stored data elements.

Sharp Information Systems (SIS) had also committed to intranet Web access for clinical information. The task force saw value in the ability to access an intervention form at any inpatient pharmacy, nursing station, or ancillary department terminal. Since the programming tools were already established and the ability to secure internal programmer resources existed, the Intervention Task Force recommended moving forward with the development of a clinical pharmacy intervention site on Sharp’s intranet.

Software development started in October 2001, and the final product was delivered in mid-January 2002. SIS used the ColdFusion 4.5 (Macromedia, Inc., San Francisco, CA) programming tool with data storage in a Microsoft SQL Server 7.0 database to store intervention data from all hospitals in one database. Task force members provided the programmers with the information necessary to build the pharmacist, physician, medication, nursing station, and intervention-type tables within the software. An audit was performed to ensure that security and privacy standards were met. The Web site was activated on February 1, 2002.

Program description

The intranet is accessible throughout all of Sharp Healthcare’s hospitals via PCs located in administrative and clinical areas, such as the main pharmacies, pharmacy satellites, nursing stations, and kiosks. The kiosks consist of PCs on desks or in alcoves within patient care areas but outside of nursing stations. Kiosk PCs are available to physicians, nurses, and pharmacists to access key applications. Pharmacists have the convenience of connecting to the intranet and recording interventions at any kiosk or PC in the health system.

Pharmacists log on to the Web site using a unique identifier, password, and hospital code. The site’s homepage describes all the available links, and an Announcements box displays information pertinent to the hospital at which the pharmacist has logged on to the system. The Change Registration link allows the user to update personal information, including name, e-mail address, and password. The Follow-Ups/Search link is used to search, view, and print a list of all active interventions requiring follow-up. Users can send an e-mail to the local database manager via the Comments/Questions link. Interventions are documented and reported using the Intervention Form and Reporting links, and the last link on the intervention homepage allows the user to go to the intranet homepage.

When the user clicks on the Intervention Form button, the first data input page is displayed (Figure 1). All fields on this page are required elements except for Room/Bed and Physician. Patient Name, Visit Number, and Room/Bed are text fields. Visit Number is validated with a pattern match of seven digits. Station/Floor choices default into a dropdown menu based on the hospital selected at login. Lists of intervention types are displayed in drop-down menus associated with intervention categories. Categories include Medication, Dose, Route, and Disease Management. For convenience, certain intervention types are displayed in two categories. For example, Clarify Dose can be selected from the Medication and Dose categories. A
list of intervention types can be found in the appendix. Medication and Physician are also selected using drop-down menus. The Med Safety Issue element is a Yes/No button answered in accordance to guidelines prepared by our Safe Medication Practice pharmacists.

One feature of the software is its ability to distinguish between long- and short-term interventions. Our goal is to allow quick entry of those events that do not require an M.D. Note or follow-up. Long-term interventions take the user to an M.D. Note page. Text can be entered, and the pharmacist has the option of printing the note for posting on the patient’s chart. Long-term interventions are kept active on the follow-up list until they are explicitly closed. Pharmacists may edit open interventions and add follow-up notes. An audit trail is maintained by the system to chronicle creation, edits, follow-ups, and closing. Long- and short-term designations are predetermined, and duplicate entries are listed in cases where either scenario may occur (e.g., Clarify Dose—Long-term, Clarify Dose—Short-term).

The final step with both long- and short-term interventions is the Acceptance page. The pharmacist indicates whether the intervention was accepted, and the intervention is then closed.

Any user may view stored data by selecting the Reporting link. A number of report filters are presented, and the pharmacist may select none, some, or all filters to accomplish a narrow or wide search. Filter choices are Intervention Record Number, Hospital, Nursing Station, Pharmacist, and Date Range. Data can be presented in a summary view that shows only patient name, visit number, intervention type, and creation date, or in an advanced view that shows all data elements. Reports can be viewed on the computer screen, sent to a printer, or exported into a spreadsheet. If the export feature is used, the spreadsheet file can be saved to disk for further data analysis.

Results

After six months of use, the tool was well accepted by the pharmacy staff. Web programmers and Intervention Task Force members received positive feedback regarding the accessibility and the functionality of the software. Short-term interventions take approximately one minute to document. This one minute includes the time it takes the computer to load the first page of the form, link to the acceptance page, and submit the intervention to the database. We did not measure the time to enter a long-term intervention, since the length and content of the M.D. Note may vary considerably by pharmacist and intervention. The number of documented interventions has more than doubled from a daily average of 20 to 43. During the training period before activation of the Web site, pharmacy managers restated to staff the importance of intervention documentation. The increase in the daily average is largely attributable to the management focus, coupled with the accessibility and functionality of the program.

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increases occurred in these latter three intervention types, indicating marked underdocumentation before the Web site was established.

Discussion

Even though the total number of interventions increased to a new norm, review of the Web site intervention data showed individual variation in documentation practices over time. We discovered staff confusion regarding the type and number of interventions to document. Our clinical coordinators met and agreed that staff should concentrate on documenting interventions with higher levels of clinical importance and those that complement current quality-of-care initiatives. Therefore, the coordinators are now developing departmental guidelines to address these issues and help ensure more consistent intervention documentation practices at each hospital.

Approximately 91% of staff pharmacists are using the site. In staff discussions and surveys, it was revealed that some specialized clinical pharmacists were documenting their interventions elsewhere. For example, members of the nutritional support service recorded interventions on an interdisciplinary care-plan form, and they viewed Web site documentation as duplicate data entry. Other shift assignments are distribution oriented (checking i.v. production, filling medication cassettes, and dispensing first doses). Distribution pharmacists do not routinely review orders or perform order entry; these functions are performed by the decentralized clinical pharmacists. Therefore, clinical pharmacists have the greatest opportunity to intervene and document these interventions.

Our plan is to compare interventions among hospitals in the health system, but first we are concentrating on the departmental guidelines to ensure consistency and confidence in the data collected at each hospital.

Pharmacists submit requests to fix and improve the Web site using the Comments/Questions link. Reported programming bugs have been quickly fixed by SIS. One month after the site was activated, we reconvened the Intervention Task Force to review change and enhancement requests submitted by the team members and pharmacist staff. These submissions were accepted, rejected, or put on hold pending further discussion and investigation. The accepted changes and enhancements were prioritized and submitted to the programmers. This change process will continue as we discover ways to improve data collection and program flow.

Pharmacists requested the ability to make an initial determination of short- versus long-term logic for a given intervention. This enhancement has been implemented. The default indicator was eliminated, and the user is prompted to indicate whether follow-up is required via a Yes/No button on the first page of the intervention form. This new functionality allows staff to produce an M.D. Note and then follow up on any intervention type, and the converse is true for short-term entries.

Another implemented enhancement is a benefit-scoring system. Pharmacists indicate the clinical benefit of the intervention as high, medium, or low. When closing an intervention, the pharmacist can add a general comment to further describe details, intervention significance, and actual or potential benefits.

Later this year, the pharmacists will be able to use PDAs to access the intervention site. The use of wireless devices to access a PDA-formatted (small screen) Web site, which mimics the PC version, is planned. Sharp has installed a local wireless network within each of its hospitals in anticipation of activating the EMR system later this year. This enhancement will provide the pharmacists with another data input option that will improve accessibility to the intervention Web site. With wireless Web access, the intervention database will be updated immediately after an intervention is submitted. This approach eliminates the need for daily synchronization of PDAs with network PCs.

Conclusion

The design and implementation of an intranet Web site to document pharmacists’ interventions doubled the documentation of interventions and standardized the types of interventions among hospitals in our health system.

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### Appendix—List of intervention types

- Add medication
- Adverse drug event
- Allergy screening
- Antibiotic review
- Clarified discontinued medication
- Clarify dose
- Clarify medication
- Discontinue medication
- Dose calculation per M.D. request
- Drug–disease interaction
- Drug information
- Duplicate therapy
- Formulary substitution
- Interaction
- i.v. to p.o. or n.g.
- i.v.p.b. to i.v.p.
- Nonformulary
- Not ordered/continued on admission
- Nursing trigger for pharmacy consult
- p.o. or n.g. to i.v.
- Polypharmacy
- Renal adjustment
- Request labs
- Review profile
- Solicited consult
- Subtherapeutic level
- Supratherapeutic level
- Therapeutic substitution

*ai.v.p.b. = i.v. piggyback, i.v.p = i.v. push*