DUH CT Step-down eKardex PDA Project:

Executive Summary

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This project consisted of the conversion of the traditional DukeCT Stepdown paper nursing kardex to an electronic kardex (eKardex) form using the Pendragon 4.0 program. This eKardex form was placed onto a Palm Pilot m130 PDA, in order to facilitate shift to shift report for the charge nurses (end users) on a Cardiothoracic Stepdown Unit (CT) at Duke University Hospital (DUH). This project was undertaken by a team of four Duke University School of Nursing graduate level Nursing Informatics students (DUHSON eKardex PDA Team - DEPT) in conjunction with the Duke University Hospital (DUH) system during the fall semester of 2004. The shared vision of both the graduate team and charge nurses were to address these threefold needs (a) improve communication, (b) optimize patient care/outcomes, and (c) enhance utilization of nursing time. It is important to note that the eKardex PDA project is viewed as both an organizational strategy to achieve the previously mentioned objectives as well as an information technology (IT) initiative by the DEPT.

Background and Significance

With escalating complexities in patient care, nurses must have reliable, accessible, up-to-the-minute data to make appropriate health care decisions that lead to improved patient outcomes (McDaniel, 1997). Nurses traditionally document patient information in a medical record using pen and paper. With today's fast-paced environment, nurse's need more than traditional paper sources of information. Computers enable practitioners to process information that is accurate, unduplicated, error-free, and accessible from remote areas by multiple persons at the same time (Young, 2000). The consistent availability of the electronic record allows documentation to be done in nearly real time in most organizations. This allows nursing information to be available to all members of the care team exactly when it is needed. To date, the majority of healthcare investment in computerized decision-support mechanisms has been directed at supporting nurses

as data gatherers. These mechanisms are designed to facilitate clinical data control through computerized data capture and storage processes (Snyder-Halpern et al., 2001).

The traditional paper kardex was seen as demonstrating an increase in quality of nursing care to Joint Commission surveyors (Simpson, 1985). An exhaustive review of the literature reviewed only rare uses of an eKardex. The depicted benefits include those which integrate traditional kardex information with a nursing care plan (Silva, et al., 1992), and those that could actually save time during shift to shift report (Hendrickson, 1990).

A workgroup report from the American Academy of Nursing Technology describes an example of an automatically generated eKardex derived from available nursing assessment data (2002). The report describes the ideal nursing care-delivery system as one that "….replaces paper-based, administrative tasks with a paperless, point of care, computer-based patient record embedded with intelligent, rules-based capabilities that automate the manual workflow processes, policies and procedures, and that support the nurses' critical thinking" (p. 6). This report further states that hand-held devices and an eKardex would be part of an ideal nursing care-delivery system.

The literature review also revealed two articles highlighting the use of the handheld device as crucial for institutional and national database construction and database portfolio building, respectively (Robertson, 2003 & Bakken, 2004). In addition, clinical nurse specialists have been documented using Palm Pilots to search existing electronic patient records for patients with signs and symptoms of diabetes (Advisory.com, 2002).

Scope

Duke University Hospital (DUH) is a Level III Trauma Center, serving nearly 800 inpatients daily. The DUH CT Division has 20 ICU beds and 62 step-down beds. Charge nurses

in the DUH CT step-down unit currently use a paper report sheet that is freshly printed at the beginning of each shift. This printout contains minimal information for each patient: name, medical record number, attending physician, date of admission, allergies, admitting diagnosis and room number. Each charge nurse starts the new shift by writing down report on each patient in pencil on the report form. The off-going charge nurse has obtained this patient information from rounding on each patient and reviewing the care in progress with the bedside nurse. Charge nurses are limited in space on their report paper and modifications to the data become difficult as patients are admitted and discharged.

Assumptions of the eKardex strategic plan focused on the change in nursing documentation practice particularly since the end-users were novice users with handheld devices. Many of the end-users had little or no experience with the Palm Pilot. The DEPT assumes that a successful pilot will garner trust in the tool as it demonstrates its ability to meet the project vision. Assumptions that were limiting in nature included the lack of the ability to interface with the DUH HIS in this pilot version, as well as the ergonomic limitations of the Palm Pilot screen while scrolling through multiple data entry fields.

Methods

Hardware/Software

The hardware (Palm Pilot m130) for this project was on loan from the Duke School of Nursing with guidance from Linda Goodwin, RN, PhD. The cost for this hardware is not prohibitive making it possible to purchase several more PDA devices if indicated during the pilot. PDAs are small, mobile, hand-held devices that provide computing, information storage and data retrieval capabilities. Through data "synchronization," information stored on a PDA can be sent to a main computer. The data can then be exported into a spreadsheet for analysis and

printing. This feature, in particular, allows for printed reports to be available for review at the change of shift. Appendix A is the example of the current paper kardex that served as the template for the electronic conversion.

Pendragon Forms database software enables users to create and deploy multi-user PDA data collection applications without expensive software development projects. The tool was developed to capture both demographic and clinical information which already exists on paper (Pendragon Software Corporation, 2004). Another consideration of importance was the need for both developer and user to install, learn, and customize the form given that the tool was piloted within the confines of one semester.

Once developed, the project manager (both Nurse Manager of the DUH CT Step-down unit and a member of the DEPT) was given the collective version (v.14) for testing in the clinical area. Feedback from this pilot was used to create subsequent versions resulting in v. 26, which was tested with fictitious patient information. A total of 57 fields were developed to capture all information on the paper kardex. Menu information for collection was specifically limited to six field types. Table 1 illustrates the field type choices used.

Table 1. Number of field types used in the eKardex v.14.

Field Type Description	**Number of Questions with Field Type**	**Presence in Tool (%)**
1) *Text*	3	5%
2) *Date Only*	3	5%
3) *Yes/No*	5	9%
4) *Pop-up*	13	23%
5) *Numeric*	16	28%
6) *Multiselection*	17	30%

Multiselection Lists and Pop-up lists were most commonly used in the development of the tool since they lend themselves to use by the fast paced end-user who may not be familiar with PDA graffiti writing. Sub forms were excluded from this tool because there was no

information in need of a direct interaction with the main form. Question types were quantitative and not open ended to reduce the incidence of error from free text. Field level validation was implemented as an advanced field property. In turn, the data collection process was analyzed on both sets of data.

Layered security measures include password-protected access to the PDA itself and a warning "Authorized Users Only" on the initial display when the Pendragon program is accessed. Patient names were limited to last names only which is consistent with how names are displayed on the CT step-down patient doors. If this pilot project were to be implemented, encryption software would be utilized to further secure data.

Data Collection

A sample set of end-users piloted version (v.) 14 of the form on two shifts in a mock-report setting by entering data on seven random patients. Patients' names were subsequently deleted from the data base to protect patient confidentiality. Participation in this pilot was voluntary, therefore only end users interested in the project participated. Thus the amount of positive versus negative feedback may not be reflective of all end users. A second sample of 20 ficititious patients was entered utilizing v. 26.

Results

The end users in the pilot group provided the following negative feedback:

- Additions and deletions of options in the program fields are needed
- Too many field types programmed
- The inability to sort data without downloading into an Access or Excel table
- The screen was perceived as too small
- The inability to scoll through patient data was problematic

- The inability to chart by exception without having to free text

The positive feedback included that the PDA was portable.

In summary, the outcomes of the goals we hoped to achieve were partially met:

(a) Improving communication

Benefits from workload functionality would include more accurate and up-to-date patient information. However, the limited pilot indicated that this eKardex would not meet the communication needs of the end users. Data stored in the handheld was not as accessible and "sort-able" as they would require. It is possible that another software program with different data management capabilities would be better in meeting the needs of the end users.

(b) Optimizing patient care/outcomes

It is conceivable that using the eKardex merely as a data collection tool and analyzing the data could provide valuable information about the patient population on CT step down units at DUH. However, data analysis is beyond the scope of this project. Given that the end users did not feel it met their communication needs, it is safe to assume that the tool would not enhance patient care and outcomes in this adaptation.

(c) Enhance utilization of nursing time

It was anticipated that in learning this new process, extra time would be required for report. End users had suggestions to decrease time inputing data, however, it has been determined that these adaptatiions will not be implemented due to the inability to easily read entered data.

Conclusions

While conceptually sound, the unsuccessful use of this platform and software package leads us to believe that alternative software and hardware options should be considered. The

end-users in particular were anxious to have input on an IT initiative that would have direct impact on their daily practice. Although this group learned that the program is ideal for data collection/mining, it was only the DEPT that viewed that function as vital. By aborting the pilot implementation of the Pendragon eKardex, in direct response to feedback from end users, the integrity of a future eKardex pilot project with a different platform/program has been maintained. As an alternative to the Palm/Pendragon platform, a Pocket PC version of the eKardex was developed using Visual CE. Though not formally piloted, the manipulation of sample data revealed similar concerns as were identified on the Palm platform..

Recommendations

Both the DEPT and end-user group agree that Pendragon software is not the recommended choice for an eKardex used solely for verbal reporting. The process of piloting the eKardex and listening to the end user feedback provided valuable insights for DEPT on what to look for in alternative software and hardware options. The PM was able to negotiate end user and administrative support for continued exploration of the development of an eKardex. It was recommended that the system would provide greater benefit for end users if it interfaced with the existing electronic patient record in order to to download information and avoid manual entry. Additionally, any eKardex tool must allow for instant retrieval and sorting of data on the handheld itself. DEPT recommends reviewing existing software and hardware products to identify alternatives that meet the needs of the stakeholders within the confines of the current regulatory environment.

References

The Advisory Board Company, (2002, September 26). *N.C.: Moses Cone nurses use Palm Pilots to improve diabetes treatment.* Retrieved September 22, 2004, from http://www.advisory.com/members/

American Academy of Nursing Technology and Workforce Conference. (2002). *Using innovative technology to enhance patient care delivery.* Washington, D.C: Author.

Bakken, S., Cook, S. S., Curtis, L., Desjardins, K., Hyun, S., Jenkins, M., John, R., Klein, W. T., Paguntalan, J., Roberts, W. D., & Soupios, M. (2004). Promoting patient safety through informatics-based nursing education. *International Journal of Medical Informatics, 73*(7-8), 581-589.

Eaves, D. (April, 1996). Benefits of nursing information systems: are there any? http://www.bcs.org/BCS/Products/Publications/JournalsAndMagazines/ComputerBulletin/OnlineArchive/apr96/benefitsofnursing.html Retrieved 11/02/04

Escaf, M. (1995). Communication system facilitates integrated patient-centered care. *Leadership, 4*(4), 19-23.

Hendrickson, G., & Kovner, C. T. (1990). Effects of computers on nursing resource use: do computers save nurses' time? *Computers in Nursing, 8*(1), 16-22.

Hinson, I., Silva, N., & Clapp, P. (1984). An automated kardex and care plan. *Nursing Management, 15*(7), 35-43.

McDaniel, A. M. (1997). Developing and testing a prototype patient care database. *Computers in Nursing, 15*(3), 129-136.

Pendragon Software Corporation. (2004). Pendragon and socket simplify bar code scanning and GPS data collection for handheld devices. Retrieved 11/02/04 http://www.pendragon-software.com/pr0304-2.html

Robertson, J. (2003). Cardiovascular point of care initiative: enhancements in clinical data management. *Quality Management in Health Care, 12*(2), 115-122.

Silva, N., & Aderholt, B. (1992). Monitoring nursing productivity: a unique approach integrating an on-line kardex with workload measurement. *Computers in Nursing, 10*(6), 232-234.

Simpson, K. (1985). Using kardex cards to improve the quality of patient care. *The Canadian Nurse, 81*(6), 27-40.

Snyder-Halpern, R., Corcoran-Perry, S. & Narayan, S. (2001). Developing clinical practice environments supporting the knowledge work of nurses. *Computers in Nursing. 19*(1), 17-26.

Young, K. M. (2002). *Informatics for healthcare professionals.* Philadelphia: F.A. Davis Company.

Appendix A

Paper form of Duke Cardiothoracic Kardex