

Signing on to Sign-out: Creation of a Web-based Patient Sign-out Application

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BACKGROUND

Sunnybrook and Women's College Health Sciences Centre (Sunnybrook and Women's) is the amalgamation of three healthcare organizations, the Orthopaedic and Arthritic Hospital, Sunnybrook Health Science Centre and Women's College Hospital. It was created by a Special Act of Legislation (Bill 51) in June 1998 and is fully affiliated with the University of Toronto. The division of General Internal Medicine within the Department of Medicine consists of four medical teaching teams, each responsible for the care of patients admitted to their medical ward. At the end of each day, the primary inpatient house staff must transfer the care of their patients to the on-call team, a process referred to as "patient sign-out."

During this process it is necessary to transfer pertinent clinical information such as past histories, medications and other issues of concern because the increasing array of providers seeing patients are raising concerns about fragmentation of care. In order to maintain continuity of care, which emphasizes coordination of services and maintaining the stability of patient-provider relationships over time, it is necessary to link current and past care to accurately arrange for future care (Haggerty et al. 2003). Enhancing patient safety and quality of care are also major focuses in healthcare organizations today. The problem of safe and efficient transfer of care has increased over the years as new and complex diagnostic tools and more complex treatment options became available (Van Eaton et al. 2004). If crucial pieces of data are not transferred to the oncoming team, it could cause major medical errors or inefficiencies to occur (Lasslo et al. 2004).

Traditionally, a "sign-out list," which in most cases is nothing more than a word processing document, was used to transfer clinical information during the patient sign-out process. However, the sign-out list was accessible from only one location, therefore impeding ongoing updating of the information. Some groups overcame this challenge by emailing the list to one another, creating other significant issues concerning confidentiality of patient information and sequencing of messages. It became clear that a solution was needed at Sunnybrook and Women's, but the topic did not take centre stage until a resident on-call one evening received a fateful page from the nursing unit. The nursing staff needed an immediate decision regarding the care of a patient, but the resident was not familiar with the patient nor did he have any of the background information from the previous team. Although the incident did not result in a fatal medical error, it was "a patient safety round waiting to happen."

MATERIALS AND METHODS

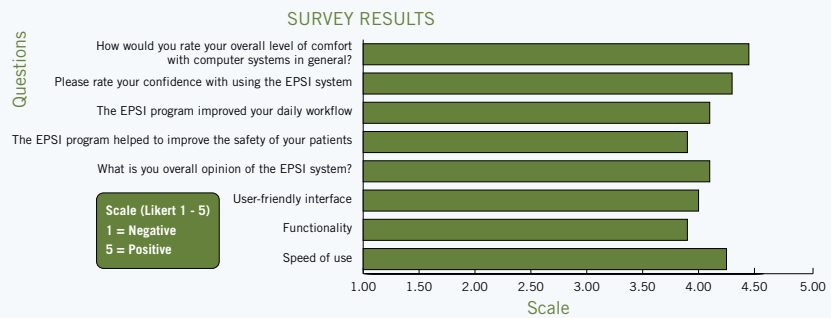
The solution was to assemble a clinical user group to help design and create the electronic patient sign-out information (EPSI) system. The group consisted of the chief medical resident, senior residents and senior staff, all of whom were enthusiastic about the potential for this project. The senior staff members were also influential physician champions who were able to help with the uptake of this new system across the clinical departments. Once the group was assembled, a detailed needs assessment was performed to determine the functional requirements of the system. The design accommodated the current sign-out process wherever possible, including the

development of a template report that mirrored the MS Word document style previously used. Advanced functionality made available through the use of an electronic system was also discussed with the users and incorporated into the final design. The specifications for the final design were forwarded to the developer (Tino Sessa) from the Information Services (IS) department and a prototype was created. This entire process, from initial discussions to creation of the prototype for testing, took less than two months to complete.

The EPSI system is a web-based application that does not require the user to install any software, meaning it is accessible from any computer with Internet access and a web browser. Users are now able to access the application from the bedside (using tablet PCs), from any PC in the medical ward and from their PC at home. Since simultaneous access is now available, users can update the same sign-out list from multiple PCs, rather than fighting for the same PC at the end of the day. For user authentication, the existing electronic patient record (EPR) username and password were utilized, negating the need for medical staff to remember yet another password. If the EPR username and password are changed, this is automatically reflected in the EPSI system. All data are encrypted before being transferred and are stored centrally on a database located within the hospital network. As the EPSI system is linked to the hospital's EPR system, users can create a patient list simply by entering the medical record number (MRN) and allowing the system to automatically populate the patient's demographics. This feature not only saves time, but data entry errors are minimized, as these fields are pulled and verified from the EPR system. Other fields such as past medical history and active issues are entered manually. The report users' printout closely mirrors the MS Word document style created previously by the medical teams. This report conveniently condenses and summarizes the information, highlighting key points such as issues the on-call team should keep a close eye on. Detailed audit trailing is used to track problems and ensure the system is not used inappropriately.

Significant end-user testing and design modifications ensued for several weeks before the system was ready to go live, an integral step to ensuring acceptance and sustainability of the platform. Integration of the Sunnybrook EPR system with the EPSI program was not available at the program launch but was included as an update.

Figure 1. Results of the user satisfaction survey



RESULTS

To determine the effectiveness of the EPSI system, a user-satisfaction survey was developed and handed out at morning report. This survey was conducted about one month after the system went live, at a time when functionality was still very basic. From the four medical teams using the system at this time, 17 responses were received. Figure 1 outlines the questions that were asked and graphs the averaged results.

The survey also included a section allowing users to provide general comments and feedback. The main benefit users observed was the ability to access the system from any computer throughout the hospital and the ability for multiple users to update the same list simultaneously. Increased accessibility and ease of use led to more accurate and up-to-date sign-out lists. This in turn led to better communication among clinicians and more efficient patient care. Table 1 outlines the comments provided by the users. Any comments that were repeated or similar to others were grouped together.

Table 1. Comments from the user satisfaction survey

• Accessible throughout hospital
• Easy access simultaneously at many computers
• Organized, integrated system
• Increased time efficiency
• Easy access when on call
• Rapid update of list in real-time is essential
• Relevant headings, user friendly
• Standardization of sign-out for all teams
• Sign-on security
• Increased accountability for clinicians
• Easier communication between team members
• Can print out orders, special notes, etc., without concern for legibility

DISCUSSION

Of significant concern in the beginning was that time would be spent on designing and implementing a system that nobody would use, as it is well known that many healthcare IT projects fail due to lack of physician uptake. An informal environmental scan and discussions with city-wide residents revealed that the other teaching hospitals in the Greater Toronto Area (GTA) were also suffering from similar issues with the patient sign-out system. This encouraged the belief that "that's just the way it is" and that an electronic solution would be impossible to create.

Contrary to this belief, it was actually fairly simple to implement, and the electronic patient sign-out information (EPSI) system at Sunnybrook and Women's has been a tremendous success due to its relative simplicity. Owing to the focus on keeping it simple, problems with the program have been almost non-existent. As the benefits of this system are generalizable to almost all the medical specialities, teams from all areas of the hospital, not just General Internal Medicine, are now inquiring about accessing the system. Originally supporting the four medical teaching teams, the system has expanded to support 19 groups throughout the hospital within a six-month period. The scope of the system has also increased from just supporting the patient sign-out process to actually managing the day-to-day care of the patients.

The success of this project has to be attributed to the support and leadership provided by the physician champions. Their experience not only provided the knowledge required for design of the system, but their influence also greatly enhanced the clinician uptake of the system. Involvement of a Health Informatician was also a key ingredient for the success of this project. Although clinicians have the knowledge to identify gaps in the care process, it is not always clear to "non-techies" how the technology fits in. A health informatician provides expertise on translating the clinician's knowledge into a solution through the use of technology. Also, this project could not have been completed without the dedicated and ongoing support of the Information Services department. In the end, it was through a detailed analysis and assessment of the medical teams' need, a step-by-step review of the current sign-out process, followed by a comprehensive development phase that translated into the simple, yet completely functional EPSI system.

A residual effect that has been observed relates to the residents' experience as they rotate from Sunnybrook and Women's to another University of Toronto affiliated teaching hospital. Since the other teaching hospitals do not have a patient sign-out system in place, residents must once again adopt the traditional, error-prone process previously described. Clearly, this has created

frustration among the residents and so they have asked their respective teaching hospitals to develop a similar sign-out system. While this solution addresses the need for a sign-out system at each hospital, it creates another problem at the same time. More specifically, residents will have to learn yet another system as they rotate between hospitals, similar to how they must learn to use a different patient care system at each hospital. A better solution would be to collaborate and create a standardized system that all the teaching hospitals use. Sunnybrook and Women's has a fully functional system in place and there is no reason why the efforts already invested and the knowledge gained from their experience can't be shared with all the teaching hospitals. There are no legacy systems that would have to be replaced, and a collaborative effort where costs are shared is clearly economically efficient.

Unfortunately, there is little evidence of truly collaborative efforts in the GTA moving beyond the discussion phase. This once again leads to the belief that such an initiative is impossible or would be very difficult to implement. However, it is hoped that this belief is proven wrong and that such a collaborative effort is possible and becomes a reality. If anything, this initiative could act as a foundation to build upon as efforts to create a consolidated health record for a patient across the region develops.

For more information or a demo of the EPSI system, contact Sherman Quan, Health Informatician at Sunnybrook and Women's College Health Sciences Centre. Email: sherman.quan@sw.ca.

References

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