Original Study

Implementing an Internet-Based Communication Network for Use during Skilled Nursing Facility to Emergency Department Care Transitions: Challenges and Opportunities for Improvement

Fredric M. Hustey MD a,*, Robert M. Palmer MD, MPH b

a Cleveland Clinic, Emergency Services Institute, Cleveland, OH
b Division of Geriatrics and Gerontology, University of Pittsburgh, Pittsburgh, PA

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A B S T R A C T

Objectives: To explore the feasibility of implementing an Internet-based communication network for communication of health care information during skilled nursing facility (SNF)-to-ED care transitions, and to identify potential barriers to system implementation.

Methods: Qualitative.

Setting: The largest SNF affiliated with the ED of an urban tertiary care center.

Participants: Consecutive sample of all patients transferred from SNF to ED over 8 months between June 2007 and January 2008; ED and SNF care providers.

Intervention: The development and implementation of an Internet-based communication network for use during SNF-to-ED care transitions. This network was developed by adapting a preexisting Internet-based system that is widely used to facilitate placement of hospitalized patients into SNFs. Internet-based SNF and ED surveys were used to help identify barriers to implementation.

Results: There were 276/276 care transitions reviewed. The Internet-based communication network was used in 76 (28%) care transitions, with usage peaking at 40% near the end of the study. Barriers to success that were identified included lack of an electronic medical record (EMR) at the SNF; pervasive negative attitudes between ED and SNF personnel; time necessary for network use during care transitions; frustration by emergency physicians at low system usage rates by SNF personnel; and additional login requirements by ED personnel.

Conclusions: Although implementing an Internet-based network for nursing home to ED communication may be feasible, significant barriers were identified in this study that are likely generalizable to other health care settings. Understanding such barriers is an essential first step toward building successful electronic communication networks in the future.

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Patient care transitions are often poorly coordinated. Such transitions often lack personal verbal communication from one set of health professionals to another, or adequate and organized written transmission of handwritten, photocopied, or facsimiled data. Unfortunately, information gaps occurring during care transitions can have harmful effects on patients. Such gaps in communication can lead to greater use of hospital and emergency services, and may contribute to increased morbidity and mortality risks.

Poorly coordinated care transitions between emergency departments (EDs) and nursing homes are particularly problematic. EDs routinely care for large numbers of nursing home and skilled nursing facility (SNF) residents and many of these patients arrive in the ED with little or no health care information. Lengthy photocopies of nursing home charts are often sent in lieu of transfer forms, which may contain only some of the data essential to ED care. In particular, information, such as resuscitation preferences, baseline mental status, and reason for ED transition, is often lacking. Communication of accurate and essential health care information is critical to ED management. Although there have been attempts to improve written communication by implementing standardized paper transfer forms for ED care transitions, such interventions have met with limited success.
Increasingly, electronic systems for health record maintenance and transmission are being viewed as one method of improving written communication during care transitions.\textsuperscript{24,25} Adapting these systems for communication between nursing homes and EDs may prove to be particularly beneficial; however, to our knowledge there are no other published studies exploring the use of such systems for nursing home to ED communication. Although verbal communication between health care providers plays an important role during transitions of care, a reliable system for providing accurate and concise written information is crucial. Patients are often transitioned to the ED at night or on weekends when SNF physicians may be unavailable to give verbal report. Furthermore, the long waiting times that have become commonplace in many EDs may contribute to a delay in attempts to contact the SNF for further information. By the time such an attempt is made, a change in nursing shift at the SNF may have occurred, and nursing staff may be unable to provide sufficient details required for ED care. Hence, it would be ideal to have a form available for electronic transmission to the ED containing the essential pieces of information necessary to adequately care for the patient.

The primary objective of this study was to determine the feasibility of implementing an Internet-based communication network between an SNF and the ED for communication of essential health care information during patient transitions to the ED, and to identify potential barriers to implementation of such a system.

\textbf{Methods}

\textbf{Setting and Participants}

This was a pre-planned qualitative analysis from a larger interventional study aimed at improving communication between a nursing home and ED using health information technology.\textsuperscript{26} Methods are described in detail elsewhere.\textsuperscript{26} In brief, this study was conducted between a single ED and a single SNF over a consecutive 11-month period spanning 2007 to 2008. The ED is part of an urban teaching hospital with approximately 55,000 ED visits per year and an affiliated ED residency program. The free-standing subacute SNF has a 59-bed capacity with approximately 300 patient transitions to this ED per year. The standard method for conveying patient information to the ED before this study consisted of sending photocopies of a portion of the patient’s SNF chart with the patient via ambulance to the ED. All patient transitions from the SNF to the ED were eligible for the study. This study was reviewed and approved by the hospital institutional review board. The requirement for written informed consent was waived.

\textbf{Internet-based Communication Network}

The SNF in this study was part of a network of hospitals and nursing homes participating in a Web-based electronic discharge system used to receive patient information and requests for SNF beds from inpatient hospital wards (Extended Care Information Network [ECIN]). Before the onset of this study, there were no EDs associated with this system.

The ED was incorporated into this Internet-based communication network by hospital information technology (IT) representatives in collaboration with technical experts from the information network provider. This entailed establishing a link for ED access on each of the ED workstations, the development of an ED-specific page within the network in which the transfer information could be accessed and viewed, and login identifications and passwords for each of the ED and SNF users for access.

As the SNF in this study was already a subscriber to the ECIN network, the existing network at the SNF was modified by creating a specific compartment for use in SNF-to-ED communication. A transfer form was also designed for incorporation into this system that has been previously described.\textsuperscript{26} This form was developed using an expert panel of 2 emergency physicians, a geriatrician, and the medical and nursing directors of an SNF after systematically reviewing the literature. SNF transfer information could be uploaded into the system by cutting and pasting from another electronic source, manually typing information directly into the system, or scanning hard copies of information as a PDF attachment. The ED physician could access this information by selecting the desktop link on any of the ED computer terminals and following a simple login procedure. A list of patients transferred from the SNF to the ED would then appear in chronological order. Selecting the appropriate patient resulted in the transfer information being pulled onto the screen for viewing. Information remains in the system indefinitely for future reference, and can also be printed as a hard copy.

\textbf{Staff Training}

A single several-hour hands-on training session for SNF assistant nurse managers (ANMs) and unit secretaries was conducted at the SNF before the onset of the study. Although the training session was not required of the remainder of the SNF nursing staff, they were encouraged to attend. Training was focused on ANMs and unit secretaries because of difficulties anticipated in training the remainder of the nursing staff owing to the large numbers of nursing staff, their varying work schedules, and the limited time allotted for the study. At this session, participants could engage in mock transfers using the new system. Technical representatives from the Internet network as well as SNF personnel with previous experience in using the system for inpatient-to-SNF patient referrals were on hand to assist with training and to answer questions from participants. Technical experts monitored and addressed any technical problems with the system at that time. Detailed handouts outlining the process were also given to SNF personnel as a reference on the use of the system.

ED training was conducted by the ED principal investigator (PI) and a technical representative from the electronic communication network at one ED physician staff meeting. Access of SNF patient information was demonstrated using mock cases and physicians were given an opportunity to ask questions. Physicians were then assigned login identifications and passwords for accessing the system. The ED PI demonstrated the use of the system at 2 subsequent staff meetings. Detailed instructions on use of the system were also communicated to each staff member via e-mail, and handouts explaining the process were also distributed in staff ED mailboxes. Following these initial training sessions, both ED physicians and SNF staff were given the opportunity at their leisure to login and practice using the system on mock patients.

\textbf{Implementation}

Plans were discussed with the SNF administrative staff to incorporate the ED transfer form template into the electronic network where it could be completed online and then transmitted to the ED during care transitions. However, at the time of this study the SNF did not use an electronic medical record (EMR) and so concerns were raised regarding the time required to manually enter information into the system including the medication administration records. It was therefore decided to electronically scan the medication administration record (MAR) and a hand-completed version of the transfer form into the network together using the PDF feature described previously, where the information could then be sent electronically to the ED for viewing. The protocol was designed so that the transfer form would be completed by the primary nurse or the ANM on duty (with the assistance of the primary nurse). The
ANM or unit secretary was then responsible for electronically scanning the completed forms into the network and transmitting them to the ED via the closed Internet connection. Unit secretaries were chosen to assist with form upload and transmission in part because of their traditional role in assisting with transmitting patient information to the ED at this SNF (see earlier in this article), and because ANMs were not on duty at all hours. As the success of the program could not be predicted, it was decided in the interest of patient safety to send duplicate paper copies of the same transfer form to the ED for all patient transitions during the study period. Following a planned 3-month period for training on use of the system and practice by SNF and ED personnel, the electronic communication network was fully implemented over a consecutive 8-month period starting in June of 2007.

Staff satisfaction surveys regarding attitudes toward the current communication process during SNF-ED patient transitions were conducted before and after implementation of the electronic communication network. Internet-based survey content, development, and validation have been described in detail elsewhere. All ED and SNF care providers were sent an e-mail request to complete the survey as part of an effort to improve the communication process between the ED and SNF during patient care transitions. Nonresponders were sent 3 additional e-mail requests at 4-week intervals. Surveys included an area where respondents could free-text comments regarding the communication process. All free-text comments from survey respondents were reviewed by the primary investigator to identify potential barriers to successful implementation of the electronic communication network.

Monthly lists of all SNF-to-ED patient transitions after the start of the intervention were obtained from the SNF administrative database. These inclusive lists were then used to search both the electronic Internet-based communication system and the ED electronic health record to determine the prevalence of use of the Internet-based communication system by a trained reviewer blinded to the study objectives using a standardized data abstraction sheet. It was standard practice for any paper forms sent to the ED by outside facilities for patient care as well as paper forms generated as part of the ED visit to be scanned into the EMR where they could be reviewed as part of the ED encounter.

Results

There were 276 SNF-ED patient transitions during the 8-month period after implementation of the electronic communication process. The Internet-based communication network was used in 76 (28%) of care transitions, whereas only the paper version of the transfer form was completed and sent to the ED in another 54 (20%). The proportion of patient transitions in which the electronic transfer form was used increased over time (Figure 1), from a minimum of 10% in the first month of implementation, to a maximum of 40% the seventh month of the project.

Cost

The estimated total cost for implementation of the project was $37,174. Support from the software provider (ECIN) for modification of the Web-based communication system for the purposes of this project, linkage to the ED, one training session each for the ED physicians and SNF personnel on use of the system, and technical support during the project was a one-time fee of $3000. Support from the hospital’s Information Technology Division for setting up a link to the Internet-based communication network from the ED and adjusting the firewalls on the ED computers to allow access to the server was estimated at $400 (5 hours of work at $80 per hour).

Fig. 1. Change in the frequency of use of the electronic communication network over time.

Two hours of training for 3 assistant ANMs at the SNF at a mean hourly wage of $35 was $210. The same training for 4 unit secretaries at a mean hourly wage of $13 was $104. The ED physicians are not paid to attend staff meetings or training sessions and so this did not contribute to the cost of the project. In addition, the hospital and SNF were already subscribers to the electronic communication network. There was no extra ongoing charge for continued use of the ED system.

Survey Results

Pre-intervention staff satisfaction surveys were completed by 16 (73%) of 22 ED physicians, 22 (28%) of 80 ED nurses (including prn [as needed or less than part-time staff] and part-time staff), 3 (43%) of 7 SNF physicians, and 23 (40%) of 58 SNF nurses. Post-intervention surveys were completed by 16 (64%) of 25 ED physicians, 35 (33%) of 105 ED nurses (including prn and part-time staff), 6 (43%) of 14 SNF physicians, and 17 (34%) of 50 SNF nurses. Recurring themes identified in the surveys as potential barriers to successful implementation of the electronic communication network include the following: pervasive negative attitudes between ED and SNF staff personnel (13 SNF and ED respondents); frustration by SNF personnel with time required to scan SNF information into the electronic communication network (3 SNF respondents); frustration by emergency physicians at low system usage rates by the SNF (4 ED respondents); and frustration by emergency physicians with requirements to login to another system (the electronic communication network) to access SNF information (4 ED respondents). These themes are described in more detail in the following section.

Barriers to Implementation: Issues Identified in Staff Satisfaction Surveys

ED and SNF Staff Attitudes

Staff satisfaction with the pre-implementation communication process was low, and comments from staff satisfaction surveys revealed negative perceptions between ED and SNF personnel.

Frustration by SNF Personnel with Time Required to Scan SNF Information into the Electronic Communication Network

Survey feedback from SNF personnel revealed dissatisfaction with the time required to scan transfer information into the electronic communication network for ED transmission. Although this process was not timed for this study, SNF personnel reported that this process could take several minutes to nearly a half-hour depending on the number of pages of information as well as the variable operating speed of the system. In addition, when a computer was in use for uploading of transfer information into the network, it could not be used for any other function. This was identified as particularly problematic during lengthy upload times.
Low Motivation to Routinely Access the Electronic Communication Network by ED Physicians when Patient Information was not Routinely Present

The low rate of initial use of the electronic communication process discouraged use of the system by ED physicians. Feedback from ED physicians accessing the system revealed that many had stopped using the system on a regular basis after several unsuccessful attempts to retrieve patient information (information that had not been loaded by the SNF staff into the electronic communication network).

Frustration by Emergency Physicians with Requirements to Login to Another System (the Electronic Communication Network) to View SNF Information

Survey feedback by ED physicians revealed frustration with the work required to login to an additional system to obtain SNF information. At the time, ED physicians were required to generate a login ID and a password that was distinct from those used for accessing the ED EMR. ED physicians suggested an interface between the ED EMR and the electronic communication network to streamline information access.

Barriers to Implementation: Issues Identified During the Implementation Process

In addition to themes identified through the staff surveys, several barriers to successful implementation of the system were identified by the ED PI during the implementation process. These issues were identified directly by the ED PI, as well as through discussion with other ED physicians and SNF personnel. These included training issues with SNF and ED staff, and personnel turnover rates during the study. They are described in more detail as follows.

Training Issues: SNF

The large number of nurses at the SNF, including many part-time and prn staff with varying work schedules, posed a logistical challenge. It was decided to focus training on the small number of ANMs and unit secretaries who could then serve as on-the-job trainers for the remainder of the nursing staff over a longer period of time in the future. Physicians were not physically present at the SNF at all hours, and did not routinely participate in the communication process to the ED during patient transitions. After a discussion with the SNF medical director, it was determined that it would not be feasible to have the SNF physicians complete the transfer forms.

Training Issues: ED

ED staff meetings were attended by fewer than half of ED physicians on average during the study period. Thus, most ED physicians were not present for the live training session conducted at the meeting. In an attempt to compensate for this, the ED PI approached remaining staff members when they were on duty in the ED or in their office on nonclinical duty and gave a brief overview and demonstration of the project including accessing mock data through the system. In addition, other methods of communication regarding procedures were implemented as previously described in the Methods section of this article.

Technical Experts

A period of 3 months was reserved to complete the training process for ED and SNF staff and implement a trial run of the system in an attempt to identify any technical problems before beginning the study. However, because of unexpected delays, technical representatives from the Internet network arrived to initiate training 3 weeks before the onset of data collection.

Personnel Changes

There were 3 medical director changes in the SNF during the planning and implementation phases of the project. Each time the project had to be re-presented to the new medical director by the ED PI for support. In addition, accommodations had to be made for training ED physicians and SNF personnel hired after the planning and training phases of the project were completed. In the ED, this was handled by the emergency physician who was the PI of the study. In the SNF, training was done while on usual duty by previously trained unit secretaries and ANMs.

Discussion

This intervention is the first published study that we are aware of to test the feasibility of implementing an Internet-based communication network for the communication of patient information during patient transitions from an SNF to the ED. It also identifies potential barriers to widespread implementation of such a system, many of which are likely to be generalizable to other ED and SNF settings. With the increasing use of electronic systems for health care information maintenance and transmission, understanding such barriers is an essential first step toward building successful electronic communication networks in the future.

The Internet-based communication network used in this study was chosen for the potential generalizability of the system. This network is already used by many hospitals, skilled nursing facilities, and extended care facilities throughout the United States. For hospitals and facilities already using the network, this study suggests that modification to facilitate communication between an SNF and the ED can be done at reasonable expense.

Several barriers were identified that may have contributed to lower usage rates of the Internet-based communication network in this study. The lack of an EMR at the SNF was particularly problematic. Several months into the intervention, an EMR was implemented at the SNF, but we were not able to develop an interface with the Internet-based communication system during the study period. For facilities that lack an EMR and an electronic MAR from which information can be easily cut and pasted between systems, manually entering these records is not feasible. With the ever-increasing presence of electronic systems for health care information maintenance and transmission, however, this may be less of an issue in the future. We believe that the availability of a nursing home EMR is a crucial step toward future widespread implementation and success of such electronic medical record communication systems.

The short time frame in which training needed to be accomplished, the unexpected delay in arrival of the technical representatives for the training sessions, and the large staff complements with varying schedules were also problematic. For larger facilities such as the one in this study, increased availability of training over longer periods of time would be preferable. Initially focusing training on a small number of personnel who could serve as on-the-job trainers for the remainder of the staff may also prove to be an effective solution. In addition, opportunities for staff to self-train on their own time using mock patient transitions through an interactive and instructive portion of the Web site may help to alleviate some of these logistical issues. This does not exist within the current system used in this study, but would need to be developed at a cost yet to be determined. As new systems for the maintenance and transmission of electronic health care information are developed, such features could be incorporated.
ED physician feedback revealed that many physicians stopped accessing the system after several attempts without finding patient information. This was likely the result of a failure by SNF staff to use the communication network for the great majority of patient transitions in the earlier phases of the study. One way to overcome this problem may be to roll out ED access to the program only after a certain threshold of usage by SNF personnel is reached. During such a transition period, a dual method of communication could be maintained (hard copy and electronic forms promoted for each transition such as in this study) in the interest of patient safety. As ED physicians find increasing amounts of information in the communication network, they may be more likely to access the system on a routine basis in the future. In addition, in our study it was decided to send hard copies of the transfer form in addition to using electronic process for all SNF-to-ED patient transitions in the interest of patient safety. It is possible that this practice may have contributed to decreased usage of the Internet-based communication system by both SNF and ED personnel. SNF staff may have not seen a need to use 2 methods of communicating the same information, and ED physicians may have been less likely to access the system if a paper version was readily available.

Negative perceptions between SNF and ED personnel were also problematic. Staff satisfaction surveys revealed that each side tended to view the other as responsible for many of the communication deficits occurring during patient transitions. In addition, some SNF staff felt they were being “picked on” for being selected for a quality improvement project while the ED had similar communication problems. We attempted to address these issues by inviting both ED and SNF personnel into the planning process, holding informative meetings, and educating both ED and SNF staff regarding the challenges faced in the work environments of their counterparts. However, most staff did not take advantage of these opportunities. The ED PI also agreed to serve as a liaison between the 2 settings, bringing concerns from each group to the other for discussion at physician and nursing staff meetings.

Antagonistic relationships and negative views between ED and SNF personnel as found in this study are not uncommon.14,27 Perceptions such as these may provide obstacles to a variety of process improvement efforts across health care settings. Communication failures and frustrations over long periods of time are likely to have contributed to such attitudes. Fostering a teambuilding approach is likely to be an essential part of such successful process improvement projects. Successful programs aimed at increasing collegiality and combating negative perceptions are likely to play an integral part in improving care transitions across health care settings.

The use of the Internet-based communication system likely placed a great demand on SNF personnel in this study, and the context in which they were expected to adapt is particularly noteworthy. SNF personnel were not only required to complete a new transfer form, but to adapt to an entirely new system of electronic communication. In addition, they were also required to send hard copies of transfer information for safety purposes, all while busy caring for a sick resident in need of an ED transfer. In this context, we believe that the peak usage rate of this system by the SNF of 40% is noteworthy.

There were several limitations in this study. This project was implemented between a single ED and a large SNF and the experience may not be generalizable to other settings. Satisfaction survey response rates were low among some subgroups. The Internet-based communication system was not compatible with the SNF system. In addition, the limited time frame owing to funding constraints made adequate training of all staff on use of the electronic communication system difficult.

Conclusion

This study identifies significant barriers to widespread implementation of an electronic communication network for nursing home to ED communication during patient care transitions. Many of these barriers are likely to be generalizable to other ED and SNF settings. Larger studies assessing barriers in multiple ED and nursing home settings are needed, as well as future research to identify and evaluate potential solutions to these problems.

References