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Incongruence of Patient Problem Information Across Three Phases of Home Care Admission: There's a Problem with the Problem List

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Abstract

In home health care, the patient problem list is an important component of the admission and care planning processes and determines the subsequent care received. We examined the information received from the referring facilities and its relationship with the final patient problem list generated at home health care admission. Researchers observed 12 admissions and collected available documents related to the admission and care planning process. Problems identified in documents provided to admission nurses (input documents) and in documents subsequently created by those nurses (output documents) were coded to form a standardized set of problem terms across the documents. Documents available, distribution of problems within the documents, and concordance between input and output documents were assessed. A varying number of the 17 unique problems found across the documents were distributed by document type. Patients were referred to home health care with more clinical problems than were documented in the output documents.

Keywords: Home Care Services, Decision Making, Nursing Informatics, Documentation

Introduction

An accurate, complete, and current list of patient problems is valuable for concisely communicating a patient's clinical status among numerous and diverse clinicians and across care settings [1]. Annually, 12 million patients in the United States are referred from hospitals, skilled nursing facilities (SNF), and physician offices to home health care (HHC) [2]. HHC patients are typically older adults with multiple chronic conditions and have on average nine problems (health related needs that may benefit from clinical intervention) [3]. These problems are often associated with multiple chronic medical conditions that affect patient function, self-care management, and hospitalization risk. As some problems are chronic and stable, not every problem is addressed during a HHC episode.

During the HHC admission, a nurse makes critical care planning decisions including identifying the problems to be addressed in the plan of care (POC) (i.e., orders for ongoing assessment, patient and caregiver education, case management, and performing procedures and treatments). Too often the HHC nurse conducts the admission visit with fragmented, incomplete, or inaccurate knowledge of the patient's clinical condition [4],[5]. Inaccurate or incomplete problem lists could lead to inappropriate, missed, or delayed care [1]. In addition, 20% of HHC patients in the United States are readmitted to the hospital within 30 days of discharge [6]. An adequate transfer of information leading to accurate care planning may assist in providing higher quality care and preventing early readmission for a large and growing population of older adults [7],[8].

This paper presents findings from a field study examining the information received from the referring facility and its relationship to the final patient problem list generated at HHC admission. This examination is part of a larger mixed methods study characterizing HHC admission and care planning practices at the point of care. The overall goal is to develop recommendations to improve the HHC admission process and to identify opportunities for technology standards that support transitions in care to HHC via electronic health record (EHR) systems.

Methods

We conducted observations of the admission process and analyzed paper and electronic documents to examine the relationship between HHC admission documents and the problems in the problem list. The Drexel University Institutional Review Board approved this study.

Setting. The research setting was a small, rural Pennsylvania HHC agency serving a majority white population with low socioeconomic status. Agency nurses used a laptop-based commercial EHR system from Allegheny Software Publisher, designed for use at the point of care. Nurses also received and reviewed paper documents from the referral facilities and generated additional paper and electronic documents. Six nurses volunteered for the study and provided consent for participation. Patients observed in the home provided consent. To facilitate data collection, the agency scheduled the nurses to return to the agency after visiting each patient in the home. The agency was reimbursed for the nurses' time.

Data Collection. The six nurses were each observed admitting two patients each (12 admissions total). Figure 1 highlights the admission process information flow from the referring facility to the admitting nurse documentation of problems in the EHR. Phase 1 includes the intake process where initial documents are prepared for the admission nurse. Typically, via a telephone call, the intake nurse collects information from the referring facility. The referral facility also faxes referral information. If the intake nurse determines that the patient is to be admitted, he or she documents patient information, including medical diagnoses, on a standardized paper intake form. The intake form and referral documents are added to the paper patient chart and the admission nurses thereby have access to them.

Phase 2 of the admission process occurs in the patient's home. Armed with the paper chart, the admission nurse visits the patient. If not part of the faxed referral, the nurse may ask the patient or caregiver for the Discharge Summary (also sometimes

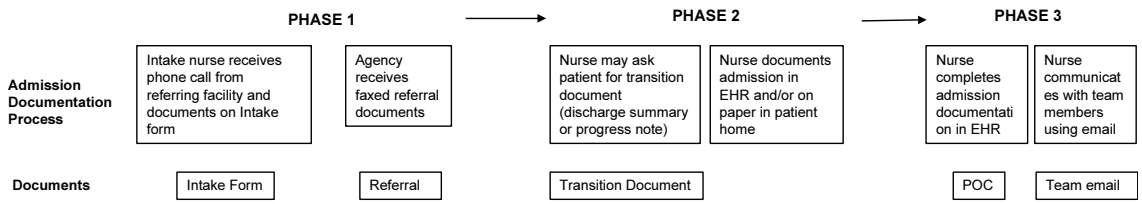

Figure 1. Phases of Home Care Admission Processes and Documents Created and/or Available.

referred to as discharge instructions) or Progress Note, called transition documents herein. With care instructions to reference, the documents are typically given to the patient at discharge from the referring facility.

In the home, the nurse documents in the EHR, on paper, or both [9]. Electronic documentation includes: (1) the patient's current health status recorded in the Centers for Medicare and Medicaid (CMS) mandated Outcome and Assessment Information Set (OASIS), [10] a standardized assessment instrument, and (2) a free text POC document with problems (nursing diagnoses) to resolve or support and related interventions, along with the patient's health goals.

Phase 3 is the completion of the admission and the creation of a team email. For this study and agency, this phase occurs at the agency and typically lasts approximately less than two hours. Not part of the EHR, the team email is a free text document summarizing the list of patient problems and the POC for the other nurses on the care team. Its purpose is to notify team members with timely, comprehensive information. This action avoids any delay in communication caused by inability to synchronize patient information on the laptop with the EHR database in a timely manner.

Research team members photocopied or photographed available documentation generated by the nurses including the POC, problem lists, and team emails.

The researchers, drawing on their HHC and nursing expertise, hypothesized that the intake document would paint the picture of the patient. They expected that additional problems would be added once the OASIS was completed. They also expected that the nurse would communicate all of the problems in the POC. The POC would then support problem prioritization.

Data Analysis. To standardize the vocabulary and reduce variability, the team used line by line coding to map each problem (medical and nursing) to terms in the Omaha System Problem Classification Scheme (Omaha System) [11]. This scheme is a standardized terminology often used in home and community-based settings. The scheme is recognized by the American Nurses Association as a recommended terminology. In 2007 it passed the Healthcare Information Technology Standards Panel (HITSP) Tier 2 selection criteria for Use Cases. It is integrated into the National Library of Medicine's Metathesaurus, Logical Observation Identifiers, Names, and Codes (LOINC®); and the Systematized Nomenclature of Medicine Clinical Terminology (SNOMED CT®) [12].

The Omaha System provides standardized signs, symptoms and problem labels for 42 problems organized in four domains (i.e., Environmental, Psychosocial, Physiological, Health Related Behaviors). Example problems include Cognition, Pain, Medication Regimen, Respiration, Circulation, Skin, Mental Health and Physical Function [13]. Omaha System expert, KB educated co-author NL about the Problem Classification Scheme definitions and problem signs and symptoms. Then the two co-authors conducted the coding together for two cases to establish coding rules. They then coded separately. To reach consensus they discussed terms on which they disagreed or were unclear. For example, the OASIS assessment "Able to bear weight and pivot during the transfer process, but unable to transfer independently" was coded in the Omaha System as the problem "Neuromusculoskeletal Function".

Each specific problem from each paper and electronic document was entered as a unique row into an Excel spreadsheet. Columns included one document per column, ordered by phases. Both nursing and medical problems were included in the analysis. Counts by document type for each problem were calculated and matches across the columns were identified.

Distribution of problems. After coding we identified the number of unique problems among the 12 admissions, regardless of which document contained the problem. We examined the overall distribution of problems among types of documents. We assessed which types of documents had more unique problems as compared to other documents. We calculated the median number of unique problems occurring on each type of document per admission.

We investigated the distribution of specific problems among the types of documents to discern patterns in appearance of problems in documents. We identified whether specific problems tended to occur more often in certain types of documents (e.g., pain appeared mostly on POCs). We also identified the set of problems that occurred most often in each type of document to see whether problems co-occurred among documents.

Concordance analysis. We assessed the concordance of problems documented (whether they matched across phases and documents) and discordance (whether they were missing from one or more phases or documents). We compared the content of the set of documents available to the nurse during the admission (input-referral, intake, transition document-discharge instruction/progress note) to the content of the electronic artifacts produced when documentation was completed (output-POC, team email). We determined whether either output document contained the complete set of problems that appeared across output documents. We conducted the same analysis for the three input documents. Then we compared the selected input document(s) and the selected output document(s) to determine concordance for problem sets between input and output. We identified problems that were matched between input and output documents.

For the quantitative analysis, we calculated the total number of problems for each observation and the median across all observations. We used the above comparison of input problems to output problems for each observation to calculate the number of problems that appeared in: (1) both input and output; (2) input and not output; and (3) output and not input. For these three categories, we then calculated the total number and median across all observations.

Case studies. We illustrate the analyses with two admission case studies. One case has all the documents. The second case lacked the transition document. We present the median number of unique problems on each document, the median number of problems on each dyad of input and output documents, and the total number of unique problems.

Results

The documents varied in content, length and detail. They contained a variety of problem terms to describe the patients' health needs.

Assessment of documents. Referrals, intake forms, POCs, and team emails were available for all observations. Seven transition documents (discharge instructions or progress note) were available before the visit (as part of the referral documents): Five of which were also available during the visit (requested in the home). The data on these documents were not standardized across referral sources; the information on a few documents was illegible or missing. Patient problems were found in all types of documents among the observations. However, two POCs contained no problems; instead they contained plans for assessment and health promotion interventions.

Identification of problems. Following standardization of problem terms to the Omaha System Problem Classification Scheme, we identified 17 unique problems across the documents and observations. Referral documents had the most problems per admission (median 7; 2-9) (Figure 2). Team emails had the next highest number of problems (4, 2-9). Intake and transition documents each had a median of 2 (ranges of 0-5 and 1-8 respectively). The POC had the least number of problems (1; 0-2). Overall, the median number of problems decreased from input to output.

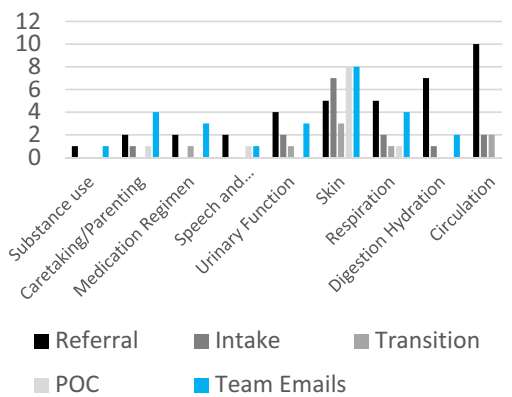

Figure 2. Occurrence of Actual Problems across Documents

Distribution of problems. Documents tended to differ as to which of the 17 problems occurred most often or at all (see Figure 2). Three problems occurred across all document types among the observations: "Skin" (occurred 28 times), "Respiration" (17 occurrences) and "Communicable/ infectious condition" (21 occurrences).

Concordance analysis. A complete set of problems was not found in any of the input or output documents. Accordingly, we used all available input documents, and both output documents in our concordance analysis of input documents as compared to output documents.

None of the 12 admissions had the same set of Omaha System problems on input documents as compared to output documents. All admissions had more problems on the input documents as compared to the output documents. For three admissions, the set of problems on the output documents was a subset of the problems on the input documents. The remaining nine admissions had one or more problems on the output documents that did not occur on the input documents, as well as having one or more problems missing on the output documents that were present on the input documents.

Although the set of problems did not exactly match between input and output documents, admissions did have individual problems that were matched between input and output documents. Here we report the medians (and ranges). In general, for each admission, a total of 8 (4-12) problems occurred on input and output documents. Among these problems, 3 (2-6) matched between input and output for each admission. Also, 3 (0-5) problems appeared on the input documents and not on the output documents. And, 1 (0-3) problem appeared on the output documents and not on the input documents.

Case studies. Analyses of two representative admissions are presented for further elucidation: an admission with all the documents, and an admission lacking the transition document. Admission 1 contained 8 problems on the referral, 4 problems on the intake form, 2 problems on the transition document, and 2 problems on the POC, and 9 problems on the team email. Among the input documents, 2 problems on the referral also occurred on the intake form and not on the transition document. Two other problems on the referral did not appear on the intake form but did appear on the transition document. The referral had 6 problems that did not appear on the intake form nor on the transition document. The intake form had 2 problems that occurred on neither the referral nor the transition document. Therefore, among the three input documents, 10 problems appeared. No single problem appeared on all three documents, and no single document contained all 10 problems. The 2 problems in the POC appeared in the team email. The 5 additional problems in the email did not appear in the POC. Of the 10 problems on the input documents, only 7 problems appeared in both the input and output documents. 3 problems appeared only in the input documents and not in the output documents. The dropped problems were Personal Care, Communicable/infectious condition, and Digestion-hydration.

A second example is admission 10 which lacked the transition document. This admission had 6 problems on the referral. Five of these problems also appeared in the intake form. No problems from the referral appeared on the POC; two problems did appear on the email. One problem on the referral did not appear on any other form. The POC problem, "Skin", did not occur on any other document. The team email had two problems, neither of which appeared on the POC. One of these problems, "Neuromusculoskeletal Function", did not appear on any other document. In summary, this admission had 8 problems; all but two of the problems appeared in the referral. Only 4 of the 8 problems on the input documents appeared on the output documents. The dropped problems were Urinary Function, Circulation, Nutrition, and Communicable/infectious condition.

Discussion

We investigated the content of problem data that the HHC nurse had at patient admission and the content of problem data that the nurse documented in the EHR and communicated outside of the EHR to the care team. This study focused on the source and congruence between documents available to the nurses when formulating the list of problems for the POC that they plan to address during the HHC episode. This study, in a rural home care agency, is the first of which we are aware, to examine this question. Findings are intended to inform point-of-care HHC EHR design, and to inform policy decisions related to interoperability along the transition in care from referral source to HHC.

Assessment of documents. The faxed referral documents contained the most problems compared to any other document.

The intake form, which was written by the home care agency nurse using information elicited from the referring facility, was universally available. The transition document was accessed in the patient home for less than half of the admissions. The team email, while universally present, was not part of the EHR. Instead, it was a communication work-around to address timeliness and information accessibility issues of the EHR. The POC, while universally present and part of the EHR, did not always contain problems and was in free text.

None of the documents were uniform or contained standardized information. Without standardization information can be lost or hard to find as our findings indicate.

Distribution of problems. The absence of any apparent pattern to the distribution of problems across documents provided no insight to nurse decision making. No document contained a complete set of patient problems. Thus, the initial referral document could not be relied on as the single source of problems. Others have reported that problem lists from hospitals and physician practices are likely to be inaccurate or out of date [1], [14], [15]. Further, these documents are often faxed from the referral source and contain multiple pages for a nurse to look through during the time constrained admission visit [16]. In addition, referral documents also contained both problems and interventions, especially for SNF patients, which puts further demands on the nurse's time to sort through dissimilar information. Similar to the other input documents in this study, referrals were not digitized or structured so as to be available for data management (e.g., copied to structured data fields for viewing or computing).

The intake form did not always contain the total set of problems appearing on the referral form. Intake forms matched the referrals in one admission and had fewer problems for the other admissions. The lack of completeness of the intake form and the occasional absence of the transition document suggest that neither could be relied on as a single source of patient problems.

Neither output document, team email nor POC, contained a complete record of patient problems. The team email, among all the documents, was second to the referral for the number of problems. The team email did not contain all problems documented in the POC. Nurses inconsistently documented some of the same problems in both email and POC. Redundant and conflicting documentation may require unnecessary expenditure of time and effort by the nurse, as well as introducing opportunity for transcription error and omission.

The POC, although part of the EHR, was not a complete source of problem information for the follow-up nurse. The POC unexpectedly contained fewer (or no) problems as compared to all other documents. Compared to team emails, the POC contained one quarter of the problems. For one quarter of the admissions, the set of problems on the POC did not match the set of problems on the team email. A potential reason for the mismatch may have been due to the fact that POCs tended to also contain interventions, evaluations, and health promotion activities, without a clear place designated where the nurse was required to document a finite problem list. Another potential cause for the mismatch is that the POC, being unstructured text, had problems which were not actionable: A nurse could not document against the problems when delivering care. As a consequence, the nurse was unable to determine if a patient problem was active or resolved. This data structure and flow do not support high quality patient care.

Our analysis of the distribution of problems among documents found that patients tended to have on average 8.5 problems at admission, which concurs with the finding of 9 problems in a prior study [3]. Findings also indicate that the problems skin, infection, and respiration are seen as important to communicate across all documents. This finding was clinically resonant with the nurse expert on the team (KB).

To the best of our knowledge, this is the first study to identify that patients are referred to HHC with more clinical problems (median 7) than are documented in the EHR plan of care (POC—median 1) or informally communicated to the team by email (median 4.5). None of these documents were in the EHR as structured data. This finding that patient referral documents contain more problems than are communicated to the care team indicates that admission nurses make decisions of which problems in the referral documents to include in the patient's care episode.

Concordance. The admitting nurse had access to the referral document, an intake form and infrequently, the patient's transition document. However, for no admission did the set of problems on the combination of these paper forms match the set of problems on the POC combined with the email.

Nurse decision-making related to inclusion and exclusion of problems between input documents and POC is unclear. We observed a decrease in number and mismatch of problems between input documents and output documents. The mismatch between input and output may be due in part to new information the nurse gathered during patient assessment in the patient home. Also, the EHR failed to provide structured language for describing patient problems and tracking their status over time.

EHR design recommendations. The decrease in number and mismatch of problems is an issue which could be addressed with EHR redesign and interoperability capability. Accordingly, we provide the following EHR design recommendations.

First, the EHR should capture and communicate problem data from the referral source. This recommendation relies on interoperability, the electronic movement of structured data among EHRs. The international data standard, the Continuity of Care Document (CCD), supports this capability [17]. The CCD is expected to be shared by health facilities as patients transition between settings. Relevant to this analysis, the CCD is structured to contain a list of patient problems [16]. Accordingly, we recommend that problems from the referral source be structured as per the CCD. Following communication of problems from the referral source to home care, the homecare EHR should map referral problems to a nursing problem terminology. Preferably the nursing terminology should be a standard terminology, such as the Omaha System [11]. The patient problem list should be viewable by the nurse. The problem should cascade through the EHR to the POC, avoiding nurse transcription of input problem data and the risk of losing information across documents.

Two recommendations are related to reducing redundant documentation. The software should enable the intake nurse to record problems viewable by the admitting nurse, and the problems should cascade through to the POC. In addition, the software should be designed to limit the number of times a problem is documented in the EHR, preferably to one. Our finding that the referral documents contained more problems as compared to the other documents, combined with our observation that referral documents tended to contain many pages [16] suggests the need to categorize referral problems to enable nurses to identify active problems. We suggest that problem modifiers such as resolved, actual, health promotion, or potential would be helpful to communicate the full array of patient issues [11]. Such descriptors would clarify the status of problems related to a hospitalization to retain the history of events and clarify which problems are resolved, are being actively worked on, or require preventive maintenance.

A fourth recommendation supports nurse workflow. The problems should be documented as structured data and be

actionable such that a nurse can document interventions and the status of the problem against the problems.

Two recommendations are related to eliminating the workaround of producing a team email to communicate the POC. We propose that the problem data should be readily viewable in a structured summary available to the care team, so as to eliminate the need to send the team email. Also, the EHR should be configured to support the timely update of patient information accessible by the care team.

A strength of this study is the research design. The field study was designed to collect and analyze quantitative data, to produce quantitative findings. Study limitations include a small sample size of six nurses and 12 patient admissions as well as the setting elements of one rural home health agency that used one EHR. Future work to further the generalizability of the findings would increase heterogeneity and sample size of nurse and patient populations studied, and the number of different EHR systems investigated.

The study was not designed to ask the nurse why selected problems were included in the POC and other problems were dropped. Future work to address this question would require near real time analysis of input and output documents and immediate review of this analysis with the nurse. In addition, future work could occur in acute care where a patient-centered assessment near discharge could identify patient problems from the patients' perspectives to share with the HHC admission team. Transmitting that list to HHC and studying the effect of having this information ahead of time are next steps.

Conclusion

This rural HHC agency relied on 3 paper input documents from the same referring source, each containing different sets of problems. The variation in problems may be due to the different intended audiences for the communication: clinicians at the referring facility, clinicians at the HHC agency, and patients. Input documents contained almost twice as many problems as compared to the output documents. However, no input document contained a complete list of problems. Following the home visit and patient assessment, new problems appeared in the output documents, and some problems on the input documents were omitted in the output documents without explanation or documentation of such. This observation underscores the importance of the home visit and further EHR functionality. Assessing the patient in the home often produced additional problems beyond those communicated from the referral source. The important output documents were the plan of care and a team email both of which were outside the EHR. This study illustrates serious issues related to EHR design and problem lists. The team email contained far more problems as compared to the plan of care. The usage of the team email highlights EHR design deficits related to the plan of care and team communication. A lack of timeliness of information; lack of structured, actionable data; and lack of interoperability provide opportunities to improve the design of this EHR.

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