Information Seeking by Nurses During Beginning-of-Shift Activities*

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Abstract

Information seeking by nurses at the beginning of a work shift is related to planning interventions and other patient activities. Subjects were observed for one hour following morning shift report. The most frequent type of information sought was medication schedules and other information related to medications. On average, nurses spent one-quarter of the first hour after shift report looking for and retrieving information. Nursing information, such as assessments and nursing summaries, required more time to retrieve than other types of information. Findings are conpared to earlier research about nurses' information seeking.

A core purpose of clinical nursing information systems (CNISs) is to assist in the management and processing of nursing data, information, and knowledge [1]. Central to achieving that purpose is the identification of information and data used by nurses not only to document nursing events, but also to give patient care. The literature suggests several approaches to identifying data and information of interest to nurses. Some writers identified data elements from computer or paper-based documentation systems used by nurses [2,3,4], while others have derived data elements by analyzing nursing textbooks and other written sources [5].

Information needs can also be identified by directly observing nursing practice in a clinical setting. In two papers, Graves and Corcoran [1,6] described the supplemental information sought by cardiovascular nurses in order to make decisions about patient care. Forty-six volunteer RN subjects from three hospitals were observed in 178 separate instances of supplemental information seeking (SIS) behavior. A questionnaire was developed to describe SIS behaviors by determining what information was sought, the purpose of the information, the source used and why, and success and difficulties encountered in obtaining the information. Data were collected on all shifts and all days of the week. Observation of each subject continued until 5 SIS instances had occurred or until 2 hours elapsed, whichever came first. Content analysis procedures were used to place the SIS behaviors into groups and categories. The 175 SIS observations were grouped into 4 categories: patient specific information (49%), institutional policies (27%), domain knowledge (21%), and procedures (3). The authors noted the similarity of SIS instances across the three hospitals, despite differences in the information milieu of each. Also observed was the significant amount of time on all shifts spent searching for information, indicating that "a CNIS that does not provide information to nurses is going to be accompanied by some sort of auxiliary paper system" [1, p. 363].

The findings reported here were part of a larger study that described the cognitive processes involved in rapid intervention planning by nurses during beginning-of-shift activities. One part of that study was a follow-up of the earlier work of Graves and Corcoran [1, 6] in that it examined information seeking behavior of nurses as they began a shift of work. In addition, the larger study extended into a new area by describing how nurses created and used worksheets to manage the information needed to give patient care. This paper reports findings based on analysis of information seeking behavior of nurses during beginning-of-shift activities.

METHODS

Subjects

Subjects were registered nurses who had been RNs and had worked on their present nursing unit at least one year, and were considered full-time employees. Subjects were recruited from four medical-surgical units of a teaching hospital in a western state. Fifteen potential subjects were nominated by head nurses and then were contacted by the graduate research assistant to invite participation; all agreed to participate. Subjects gave written informed consent at the time of data collection. One subject was ill on the

scheduled data collection day and was unable to be rescheduled during the data collection period. Two other subjects did not complete all phases of data collection, one because of pressing clinical demands and one because of problems with recording equipment, leaving a final sample of 12 subjects.

The subjects ranged in age from 24 to 57 years, and averaged 35 years of age. They had practiced nursing an average 9 years, but experience ranged from 1 to 36 years. Experience on their present unit ranged from 1 to 17 years and averaged 6 years. Eight were BSN graduates, 3 were graduates of ADN programs, and one held a diploma in nursing. None held advanced degrees or certification.

Setting

The four medical-surgical patient care units from which subjects were drawn were considerably different from one another in terms of type of patients served, usual census, patient acuity, and number of direct care staff. The smallest unit served hematology, oncology, and bone marrow transplant patients and had a usual census of 13 patients, an average acuity of 3.4 (4-point scale), and usually had 7 RNs or other direct care staff on day shift during the data collection period. The largest unit, a general medical-surgical unit, had a usual census of 31, average acuity of 3.1, and typically had 11 direct care staff on day shift. The third unit served orthopedic patients, had a typical census of 27, average acuity was 3.3, and usually had 9 direct care staff. The fourth unit served medical and surgical cardiovascular patients, including patients on telemetry, had a usual census of 25 patients, an average acuity of 3.6, and usually had 11 direct care staff. Even though each unit had a specialty designation, all units usually had all types of medical and surgical patients in addition to patients in the specialty area.

Despite these differences, the units were similar in their information management practices. Shift report on three of the units was given one-to-one: the departing nurse gave report directly to the arriving nurse who would be caring for the patient that day. On the fourth unit, the entire oncoming staff heard a brief report on all patients, followed by one-to-one reports as described above. On all the units, each patient had a Kardex folder, a medical chart, a bedside chart, a nursing assessment and care plan folder, and a medication administration record (MAR). As in most settings, the Kardex was used as a record of current medical and nursing treatment and included information about the patient's diet, fluid restrictions, vital signs, activity, elimination, allergies, daily and

special lab studies, and so on. Kardex folders were stored at the main desk of the nurses' station in a large file folder. Medical charts were the "official" patient record, where physicians wrote orders and progress notes for their patients. The bedside chart contained nurses' notes, the graphic sheet, intake and output records, and various flow sheets; it was kept in a plastic holder mounted on the wall outside the patient's room. The MAR consisted of two pages for each patient, one for PRN medications and one for regularly scheduled medications. It was used as the listing of current medication orders and as the form on which nurses charted that medications had been given. All MAR sheets were kept in a loose-leaf notebook on the medicine cart in the medicine room. Only one nurse at a time could use the MAR to retrieve or enter information. Finally, each nurse also developed a personal shift worksheet and used it throughout the shift to keep track of tasks to be done and to jot down observations and actions for later reference or permanent documentation.

Patients

A total of 34 patients was assigned to the 12 subjects during the data collection period. The number of patients assigned to subjects ranged from 2 to 4, and averaged 3 patients. The average patient length of stay on the units ranged from 4 to 19 days. Patients were rated by subjects in terms of how difficult they were to care for (1=not difficult, 5=very difficult), how similar they were to patients the subject usually cared for (1=very similar, 5=not similar), and acuity level (1=not acute, 4=very acute). Overall, subjects rated patients as slightly difficult to care for (2.67), somewhat similar to previous patients (3.00), and moderately acute (3.19).

Procedures

The larger study involved collection of verbal data about intervention planning, collection of shift worksheets, and observation of information seeking behaviors after shift report. Only the latter data are reported here. Subjects were observed by the investigator for one hour following shift report to determine what information sources and documents were used to support the intervention planning process. Data collection occurred during the day shift; subjects were not observed while they were in patients' rooms. Each instance of information seeking was documented on a form similar to that used by Graves and Corcoran [1]. Information sought, source of the information, and start and stop times for each information seeking event were recorded at the moment and then validated with

the subject at the end of the observation period. Content analysis procedures were used to identify categories and elements of information from the information seeking data forms. After the information seeking data were analyzed, categories and frequency distributions were compared with those identified by Corcoran-Perry and Graves [6].

RESULTS

Information Seeking Behavior

For the 12 subjects, a total of 69 information seeking events was observed. The time required for each event ranged from 30 seconds to 25 minutes. Fifteen (22%) of the observed events involved using multiple sources to obtain the needed information. Over all the subjects the total time required for information seeking instances was 3 hours and 10 minutes, or 26% of the 12 hours of observation. In other words, each subject spent a little more than 15 minutes of the first hour after shift report looking for and retrieving information needed for patient care.

Types of Information Sought. After reviewing the types of information sought and deriving an initial coding scheme, it was determined that the data could be grouped into the categories identified by Corcoran-Perry and Graves [6]. As shown in Table 1, only two of the major categories identified earlier, PATIENT SPECIFIC INFORMATION (90% of information seeking instances) and INSTITUTION SPECIFIC INFORMATION (10%), were identified in the present study. No instances of seeking DOMAIN KNOWLEDGE or PROCEDURAL INFORMATION were observed.

Table 2 shows a comparison of distributions for subcategories of PATIENT SPECIFIC INFORMATION for the two studies. For the present study, data elements could be grouped into several of the subcategories identified by Corcoran-Perry and Graves: medications, physicians' orders, lab data, cardiovascular status, and diet. Compared to the earlier data, there were more instances of seeking information about medications and physicians' orders and fewer instances of seeking information about diet and cardiovascular status.

Most items in the MEDICATIONS subcategory involved seeking information about what medications were scheduled for subjects' patients during the shift. The second largest category included instances of seeking information about physicians' orders, many of which involved questions about

medications. Table 3 gives examples of information types in the PATIENT SPECIFIC category. The present study identified several subcategories of patient

Table 1. Comparison of types of information sought: Lange data vs. Corcoran-Perry & Graves data.

Information Type	Lange Data	Corcoran-Perry & Graves Data
Patient Specific	90%	49%
Institution Specific	10%	27%
Domain Knowledge	----	21%
Procedural Information	----	3%

Table 2. Comparison of subcategories of Patient Care Information: Lange data vs. Corcoran-Perry & Graves data.

Patient Care Information	-----Lange Data----- n=62	Time (min.)	CP&G Data [6] n=185
Medications	34.4	61	18.8
Physicians' orders	18.0	22	8.2
Lab data	9.8	11	15.3
Cardiovascular status	3.3	3	12.9
Diet	1.4	1	4.7
Interdepartmental info.	13.1	12	----
Nursing information	9.8	50	28.0
New information update	6.6	19	----
Preop. preparation	4.9	3.5	----
Other	----	----	9.0

specific information that were not reported earlier. For example, 8 of the 62 instances (13%) were classified as INTERDEPARTMENTAL, seeking information about other departments' plans or activities concerning subjects' patients. Six instances (10%) involved seeking NURSING INFORMATION, such as nursing

Table 3. Examples of information sought for most frequently used subcategories of Patient Specific Information.

Subcategory	Example
Medications	Med schedule for my patients.
	Pre-angiocath medication for patient -- angio came early for the patient.
Physicians' orders	Pre-op and pre-cath orders for patient.
	New orders and orders missed on the night shift.
Lab data	Blood gas report.
	Whether blood is ready for my patient.
Interdept. info.	When is my patient's appointment in the clinic.
	Will social worker talk with the patient's family about financial concerns.
Nursing information	Patient's temperature last night. Whether bowel care was done last night and what was done about patient's elevated temperature.
New information update	New Kardex information to copy onto worksheet.
	Patient's history and any new orders.

assessments or care plans recorded by nurses on earlier shifts. Four instances (7%) occurred in which subjects consulted several sources, such as the medical chart, Kardex, and MAR, in order to update their knowledge about the patient and the treatment plan. Finally, 3 instances involved seeking information about PREOP PREPARATION, including reviewing the preoperative checklist and identifying preoperative medications.

Patterns of Information Seeking Behavior.
Every subject sought information about medications at least once during the one-hour observation, and 8 of the 12 subjects sought information about medical orders. When questioned about their information seeking patterns, every subject described a personal, consistent routine that was used to gather information before beginning patient care activities. Although the order of search activities varied among subjects, all subjects said they routinely obtained patients' medication schedules from the MAR, checked the medical charts for new or missed orders, reviewed and updated the Kardex, checked for lab results, and reviewed nurses' notes and assessments. Since many of these activities routinely occurred after the rush of AM care, all were not captured during the 1-hour data collection period.

Table 4. Comparison of information sources: Lange data vs. Corcoran-Perry & Graves data.

Information Source	Lange Data (%) n=83	Corcoran-Perry & Graves Data (%) n=175
VERBAL	*36*	*45*
Other nurses	12	25
Other personnel	24	20
WRITTEN	*59*	*45*
Patients' charts	22	25
MAR	20	--
Kardex	7	--
Bedside chart	6	--
References	1	15
Other documents	--	5
TECHNICAL	*5*	*10*
Computer output	5	8
Cardiac monitor	--	2

Time Required for Information Seeking. Table 2 also shows the time across all subjects required for each PATIENT SPECIFIC subcategory. As could be expected, seeking medication information required the largest block of time (61 minutes overall). Surprisingly, seeking nursing information about patients required the next largest block of time (50 minutes), although there were only 6 such instances. The nursing information, such as assessments and care plans, was text-based and often located in more than one document, which may account for the longer time

requirement. In contrast, the 6 instances of seeking lab results, which were usually available via computer terminal or printout, required only 10.5 minutes.

Sources of Information. Because some information seeking instances required the use of more than one source of information, a total of 83 sources was used by subjects. Sources were easily grouped into the major source categories developed by Corcoran-Perry and Graves [6], as shown in Table 4. The earlier study found that verbal and written sources were used equally by cardiovascular nurses. In contrast, the present study found much greater use of written sources (59% of instances) by the 12 subjects. Verbal sources of information were used only 36% of the time, with other personnel accounting for twice as many sources as other nurses.

DISCUSSION

The information seeking behaviors observed in this study are similar to those described by Corcoran-Perry and Graves [6]. Most of the information sought by subjects could be described within the PATIENT SPECIFIC information category, which is not surprising given that all observations were made during the first hour after morning shift report. During that period, subjects were gathering information necessary to begin the day's patient care activities. Every subject's morning routine included quick reviews of medical charts, Kardexes, and lab results in order to create or update the nurse's personal store of information about assigned patients. Given these commonalities, it was also found that each subject sought a unique constellation of information types, perhaps based on rapid intervention plans made during and immediately after shift report.

The most frequently used sources of information were documents, and among those the MAR was the most common source. Non-nurse personnel were more frequently used sources of information than other nurses, perhaps because during the early part of the shift other nurses are also busy gathering information needed for patient care.

The results of the study can make an important contribution to the design of clinical nursing information systems (CNISs). To support the information needs identified in the study, future CNISs should draw information from a variety of sources and integrate it into a real-time data and information source.. Given a common database of patient information, users should have the capability of designing interfaces to fit their own unique needs.

Further, patient information should be available to nurses at all times, immediately accessible, wherever the nurse happens to be. In short, future CNISs should provide mobile, customizable information management tools to nurses. Future research by the investigator will test the utility of the new pen-based "notepad" computers in meeting the information management and processing needs of nurses.

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