DESIGN AND IMPLEMENTATION OF COMPUTERIZED NURSING CARE PLANS


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Abstract

The design and implementation of computerized nursing care plans is described, together with the rationale for the systems approach. The project was developed at LDS Hospital in Salt Lake City, utilizing HELP, a total hospital information system. Implementation of the program was initiated in six critical care units (52 beds) where nursing personnel have been actively using computer interface for more than ten years.

Introduction

Nursing personnel in the acute care setting are inundated with voluminous information from many sources including patient records, condition sheets, laboratory reports, staffing forms, and budgetary analyses. The Registered Nurse (RN) on a ward or in a critical care unit is responsible for assimilating and coordinating this information as a basis for planning, implementing and communicating patient care. Because the acutely ill patient is often unstable, a dynamic method for continuous collection and display of this information is necessary. The management of this data has historically taken the form of a Xardec and the Nursing Care Plan (NCP).

For many years, clinical use of NCPs has been recognized as an important aid for planning and providing consistent, quality patient care. NCPs have been used extensively in educational settings. Nursing students are often required to prepare and utilize the plans during clinical training as the NCP has proven to be an essential teaching tool. The value of care planning has been reinforced by the Joint Commission on Accreditation for Hospitals (JCAH) which requires evidence that nursing care plans are used before hospitals can be accredited. Yet, it remains difficult to find NCPs that are in fact an integral part of the clinical setting. In reality, if care plans are written, they are often incomplete, outdated, rarely used for determining care and infrequently relied upon as a means of communicating problem management from one shift to another. The project described in this paper was designed to provide a computerized nursing care plan which could be individualized to any acute care patient on the ward or in an Intensive Care Unit (ICU). The ultimate goal of the project is the realization of a dynamic NCP that can be expedi-

tiously written or updated and will serve the primary nurse as a valuable tool for delivering patient care.

Nursing Care Plans

If nurses are to effectively provide quality care for each individual patient, they must plan and direct that care. All available information on each patient must be utilized in order to develop NCPs that will a) give direction to care, b) establish continuity of care, c) provide a means of communicating care between nursing staff, d) aid in the determination of patient care assignments and e) provide data which can be used for pertinent research purposes. If approached in this manner, the NCP will be dynamic, facilitate consistent care throughout the hospital stay and in addition, will provide a permanent record which can be used for care planning after discharge.

The NCP must be used in order to be effective. Because nurses often view the care plan as another burdensome piece of time-consuming paperwork, preparation or revision of the plan is usually low on the list of priorities. Therefore, the plan is not predictably available or accurate and consequently is not used because it is not a reliable source of information. The perpetuation of this cyclical disuse of the NCP may be ameliorated if care plan construction and modification were quick and simple. The end product (NCP) should not contain any redundant or useless information, and must be complete, current, and easily assessable in a legible, organized form. A computerized program would facilitate this kind of care planning.

Computerization

The concept of computerized nursing care plans is not new. The task is difficult at best; complicated by the ever-changing data base and the wide range of nursing implications for any diagnosis. In the past, computerized approaches have generally taken one of two forms, either computer readable forms on which the nurse indicates the desired nursing actions or standard care plans generated by the computer and later adjusted by the nurse to the individual patient. Examples of the latter approach include the Technicon system developed at.
El Camino Hospital in California\(^5\) and the standardized rehabilitation plans described by Cornell and Bush.\(^6\)

Unfortunately, most standardized care plans have been developed from medical diagnoses and have encountered the unwieldy problems of redundancy and overlap. For example, a patient may be admitted with an abdominal aortic aneurysm and then develop pneumonia during the hospital stay. Standard care plans for both diagnoses would then be required. Problems such as immobility and anxiety would be addressed in each standard plan, creating redundancy and an element of confusion. Computerized NCPs, based on identified, system abnormalities (nursing diagnoses), rather than medical diagnoses, would provide a single standardized care plan which could be used by a variety of patients. This "systems" approach would facilitate nursing symptomatology, encourage similar documentation, and simultaneously eliminate overlap endemic to use of multiple standard care plans.

It has been noted that computerized NCPs are successful only when nurses are involved at each stage of planning, development and implementation. The tool described in this paper was developed primarily by a "nurse user group" which utilized expertise from computer and nursing consultants.

**Methods**

The computerized nursing care plan was designed and implemented using the HELP system at LDS Hospital in Salt Lake City, Utah.\(^8\) This system is a total hospital information system which has been developed to meet not only the administrative needs of the hospital, but the medical needs as well. The distributed mini/micro computers serve the special needs of various hospital departments and include a clinical laboratory computer, ICU monitoring computers, catherization laboratory computers, pulmonary and blood gas computers, and an ECG interpretive computer. The unique feature of this system which sets it apart from other hospital information systems, is the integrated medical decision making capability which it provides. A series of subsystems are available which allow the user to easily implement new data elements, define data entry modules, data display, and decision logic.

The computerized nursing care plan was developed using a systems approach to patient problems. Twelve problems, encompassing the common abnormalities seen in acutely ill patients, were identified (Table 1). Usual nursing actions (orders) and associated expected outcomes were determined for each problem. The potential causes of each nursing problem were also included to assist the nurse in relating nursing problems to medical diagnoses. Hospital policy and procedure as well as JCAH requirements were considered in the program design.

**Table 1**

<table>
<thead>
<tr>
<th>Nursing Care Plan Problem List</th>
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<tbody>
<tr>
<td>1. Altered Ventilation/Oxygenation</td>
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2. Hemodynamic Instability
3. Fluid/Electrolyte Imbalance
4. Altered LOC/Impaired Neurological State
5. Cardiac Rhythm Disturbance
6. Pain
7. Altered Gastro-Intestinal Function
8. Infection/Compromised Defense Mechanisms
9. Immobility/Impaired Musculo-Skeletal Function
10. Patient/Family Anxiety
11. Inadequate Nutrition
12. Altered Hematologic Status

**Creating The Initial Care Plan**

When the nurse desires to initiate a care plan on a patient, the problem list option is selected from the NCP menu. The list is displayed from which a specific patient problem such as ALTERED VENTILATION/OXYGENATION can be chosen. The probable cause is then identified, i.e., PNEUMONIA, ASTHMA, COPD. Expected outcomes are then offered for consideration.

Next, individual nursing actions are selected from indexed screen menus. If the nurse chooses an action which has a numerical value associated with it, the specific numbers will be requested for that particular patient. For example, the menu may show an option to RECORD BREATH SOUNDS O=HRS. The desired time frequency can be designated. Similarly, the values can be inserted for other types of actions such as ENCOURAGE INCENTIVE SPIROMETER VOLUME TO== CC. In addition to the numerical value option, free text entries may be selected to further individualize the care plans. If the patient has a hearing deficit, the nurse can select the unique problem index, the hearing option, and then type in whatever information she feels will be useful to the nursing staff.

After all of the care plan components for this particular problem have been shown to the nurse, and the content is validated, a nurse ID number is requested and the information is stored. After this process is completed for each patient problem, a hardcopy print-out of the individualized NCP is requested. This print-out is available at any time upon request for planning and reporting purposes, and as a format for documentation. (Figure 1) Eventually, the NCP print-out will include a schedule of medications, diagnostic tests or studies and treatments.

**Modifying An Existing Care Plan**

The NCP can be easily updated as the patient's condition changes through an editing program. This program allows the nurse to review the current plan, inactivate a resolved problem, delete items, modify values, and add new components.

**Permanent Record Of Care Plan**

Each time a care plan is initiated or changed, dates and times are automatically captured and stored. All changes in problem identification, causes, expected outcomes, and nursing actions are permanently stored in the patient's computer file. In addition, the names of all of the nurses who
Figure 1. Example of a patient specific computerized nursing care plan.

Figure 2. Example of a case plan history printed at discharge for the permanent medical record.
contributed to the care plan are collected with the specific entries and associated times. This information is available for terminal review at any time, and a care plan history print-out is requested at the end of hospitalization as part of the permanent medical record. (Figure 2)

Implementation

Design

Because clinical computer interface is available in the six critical care units (52 beds) at LDS Hospital, these units were selected as the practical sites for initial NCP implementation. The nurses who work in these units routinely record and review patient data through the computer. It was concluded that the group would have little difficulty adapting to a computerized NCP.

When the initial programming was completed, a user committee comprised of ICU staff nurses and head nurses was organized to troubleshoot the program before clinical implementation. The committee was asked to provide feedback about program utility in general, the organization of the program content, and the propriety of the nursing action (order) options. Members of the user group used the program to develop care plans for the patients in their respective units to further identify potential problems. As criticism and suggestions came from the user group, the program was modified to rectify inefficiencies.

Training

The ICU staff was oriented to the program during a regularly scheduled inservice hour. The format and function of the program was described, screen flow was demonstrated using an overhead projector, and the terminal users manual which contained copies of all screen content was introduced. Although all staff members were not present at the inservice, it was hoped that the members who did attend and the user groups would help teach the others. Use of the computerized NCP was required for all ICU patients after the training period. A special NCP census program was written for the head nurse which indicates whether or not a care plan has been entered for each ICU patient, hence follow-up was simple.

After the program was introduced in the ICUs, similar user groups were organized for the general nursing divisions so that the NCP could be modified to meet the needs of that patient population.

Evaluation

Prior to implementation, ninety (90) patient records were randomly audited for the presence of manually constructed NCPs, the number of problems identified in both the NCP and the nurses notes and the number of interventions and outcomes charted by the nurse. Patient age, sex, and diagnosis were also recorded. Another ninety (90) patient records were randomly audited for the same information two months after the computerized NCP was implemented. The two groups of data are being compared in order to evaluate the impact of the computerized NCP. A similar random patient audit will be conducted on the general nursing divisions before and after implementation of the computerized NCP.

During the post-implementation period, an informal user survey was distributed among the ICU nurses, twenty percent of the total ICU nursing staff evaluated the program. Preliminary examination of these data showed that a majority of the nurses felt that more instruction and familiarity with the program directives would improve the utility of the computerized NCP.

Results of the post-implementation audit and user survey will be made available after analysis is completed.

Future Uses

The computerized NCP can be used to evaluate and document future nursing care activities. The program has been designed so that eventually it can be used as a format for documenting nursing actions that are actually performed (nurse notes), for recording patient acuity (necessary to determine patient care hours) and for assessing staffing patterns. The computerized NCP could also be used as a means of evaluating the quality of patient care. These future developments should ultimately improve documentation, decrease charting time, and thereby increase the time available for the nurse to provide more care at the bedside.

Researchers at LDS Hospital believe that computerized nursing care plans have tremendous potential educational as well as clinical arenas. From the software, clinical nursing problems can be simulated and serve as a valuable tool in teaching the nursing student to make decisions and set priorities.

References

3. Gooding M. If You Think Care Plans are a Nuisance, Read This. RN 1978; :99-102.