MICROCOMPUTERIZATION OF A THEORY-BASED
NURSING ASSESSMENT OF DISCHARGE MEDICATION KNOWLEDGE

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Abstract

This study designed and tested a computerized nursing assessment based on the concept of self-care in nursing (Orem, 1980). Previous research by Horn and Swain (1978) served as the guide in the development of a paper-based assessment tool. The paper-based assessment was then transformed into a computer-assisted assessment. A control assessment, structured paper-based and computer-assisted assessment were evaluated for time, quantity and quality of nursing diagnoses, and acceptance by nurses. Significant differences were found in the time, quality of nursing diagnoses and nurses' preferences for the assessments.

Assessment Tool

Criterion Measures of Nursing Care
Quality (Horn and Swain, 1978), is an evaluative tool to measure patient outcomes that reflect the quality of nursing care. This tool, organized around a classification system appropriate for nursing problems, offers a theoretical framework, content validity, and tested reliability.

The Horn and Swain assessment consists of 539 measures utilizing eight universal and ten health deviation self care requisites. Universal self care includes all the necessary activities of daily living. The increased requisites of illness and injury are called health deviation self care demands. A primary responsibility of nursing is to evaluate the self care capabilities and demands of the individual. Appropriate nursing interventions are required when an individual's self care needs exceed his or her capabilities.

At the present time, the Horn and Swain tool is not used in daily clinical assessment. Because it is paper-based and a relatively comprehensive guide, it is bulky and awkward to use. Its branching algorithmic design requires a great deal of skipping around, since few patients would require indepth assessment in all areas. In its present paper-based form, the guide is impractical as a clinical tool. A computerized data management system utilizing the branching algorithmic design could eliminate the clumsiness of the paper-based form, while retaining its comprehensiveness.

The Medication Knowledge section of the Horn and Swain tool was tested in this research. Medication Knowledge assesses the patient's knowledge of discharge medication regimens including name, dosage, action, side effects, preparation, and management. This section was chosen because of its broad applicability to a variety of patients and its branching algorithmic design.

The Medication Knowledge section consists of 31 interview questions. Responses are evaluated by nurses and most are scored on a 3 or 4 item scale. The scales are designed to evaluate the presence of accurate knowledge or misinformation related to managing the discharge medication regimen.

Experimental Procedure

Subjects

The sample for this study consisted of 6 nurses associated with the graduate medical-surgical nursing program at the University of Michigan.

Instruments

Videotapes: Three 'nurse-patient' videotaped interviews were developed from the Horn and Swain assessment questions. Each interview involved a different discharge drug: propranolol, coumadin, or diazepam. The interviews were scripted to allow time and content control.

Control Assessment Tool: Blank paper and the nurses' own assessment styles acted as the control for this research. A standardized list of nursing diagnoses relevant to discharge medication regimens was provided.

Structured Assessment Tool

Photostatic copies of the Medication Knowledge section were used for the study. All relevant scoring and drug information was available to subjects during their participation.
Computer-Assisted Assessment Tool

The interactive computer program was written in BASIC for the Apple 2+ microcomputer. This program duplicated the Horn and Swain tool as closely as possible. The interview questions, scaling, branching algorithm, and logic of the Medication Knowledge section were preserved. In addition, nursing diagnoses derived from the input data reflected the diagnostic logic of the Horn and Swain tool.

The computer program consists of approximately 40 screens containing the 31 Medication Knowledge items. Nurses were required to input single digit responses to prompts appearing on the screen. A double-strike system was built in to decrease the likelihood of inadvertent entry of incorrect data. Additional screens provided a description of the tool and instructions for use. HELP screens provided medication information and scoring procedures, including examples of correct and incorrect responses. The nurses were able to access the HELP screens through a simple mechanism. Upon completion of the interview assessment, the nurse automatically viewed several screens containing the appropriate nursing diagnoses based upon the computer’s analysis of the input data.

Nursing Diagnoses. For the purpose of this research, a nursing diagnosis was defined as a statement of an individual’s abilities to meet his or her universal self-care requisites now or in the future and the nurse’s appraisal of these abilities in relation to the person’s health deviation self-care demands (Orem, 1980, p. 84). A set of nursing diagnoses relevant to discharge medication knowledge was derived from the Horn and Swain tool. The set of diagnoses was used in the control and structured assessment trials and in the development of the computer’s diagnostic algorithm.

Questionnaires. The three types of assessments were analyzed through a set of “Assessment Questionnaires” consisting of five statements with Likert scales. The statements were designed to elicit the participant’s opinions concerning the assessments. A “Summary Questionnaire” consisting of six questions related to demographics and acceptance of the system was completed at the end of the subjects participation in the study.

Procedure. Participants viewed, in random order, three nurse-patient interviews and performed a nursing assessment based on the interviews. The first assessment acted as a control. The nurse recorded data on a blank sheet of paper in her usual style. The nurse identified the appropriate nursing diagnoses.

The structured and computer-assisted assessments were randomly second or third. Participants were given a brief introduction to the use of the assessment tools and the microcomputer prior to the actual viewing of the interview and data collection. The structured assessment data was recorded directly on a photostatic copy of the Medication Knowledge section of the Horn and Swain tool. The nurse identified the appropriate nursing diagnoses. Data collected during the computer-assisted assessment was entered directly into the microcomputer by the participating nurse. Diagnosis was performed by the computer.

After each assessment, the nurse was asked to complete an Assessment Questionnaire evaluating the particular type of assessment tool. An additional Summary Questionnaire was administered after all three trials to compare the assessment tools. Participation required approximately one hour for each nurse.

Data Analysis

The Assessment and Summary Questionnaires and the nursing diagnoses lists generated from the patient interviews provided data for analysis. A variety of statistical tests were performed on the data including the median sign test and paired t-tests. Statistical analysis was performed utilizing AIDA (Apple Interactive Data Analysis) software on an Apple 2+ microcomputer.

Results

The average time required for each type of assessment is shown in Table 1. Significant differences were found between the time required for the control and the structured assessments (t=10.075, N=6, P=.0005), as well as the structured and computer-assisted assessments (t=7.303, N=6, P=.0014).

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20
M 18
I 16
N 14
U 12
T 10
E 9
S 6
2

ALL CONTROL STRUCTURED COMPUTER-ASSISTED
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TABLE 1-Mean Times for Assessments
No significant differences were found between the three assessments in total number of nursing diagnoses. The quality of nursing diagnoses was evaluated by comparing the intrinsic and extrinsic errors. The average number of missing diagnoses, or intrinsic errors, for all assessments was .67 (N=6). The structured assessment had significantly more intrinsic errors than the computer-assisted assessment (t=-3.162, N=6, p=.025). No other significant differences in intrinsic errors were found.

Extrinsic errors are incorrectly identified, extra diagnoses. The average number of extrinsic errors was 2.0 (Range=0-9, N=6). No significant differences were found between any of the assessments in extrinsic errors.

The participants' opinions about the three assessments were evaluated with a five-item questionnaire. The computer-assisted assessment was rated significantly better than either the control or structured assessments on ease of use, data organization, determination of appropriate diagnoses, and assistance in communication of assessment findings to other health professionals. The participants in the study were asked to rank order their preferences for the three systems at the present time. In addition, they were asked to speculate which system they might prefer if they could use all three systems for an extended period of time. Table 2 displays their preferences.

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<th>1ST PREFERENCE</th>
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<td>CONTROL</td>
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<td>FUTURE</td>
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**TABLE 2—Nurses' Preferences For Assessment Systems**

**Discussion**

The purpose of this study was to determine the effects of computerization on an existing nursing assessment. Statistical analysis of objective measures (time, quantity and errors in diagnosing) provides equivocal results. The computer-assisted assessment was significantly more favorable only in terms of time and intrinsic errors. Since the structured assessment and computer-assisted assessments collect the same clinical information, the results suggest that the technology may facilitate collection of a more complete data set and/or improved analysis of information, as well as time savings. However, the findings are only important if the clinical data collected is of greater value to the practicing nurse than the traditional free-style (as in the control) assessment.

The value of a new technology can reside in its ability to improve on an existing system. Resistance may increase if the user perceives that they are losing information, time, or accuracy with the new system. The computer-assisted assessment was not significantly less favorable than the other two assessments on any measurements. This research was unable to identify any loss of time, accuracy, or quality due to the process of computerization.

The subjective measurements (opinions and preferences) clearly favor the computer-assisted assessment over the other assessments. These results suggest that nurses similar to those studied would support the use of computerized nursing assessments. Further research with other nursing populations and larger samples is needed to clarify this issue.

The results of the study suggest that the Horn and Swain assessment may be more acceptable and less time consuming if it were computerized. However, the success of its computerization may hinge on its algorithmic structure or its bulkiness. Either factor could lead to frustration in the use of the structured tool and a more favorable response to the computer-assisted assessment. At the present time it is unclear whether any algorithmic or bulky instrument would benefit from computerization. Further research with other, more widely used assessment tools could help identify the characteristics of assessments which would benefit from the computerization.

**Bibliography**
