APPLICATIONS OF A NURSING KNOWLEDGE BASED SYSTEM FOR NURSING PRACTICE: INSERVICE, CONTINUING EDUCATION, AND STANDARDS OF CARE

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ABSTRACT

A knowledge base of nursing theory supports computerized consultation to nursing service administrators and staff about patient care. Three scenarios portray different nurses utilizing the system for inservice development, continuing education, and development of standards of care or protocols for practice. The advantages of the system including cost savings are discussed.

INTRODUCTION

The faculty of the school of Nursing at Creighton University have spent over five years describing its undergraduate nursing curriculum and loading it into a computerized artificial-intelligence-based system, the COMMES System.1 The system, designed and reported by Evans,2-4 a knowledge engineer, has recently been modified to assist with several nursing service functions described below. Several features of the system allow for individualized consultation with efficiency and conservation of costly time, personnel, and other resources to both the expert and the user.

Scenario 1: Inservice Development

The nursing staff in the inservice department of your hospital have been requested to prepare a program for the nurses on two medical units related to rehabilitation of the patient with emphysema. The nurses have noticed an increasing admission of such chronic obstructive lung disorders and are concerned that acute treatment has limited benefit without a long term plan of care implemented before such patients are discharged.

The inservice developer goes to the COMMES System, requests the B.S.N. Nursing Consultant and enters the phrase "patient care in the context of rehabilitation and emphysema." The goals are immediately printed as seen in Figure 1. Each goal statement has an identifying number which can be used for further delineation of more specific subgoals or for requesting "parent" goals to see where rehabilitation of patients with emphysema fits in the larger structure of the nursing care of the patient with a chronic obstructive lung disorder. Each learning objective under a goal statement also includes a specific bibliographic reference which provides the needed information to accomplish that objective. (An available library of all reference materials is part of the system package and is provided to each site using the system.)

GOAL STATEMENTS FOR PATIENT CARE IN CONTEXT OF REHABILITATION AND EMPHYSEMA

1. PATIENT CARE: EXPLAIN THE NEED FOR INCORPORATING CONCEPTS RELATED TO RELIEF OF AIRWAY OBSTRUCTION, BREATHING RETRAINING, AND EXERCISE TOLERANCE IN PLANNING MEASURES FOR THE CARE AND REHABILITATION OF THE PATIENT WITH EMPHYSEMA. (3; 2.5; 3; 15M/1H15M) 013801-0104

2. TEACHING: DESIGN AN APPROPRIATE TEACHING PLAN, INCLUDING ENVIRONMENTAL, PSYCHOLOGICAL, AND PHYSICAL FACTORS, WHICH PROMOTES REHABILITATION OF THE PATIENT WITH EMPHYSEMA. (3; 2.5; 3; 15M/45M) 013801-0106

3. REHABILITATION: FORMULATE A PLAN OF CARE WHICH PROMOTES THE REHABILITATION OF THE PATIENT WITH PULMONARY DISTURBANCES. (3.5; 3.5; 3.5; 40M/2H) 013801-0076

4. DEFENSE MECHANISMS: ASSESS DEFENSE MECHANISMS AND COPING STRATEGIES EMPLOYED BY PATIENTS WITH PULMONARY PROBLEMS AND THEIR FAMILIES AND DISCUSS APPROPRIATE INTERVENTIONS. (3.5; 3.5; 4; 5M/15M) 013801-0080

5. SOCIOCULTURAL INFLUENCES: ANALYZE SOCIAL, CULTURAL, AND DEVELOPMENTAL INFLUENCES ON THE PATIENT WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE AND RELATE THESE TO HIS RESPONSE TO ACUTE DISTURBANCES AND COMPLIANCE WITH THERAPY. (3.5; 3.5; 4; 5M/15M) 013801-0082

6. REHABILITATION TECHNIQUES: DESCRIBE REHABILITATION TECHNIQUES AND STRATEGIES TO SUPPORT THE PATIENT WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE THROUGH A PROGRAM OF PHYSICAL RECONDITIONING. (3.5; 3.5; 4; 5M/15M) 013801-0083

—FIGURE 1—
The inservice developer examines the goals and concludes that the outline of the requested program is adequate, the reference resources are available, and via the system the objectives for the program have already been supplied. This nurse can proceed to an expert respiratory nurse specialist to assist in presenting the program as outlined or, as is more likely the case when such expertise is not available, he or she can go to the materials and begin a review. A computer-based A/V consultant from COMMES is also available to assist in the selection of appropriate media.

The time saved in this planning activity alone can be estimated from 8 to 20 hours depending on the amount of resource materials available and number of meetings necessary. If four such new programs were planned each month in this hospital, 48 per year, the planning hours saved could range from 400 to 1000 and would equate to .5 FTE of one nurse inservice program developer. Some hospitals do not have time and can not afford the additional staff. The COMMES Consultant would provide much assistance in this additional activity.

Scenario 2: Continuing Education

One of the nurses who requested the inservice was not able to attend the program when it was presented..."a patient crisis occurred," "ward was too busy," "not working that day." But this staff nurse is professionally motivated to satisfy a need to learn about rehabilitative care of the patient with emphysema. It is too expensive to repeat the program for a few or even video-tape the program assuming your hospital has the equipment and trained staff. The staff nurse takes a copy of the goals (Figure 1) and is directed to the appropriate sections in the text by Luckmann and Sorenson. He or she self-studies the material at home, in the evening, or when the ward activity is slow, and now wishes to earn credit for continuing education activities.

The nurse goes to the COMMES System, requests the BSN Evaluation Consultant and enters the corresponding goal number. A form is immediately printed identifying the amount of C.E. credit to be awarded as a result of studying the goals, the cost of the units, and directions and guidelines for completing the evaluation questions specific to the unit of study (Figure 2). The user is asked to answer the questions in a brief summary-style in order to demonstrate satisfactory review of the material. Books and resources may be used to answer the questions anywhere and at anytime since the credit is earned in exchange for the time and effort spent in continuing or maintaining one's professional knowledge.

The user sends the completed questions to Creighton University, School of Nursing, Continuing Education Department where the answers are reviewed on a satisfactory/unsatisfactory basis. Record of completed CEU's is forwarded to the nurse and kept in a computer memory so that at year's end, the nurse receives a complete listing of all the CEU's earned. Conceivably, a hospital can likewise get a complete list of all CEU's earned by all of the RN staff as required by its accrediting agency.

The savings resulting from the Evaluation Program can be numerous. The staff nurse does not have to miss time from work to attend a workshop with the attending travel expenses. This could amount to considerable savings in a hospital with a nursing staff of several hundred. Nor does the nurse have to forfeit "time away" from the family on off-duty time to earn necessary CEU's. Perhaps the most conserving feature for this nurse is the time "not wasted" in attending a workshop that did not meet his/her needs. The nurse participated in the selection of exactly what he/she wanted to learn or review. The efficiency of recording CEU's over time saves endless hours of recording and documenting attendance, etc., a function usually left to the inservice and development department staff.

COMMES Evaluation Consultant to earn C.E.U.s.

1. I.D. ASSIGNED TO THIS REQUEST: B-1050 GOAL NUMBER: 0138910
   AMOUNT OF C.E. CREDIT: 2.75 COST OF UNIT: $14.50

Please forward this form, the questions below, your responses, and a check (made payable to Creighton) to:
   COMMES Evaluation Secretary
   SCHOOL OF NURSING
   CREIGHTON UNIVERSITY
   OMaha, NE 68178

NAME (FIRST M. LAST):

MAILING ADDRESS:

CITY STATE ZIP CODE:

SIGNATURE OF APPLICANT:

PLEASE PRINT THE FOLLOWING INFORMATION:

PLEASE FORWARD THIS FORM, THE QUESTIONS BELOW, YOUR RESPONSES, AND A CHECK (MADE PAYABLE TO CREIGHTON) TO:

COMMES EVALUATION SECRETARY
SCHOOL OF NURSING
CREIGHTON UNIVERSITY
OMaha, NE 68178

Below are your evaluation questions for the following goal:

EMPHYSMA: DEFINE AND DESCRIBE PATHOPHYSIOLOGICAL CHANGES, RESULTING SIGNS AND SYMPTOMS AND THERAPEUTIC IMPLICATIONS ASSOCIATED WITH EMPHYSEMA. (1520)

1. EMPHYSEMA: DEFINE AND DESCRIBE PATHOPHYSIOLOGICAL CHANGES THAT ARE RELATED TO THE DECREASED DIFFUSION CAPACITY OF THE LUNGS WITH ADVANCED EMPHYSEMA, E.G., ACID-BASE IMBALANCE, POLYCYTHEMIA, ETC. (15M)

2. THROUGH A BRIEF SUMMARY OF THE INSTRUCTIONAL MATERIALS, RELATE THE PATHOPHYSIOLOGY OF EMPHYSEMA TO COMMON CLINICAL MANIFESTATIONS OF THE DISEASE, E.G., SHORTNESS OF BREATH, MARKED CHEST, ETC. (15M)

3. FOCUSING ON ESSENTIAL ISSUES, DESCRIBE THE DESTRUCTION OF LUNG TISSUE THAT LEADS TO PATIENT, I.E., RESIDUAL VITAL CAPACITY, FORCED EXPIRATORY VOLUME. (10M)

4. VERY BRIEFLY, DESCRIBE SPECIFIC SYMPTOMATIC PATHOPHYSIOLOGICAL CHANGES THAT ARE RELATED TO THE DECREASED DIFFUSION CAPACITY OF THE LUNGS WITH ADVANCED EMPHYSEMA, E.G., ACID-BASE IMBALANCE, POLYCYTHEMIA, ETC. (15M)

5. EMPHASIZING KEY POINTS OR ISSUES, DISCUSS PHYSICAL AND PSYCHOLOGICAL ADJUSTMENT FACTORS RELATED TO THE CHRONICITY OF EMPHYSEMA. (10M)

6. COMMENT ON BASIC ISSUES WHEN ONE WISHES TO DESIGN AN APPROPRIATE TEACHING PLAN, INCLUDING ENVIRONMENTAL, PSYCHOLOGICAL, AND PHYSICAL FACTORS, WHICH PROMOTES REHABILITATION OF THE PATIENT WITH EMPHYSEMA. (15M)

Figure 2
Scenario 3: Standards of Care

The head nurse has just been informed that standards of care must be written specific to patient needs most commonly admitted to her respiratory unit. These standards will serve as Protocols for nursing practice so that outcome audits can be created to assure the quality of the professional's care. The head nurse appoints several staff nurses to sub-committees to undertake this new activity, but they are unhappy because they have never seen or heard of standards, don't like writing objectives or measurable statements, and are looking for some ready assistance and expertise: "I know when I'm giving the best care, but I don't know how to put it in standards."

The head nurse guides them to the COMMES System, where they request Nursing Practice Protocol Consultant5 and enter one or more goals according to the patient care issue or need, e.g., rehabilitation of the patient with pulmonary disturbances (Figure 3). The printout summarizes the key nursing responsibilities and professional actions as constructed
from the COMMES System goals. Such responsibility or action is accompanied by a reference citation to document the appropriateness of the action.

The Protocol Consultant also provides specific actions under each key responsibility to further delineate the actions. For example, "physical adjustments" important in helping a patient cope with pulmonary disturbances include "environment, breathing pattern, hydration, activity, occupation and no smoking." Such Protocols can be used by the staff to modify or create more specific standards of care, to identify audit checklists for quality assurance documentation, and possibly, to serve as a guideline in the development of performance evaluation behaviors of the nurse. The cost savings from countless hours of committee work is obvious.

ADVANTAGES OF THE COMMES SYSTEM

There are several "consulting" systems available to nursing service administration. However, several features make this system uniquely advantageous. Its ease of use is one such feature. A Texas Instrument terminal that dials via a regular phone connection to Creighton University's computer makes the hardware investment minimal (approximately $800.00) and can be connected from any place in the world. This is particularly useful for overseas military hospitals as well as international hospital corporations. A few terminals per hospital are adequate for multiple uses.

On the other hand, it is possible for one host site to license the entire tape and serve as a relay agent to several other remote sites through its own main computer. A metropolitan university health sciences center with outstate responsibilities may consider this approach. Currently a UNIVAC Computer would be needed to insure program compatibility.

Some may ask, "Isn't it better to purchase the latest computerized 'packaged instructions'?" Modules of packaged instruction are valuable for the most part. However, they become dated rapidly. The COMMES Consulting System is updated no less than annually, as a faculty would update its courses. In fact, the biggest function of COMMES is to provide a full nursing faculty's expertise to a nursing staff. Just as one might call on a former faculty to find out "the latest" in a patient care problem, a nurse can go to the COMMES terminal and access the expertise of many nursing faculty. This would have particular benefit to smaller, rural hospitals without the resources of a university close by or a well-staffed and funded department of inservice and development. Likewise, nursing homes rarely have the extra staffing to send people to inservice programs and could find great value using the COMMES consultant.

Lastly, as faculty courses and curricula expand, so too does the system. For example, under present development is a gerontological nursing knowledge-base with a generalist and specialist nursing approach. Advanced material in the area of nursing management and administration and teaching and evaluation are in process. The ability of the system to continue to grow and respond to changing needs is clearly the strongest advantage. For example, the greatest efficiency from the consultant's point of view is that the artificial-intelligence-based system has created the three programs (as described) from the original description, without any additional faculty time and investment.

SUMMARY

It is recently reported that over 7000 scientific articles are published daily and that the half-life of knowledge will be less than two years by the year 2000. Therefore, a knowledge-based, expert system is needed to ease the selection of important information and still send the user to a concise, accurate and updated reference as opposed to 200 articles. It helps the user know what he/she wants to know and provides specific and immediate resources to find the answer.

Using COMMES, nursing service applications allow for (1) individualized consulting about a patient problem, (2) continuing education including credits earned, and (3) program consultation and development for nursing inservice departments. The Nursing Practice Protocol can be used to guide in the development of standards of care, specific quality assurance audits, and nursing performance evaluation behaviors.

Several advantages of the system include ease of administration, accessibility to remote locations, provision of ongoing and updated expertise, and the inclusion of growing areas of nursing theory.

REFERENCES