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ABSTRACT

A computer simulation model called PLAN was developed to broaden student clinical experience in the field of dietetics. Each simulated experience consists of five elements: (1) introduction to the patient, (2) data gathering, (3) assessment of data, (4) patient interview and counseling, and (5) assessment of outcomes with the assistance of the instructor. The teaching strategy employs problem solving techniques, tutorial evaluation (including pre- and post-interview quizzes), and interview skills. Technical problems were encountered and overcome, and the simulation model has been shown to have potential in other medical teaching fields. Flowcharts, outlines, and sample quizzes are included. (EMH)

"SIMULATION - DIALOGUE AND TEACHING STYLE"

by

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A simulation model called PLAN has been developed at The Ohio State University College of Medicine by the Medical Dietetics Division of the School of Allied Medical Professions and The Division of Computing Services for Medical Education and Research, as part of a Public Health Services Grant.* PLAN was developed to meet the needs of an increasing student enrollment in the Division of Medical Dietetics. More students enrolling meant that more patients were needed to enable the students to gain valuable clinical experience. The faculty found it increasingly difficult to provide enough clinical encounters, which were correlated with the classroom study, to meet the needs they felt were essential for strengthening the student's clinical skills. PLAN helped ease these problems by providing simulated clinical encounters to supplement real clinical experiences.

Each quarter the Medical Dietetics faculty determines how many and which simulations are to be included in the curriculum. Usage has vaired from 1 simulation and 3 real encounters to 3 simulations and 4 real encounters per quarter. Each simulation case must be completed in one to two weeks. The average time a student spends at the terminal per simulation case is approximately 4-8 hours.(7)

The clinical encounters in Medical Dietetics follow a specific sequence as shown in figure 1. Each student is assigned a patient

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CLINICAL EXPERIENCE

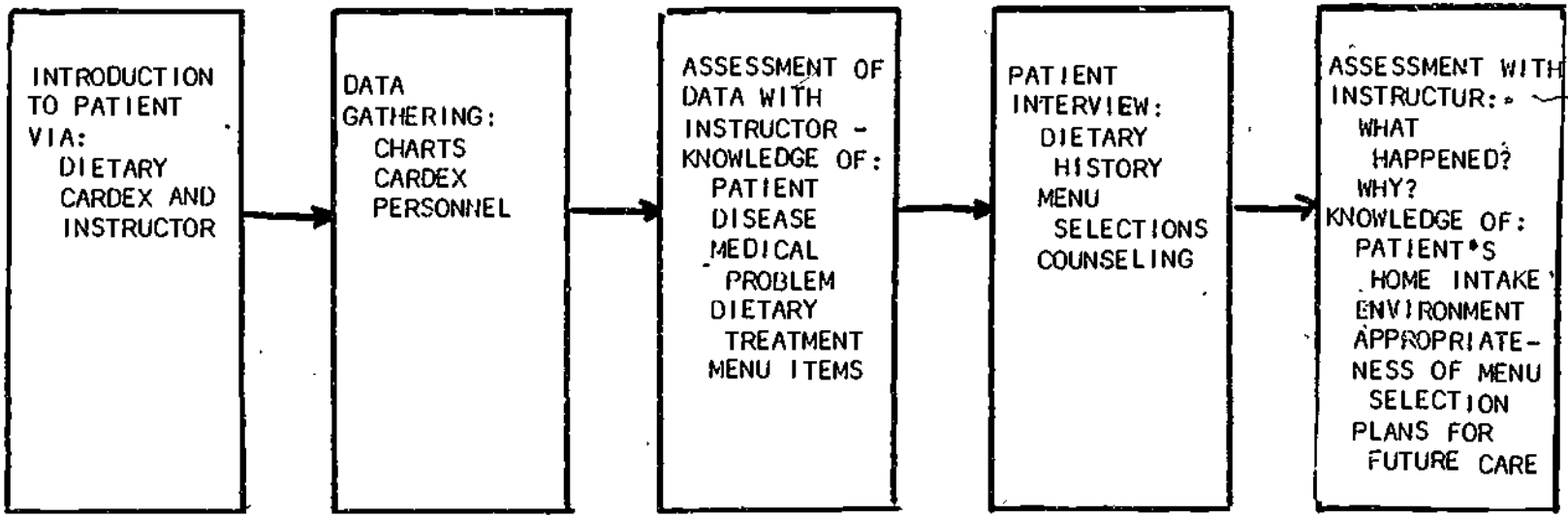

figure 1

and given a dietary cardex, which is the dietitian's record of nutritional care provided for the assigned patient. Prior to the clinical encounter, the student meets with the clinical instructor for the assessment of the student's achievement of 3 specific objectives:

1. the student should have a sufficient amount of information about the patient, such as is found in the dietary cardex and medical record.
2. the student should be familiar with the patient's disease conditions as relate to nutritional status or care.
3. the student should be knowledgeable about the specific dietary treatment and rational and specific foods allowed and avoided.

This conference serves several other purposes in addition to assessing the student's knowledge of the 3 objectives stated above:

1. the student gains a certain degree of confidence in realizing that she possesses the knowledge she needs.
2. the conference assures patient safety.

The student's task during the patient interview is to obtain a fairly complete diet history and plan a menu with the patient for the next day's meals. The student should also provide counseling regarding the patient's diet and future eating habits pertaining to the diagnosis.

Upon completion of the interview, the student-dietitian meets again with the clinical instructor. This post-interview conference serves as a mechanism for:

a. review of the diet history information the student obtained during the interview,

b. evaluation of the menu selection, and

c. discussion of the plans for future counseling and continuity of nutritional care. (3)

The task of the PLAN project staff was to develop a model, which would not only simulate the student-dietitian/patient interview, but the entire teaching sequence as used by the Medical Dietetics faculty and shown in figure 1. Figure 2 offers a schematic view of the model developed by the staff for simulating the total encounter. The objectives for the simulated clinical encounter and the real clinical encounter are the same. The use of multiple educational strategies and the provision for data retrieval is what makes PLAN unique.

Some of the teaching strategies incorporated into this model are:

1. problem solving in which the student is presented with a problem, and she must analyze her previously acquired information about the problem area to reach a solution;

2. tutorial evaluation, which combines an on-going evaluatory process with the basic instructional material, and;

3. simulation-dialogue, which allows the student to perform in a situation closely resembling the actual patient interview experience.

The first strategy, problem solving, appears immediately after the student has signed on to the computer program. The dietary Cardex is given, which contains minimal data about the patient, such as name, address, height, weight, age, sex, hospital service, diet order, etc. The student then has the option of branching to one of the five sections in the model. Those options are:

A. the patient section containing mandatory pre- and post-quizzes, and the interview (shown in figure 3)

B. the medical record (figure 4)

SIMULATION

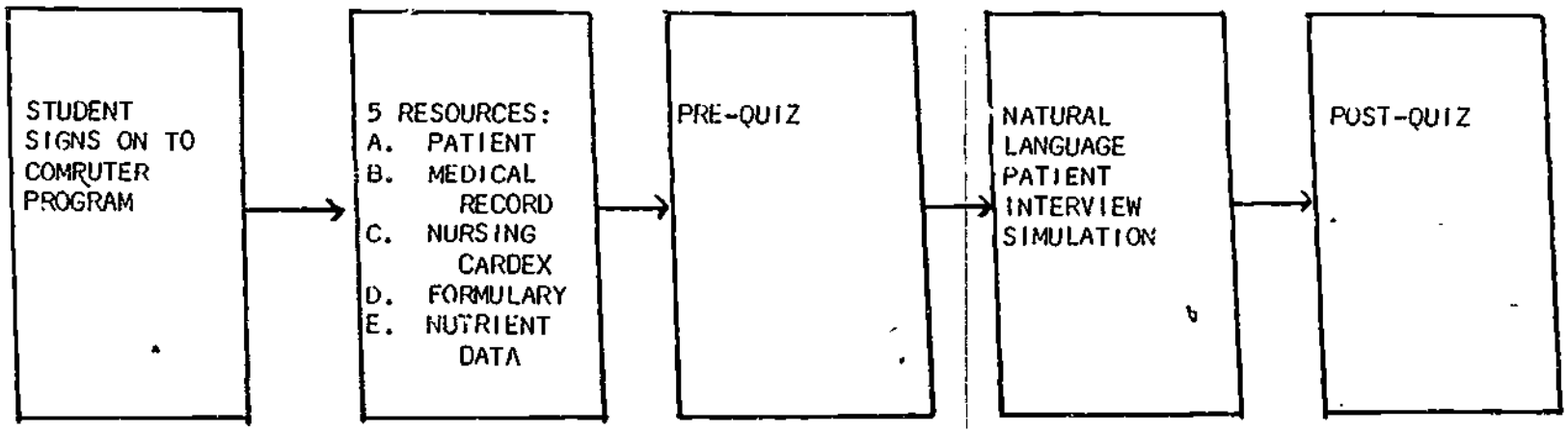

figure 2

RESOURCE A: PATIENT

1. PRE-QUIZ
2. INTERVIEW
3. POST -QUIZ

Figure 3

RESOURCE B: MEDICAL RECORD

1. ADMISSION DATA
2. PAST MEDICAL HISTORY AND HISTORY OF PRESENT ILLNESS
3. PHYSICAL EXAM AND PHYSICAL FINDINGS
4. IMPRESSIONS AND/OR DIAGNOSIS
5. PHYSICIAN PROGRESS NOTES
6. FAMILY AND SOCIAL HISTORY
7. HEIGHT AND WEIGHT
8. NUTRIENT INTAKE IN HOSPITAL
9. XRAY REPORTS AND OTHER DIAGNOSTIC PROCEDURES
10. CONSULTATIONS
11. MEDICATIONS
12. INTAKE AND OUTPUT
13. INTRAVENOUS FLUIDS
14. NURSES NOTES
15. REPORT OF OPERATION
16. LABORATORY DATA
17. DIABETIC NOTES

figure 4

C. the nursing cardex (figure 5)

D. the drug formulary (figure 6)

E. the nutrient catalogue (figure 7)(4)

The student should logically choose to branch to the Medical Record and Nursing Cardex sections of the model before choosing the patient interview section. In the real experiences, the faculty discovered that sometimes the students liked to take shortcuts by neglecting to familiarize themselves with the patient hospital records. The authors decided to allow this possibility to occur in the model, realizing that patient safety in the simulation was not a problem. The expected outcome of this decision was that the students who neglected to proceed in the correct manner would learn from this simulation experience that information gathering was an important first step.

The quizzes employ the tutorial-evaluation strategy. The objectives of the pre-quiz are to evaluate the student's knowledge of the patient and to instruct the student about the disease conditions, as these relate to dietary modifications. Several types of questions are used in the quizzes. For example:

1. The essay question (see figure 8) usually requires the student to analyze previous information she has concerning some portion of nutritional care of the patient. Presently the model allows for multiple lines of type e i gives the student a general response containing the information needed to answer the question correctly. Future revisions of th. model will bring about a more sophisticated handling of this type of question in the programming. The computer will search for key words and phrases and give an appropriate response to the student.

RESOURCE C: NURSING CARDEX

1. DIAGNOSTIC TESTS/CONSULTATIONS
2. SAFETY PRECAUTIONS
3. ACTIVITY *
4. NURSING OBJECTIVES
5. TEACHING
6. DIET INFORMATION

figure 5

RESOURCE D: DRUG FORMULARY

106 DRUGS: CLASSIFICATION

ACTION

PRECAUTIONS

NUTRITIONAL IMPLICATIONS

figure 6

RESOURCE E: NUTRIENT CATALOGUE

320 FOOD ITEMS: 14 NUTRIENTS

ANALYSIS

figure 7

ESSAY QUESTION

2. DESCRIBE HOW HER MENU SELECTION FOR TOMORROW (7/30) HAS PROGRESSED FROM THE MENU SHE SELECTED FOR TODAY. (7/29). (TYPE 'DONE' ON A SEPARATE LINE WHEN YOU ARE FINISHED.)

MRS. LONG ASKED FOR LARGER PORTIONS.

DONE

MRS. LONG OBVIOUSLY WANTS LARGER PORTIONS. SINCE SHE SUGGESTS THAT LARGER PORTION SIZE IS PROBABLY THE WAY TO GO RATHER THAN INCREASED NUMBER OF ITEMS. PERHAPS YOU CAN INCREASE VARIETY TOMORROW.

figure 8

2. The true/false question is another type used in the model (see figure 9). This type of question may also require the student to respond analytically. For example: the question asks the student to analyze all the information she possesses that pertains to the dietary modifications required by the patient. She must then analyze the information she has about each food item presented and determine the appropriateness of the food items for her patient.

Other types of questions such as multiple choice, matching, and constructed response, are used in the model. At the present stage in the development of the model, many of the questions are at the drill and practice or recall level. As part of the future planned revisions, the quiz sections will be updated and these types of questions will occur most often in coaching sequences.

The interview section is a natural language simulation of the real-life clinical encounter situation. The student's objectives, during the simulation interview, just as in the real-life interview, are to obtain the patient's diet history, counsel and instruct the patient about his dietary modifications, and assist him in planning menus for the next day's meals. The student is automatically branched to the interview from the last question of the pre-quiz. She may begin the interview by asking history or menu questions or offering counseling statements. Figure 10 shows a sample print-out of the student/patient simulated interaction. No on-line evaluation of the student's performance occurs during the interview. The faculty evaluates the student's performance using the student's copy of the computer print-out. Prior to the post-simulation conference, the instructor will complete an evaluation form such as the one shown in figure 11. A more detailed description of

YES/NO TRUE/FALSE QUESTION

13. CONSIDERING THE PRINCIPLES OF THE POST-GASTRECTOMY DIET, INDICATE WHETHER EACH OF THE FOLLOWING ARE SUITABLE TO OFFER MRS. WADE WHEN YOU TALK WITH HER. (TYPE YES/NO FOR EACH ENTRY)

A. SHREDDED WHEAT AT BREAKFAST YES

CORRECT. WHOLE GRAIN OR REFINED CEREAL MAY BE USED ON THE P-G DIET.

B. FROZEN CORN AT LUNCH NO

COOKED VEGETABLES ARE SUITABLE FOR THE P-G DIET. HOWEVER, MRS. WADE MAY WISH TO WAIT A FEW DAYS BEFORE TRYING CORN.

C. SLICED PEACHES, GRAHAM CRACKERS AND 120CC FRESCA FOR 2 PM SNACK NO

RIGHT YOU ARE!

THIS SNACK DOES NOT CONTAIN A GOOD SOURCE OF __3__.

IRON

REMEMBER EACH FEEDING SHOULD BE A COMPLETE MEAL CONTAINING CARBOHYDRATE, PROTEIN AND FAT.

D. 120CC CREAM OF CELERY SOUP AT DINNER YES

YES, THEORETICALLY, SOUP CAN BE GIVEN ON A P-G DIET. HOWEVER, PATIENTS ARE INSTRUCTED TO CONSUME LIQUIDS AT THE END OF THE MEAL. MRS. WADE MAY NOT WANT SOUP BECAUSE IT WOULD GET COLD BEFORE SHE ATE IT.

E. CHERRY PIE AT DINNER NO

RIGHT. MRS. WADE MIGHT DUMP.

THIS ITEM CONTAINS LOTS OF __2__ __3__, WHICH SHOULD BE AVOIDED ON A P-G DIET.

figure 9

RESOURCE A: THE PATIENT

**C$Good morning, I am Ms. Smith, a Medical Dietetics student. I would
**like to help you select your menu for tomorrow and ask you a few questions
**about what you have been eating at home.

**H$Do you feel like talking with me this morning?

I feel O.K. Not sosick as before. You're a new one. Where's the
other woman?

**C$She's still here. I am a student who is here to gain experience by
**assisting you with your diet. Let's select your menu first this morning.

**M$For breakfast, we have grapefruit juice or pear nectar.

I thought I told them that I can't stand juice. Never could!!

I don't have to drink any, do I?

**C$No, it's not necessary, juice is a good source of certain vitamins,
**but other foods also contain those nutrients.

**H$Do you drink juice at home?

Don't drink juice if I can help it. Just never could stand the taste
of the stuff.

**Do you like fruit?

I like fruit O.K. Eat it for lunch when I can get it. Have canned
fruit mostly. But I like fresh fruit too.

**M$Then, for breakfast tomorrow, would you care for some fruit?

Fruit might be kinda good for breakfast. I'll take a banana.

STUDENT NAME _____

CASE NO. _____

PLAN

COMPUTER PRINT-OUT EVALUATION

	POSSIBLE POINTS	POINTS EARNED
ANSWERED ____ OUT OF ____ QUIZ QUESTIONS CORRECTLY THE FIRST TIME.	5	
LISTED ____ OUT OF ____ NUTRITIONAL CARE OBJECTIVES.	5	
OBTAINED ALL AVAILABLE DIET HISTORY INFORMATION BY ASKING APPROPRIATE QUESTIONS.	5	
DIET HISTORY RECORDED APPROPRIATELY	4	
MENU SELECTIONS CORRECT	2	
APPROPRIATE ADDITIONS TO CARDEX CARD.	2	
MADE SUFFICIENT AND APPROPRIATE COUNSELING STATEMENTS	4	
TOTAL	25	

the interview section can be found in the paper "NATLAN - A Model for SIMULATION" by Judy Sutherland, a presentation of which is to follow.(6)

The post-quiz is similar in format to the pre-quiz. The objectives of the simulation post-quiz, just as in the real clinical experience post-interview conference with the instructor, are to review the diet history obtained in the interview, evaluate the menu selection, and discuss nutritional care plans. Since the student's real clinical encounter encompasses two days with the same patient, the model also simulates two days with the same patient for the student.

The development of a model encompassing so many different concepts and strategies did not occur without some problems. The major problem was that a great deal of disk space was required to store the entire model. Several data banks, a response file for the natural language section, the control labels, and all the case-specific material was initially contained in one course area. The problem of course management became most crucial when reorganizing the course in order to obtain more space or enlarging the course area for addition of new material. For any course management function to occur, the entire course had to be made unavailable to students for periods of up to a day at a time. For this reason, it was decided to segment the model. This involved creating a new, smaller course area for each case and moving all case-specific material into that area. The control labels and the foods and drugs data banks remained in the original area, now called 'plan-00'. Each case now branches between its segment and 'plan-00' for control label directions. (Figure 12 is a schematic drawing of the segments as they are now organized.) This segmentation process proved to be very simple. Course management is now a less time-consuming process for the course management supervisor because only one small

ORGANIZED SEGMENTS

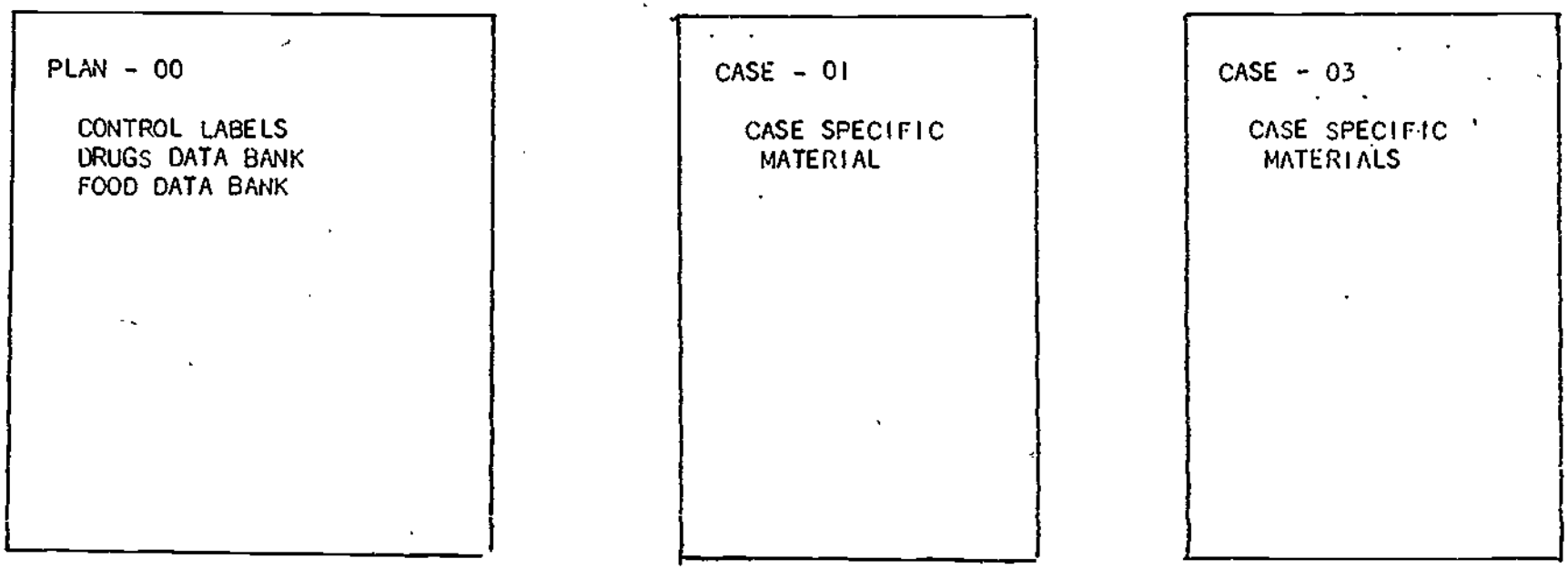

figure 12

area needs to be considered instead of the large bulk of material which existed before segmentation. It is also possible to move cases currently not in use to an off-line storage area, releasing more space in the course area. There is little or no inconvience now to the students since specific courses can be worked on without having to make the entire program unavailable to students.

To meet the need for generating new cases as quickly as possible, the macro capability of Coursewriter was used. A macro, as defined in the Coursewriter III Applications Manual, is a capability of the Coursewriter III language, which permits the authors to write and generate "frequently used course statement sequences in a skeletal form". All of the labels and general branching statements for the Medical Record, Nursing Cardex, and quiz sections are generated by macros. All of the case-specific Medical Record and Nursing information now can be input by a secretary. The quizzes initially could be completed in this manner, but because of the increasing sophistication of the authors and the educational strategies used, the quiz sections are becoming more complex in their presentation, specifically, more educational strategies and sequences are used and macro generation can not always be utilized. When weighing the time saved by macro generation of the quizzes against the increased complexity of the question presentation, the project staff has decided that the educational strategies used outweigh the advantage of rapid generation of the quizzes. Evaluation methods and ongoing research has been conducted throughout the 4 years since 'plan's inception. To briefly summarize the results, when comparing the student's academic performance (the comparison being drawn between an experimantal group having a combination of real and simulated clinical encounters and a group having only real clinical encounters)

there was no significant difference in overall three quarter numeric and final grades. When using a Clinical Comfort Scale, it was found that the students having the combination real and simulated clinical encounters were reporting a slightly higher level of interactional and environmental comfort in the clinical situations.(5)

This simulation model has potential applications beyond that of instructing undergraduate Medical Dietitian students. For example, given the fact that the Medical Dietetics Division at Ohio State was the first in the United States to have a coordinated program for instruction in the clinical components of Medical Dietetics and knowing that PLAN is a simulation of part of that coordinated program, the University of Texas is considering using the model as inservice education for their clinical instructors.

Continuing Education is another application of this model. PLAN is now accredited by the American Dietetics Association for 57 hours of continuing education credits or a maximum of 7 hours credit for each case.

In addition to these applications of the specific program PLAN, it is proposed that this model may be used in any 'micro-teaching' situation where a similar teaching sequence is used and a combination of teaching strategies is desired.

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