Clinical Decision Making in Nursing: A Comparison of Simulations and Practice Situations

by

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TABLE OF CONTENTS

PAGE

APPENDICES

LIST OF TABLES

CHAPTER I

Introduction

Simulations have been used for over two decades as 1) a method to evaluate performance of nurses and nursing students and 2) the basis for a significant portion of the research in clinical judgment. For the first purpose, subjects read or viewed simulations, then identified the patient's problems and described actions that they would take related to the problem (Del Bueno, 1983; deTornyay, 1968a). The subjects were then evaluated on the accuracy of their decisions. For the second purpose, simulations have been used to study processes of clinical judgment (e.g., Tanner, 1982; Tanner, Padrick, Westfall, & Putzier, 1987; Corcoran, 1986a, 1986b), examine correlates of clinical judgment performance (e.g., Tanner, 1982; Davis, 1972, 1974; Verhonick, Nichols, Glor, & McCarthy, 1968), and evaluate the effectiveness of instructional methods (e.g., deTornyay, 1968b; Tanner, 1982).

Research on decision making is important to the improvement of nursing practice. The delivery of quality health care requires that clinicians be able to make accurate decisions efficiently and effectively. Research in the area of clinical decision making should be useful to the education of future and practicing nurses. There is an emphasis in many schools of nursing on clinical decision making skills. It is somewhat difficult to teach these skills when so little scientific knowledge is available. The continuing education of practicing nurses could also be

improved if more were known about clinical decision making. Assistance could be given so that these nurses could become better decision makers, making decisions more effectively and efficiently.

Simulations used for studies of clinical decision making have ranged from low-fidelity to high-fidelity (Elstein, Shulman, & Sprafka, 1978). Low-fidelity simulations are those in which human beings are replaced by paper or film representations. High-fidelity simulations use trained actors to play the part of patients. High face validity is achieved through the use of these high-fidelity simulations. According to Elstein et al., written simulations have the lowest fidelity, videotaped or filmed simulations have moderate fidelity, and simulations using trained actors have the highest fidelity.

Clinicians' response formats to the simulations may be written, verbal, action oriented, or any combination of the above. The written responses may be open ended or may require subjects to select from alternatives provided to them. Verbal responses may be a description of information that the subject attended to or answers to specific questions such as identification of the problem presented in the simulation. Subjects may also be requested to perform actions that they might normally do in a situation similar to that presented in the simulation. They are usually then requested to describe what they have done.

The major advantage to using simulations in research is that the problem solving situations can be held constant so

that the relationship between situations and other reasoning factors can be examined. Moreover, simulations are generally easy to administer and usually have a "correct" answer that is known to the examiner. This allows the investigator to have a criterion against which to compare each subject.

Recent findings and an integrative review by McGuire (1985) have raised the question of the extent to which clinicians' responses to simulated patients would be similar to what they actually do in practice. There are many ways in which differences between simulated and actual patients could affect clinical performance. For example, subjects may not become engaged with the hypothetical patients portrayed in the simulations. Subjects may also take more risks because they know that no real patient will be endangered by their actions. These differences may affect the cognitive strategies used in decision making, as well as the actual decisions made by the subjects after viewing a simulation.

One alternative to using simulations is, of course, observation of clinicians in actual practice. The limitations of this approach are many. For example, it is not possible to predict when a decision will be made by a clinician, therefore, it may be necessary to observe the subject for long periods of time. During that observation time, decisions of the type desired for the research may or may not occur. Another limitation is that the presence of an observer may change the interaction between the subject

and the patient. The subject may change the way in which decisions are usually made because of the observer, and the patient may react differently because the observer is present. Moreover, it may be difficult to determine when a subject is making a decision through simple observation. However, some of the difficulties encountered with the observation of nurses in practice may be resolved by requesting nurses to describe decisions they have made in practice. By requesting nurses to describe decisions made in practice, observers would not be present during the interaction; consequently they would have no effect on the interaction. In addition, the subject would know that a decision had taken place and an observer would not need to make the determination that a decision was being made. However, this methodology has its difficulties which will be discussed in a subsequent section.

A study comparing simulations and practice is both important and timely. This comparison could give direction to future research in clinical reasoning. If the performance between the two situations is similar, the research with simulations should continue and perhaps be increased. However, if the use of simulations produces different strategies and thinking processes than those used in practice, it may be more useful for more research related to clinical decision making to be conducted in the practice setting. Although this type of research is more complex and not well-suited to experimental manipulation, the findings may be more valid.

The purpose of this study was to determine if the decision making processes used in pain management by hospice nurses differed when responding to a simulation from those processes used in an actual clinical situation. A secondary purpose was to investigate selected factors in the two different conditions (simulation or practice) which may account for any differences.

Review of the Literature

Before the literature in decision making is summarized, it is necessary to define and distinguish among the terms commonly used in the literature such as problem solving, decision making and diagnostic reasoning. However, a distinction among decision making, problem solving and diagnostic reasoning is not always clear. In many cases it is difficult to make the distinction because the overlap among the three concepts is great and experts in the field do not always agree about the distinction. Some tend to use these words interchangeably (Slovic & Lichtenstein, 1971).

Anderson (1985) states that problem solving in general, has three essential features: 1) goal directedness, 2) subgoal decomposition, and 3) operator selection. Problem solving behavior is organized toward achieving a goal. There is a need to decompose the goal into subgoals and an action or operator is available for selection to achieve the subgoals. Elstein and associates (1978) have described problem solving in medicine as the process of making adequate decisions with inadequate information.

In Elstein et al.'s (1978) definition, decision making

becomes a subset of problem solving. On the other hand, decision making can be viewed as making choices among alternatives (Billings & Scherer, 1988). The decision may have certain or uncertain outcomes, subjects may assign different values to the outcomes, and many people may or may not have conflicting interests in the decision. Tanner (1989) describes clinical decision making as the rational processes of clinical judgment. She elaborates on this definition by stating that clinical decision making involves collecting and analyzing information, generating alternatives and choosing among the alternatives to achieve patient care goals.

Diagnostic reasoning usually refers to the processes in which the clinician attends to presenting signs and symptoms, generates hypotheses to explain the signs and symptoms, collects information to confirm or disconfirm the hypotheses, evaluates the hypotheses in light of the information and determines a diagnosis (Tanner, 1989). Diagnostic problem solving and diagnostic reasoning have been used interchangeably in the literature (Tanner, 1983).

For the purposes of this study, clinical decision making was defined as the choice(s) that a hospice nurse made among alternatives. The hospice nurses were required to choose among intervention alternatives for pain management and hence, make a decision related to the patient's pain control regimen. This definition assumes a rational process of generating alternatives from which the subject can choose.

The review of the literature consists of summaries of

studies in three areas: 1) those that use simulations as the stimulus material, 2) those conducted in practice, and 3) those that compare performance in practice to that on simulations. Studies that include both nurses and other health care professionals as the sample are included. Although the content around which the clinical decision making is performed differs among health care professionals, it was assumed that the processes used are similar.

Studies Using Simulations

Studies Describing Processes

There have been three nursing and five medical studies that used simulations as the stimulus material to describe cognitive processes. Corcoran (1986a, 1986b); Tanner (1982); and Tanner et al. (1987) have investigated the processes nurses and/or nursing students used to make decisions. Barrows and Bennett (1972); Elstein et al. (1978); Kassirer and Gorry (1978); Mancuso and Rose (1987); and Neufeld, Norman, Feightner and Barrows (1981) investigated the processes that medical students and/or physicians used to make decisions.

In Tanner (1982) and Tanner et al. (1987), one of the study purposes was to describe processes of diagnostic reasoning. In both, moderate-fidelity videotaped simulations were used. Subjects were instructed to think aloud as they sought additional information, derived nursing diagnoses and determined nursing management. In both studies, the thinking aloud was tape recorded and transcribed for analysis.

In Tanner's (1982) first study, eight dependent variables were investigated. These included knowledge, number of early tenable hypotheses generated, total number of tenable hypotheses generated, number of cues observed in the videotaped simulation, the validity and dependability of cues sought, accuracy of nursing diagnosis, patient care management ability, and the quality of the search strategy. A written examination, with a split-half reliability of .92, tested factual knowledge. The remaining variables were obtained from the verbal protocols generated by the subjects after viewing the videotaped patient situations. Interrater reliability for those seven measures ranged from .845 to .978.

Tanner (1982) found a positive relationship between the formulation of diagnostic hypotheses and the quality of the information search and diagnostic accuracy. However, the relationship between the early formulation of hypotheses and diagnostic accuracy decreased when the quality of the information search was controlled. Tanner also noted that the subjects appeared to be more accurate if they generated the correct hypothesis in the initial set of hypotheses.

In their study of diagnostic reasoning, Tanner et al. (1987) were interested in three concepts: 1) diagnostic hypotheses, 2) data acquisition and 3) accuracy of diagnosis. Diagnostic hypotheses were scored as the number of accurate or possible hypotheses. The earliness with which the first diagnostic hypothesis was activated was also determined. Data acquisition was scored as the number of

questions that a subject asked during the verbal protocol and the rating of the predominant strategy used. Strategies were classified into five categories: 1) hypothesis driven, 2) cue-based, 3) review of systems or routine, 4) answers to one question lead to next question and 5) random, nonsystematic.

Tanner and associates (1987) found no consistent significant differences among junior and senior nursing students and practicing nurses on measures of diagnostic reasoning except on accuracy. Nurses were more accurate in their final decision than the junior and senior nursing students. There was a trend toward the use of more systematic data gathering strategies with practicing nurses. There were no differences on number of hypotheses activated, earliness of the activation of the hypotheses, and number of questions asked.

Corcoran's (1986a, 1986b) study described the initial and overall approaches to planning used by hospice nurses under different levels of task complexity. She used three low-fidelity, written patient simulations that depicted three types of chronic pain and three levels of complexity for decision making. Subjects were given a simulation, asked to read the simulation aloud, develop a drug administration plan and write the plan. Subjects were instructed to think aloud as they performed each task. These verbalizations were audiotaped and transcribed for analysis. The verbal protocols were analyzed for initial approach, overall approach and quality of the final plan.

The initial approach was classified as either broad or narrow. A broad initial approach was one in which the subject mentioned a number of pain related problems in the beginning of the protocol. A narrow approach was one in which the subject focused on one problem initially. The overall approach was defined as either opportunistic or systematic. An opportunistic overall approach was one in which the subject jumped from problem to problem. In a systematic approach, the subject focused on one problem before moving on to the next. The quality of the plan was judged to be either consistent with the consultant's plan, appropriate for the case but not consistent with the consultant's plan, incomplete, or erroneous.

Corcoran (1986a, 1986b) found that the subjects varied the number of alternative actions generated and the proportion of actions evaluated as a function of task complexity. Experts generated more drug alternatives and developed better final plans than did novices. Experts evaluated only a portion of their alternative actions; novices varied their approaches to evaluation dependent upon the case situation. There was no relationship between task complexity and the quality of the plan developed.

In a series of studies of physicians' clinical problem solving processes, Elstein and associates' (1978) used high-fidelity simulations in which trained actors portrayed patients. The interaction between the patient and the physician was videotaped. Physicians were asked to perform a consultation as they would in practice. The actors

provided the patient history upon questioning. The physical examination information was provided by an assistant who acted as a data bank, providing information to questions asked about physical exam items. The physician was asked to think aloud during the consultation. After the subject finished the consultation, the videotape was reviewed to stimulate the subject's memory. Subjects were asked to recall what they had been thinking during the consultation. Elstein et al. described a general model of diagnostic reasoning which included four components: 1) narrowing the search field, 2) hypothesis generation, 3) data acquisition, and 4) hypothesis evaluation. One of their findings was that hypotheses were generated early in the clinical encounter.

Barrows and Bennett (1972) and Neufeld et al. (1981) used similar methods in their studies of clinical decision making. One of the purposes of the studies was to describe clinical decision making processes. Both studies used high-fidelity simulations with trained actors who portrayed patients. Subjects were asked to perform a consultation exactly as they would in practice. The subjects were videotaped and monitored by an observer through a one way glass. The observer wrote down what he thought the subject was thinking about as the subject did the consultation. The subject was then interviewed and reviewed the performance on the videotape. The subject was asked to describe what he had been thinking as he asked each question and performed each maneuver.

Barrows and Bennett (1972) found that subjects generated hypotheses about the diagnosis early in the encounter with the patient. The subjects would then ask questions about their hypotheses until they decided that the questioning was no longer productive. They would then switch into routine questions. This switch into the routine questions allowed subjects to search for additional information and to ponder the patient's problem without appearing confused to the patient. If a positive response occurred, subjects would return to the hypothesis driven strategy of questioning.

Neufeld et al. (1981) used medical students and physicians in their study. They found little difference among groups. Early hypothesis generation occurred in all groups, usually within the first 30 seconds of eliciting the chief complaint. The number of hypotheses and the extent to which questions were testing hypotheses were all similar. Senior students and physicians did collect more relevant data than junior students. The content and specificity of the hypotheses increased with education.

Kassirer and Gorry (1978) studied six physicians decision making behavior using one case situation. The purpose of this study was to describe problem solving behaviors used by physicians. One of the authors played the part of the patient and acted as a respondent rather than as the patient. Using a script, the respondent would answer the subject's questions. Verbal protocols were recorded and transcribed. Analysis of the protocols generated a description of problem solving behaviors used by physicians.

They found that the subjects made specific diagnostic hypotheses with little more information than the presenting complaint. They also found that subjects used a common approach to evaluating hypotheses. They would request information, reject some initial hypotheses, substitute specific hypotheses for general ones and then select a few hypotheses for more detailed testing.

Mancuso and Rose (1987) used low-fidelity, written simulations of angina patients with 18 internists who had been practicing from one to 50 years. The purpose of their study was to describe a general pattern of decision making. They used a process tracing methodology in which the decision making process was described from verbalizations made by the subjects during each step of the problem solving. Each subject was interviewed individually and asked to recommend and explain treatment choices for three hypothetical patients. The responses to the interview were recorded in field notes. After all of the interviews were completed, the investigators described a general pattern of decision making through inductive analysis. This general pattern had three successive stages: 1) focusing on a few facts (focal points) and evaluating each focal point with respect to the treatment options, 2) reassessing each focal point in light of the other focal points and uniting the picture, and 3) summing the values of each focal point to reach a final decision.

In summary, the findings from the studies using lower fidelity simulations (Corcoran, 1986a, 1986b; Mancuso &

Rose, 1987; Tanner, 1982; and Tanner et al., 1987) were similar to those using high-fidelity simulations (Barrows & Bennett, 1972; Elstein et al., 1978; Kassirer & Gorry, 1978; and Neufeld et al., 1981). This may be because the fidelity of the simulation does not make a difference in the processes used by the subjects. Although high-fidelity simulations are assumed to represent an actual patient situation more faithfully than a low-fidelity simulation, the fact still remains that the patient in the simulation is not real and actions taken by the subject will not affect the patient.

Additionally, the researchers in these studies describing the processes used in decision making found that a hypothetico-deductive method was employed. Generally, the subjects would begin with an impression, generate hypotheses early in the encounter, collect data to test the hypotheses and make an evaluation based on the information gathered. Most practitioners, whether experienced or not, used this general process. Differences between the experienced and inexperienced usually existed in the amount of information obtained and the accuracy of their diagnoses. Experienced practitioners tended to gather less information and be more accurate.

As McGuire (1985) queried in her review of medical problem solving research, are these findings due to the methodology employed in the studies? It is possible that different processes might be uncovered if a different methodology was used. The tasks used in the simulations may

not be representative of tasks in the real world. The presentation of the information in the simulation may not represent the manner in which information is usually presented in practice. In addition, there is some evidence that the decision making processes differ depending upon the task presented (e.g., Elstein et al., 1978). Different processes and differences between experienced and inexperienced clinicians may become evident if actual clinical encounters are used as the stimulus material for research in decision making.

Studies Evaluating Decision Making

Baumann and Bourbonnais (1982); Davis (1972, 1974); Del Bueno (1983); Thompson and Sutton (1985); and Verhonick et al. (1968) used simulations to evaluate clinical decision making abilities of practicing nurses but did not describe the processes used. Benbassat and Bachar-Bassan (1984); and Norman, Tugwell, Feightner, Muzzin and Jacoby (1985) studied physicians and medical students using simulations to evaluate clinical decision making abilities.

Verhonick et al. (1968) were interested in identifying the nuances that the nurse observed in a patient situation that lead to a nursing action. They developed a moderate-fidelity film of five simulated patients. After viewing the film, respondents described in writing, what they observed, what action they would take based on what they saw and what led them to take the action. Observations were classified into five categories and then defined as 1) relevant, 2) irrelevant and 3) inappropriate to the

situation. The major categories for actions were: 1) therapeutic, 2) supportive, and 3) inappropriate. Therapeutic actions were those that needed to be prescribed by another health care provider. Supportive actions were those that did not require medical prescription and were voluntary nursing actions requiring nursing knowledge, skill and/or judgment. Verhonick et al. found that instructors and practitioners with one to six years of experience made the largest percentage of relevant observations. The number of relevant observations made increased progressively with the academic degree held. The higher the academic degree the more likely they were to relate the supportive action to observations made.

Davis (1972, 1974) conducted two studies using Verhonick and associates' (1968) filmed patient situations. In both studies, Davis hypothesized that clinical nurse specialists would perform better than baccalaureate nurses. She used similar data collection procedures as Verhonick et al. In both studies, Davis found that the clinical nurse specialists did perform better than the baccalaureate nurses. They made significantly more relevant observations, suggested a greater number of significant actions based on their observations and gave more appropriate reasons for the actions.

The purpose of Del Bueno's (1983) study was to evaluate the effectiveness of simulations to assess nurses' clinical decision making skills. She used videotaped simulations and data collection procedures similar to Verhonick et al.

(1968). She found that nurses' educational preparation and experience correlated with the number of correct answers. Baccalaureate graduates made fewer errors than associate degree or diploma graduates. Experienced nurses obtained the most correct answers. She investigated the reasons for some of the nursing actions and found that some practitioners gave incorrect rationale for correct actions. She also found that correct rationale was given for inappropriate actions.

Baumann and Bourbonnais (1982) conducted a study of 50 critical care nurses in Canada using a low-fidelity, written case study. The purpose of this study was to explore the decision making of nurses in crisis situations. The subjects read a case study and responded to a semi-structured interview. Interviews were audiotaped and transcribed for analysis. They found that nurses stated that knowledge and experience were the most important factors influencing rapid decision making, that subjects could identify appropriate decisions in a crisis situations but had difficulty giving a rationale, and that many decisions for critically ill patients were made prior to obtaining physician assistance.

Thompson and Sutton (1985) replicated the Baumann and Bourbonnais (1982) study with 20 coronary care nurses in the United Kingdom. The results of the study were similar to those of the Baumann and Bourbonnais study. Knowledge and experience were the most important factors in making a rapid decision in a coronary care unit and nurses agreed on the

priority actions to be taken.

In a study of two levels of medical students and board certified physicians, Benbassat and Bachar-Bassan (1984) used two low-fidelity, written clinical simulations. They were interested in the differences among the three groups. The subjects were given the written simulations and asked to list their initial diagnostic hypotheses. They found that junior students had fewer and less specific hypotheses. Senior students' hypotheses were similar to internists in number and specificity. However, senior students made hypotheses that were rare and virtually nonexistent in the age groups of the patients in the simulation. Benbassat and Bachar-Bassan concluded that medical students lack familiarity with alternative hypotheses and use diagnostic probabilities inappropriately.

In a study by Norman et al. (1985), eight high-fidelity clinical simulations were developed and depicted by trained actors. The purpose of the study was to examine the relationship between content knowledge and problem solving. Subjects saw four to eight of the simulated patients. Each patient encounter was videotaped for subsequent review. Subjects also completed a structured medical record containing diagnosis, further tests required and a treatment plan. The performance of the subjects was evaluated by five measures: 1) significant data gathered, 2) critical significant data gathered, 3) diagnosis, 4) further tests required and 5) formal knowledge tests. Norman et al. found that the knowledge scores were not significantly

related to any of the other scores. There was also no relationship between knowledge scores and content differences in the simulations. There were no significant relationships among the scores when the content related to the same problem.

In summary, the research using simulations to evaluate decision making found that increased education was associated with better decision making. Practitioners with increased experience were better decision makers than the inexperienced. However, the performance of the practitioner tended to decrease after six years of experience (Davis, 1972, 1974; Verhonick et al., 1968). Once again, the use of simulations may have precipitated these findings. Practitioners with more experience may not have performed as well on the simulations because they did not perceive the simulations as representing reality and did not try as hard as they might in practice. In addition, there is more sensory information such as smells, color changes, available in practice than on simulations. The nurses with more experience may have needed that information in order to perform well on the simulations.

Other Studies Using Simulations

Grier (1976); and Shanteau, Grier, Johnson and Berner (1981) conducted studies using low-fidelity, written simulations. They were interested in investigating the usefulness of decision analysis in assisting nurses with their decision making abilities. Hobus, Schmidt, Boshuizen and Patel (1987) described the differences between novices

and experts in their abilities to use contextual information about a simulated patient in making a diagnosis.

Grier (1976) studied 47 nurses using four written patient situations. The purpose of this study was to determine if an intuitive decision was in agreement with a decision made using quantitative techniques. Subjects were asked to read the simulations and then rank three possible nursing actions. The ranking was based on which action was best for the patient described. They were then asked to determine the probability that a given outcome would occur as a result of the action, and the value of the outcome for the patient. Expected values were calculated by multiplying the probability of the outcome occurring by the value of the outcome and summing across outcomes for a given action. Results were significant agreements between the expected values and the ranking of the actions. The preferred action had the highest expected value for 109 of 185 decisions investigated.

Shanteau et al. (1981) studied 115 nursing students divided into three groups and 7 nursing faculty. The purpose of this study was to evaluate the effectiveness of teaching decision making skills to nurses. Pre-tests consisting of written clinical simulations were administered to measure nursing decision making skills related to information acquisition, making nursing diagnoses and choosing nursing actions. A course about decision making in nursing was presented to two groups of students; the other students served as controls and did not take the course. A

post-test which was similar to the pre-test but covered different clinical content was administered to all students. The major conclusions from the study included: 1) The pre-test results indicated that the nursing students gathered too much information, did not use probabilities accurately, and were making ineffective choices of actions. 2) Some nursing decisions could be improved by providing a course in decision making. 3) Acquisition of information and choosing nursing actions were improved following the course. The ability to use probabilities in making nursing diagnoses was not improved by the course.

Hobus et al. (1987) compared the performance of expert and novice physicians using slides of patients and portions of their charts. The purpose of the study was to determine if contextual information had a role in the generation of initial diagnostic hypotheses. It was hypothesized that experts were better able to use contextual information to make a diagnosis. Contextual information included non-verbal behavior, appearance, past medical history, occupation, marital status, family history and risk factors. The subjects were shown a portrait of a patient followed by the patient chart and the presenting complaint. No physical examination or present illness history was available. The subject was then asked for the most likely diagnosis which was audiotaped and transcribed. After the most likely diagnosis had been made for each of the cases, the presenting complaint and the tentative diagnosis were read to the subject. The subject was then asked to recall the

information embedded in the case that gave rise to the diagnosis. The results showed that the experts were significantly more accurate in their diagnoses than the novices. The experts also recalled significantly more total information about the patient than the novices. The experts recalled significantly more relevant information than the novices. There was no significant difference in the amount of irrelevant information recalled. Hobus et al. concluded that expert physicians use contextual information to solve diagnostic problems when information about the presenting complaint is limited.

Summary

In both nursing and medicine, research has been conducted using simulations to stimulate the subjects' thought processes. Most of the studies have described the decision making process the subjects have used. The fidelity of the simulated patients has ranged from written cases to actors portraying patients. Most of the studies have found that hypotheses are generated by the subjects. Other factors such as expertise, knowledge, contextual information and task complexity were examined for their relationship to the decision making process by some of the studies. In general, experienced practitioners performed better than less experienced. However, this was not a consistent finding. Part of this inconsistency may be due to the inability of the simulation to elicit true differences between groups of subjects. The relationship between knowledge and decision making ability was not

consistent. Subjects varied their approaches according to the task complexity. However, none of these studies compared performance of the subjects in practice with that on a simulation. It is unknown if their performance would be equivalent.

Although the findings from studies using high-fidelity simulations are similar to those using low-fidelity simulations, it cannot be assumed that the findings would be similar if a practice situation had been used. High-fidelity simulations are assumed to more faithfully represent reality; however, subjects are still aware that the patients are not real. The decision making processes may be affected by the knowledge of this fact.

Studies Using Practice Situations

Phenomenology as Theoretical Framework

Three studies describing clinical judgment of nurses in actual practice have been conducted. Benner (1984); Benner and Tanner (1987); and Pyles and Stern (1983) studied nurses' experiences in clinical practice while making decisions about patient care. These studies used phenomenology as their theoretical framework.

Benner (1984) interviewed experienced and inexperienced nurses about patient situations that stood out in their minds. These interviews were interpreted by the research team and consensually validated. Based upon these interpretations, five categories of skill acquisition were identified: novice, advanced beginner, competent, proficient and expert. The novice's behavior was rule

governed while the expert used a holistic approach to the situation. The novice used theories and factual knowledge to make decisions while the expert was able to base decisions on past experience. Experts were better able to become involved with their patients because they had insight into the patients' "lived experiences". It is important to note that the term "novice" referred to anyone with limited experience in a particular situation. An expert adult critical care nurse becomes a novice when faced with a chronic pediatric patient.

Benner and Tanner (1987) studied 21 expert nurses to identify the role of intuition in clinical judgment. The nurses were interviewed three or more times and observed in their practices. The interviews consisted of narrative accounts of situations in which the nurse made a difference in the patient's outcome. Dreyfus and Dreyfus (1985) have posited that there are six key aspects of intuitive judgment: 1) pattern recognition, 2) similarity recognition, 3) commonsense understanding, 4) skilled know-how, 5) sense of salience, and 6) deliberative rationality. Pattern recognition is the perceptual ability to recognize patterns within a situation without the use of a context-free list. Similarity recognition is the ability to recognize that a situation is somewhat similar to other situations even though there are many differences between the situations. Commonsense understanding is being able to have the flexibility to understand a situation without having to adhere to a set of rigid rules; the ability to

tune into another person. Skilled know-how occurs when a skill becomes second nature, when one no longer has to think about doing the skill but the skill becomes an extension of the body. People have a sense of salience when they can hone in on the relevant and ignore the irrelevant. Deliberative rationality is a way to perform a perception check on oneself. The intuitive decision maker uses alternative perspectives to determine if tunnel vision has developed. From their interviews and observations, Benner and Tanner described many examples of these aspects of intuitive judgment.

Pyles and Stern (1983) interviewed 28 critical care nurses about the early detection and prevention of cardiogenic shock in patients with acute myocardial infarction. They found that the nurses used a combination of knowledge, past experiences, identification of cues presented by patients, and sensory input including "gut feelings" to make decisions about whether or not a patient was developing cardiogenic shock. They referred to this combination as "nursing gestalt". This is similar to Benner and Tanner's (1987) description of pattern recognition by expert nurses.

Information Processing as Theoretical Framework

Two studies of decision making of physicians and medical students have been conducted using patient situations as the stimulus material. In one study, the patient was an actor but the subjects were not cognizant of this fact. Both of the studies used information processing as their theoretical

framework.

In research by Lutz, Schultz, and Litton (1986), 13 residents with varying number of years of experience and two faculty physicians were studied. The purpose of the study was to describe the process of decision making using "actual" patients. Interactions with simulated patients were videotaped. The study considered the interactions with the patients to be close to actual clinical situations because the subjects did not know the patients were actors. This was accomplished by obtaining consent from the subjects two to six months prior to the videotaping and not informing the subjects which patients were simulated until after the interaction. The videotapes were reviewed with the subjects. The results indicated that 12 of the 15 subjects had generated at least one diagnosis at the end of 30 seconds. All subjects had generated a diagnosis by the end of three minutes. The final diagnoses were the same at the end of history taking as at the end of the first three minutes. Seven of the subjects became more specific in their diagnoses over time. The two faculty members went from having the lowest percentage of specific diagnoses in the first 30 seconds to the highest percentage of specific diagnoses after the first three minutes. There were no significant differences among the different groups (based on number of years of experience) with respect to number of diagnoses considered nor specificity of the diagnoses.

Barroso (1985) studied 18 medical students who had just finished a course in interviewing. The purpose of the study

was to test a new system for classifying information gathering questions in a clinical interview. The categories were: 1) derived questions, 2) new questions, 3) returns, 4) developments, and 5) verifications. Derived questions were opening questions which could be traced to the patient's verbalizations. New questions were opening questions whose basis could not be readily ascertained although they appeared to be similar to standard review of systems questions. Returns were questions that re-opened areas that had previously been explored. The return emerged as a sudden departure from the line of inquiry that the subject had been pursuing. A development was a question that continued to build on the area being covered currently. Verifications were attempts to clarify the patient's statements or to establish the accuracy of a particular piece of information. In this study, two patients were each interviewed by nine medical students. All interviews were audio and videotaped. The students were told the patient's diagnosis and drug treatment. The results showed that there was wide variation in the number of each type of question asked among the subjects. Barroso concluded that differences in information gathering appear to be unrelated to knowledge and experience and were already present at a early stage of training. He also found that there was a significant inverse relationship between derived questions and new questions. Derived questions and their developments were not significantly correlated. New questions and their developments were highly correlated.

Summary

Studies using actual patients in nursing and medicine have focused on different aspects of clinical decision making. The studies in nursing described categories of expertise, intuitive judgment and factors related to nurses' decision making. The studies conducted with physicians and medical students continued to describe a hypothetico-deductive process being used to make decisions. As with the simulated patients, the subjects using "actual" patients still generated hypotheses. Barroso's information gathering categories are not comparable to those described by investigators using simulated patients. Once again, however, the performance of the subjects in actual practice was not compared to their performance on simulations.

The studies in medicine have continued to study the hypothetico-deductive processes of decision making. As described above, there was some similarity between the findings in the studies using simulations and practice as the stimulus material. The studies in medicine have continued to use information processing as their theoretical basis. In nursing, however, the studies using practice as the stimulus, have used a phenomenological perspective as their theoretical basis. This may account for some of the differences between the findings in the studies in nursing and medicine. It may also account for the differences between the findings in the studies in nursing using simulations and practice as the stimulus material. It is also possible that the intuitive processes described by

Benner and Tanner (1987) would not be elicited by simulations. Intuition requires holistic gathering of information. Simulations do not contain all the information available in practice. Because of this difference, intuitive processes may not be possible on simulations.

Studies Comparing Simulation with Practice

In the nursing literature, few studies have been conducted to investigate if simulations are related to actual clinical performance (e.g., Holzemer, Schleutermann, Farrand, & Miller, 1981; Dincher & Stidger, 1976). The results have been mixed but generally, they have not supported the hypothesis that performance on simulations is directly related to performance in actual practice. These studies used low-fidelity simulations. A study with pharmacists (Page & Fielding, 1980) also used a low-fidelity simulation to compare performance with a high-fidelity, very close to practice situation. A study in medicine (Norman, Tugwell, & Feightner, 1982) used high-fidelity simulations for the comparison.

Low-Fidelity Simulation and Practice Comparison

Three of the studies that compared simulations with practice used patient management problems for the simulation. Patient management problems (PMP) are paper and pencil, branched simulations and would be considered low-fidelity. Subjects select from various decisions, their desired order of approaching the patient's care as well as items judged essential to safe and quality care. Items are classified as essential, contributory but not essential, and

inappropriate. An item is essential and assigned a value of 1, if it is deemed essential to data collection, differential diagnosis, management, evaluation and/or follow-up; is deemed essential to safe and quality care practice; and/or is cost-effective. An item is classified as contributory but not essential and assigned a value of 0, if it contributes to data collection, differential diagnosis, management, evaluation and/or follow-up, but is not essential to safe and quality care, and/or the benefit might outweigh the cost. An item is inappropriate and assigned a value of -1, if it is inappropriate to data collection, differential diagnosis, management, evaluation, and/or follow-up in consideration of the chief complaint; is unsafe; unreasonably costly; and/or delayed proper treatment. Total, efficiency and proficiency scores are calculated using the classification scheme. The total score is the sum of the essential, contributory and inappropriate items. Efficiency is the sum of the positively weighted items (essential) chosen divided by the total number of choices made. Proficiency is the sum of the essential and inappropriate items chosen divided by the maximum possible score.

Holzemer et al. (1981) studied 79 nurse practitioners and their performance on a patient management problem (PMP) with measures related to actual clinical practice. Subjects completed a PMP, cognitive examination, chart audit, self-evaluation rating scale and colleague evaluation rating. All instruments were administered by mail. The

self-chart audit was a questionnaire that requested demographic information about the patient to be audited and a checklist of 24 patient care activities. The checklist included items necessary for the assessment and management of acute, uncomplicated pneumonia. The self- and colleague evaluation rating of clinical practice were parallel 20 item instruments. Items were scored as data gathering, management and total. The scale had four levels of practice which ranged from "knowledge only" to "ability to perform without supervision." There were no significant relationships when PMP performance was compared with colleague evaluations and the chart audit. There was a significant relationship with the self evaluation. However, Holzemer et al. did not directly observe the nurse practitioners in practice and compare that performance with the simulation findings.

Dincher and Stidger (1976) also used PMPs to measure the ability of subjects to make clinical nursing judgments. They examined construct and concurrent validity by comparing the rank order of the subject's performance on the PMP with the rank order of the subject's performance in clinical as evaluated by clinical instructors. There was a significant relationship between the two rank orderings when the subject's efficiency was measured but not with their proficiency.

Page and Fielding (1980) conducted a study using pharmacists to test the criterion validity of a set of PMPs. Four PMPs and four matching in-store assessment problems

(ISAP) were developed. In the in-store assessment problems, actors posing as patients approached the subject in the pharmacy and stated that they had a problem choosing an over the counter medication. These problems were similar to the ones described in the PMPs. Actors were trained to observe the subjects' responses to them. The subjects did not know that the actors were not real customers so it was assumed that the ISAPs represented an actual clinical situation for the pharmacists. Behaviors of the subjects on the PMPs and the ISAPs were compared. Inconsistencies characterized by significantly greater errors of omission and commission in the practice setting occurred. Subjects indicated many essential behaviors on the PMPs but did not do them in practice. They also indicated many behaviors that must not be done on the PMPs but did them in practice.

Many studies state that they used actual patient situations to develop the simulations. However, Kirwan, de Saintonge, Joyce and Currey (1983) developed "paper patients" using actual patient encounters and then compared the results obtained with the simulations with the results from the patient situations using the same practitioners. The paper patients were developed by asking physicians to rate actual patients using a 100 point scale, on twelve clinical variables related to rheumatoid arthritis. The physicians then rated the patient on the level of disease activity using a ten centimeter visual analogue scale. Some weeks later, the same physicians were presented with the ratings of the clinical variables that they had given to the

patients and asked to rate the paper patient on the level of disease activity using the visual analogue scale. The outcomes for both sets of patients were highly correlated (.901).

High-Fidelity Simulation and Practice Comparison

Norman et al. (1982) conducted a study to examine the relationship between actual and simulated patients. They used four actual patients with chronic, relatively stable problems. The simulated patients were actors that were trained to simulate the actual patients. Encounters with the patients were videotaped through a one way glass. The videotapes were reviewed by trained observers who recorded the number of questions asked, the physical examination procedures and significant findings elicited from the patient. The investigators found no significant differences in resident performance in history and physical examination, diagnostic formulations, and planned investigations between the simulated and the real patients. The only significant difference found was in the amount of data elicited in one case, the actual patient had difficulty with memory loss and did not provide the information to the subjects. Subjects correctly identified 67 per cent of the patients as real or simulated. However, many volunteered that identification was possible because they could compare the two patients.

Summary

There have been a few studies describing the processes nurses use to make decisions using simulations and in practice, and a few studies looking at the measurement of

different aspects of clinical decision making. There have been three studies conducted in health care professions outside of nursing that have compared performance of subjects on decision making abilities using both simulations and actual patients. The results were not consistent; one study showed a difference in performance while two studies indicated that performance was similar. There have been no studies in the nursing literature thus far that attempt to compare performance on simulations with clinical practice. While Holzemer et al. (1981) used some measures related to clinical practice, they did not actually observe the practitioners in their clinical practices.

Very little research has been conducted in the area of decision making related to planning of care. Most studies included information about initial management plans but descriptions of the processes of decision making usually concluded at the point where a diagnosis was made. Corcoran (1986a, 1986b) is among the first to study planning of interventions explicitly. The purpose of this study was to continue to build on the work that has been done thus far, and to compare decision making processes on low-fidelity simulations with descriptions of decisions made in practice. Specifically, this research studied the processes by which hospice nurses made choices among pain management interventions on simulations and in practice.

Theoretical Framework

This study built on studies by Tanner et al. (1987) and Corcoran (1986a, 1986b). Both of these studies used

information processing theory as their theoretical frameworks. Information processing theory has been described by Newell and Simon (1972) as an interaction between the information processing system (the problem solver) and the task environment. The human processing system has limitations and problem solving effectiveness rests upon the system's ability to adapt to these limitations. One of the limitations is derived from the small capacity of short term memory. This small capacity limits the amount of information that an individual can attend to at any one time. The ability of the problem solver to encode and retrieve information from long term memory is also a factor which limits or enhances problem solving ability. Newell and Simon posit that one of the methods that a human problem solver uses to compensate for some of the limitations is to develop heuristics so that smaller bits of information can be combined together to form larger chunks which take up less space in short term memory.

Assumptions of Information Processing Theory

Information processing theory is based upon some assumptions that have historical as well as disciplinary roots. Some of these assumptions came about as a reaction to the state of knowledge prior to information processing theory, some through the development of the theory and some came from other disciplines. Lachman, Lachman, and Butterfield (1979) discuss assumptions that they classify as pretheoretical ideas. These include symbolic manipulation, representation, a systems approach, constructive/creative

processes, innate capacities, and mental chronometry with the isolability of subsystems.

The first assumption of symbolic manipulation views man as an information processing machine somewhat analogous to a computer. A person is able to perform certain computational manipulations such as encoding, comparing, and storing. One of the goals of research based upon information processing theory is to describe the symbolic manipulation in enough detail so that it could be programmed into a computer. The computer could then mimic the information processing that a human would perform.

Representation becomes a very important concept as one considers the implications of symbolic manipulation. Symbols are representations of things in the environment. The information processing system needs material to process and that material is the cognitive representation of reality.

Information processing theorists view humans as natural systems and use a systems approach. The interaction among human capacities, activities and the representation of the environment is acknowledged. However, Gardner (1985) notes that there is a deemphasis on affect, context, culture and history.

Another assumption of information processing theory is that constructive or creative processes occur internally. Behaviorists would be sensitive to observable events but information processing proponents believe that events occur within an individual that cannot be directly observed. A

human is an active information seeker rather than a passive responder to external stimuli.

Information processing theory accepts the presence of innate capacities of humans. However, the use of instinct as an explanation for mysterious abilities of individuals is not acceptable. Rather, it is the desire of information processing theorists to use the interaction of innate capacities, learning and experience to explain cognitive performance.

One of the more important assumptions of information processing theory is that of mental chronometry and the isolability of subsystems. It is believed that processing occurs in stages and those stages can be isolated. Much of the research using information processing theory as its basis is devoted to describing the processes and the stages that accompany the processes.

Studies Using Information Processing Theory

This theory has been used as basis for a number of studies in medicine (e.g., Barrows et al., 1972; Elstein et al., 1978) and in nursing (Tanner, 1982; Tanner et al., 1987; and Corcoran, 1986a, 1986b). Elstein et al. have proposed a model of diagnostic reasoning which may describe one of the processes that physicians use to solve problems. This process may be considered to be one of the heuristics that physicians use to deal with the limited capacity of the human information processing system. This model includes 1) narrowing the search field (attending to relevant cues), 2) activating hypotheses, 3) gathering information to confirm

or disconfirm the hypotheses, and 4) evaluating the hypotheses based upon the information. This model was used by Tanner et al. in their study of diagnostic reasoning.

Corcoran (1986a, 1986b) also used information processing theory as the basis for her study. She was interested in the relationship between task complexity and the initial and overall approaches used to plan an intervention. As would be predicted by information processing theory, Corcoran found that experts and novices used different initial and overall approaches to planning. This is expected because the information processing system may be different for novices and experts. There were also differences for the experts in their approach to tasks of differing complexity. Once again, this would be predicted by information processing theory because the task environment has changed.

According to information processing theory, the decision making process should change as the task environment changes and as the capability of the information processing system changes. In the present study, the information processing system or the problem solver remained somewhat constant because subjects acted as their own controls. The task environment varied in a number of different ways. First, the task was either a simulation or a situation in clinical practice. The tasks also varied on complexity. The simulations had three levels of complexity by design. The complexity of the practice situations was evaluated. The degree of engagement that subjects felt with the patient also varied. In addition, the degree of subjective decision

difficulty of the simulations and the practice situations varied. The task environment was known to vary on complexity. Based on the literature, complexity has been shown to have an effect on the planning processes (Corcoran, 1986a). In addition, it was hypothesized that the degree of engagement that a nurse felt with a patient may be a factor upon which simulations and practice situations differed, based on studies by Benner (1984) and Benner and Tanner (1987).

The variable of primary interest in this study was the stimulus material used, ie., simulation or clinical practice. However, the difference in the task environment using the two stimulus conditions may not have accounted for all of the differences in decision making processes so task complexity, degree of engagement with the patient, decision difficulty, and the degree of uncertainty of recalling the practice situation were also examined. Based on the work of Elstein et al. (1978), Tanner et al. (1987), and Corcoran (1986a, 1986b), the decision making process was measured by determining the initial approach used by the subjects, whether or not most of the appropriate alternative interventions were considered, the information reporting strategy used, and the overall approach to the situation. The theoretical and empirical bases for these variables will be described in the next chapter.

The specific research questions addressed by this investigation were:

1. Is there a difference in the quality and nature of

the decision making processes used by hospice nurses in deciding on pain management when the stimulus material is a simulation as compared to an actual practice situation? The decision making process would be measured by determining the initial approach used by the nurse, alternative interventions considered, the information reporting strategy used, and the overall approach used.

2. What factors in the different conditions (simulation vs. practice) account for differences in decision making processes? The factors to be considered include the complexity of the situation, the uncertainty that the subject felt in reporting the practice situation, the degree to which the subject felt engaged or involved with the patient, and the subjective degree of difficulty the subject felt while making the decisions.

CHAPTER II

Methodology

This chapter describes the design, sample, data collection procedures, variables and analysis used in the study. It also describes the pilot study conducted to 1) develop and test the instruments, 2) test the data collection procedures, and 3) test the coding procedures.

Design

This study used a repeated measures design. The subjects completed three written simulations and described three situations in practice where they made a decision about a patient's need for pain medication. Subjects were randomly assigned to one of two sequence groups: 1) describing the three clinical practice situations followed by completing the three written simulations; or 2) completing the three written simulations followed by describing the three clinical practice situations. Although there were 20 possible variations of sequencing, the two described above were chosen as having the highest likelihood of affecting the outcome because they were the most extreme.

The study design allowed for the testing of an order effect. Completing the simulations first may have affected the practice situations chosen by the subjects. They may have attempted to match the simulations in terms of content or difficulty of decision making. Describing the practice situations first may have affected the completion of the simulations. Subjects may have used solutions that were successful in the recalled practice situations to solve the

simulations. Independent t-tests were computed to determine if an order effect had occurred. As can be seen in Appendix A, only the t-test on the appropriate alternatives for the first practice situation was significant ($t=-2.22$, $p=.03$, $df=32$). It was concluded that an order effect had not been detected.

Subjects

The subjects for this study were a convenience sample of 34 hospice nurses from ten northwestern institutions. In order to control for some possible sources of systematic variance, the following inclusion criteria were developed: 1) at least one year of experience in hospice nursing; 2) at least two years of experience as a nurse; 3) currently practicing in a hospice setting at least half time; and 4) at least a baccalaureate degree in nursing. Due to the limited number of hospice nurses available to participate in the study, all subjects did not meet the inclusion criteria. However, statistical procedures were employed to determine if experience and education affected the results. These analyses will be described in a subsequent section.

A majority of the subjects were from home care settings ($n=22$); 12 subjects were from inpatient settings. Twenty seven (79%) of the subjects were staff nurses, three (9%) were patient care coordinators, two (6%) were head nurses and one (3%) each was the director of nursing and a clinician. Educational preparation included nine (26%) subjects with associate degrees, six (18%) with diplomas, 18 (53%) with baccalaureate degrees and one (3%) with a masters

degree. Experience as a hospice nurse ranged from six months to greater than six years. Total experience as a registered nurse ranged from six months to greater than ten years. Appendix B summarizes the hospice and registered nurse experience of the subjects and their ages.

A power analysis using an alpha of .05, power of .80 and an effect size of .24 was calculated (Kraemer & Thiemann, 1987). The result indicated that a sample of 105 would be needed in order to detect differences between the independent variable of simulation and practice if the trial was completed once. However, this study used a repeated measures design with two replications, thus decreasing the within groups error variance; the sample size of 34 was sufficient to detect differences at the selected power.

Data Collection Procedure

At the beginning of the first session, the purpose of the study was explained and consent to participate in the study was obtained. (See Appendix C for consent form.) Subjects were asked to describe three patient situations in which they had made a decision about a patient's pain control regimen and to describe recommendations they would make about a patient's pain control regimen in each of three written simulations. These descriptions or verbal protocols were collected by the researcher in one or two sessions. Demographic information was collected from the subjects after all of the verbal protocols were collected. (See Appendix D for demographic information questionnaire.)

Anonymity and confidentiality were assured through the

use of subject numbers rather than names. Data were kept in locked cabinets. Any mention of patient names or other identifying data was eliminated from the transcripts.

Simulations

The three written cases developed by Corcoran (1983) were used in this study. These cases represented three types of chronic pain and three levels of complexity. (See Appendix E for the simulations and the instructions to the subjects.) The cases were developed by Corcoran and a consultant who is an expert in hospice nursing. Actual patient histories were used to develop the cases. A hospice nurse who was not currently practicing and four oncology nurses in Portland were asked to examine the simulations for consistency with terminology used in the Northwest and to update the simulations so that they reflected current practice. In addition, the subjects were asked if the simulations were representative of cases found in a hospice program and if the description of the case was realistic. All of the subjects agreed that the simulations were representative and realistic. A brief description of the simulations follows.

Case A, Mrs. Ludlow, presented with chronic pain due to adenocarcinoma of the lung with possible liver metastases, osteoarthritis and acute pain due to constipation and impaction. This case was rated as moderate in complexity because Mrs. Ludlow had multiple diagnoses and interrelated physical and emotional sources of pain. In addition, there was some uncertainty about her increased sensitivity to

central nervous system depressant drugs.

Case B, Ted Johnson, presented with chronic pain associated with his adenocarcinoma of the colon and abdominal metastases and acute throat pain due to stomatitis. This case was the least complex of the three cases. Although he had multiple diagnoses, Ted Johnson did not have any reported sensitivities to drugs. Therefore, his throat and abdominal pains could be treated using standard treatments.

Case C, Jane Taylor, had severe, chronic pain associated with adenocarcinoma of her colon with metastases to her liver. Her perception of pain was intensified by many psychological factors. She became nauseated when she took oral morphine solution and was allergic to compazine. This case was the most difficult because she had many physical and psychological sources of pain. There was no clear form of treatment that would ease her pain.

Subjects were also presented with a simulation that was not used in the analysis so that they could practice the thinking aloud process required by the collection of verbal protocols. The subject was given a written simulation, asked to read it and then asked to develop a pain management plan for the patient depicted in the simulation. The subjects were asked to think aloud as they read the simulation and as they developed the plan. After subjects developed their plans, they were asked to rate the simulation on its difficulty for decision making. (See Appendix F for interview guides.) The thinking aloud and

plans were tape recorded and transcribed. Coding categories that were theoretically derived and empirically based on research by Corcoran (1986a, 1986b), Tanner et al. (1987), Elstein et al. (1978), and Newell and Simon (1972) were developed. A content analysis using the categories was conducted. A description of the variables follows in a subsequent section.

Practice

The hospice nurse subjects were asked to describe a clinical situation that had occurred in the last two or three days in which they made a decision about a patient's pain control regimen. They were asked to describe their thoughts as they made these decisions. A debriefing interview was conducted after the subject described the situation to obtain information about the difficulty and complexity of the situation. (See Appendix F for interview guides.) These descriptions were tape recorded and transcribed. The same coding categories used for the simulation protocols were used for the practice situations.

A retrospective data collection method for the clinical situations was conducted. This method was selected because of its feasibility. An exploratory study conducted by Monahan and Tanner (1988) compared two methods of collecting verbal protocols in practice. Both methods required the tape recording of the interaction between the patient and the nurse. The nurses found it very inconvenient to wear a tape recorder and remember to turn it on when they were making a decision. Many times the nurses were unaware that

they were in the process of making a decision until the decision was actually made. Benner (1984) has been successful in obtaining relevant information for her studies by asking subjects to recall cases in which they made a difference in the patient care. Although she would not define her procedure as collecting retrospective verbal protocols, it is similar in many respects.

However, there are many problems with gathering verbal protocols retrospectively. Subjects may not remember their thoughts as they were interacting with the patients. Social desirability may also be a problem in that subjects may describe the situation in such a manner as to project a more favorable impression. The situation will have been interpreted by the subject and the investigator will not have had the opportunity to observe the situation first hand so only the interpretation of the subject will be available. Methods to reduce the effect of some of these problems included attempting to develop a rapport with the subjects so that they did not feel that they needed to impress the investigator. Since the investigator is not a hospice nurse, the subjects may have felt more comfortable describing the situations because they did not feel that the investigator was judging their nursing abilities. The subjects were asked to use clinical situations that had occurred within the past two days. Although this did not occur in all cases, it may have assisted with the problem of decreased memory about the situation.

In general, the use of verbal protocol analysis as an

effective method to gather information about cognitive processes has been criticized. Nisbett and Wilson (1977) raised concerns about the ability of subjects to provide information about their cognitive processes. Sometimes they are unaware of a stimulus that influenced a response, or are unaware of the response. However, Ericsson and Simon (1980, 1985) have concluded that verbalizing information affects cognitive processes only if subjects are asked to attend to information to which they would not normally attend. This study did not request subjects to infer or make conclusions about their thought processes.

Variables

This study was designed to determine if hospice nurses made decisions differently when using a simulation as the stimulus material than when they were in an actual clinical situation. A secondary purpose of the study was to investigate factors which may account for any differences. The variables for this study were related to the process of decision making and to the situation (either simulation or practice). The process variables included: 1) the initial approach used in making the decision about the type of pain control, 2) alternative interventions considered, 3) the information reporting strategy used, and 4) the overall approach used in making decisions about the type of pain control. The situation variables included: 1) the amount of complexity of the situation, 2) the degree to which the subject felt engaged or involved with the patient, 3) the subjective degree of difficulty the subject felt while

making the decision, and 4) the degree of uncertainty the subject felt when reporting information about the practice situation. These variables are discussed in further detail below.

Interrater reliability for the variables was computed using Cohen's coefficient of agreement. An experienced hospice nurse who was a doctoral student and was not currently practicing as a hospice nurse agreed to review and code transcripts. Using the coding procedures described in Appendix G, the investigator and the other judge coded two transcripts together. Questions about the coding procedures were discussed. The two raters then coded two more transcripts independently and compared their ratings. After further clarifications were made, each rater coded 20 more transcripts independently. Interrater reliabilities were calculated using the information from these ratings and are reported below.

Process Variables

The process variables were conceptualized using Elstein et al.'s (1978) model of diagnostic reasoning. This model consists of four phases: 1) narrowing the search field, 2) activating hypotheses, 3) gathering information related to the hypotheses, and 4) evaluating the hypotheses. Although this model was developed using diagnostic reasoning as its basis, it seemed appropriate to generalize it to the planning of interventions, and was used as a basis for the development of some of the quantitative measures. It was assumed that the cognitive processes used to make a

diagnosis are similar to those used to make a decision about interventions. Both tasks require that multiple bits of information be held in memory. Similar heuristics may be used in both tasks for memory conservation. Both of these tasks require that decisions be made about a patient situation, as detailed below.

Initial approach. Corcoran (1983) developed a measure of the initial approach that subjects used as they determined the plan of care for the patients in the simulations. Initial approaches were classified as either broad or narrow. A broad initial approach was one in which the subject considered more than one pain related problem initially. A narrow approach was one in which the subject considered only one pain related problem. (See Appendix G for the coding procedures.) Interrater reliability using Cohen's coefficient of agreement was .78 in Corcoran's study. In this study, interrater reliability was .48.

This measure would correspond to Elstein et al.'s (1978) first phase of narrowing the search field. Subjects who had a broad initial approach would be narrowing the search field slowly while the subjects with a narrow initial approach would be narrowing the search field more rapidly.

Alternative interventions. The number of alternative interventions that subjects considered was considered to be equivalent to the activation of hypotheses. Each intervention would be an hypothesis about the appropriate plan of care for the patient. Tanner and associates (1987) used a similar measure of hypothesis activation in their

study of diagnostic reasoning strategies of nurses and nursing students. The number of accurate and plausible hypotheses related to a patient situation was determined and used as a measurement of hypothesis activation.

In both the practice and simulation cases, drug and non-drug solutions to the problems were considered. The alternatives could be specific or general. A specific drug alternative was the name of a medication such as Dilaudid. A general drug alternative was a category of medication such as a non-steroidal anti inflammatory. A specific non-drug alternative was one in which the subject recommended a particular non-drug therapy such as a backrub. A general non-drug alternative was a therapy that was general in scope such as diversional activities. Each type of alternative was counted and a grand total was determined. Interrater reliability using Cohen's coefficient of agreement was .65.

For the analyses, a dichotomous variable indicated whether or not most or all of the appropriate interventions were considered. This dichotomous variable was constructed because the raw number of alternatives considered could not be compared across cases. In the practice setting, every situation differed. It was possible to consider one alternative in one case and ten alternatives in another case simply because more alternatives were available in the latter situation.

For the practice situations, the value of the dichotomous variable was determined by using the information provided by the subjects about the factors limiting the

number of alternative interventions available. For example, a subject could state that sublingual morphine sulfate was administered to the patient. If the subject stated that the patient's pain was such that the morphine could not be administered by any other route, then the subject received a rating indicating that most of the appropriate interventions were considered. If, however, the subject did not consider other routes and did not state that there were factors that limited the interventions that could be considered, then the subject received a rating indicating that most of the interventions had not been considered.

The simulations had specified interventions that were determined by Corcoran (1983) and the hospice consultant. Subjects had to state these interventions to receive a rating indicating that they had considered all of the interventions. (See Appendix G for the coding procedures for both practice and simulations.) Interrater reliability using Cohen's coefficient of agreement was .89.

Information reporting strategies. Tanner and associates (1987) developed an ordinal scale measuring the data acquisition strategies that subjects used as they collected information about patients presented in simulations. Data collected to form this scale correspond most closely to the information gathering phase described by Elstein et al. (1978). The ordinal scale has five levels that range from systematic to nonsystematic in the description of strategies used to gather information.

Tanner et al.'s (1987) classification of strategies was

modified to be more congruent with the needs of this study. The underlying concept of systematization of the decision making processes remained the same. However, subjects were not gathering information about the patients but were reporting information that they had obtained. The assumption was made that the manner in which subjects reported information was an indication of the way information was organized in the working memory. It was also assumed that this organization was reflective of the approach a subject might have used in making the decision.

Four categories of information reporting strategies were developed: 1) hypothesis driven, 2) one-thought-leads-to-another, 3) cue-based, and 4) random. Hypothesis driven reporting was one in which the subject presented most of the information related to a problem/hypothesis at one point in the verbal protocol. In the one-thought-leads-to-another category, the subject presented some information which lead to another thought which was not along the same lines as the first. The subject moved from one content area to another and back to the same content area. In cue-based reporting, the subject used cues from the situation to present information. In random reporting, the subject presented information in a nonsystematic manner. Table 1 summarizes these categories. (See Appendix G for coding procedures.) Interrater reliability using Cohen's coefficient of agreement was .83.

Table 1

Information Reporting Strategies

Categories	Definition
Hypothesis Driven	1. Subject identifies a patient's problem and describes alternatives to solve problem AND 2. Subject does not move to another problem before finishing with identified problem
One-thought-leads-to-another	1. Subject reports some information about a problem AND 2. Subject moves to another topic that is peripherally related to first topic AND 3. Subject moves to another topic OR 4. Subject returns to previous topic
Cue-based	1. Subject reports information related to a cue presented in the situation AND 2. Information is not hypothesis-related.
Random, nonsystematic	1. It is not possible to trace rationale for order of reporting

Overall approach. Corcoran (1983) developed a measure of overall approach to decision making. This dichotomous scale measured the approach that the subjects used throughout the entire verbal protocol in deciding upon a plan for pain management for the simulated patients. The categories were opportunistic and systematic approaches. An opportunistic overall approach was one in which the subject jumped from problem to problem. The systematic approach was one in which the subject addressed single problems at adjacent points in the process. (See Appendix G for the coding rules.) Corcoran reported a Cohen's coefficient of 1.00 for this measure. Interrater reliability for this study was .68.

Situation Variables

The differences in the performance of nurses on simulations and in practice may be related to some characteristics of the stimulus material. Four variables related to the situation were measured in the hopes that they might assist with the explanation of the differences. These four variables were degree of engagement or involvement with the patient, the complexity of the situation, the subjective feeling of difficulty the subject had while making the decision, and the degree of uncertainty that the subject had in recalling the practice situation.

Engagement. A difference between a simulation and practice is the degree to which a practitioner can feel involved or engaged with the patient. In a written simulation, the patient is described verbally. Some general

demographics, medical diagnosis, past history, and sometimes psychosocial history about the patient are communicated to the subject. It was hypothesized that subjects would feel engaged the least with this patient. In a videotaped simulation, the same information is usually given about the patient plus the subject can see the patient in a film. In a simulation where a patient is portrayed by an actor, the subject may be able to become more engaged with the patient but the subject usually knows that the patient is an actor. This knowledge may affect the interaction between the patient and the subject.

In clinical practice, subjects may feel different degrees of engagement with patients depending upon the nurse, the patient, and the clinical situation. For example, a patient may have had many admissions to a particular unit and have developed a special rapport with a nurse. This nurse may be more engaged with this patient than with another. Another nurse may not feel the same type of relationship with this patient. There are certain factors that a nurse may know about a patient especially about nonverbal actions or physiological parameters which makes the nurse more engaged with the patient. The level of experience that a nurse has may affect the degree of engagement that a nurse may have with a patient. A more experienced nurse has more information and clinical background and may feel engaged with a patient more rapidly than the less experienced because the experienced nurse has had vicarious experiences with other patients who are

similar to one another (Benner & Wrubel, 1989).

There have not been any measures of engagement with specific patients developed. There have been measures of empathy which have been developed but these instruments measure empathy in general rather than related to a specific patient (e.g., Becker & Sands, 1988; Brown & Hunter , 1987; Zeldow & Daugherty, 1987). Engagement for this study was measured using a researcher developed instrument which consisted of three 100 millimeter analogue scaled items. This instrument was pilot tested with a group of oncology nurses who worked with patients who had pain management problems. The pilot study is described in more detail in a subsequent section. (See Appendix H for a copy of the instrument.)

Complexity. The degree of complexity in clinical situations and in simulations varied. Corcoran (1983) developed the three simulations used in this study with varying degrees of complexity. The theoretical basis of complexity related to the amount of information stored in short term memory. Increased complexity required more information to be stored in short term memory. The theoretical level of complexity was represented by the number of pain-related problems presented by the patient, the interrelationships of the pain-related problems and the degree to which the problem could be managed by established hospice protocols. Using the criteria described above, three levels of complexity were established. A situation was considered to be of high complexity if three or more

pain related problems were presented by the patient, a standard protocol for pain control could not be followed and/or there were complex social and/or psychological factors involved. A low complexity situation was one in which there was one or two pain related problems, a standard protocol for pain control could be followed and/or there were no complex social and/or psychological factors involved. A moderately complex situation fell between the two described above. (See Appendix G for the coding procedures.)

Decision Difficulty. For both the practice situations and the simulations, subjects were requested to rate the case in terms of difficulty for decision making using a scale from zero to ten where zero was not difficult and ten was extremely difficult. These ratings were recorded. (See Appendix F for the interview guide.)

Uncertainty. With the practice situations, subjects were requested to describe patient situations that occurred within the past two or three days. Some of the subjects did not comply with this request and described situations which had occurred further in the past. Of the subjects who did not describe a case that occurred within the past two or three days, most described cases that had occurred within one week to one month. However, in a few instances, subjects described situations that had occurred over one year ago. In order to determine if differences between the practice situations and the simulations occurred due to the subject's inability to recall the practice situation, a

measure of uncertainty related to the practice situation was established. Uncertainty was measured on a four point scale ranging from no uncertainty mentioned to uncertainty about details and thoughts about the situation. (See Appendix G for coding procedures.)

Pilot Study

A pilot study to test the methodology, instruments and coding system was conducted. Specifically, the purposes of the pilot study were to test and refine: 1) the engagement instrument, 2) the data collection procedures, 3) the simulations, and 4) the coding procedures. The sample was four oncology nurses from a large university hospital. Each nurse either completed a simulation or described a situation in which she had made a decision about a patient's pain control regimen. After completing the simulation or the description, subjects completed a pilot instrument on engagement (see Appendix H for the pilot instrument). In addition, the subjects were interviewed about the difficulties they encountered in answering the engagement instrument and the interview questions related to the patient situation. They were asked to describe the meaning of the terms engaged, involved, empathy, rapport, and close, which were used in the pilot engagement instrument. The subjects completing the simulations were asked about the representativeness, realism and currency of the simulations. These interviews were tape recorded and transcribed for analysis.

Collection of Verbal Protocols

Simulations. Two nurses completed the three simulations; one nurse completed two cases and one nurse completed one case. They found the simulations easy to understand, representative of patients with severe pain, that descriptions were realistic, and current with practice standards. They were able to describe their thoughts related to the simulations and their decisions as they described interventions.

Practice. Two nurses described situations from their practice where they had to make a decision about a patient's pain control regimen. They stated that they made this type of decision frequently and had no difficulty in recalling a recent situation in which they had made the decision. They stated that they had no difficulty answering the interview questions. Of particular concern to the investigator was the question about the alternative interventions considered because it was unknown if that question would cause subjects to attempt to access information that was not in recent memory. If subjects had difficulty remembering, this could cause them to make inferences about their thought processes, or in other ways reconstruct what had occurred. Subjects stated that it was not difficult to remember if they had considered other interventions prior to selecting the one described.

Engagement Instrument

The subjects completed the pilot engagement instrument following the completion of the simulation or description of

the practice situation. The pilot engagement instrument asked the subjects to rate how they felt about the interaction with the patient in the simulation or in practice using the 100 millimeter visual analogue scale. They were asked how engaged, how close, how involved, how much empathy, and how much rapport they felt with the patient. All of the subjects indicated that feeling close to the patient and engaged with the patient were very similar in meaning. Three of the subjects felt that being involved with the patient and feeling engaged with the patient were very similar in meaning. The term engaged used in the context of a feeling toward a patient, was not a familiar word to the subjects. They had a difficult time defining engaged and used the words "involved" and "close" in their definitions. They felt that empathy and rapport were different concepts than engaged. For these reasons, the final engagement instrument included the items related to how involved and how close the subject felt to the patient.

Coding the Verbal Protocols

A content analysis using the five coding categories described previously was conducted. These five categories were: 1) initial approach used, 2) alternative interventions, 3) information reporting strategies, 4) overall approach, and 5) complexity. During the pilot study phase the information reporting strategies were modified so that they were more useful for this study. The dichotomous variable for alternative interventions was also determined

to be necessary during this phase. A simple reporting of number of alternatives generated would not accurately reflect the hypothesis activation of the subject. Only one or two alternative interventions may have been generated due to the limitations presented by the practice situation. For example, if a patient was allergic to morphine, could not swallow, and it was extremely difficult to turn the patient so that a suppository was difficult for the family to administer, the alternative interventions were limited to an intravenous or subcutaneous administration of Dilaudid. However, if limitations did not exist, there may have been a possibility of many alternative interventions. After these modifications were made to the coding categories, data collection for the main study was initiated.

Analysis

The data were entered using the statistical package CRUNCH and verified. Descriptive statistics were computed. To determine if the scores on each of the four process variables could be combined across the three simulations, correlations were computed to examine their interrelationships. Another set of correlations was calculated with the practice measures for the same purpose. Because the correlations were approximately .30, the measures were combined across the simulations and across the practice situations. Paired t-tests were calculated to determine if there was a difference on the measures between practice and simulation.

In order to determine if factors related to the

situation could account for a difference in the decision making processes, stepwise multiple regressions were calculated with task complexity, decision difficulty, degree of engagement, and uncertainty as the independent variables and the measures of decision making process as the dependent variables.

In addition, because not all of the subjects met the inclusion criteria, two factor repeated measures analyses of variance were computed using experience as the between factor and the stimulus type (practice vs. simulation) as the within factor. Similar analyses of variance were computed using education as the between factor.

CHAPTER III

Results

The results of this study are described in this chapter. First, descriptive statistics are presented followed by information related to scale construction. Finally, the results related to the research questions are given.

Descriptive Statistics

Process Variables

The process of decision making was measured by four variables: 1) initial approach used by the subject in making the decision about the type of pain control, 2) alternative interventions considered, 3) the information reporting strategy used, and 4) the overall approach used in making decisions about the type of pain control.

The next sections iterate the measurement of the variables and highlight findings related to the descriptive statistics. Frequency distributions for the process and situation variables are displayed in tables in Appendix I. It should be noted that the practice situations as shown in the appendices were ordered by the degree of complexity. The situations numbered 1 are those that were the least complex for the subject and those numbered 3 are the most complex. However, all subjects did not describe situations that varied from low to high in complexity. For example, at least one subject described three practice situations which were all evaluated as low complexity.

Initial approach. The initial approach used was a dichotomous variable which classified each subject's

responses into broad or narrow. On the simulations, 53-65% of the subjects used a broad initial approach. On the practice situations, 35-62% of the subjects used a broad approach.

Alternatives considered. The alternative interventions considered was also a dichotomous variable indicating whether or not a subject considered most or all of the appropriate alternative interventions for each of the simulations or practice situations. Sixty two to seventy four percent of the subjects considered most or all of the appropriate alternatives on the simulations. On the practice situations, 79-88% considered most or all of the alternatives.

Reporting strategy. The information reporting strategy was a four point scale ranging from an hypothesis driven to a random strategy. The middle points were one-thought-leading-to-another and cue-based. On the simulations, 65-73% of the subjects used a cue-based strategy. On the practice situations, 44-67% used the one-thought-leads-to-another strategy.

Overall approach. The overall approach used was a dichotomous variable indicating whether a subject used a systematic or opportunistic approach to the simulations or practice situations. Eighteen to thirty five percent of the subjects used a systematic approach to the simulations. Thirty two to fifty nine percent same approach to the practice situations.

Situation Variables

It was hypothesized that factors related to the situation might assist in explaining any differences that occurred between practice and simulation. These factors included: 1) engagement with the patient, 2) the subjective degree of difficulty of decision making, 3) the complexity of the situation, and 4) the uncertainty of memory that the subject had while reporting the practice situation. Since the subjects were reporting information concurrently for the simulations, uncertainty of memory was not applicable. The complexity of the simulations was experimentally varied so complexity was also not relevant for the simulations.

Engagement. The engagement scale consisted of three items which asked the subjects to rate how close they felt to the patient, how involved they felt with the patient and how in tune they felt with the patient, using a 100 millimeter analogue scale. The engagement scale item values for the simulations ranged from 5 to 98. For the practice scale items, the range was from 1 to 100.

Decision difficulty. Subjects were requested to rate the difficulty they had making a decision for each simulation and practice situation using a scale of 0 to 10, where 0 was not difficult and 10 was extremely difficult. The difficulty of making the decision for the simulations ranged from 0 to 10. For the practice situations, the decision difficulty also ranged from 0 to 10.

Uncertainty. The amount of uncertainty that subjects had recalling a practice situation was measured using a four

point scale where 0 meant that the subjects had no uncertainty while recalling the situation and 3 meant that they had uncertainty in recalling both details and thoughts about the situation. The range of uncertainty on each of the three practice situations was from 0 to 3 with means ranging from .74 to .82.

Complexity. The degree of complexity within each subject's practice situation descriptions varied. Some subjects described only situations that were low in complexity while others described situations that ranged from low to high complexity. The practice situations were ordered from low to high complexity during data entry. The situation order presented in the tables is not necessarily the order in which the situations were described during the interviews.

Scale Construction

Scales were constructed by combining the values of the variables across the simulations and across the practice situations. Standard procedures for constructing scales were followed (Nunnally, 1978). Intercorrelations among the items for the scales were computed. Since most intercorrelations were approximately .30, items were combined. According to Nunnally (1978), correlations among test items usually range from .10 to .30. The average correlation of the items is a rough approximation of reliability and is sufficiently greater than zero so that further analysis is warranted. Appendix J displays the intercorrelations for each of the variables by stimulus type

(simulation or practice).

Internal consistency reliability was determined for each scale using the alpha coefficient. Alpha coefficients, means, standard deviations and ranges of the scales using values combined across simulations and across practice situations are displayed in Table 2.

Table 2

Alpha Coefficients, Means, Standard Deviations, and Ranges for Scales (n=34)

Variable	Alpha Coefficient	Mean	S.D.	Range
		Simulation		
Initial Approach	.49	1.26	1.05	0-3
Alternatives Considered	.41	2.06	.95	0-3
Reporting Strategy	.52	7.71	1.78	3-10
Overall Approach	.52	2.24	.92	0-3
Engagement	.94	60.58	18.34	16-88
Decision Difficulty	.66	6.11	1.71	2-9
		Practice		
Initial Approach	-.09	1.47	.82	0-3
Alternatives Considered	.26	2.50	.71	1-3
Reporting Strategy	.71	6.21	2.10	3-12
Overall Approach	.65	1.76	1.10	0-3
Engagement	.77	72.89	13.15	49-93
Decision Difficulty	.77	5.30	2.07	1-9
Complexity	.67	1.74	.39	1-3
Uncertainty	.55	.76	.56	0-3

There was concern about the effect of complexity on the four process variables. Subjects were asked to recall practice situations that were as recent in their memory as possible rather than varying in complexity. Consequently, a wide variation in degree of complexity of the practice situations occurred. On the other hand, the complexity of the simulations was fixed since every subject completed the same simulations. To determine if complexity had an effect on the four process variables, four repeated measures analyses of variance were computed using each of the process variables repeated across the three simulations. There were no differences on any of the four process variables among the simulations with their known variation in complexity (see Appendix K). This provided further evidence for combining the process variables across the simulations.

Because complexity across the practice situations did not vary in a fixed manner, a repeated measures analysis of variance using the practice situation as the within factor could not be performed. To compensate for this difficulty, each of the practice situation process variables was matched by complexity with the appropriate simulation. For example, the initial approach on the low complexity practice situations was crosstabulated with the initial approach from the low complexity simulation. A visual comparison of each of the variables across the three levels of complexity was conducted. No differences across the different levels of complexity was apparent. A statistical test was not performed because the frequency in each level of complexity

varied too widely. Tables in Appendix L summarize the findings from the crosstabulations. This lack of difference provided further evidence that complexity was not a factor in the practice situations.

Research Questions

The specific research questions addressed by this investigation were:

1. Is there a difference in the quality and nature of the decision making processes used by hospice nurses in deciding on pain management when the stimulus material is a simulation as compared to an actual practice situation?

2. What factors in the different conditions (simulation vs. practice) may account for a difference in decision making processes?

The next section presents the findings related to these questions.

Differences in Decision Making Processes

Paired t-tests were computed to determine if there were differences between the combined simulation score and the combined practice situation score on each of the four process variables. As can be seen in Table 3, there were significant differences between practice and simulation on three variables: whether the appropriate alternatives were considered, the reporting strategy and the overall approach. There was no significant difference on the initial approach used. Subjects tended to use a broad initial approach on simulations and in practice. Subjects considered most or all of the appropriate alternatives in practice more often

than on the simulations. The reporting strategy in practice was more towards the hypothesis driven strategy and was more towards the random strategy on the simulations. The overall approach was more systematic in practice and more opportunistic on the simulations.

Table 3

Means, Standard Deviations, and Paired t Values for Process Variables Combined Across Stimulus Type (n=34)

Stimulus Type	Mean	S.D.	Paired t Value
	Initial Approach		
Practice	1.47	.82	.92
Simulation	1.26	1.05	
	Alternatives Considered		
Practice	2.50	.71	3.14**
Simulation	2.06	.95	
	Reporting Strategy		
Practice	6.21	2.10	-4.24**
Simulation	7.71	1.78	
	Overall Approach		
Practice	1.76	1.10	-2.86**
Simulation	2.24	.92	

** $p \leq .01$

Further analysis of the differences showed that many of the process variables were significantly correlated among themselves (Table 4). Of particular interest are the high correlations between practice and simulation on alternatives considered, reporting strategy, and overall approach.

Table 4

Intercorrelations Among Process Variables (n=34)

	Simulation			Practice			
	Alt [b]	Rep [c]	Over [d]	Init [a]	Alt	Rep	Over
Sim Init	.47**	-.44**	-.63**	.06	.06	-.16	-.52**
Alt		-.29	-.33	-.11	.54**	-.20	-.48**
Rep			.72**	-.09	-.26	.44**	.47**
Over				-.23	-.18	.33	.56**
Prac Init					.16	-.27	-.24
Alt						-.44**	-.43**
Rep							.60**

[a] Initial Approach

[b] Alternatives Considered

[c] Reporting Strategy

[d] Overall Approach

** $p \leq .01$

An effort was made to control systematic sources of variance by having an homogeneous sample using the inclusion criteria described in the methodology chapter. However, it was not possible to recruit enough hospice nurses who met the criteria. To determine if having varying levels of education and experience had an effect on the finding of differences between practice and simulation and if there was an interaction between education or experience and the testing condition, two factor repeated measures analyses of variance were computed. Experience was dichotomized into low and high amounts of experience as a registered nurse and as a hospice nurse. Education was also dichotomized into baccalaureate and non-baccalaureate preparation. There were no significant differences between the groups based upon education and experience (Tables 5 and 6). In addition, there were no significant interactions between the process variables and experience or education.

Table 5

One Way Repeated Measures ANOVA on the Process Variables with Experience

Source	SS	df	MS	F
	Initial Approach			
Total	59.81	67		
Between Subjects	31.31	33		
Experience	.72	1	.72	.75
Subj w Groups	30.59	32	.96	
Within Subjects	28.50	34		
Stimulus Type	.72	1	.72	.87
Trtmt x Exper	1.19	1	1.19	1.43
Error	26.59	32	.83	
	Alternatives Considered			
Total	49.69	67		
Between Subjects	35.19	33		
Experience	.01	1	.01	.01
Subj w Groups	35.18	32	1.10	
Within Subjects	14.50	34		
Stimulus Type	3.31	1	3.31	10.11**
Trtmt x Exper	.72	1	.72	2.20
Error	10.47	32	.33	

Table 5 (continued)

One Way Repeated Measures ANOVA on the Process Variables with Experience

Source	SS	df	MS	F
	Reporting Strategy			
Total	288.86	67		
Between Subjects	180.36	33		
Experience	18.01	1	18.01	3.55
Subj w Groups	162.35	32	5.07	
Within Subjects	108.50	34		
Stimulus Type	38.25	1	38.25	18.28**
Trtmt x Exper	3.31	1	3.31	1.58
Error	66.94	32	2.09	
	Overall Approach			
Total	72.00	67		
Between Subjects	53.00	33		
Experience	.24	1	.24	.14
Subj w Groups	52.76	32	1.65	
Within Subjects	19.00	34		
Stimulus Type	3.76	1	3.76	8.43**
Trtmt x Exper	.94	1	.94	2.11
Error	14.29	32	.45	

** $p \leq .01$

Table 6

One Way Repeated Measures ANOVA on the Process Variables with Education

Source	SS	df	MS	F
	Initial Approach			
Total	59.81	67		
Between Subjects	31.31	33		
Education	.23	1	.23	.24
Subj w Groups	31.08	32	.97	
Within Subjects	28.50	34		
Stimulus Type	.72	1	.72	.86
Trtmt x Educ	.91	1	.91	1.09
Error	26.87	32	.84	
	Alternatives Considered			
Total	49.69	67		
Between Subjects	35.19	33		
Education	.41	1	.41	.38
Subj w Groups	34.78	32	1.09	
Within Subjects	14.50	34		
Stimulus Type	3.31	1	3.31	10.54**
Trtmt x Educ	1.14	1	1.14	3.65
Error	10.05	32	.31	

Table 6 (continued)

One Way Repeated Measures ANOVA on the Process Variables with Education

Source	SS	df	MS	F
	Reporting Strategy			
Total	288.86	67		
Between Subjects	180.36	33		
Education	5.58	1	5.58	1.02
Subj w Groups	174.78	32	5.46	
Within Subjects	108.50	34		
Stimulus Type	38.25	1	38.25	17.46**
Trtmt x Educ	.13	1	.13	.06
Error	70.12	32	2.19	
	Overall Approach			
Total	72.00	67		
Between Subjects	53.00	33		
Education	.00	1	.00	.00
Subj w Groups	53.00	32	1.66	
Within Subjects	19.00	34		
Stimulus Type	3.76	1	3.76	7.94**
Trtmt x Educ	.07	1	.07	.14
Error	15.17	32	.47	

** $p \leq .01$

Factors Accounting for Differences

In an effort to account for some of the variance in the process variables, multiple regressions were computed. Each of the process variables by stimulus type were regressed on the situation variables in a stepwise manner. The situation variables that were used were engagement, decision difficulty, uncertainty and complexity. The most variance that the situation variables were able to account for was 29% for the overall approach in the practice situations (Tables 7 and 8). For some of the process variables, none of the situation variables entered the regression.

Table 7

Stepwise Multiple Regressions with Simulation Process Variables

Step	Variable	Beta	Std Error of Beta	F	Multiple R	R2	Overall F
			Initial Approach				
No variables entered the regression							
			Alternatives Considered				
1	Engagement	.44	.01	6.86*	.40	.16	5.93*
2	Dec. Diff.	.17	.09	1.01	.43	.18	1.01
	Constant	.08					
			Reporting Strategy				
1	Dec. Diff.	.19	.18	1.18	.19	.04	1.18
	Constant	6.5					
			Overall Approach				
No variables entered the regression							

* $p \leq .05$

Table 8

Stepwise Multiple Regressions with Practice Process Variables

Step	Variable	Beta	Std Error of Beta	F	Multiple R	R2	Overall F
			Initial Approach				
1	Dec. Diff.	-.40	.06	5.99*	.40	.16	5.99*
	Constant	2.31					
			Alternatives Considered				
No variables entered the regression.							
			Reporting Strategy				
1	Dec. Diff.	.52	.21	6.42*	.33	.11	4.02
2	Complexity	-.31	1.09	2.24	.41	.17	3.21
	Constant	6.27					
			Overall Approach				
1	Dec. Diff.	.36	.08	5.36*	.41	.17	6.50*
2	Uncertainty	-.35	.30	5.09*	.54	.29	6.21**
	Constant	1.28					

* $p \leq .05$

** $p \leq .01$

Intercorrelations among the situation variables. In order to help determine if multicollinearity was a problem, intercorrelations among the situation variables were computed. Evidence for multicollinearity can be found if intercorrelations are .8 or greater (Kim & Kohout, 1975). Multicollinearity did not appear to be a problem. Table M-1 displays the intercorrelations.

In addition, there was a significant relationship between the practice and simulation decision difficulty ($r=.47$). The greater the perceived difficulty of decision making on the simulations, the greater the perceived difficulty in practice. There was also a high correlation between the practice decision difficulty and the complexity of the situations. This high correlation occurred because decision difficulty was used as part of the evaluation of the situation complexity.

Intercorrelations among the process and situation variables. The engagement score on the simulations was significantly correlated to the appropriateness of the alternatives considered in the simulations. The decision difficulty score on the practice situations was significantly correlated with the initial approach and overall approach scores. In the practice situations, the uncertainty score was significantly correlated with the overall approach score and the complexity score was correlated with the initial approach score. Table M-2 displays the intercorrelations among the process and situation variables.

Summary

Based on the intercorrelations among the process and situation variables across the three simulations and three practice situations, scales were constructed. Complexity, which might have affected the homogeneity of the scales, was analyzed and determined to have little effect. Internal consistency for the scales ranged from -.09 to .94.

There were four major findings in the study. There were significant differences between practice and simulation on three of the four process variables. The significant differences were on the alternative interventions considered, the reporting strategy and the overall approach used in making a decision. There was no significant difference between practice and simulation on the initial approach used. There were no significant differences between groups based on education and experience on the four process variables and no significant interactions between the variables. The situation variables only accounted for 29% of the variance on the overall approach score with the practice situations. The situation variables did not enter the regressions on the initial approach and the overall approach used in decision making on the simulations and the alternatives considered in the practice situations. A discussion of these findings in terms of the theoretical framework and previous studies follows.

CHAPTER IV

Discussion

There were four major findings in this study. First, there was no significant difference between practice and simulation on initial approach used. Second, there were significant differences between practice and simulation on the alternatives considered, the reporting strategy and the overall approach used by the subjects in decision making. Third, the situation variables of engagement, subjective decision difficulty, complexity and uncertainty of the subjects in recalling the practice situations did not account for a substantial amount of the variance of the process variables. Fourth, there were no significant differences between groups based on the demographic variables of educational preparation, and combined hospice and overall nursing experience on the four process variables and there were no significant interactions between the variables. The following sections discuss each specific finding in relationship to the design of the study, prior research and information processing theory. Following this discussion, more general methodological and theoretical issues are discussed.

Differences between Practice and Simulation

Initial Approach

There was no significant difference between practice and simulation on the initial approach that subjects used in making a decision. Two major reasons could explain this lack of difference. First, the measure did not have

internal consistency reliability across the practice situations. Second, there may be no difference in initial approach between practice and simulation. These reasons are explained more fully below.

The combined score for initial approach across the practice situations lacked internal consistency reliability. Theoretically, this could be explained because the initial approach that a person used in making a decision about a situation might be dependent upon the situation. Because the situations were different in their content and complexity, they did not all require a similar initial approach. One subject described a situation in which the patient was having pain with difficulty breathing but was only able to take sublingual morphine because she had difficulty swallowing, did not have a venous access line and it was difficult for the family to turn her to give her anything rectally. Because of all of the limitations of the situation, the subject's initial approach was narrow. The patient had one major problem with one appropriate response. On the other hand, the same subject described a situation in which the patient had multiple problems which required multiple solutions. With this second case, the subject took a broad initial approach so that all of the problems were outlined in the beginning. Hence, the initial approach for this subject varied based upon the situation. If this scenario repeated itself frequently, a low internal consistency reliability could result.

In addition, the alpha coefficient is affected by the

number of items in the scale and the total test variance (Waltz, Strickland, & Lenz, 1984). The initial approach scale had only three items in it and had a variance of .7. All of these factors resulted in a low alpha coefficient. Because the measure was not internally consistent, findings should be interpreted with caution.

However, it is possible that there is no difference between practice and simulation on initial approach. Corcoran's (1986a, 1986b) study offers some support to this hypothesis. She found that subjects did not change their initial approaches across the simulations. The findings from this study corroborate her findings. A repeated measures analysis of variance across the simulations found that there was no difference in the initial approach used by the subjects. Based upon the lack of difference between practice and simulations, it might be concluded that the initial approach also does not vary consistently in practice.

Using Elstein et al.'s (1978) model of diagnostic reasoning, the initial approach could correspond to the phase of narrowing the search field. It may be possible that subjects narrow the search field in a similar fashion in both practice and on simulations. The rapidity with which the narrowing is done may be dependent upon the task in both practice and simulation.

Alternatives Considered

There was a significant difference between practice and simulation on whether or not most or all of the appropriate

alternative interventions were considered. Most or all of the alternatives were considered in the practice situations more often than in the simulations. Possible explanations of this finding relate primarily to the methodology employed in the study.

First, the subjects may have considered most of the alternatives in practice because they chose more practice situations in which they had been successful in solving the problem. However, successful solving of the problem did not necessarily mean that the the subject had considered most or all of the appropriate interventions. For example, it was possible to control a patient's pain with intravenous morphine sulfate but not to have considered a less invasive route such as sublingual.

Second, the interviewing technique provided more probes to ascertain if other alternatives had been considered in the practice situations than on the simulations. Because retrospective recall was used for the practice situations, the additional probes were necessary to elicit the information. Since concurrent recall was used for the simulations, the additional probes were not used. However, it is possible that subjects were not reporting all of their thoughts as they worked through the simulations.

Third, in two of the simulations, there were specific physical etiologies for the patient's pain. If the subjects did not recommend treatment for these etiologies, in addition to recommending a general analgesic, they were rated as not having considered all of the appropriate

alternatives. In simulation A, nine of the subjects did not recommend treatment for the patient's constipation which was the main cause of her pain. In simulation B, 13 of the subjects did not recommend treatment for the stomatitis which was a major contributor to the patient's pain. Because there were specific criteria upon which to rate whether or not subjects considered appropriate alternatives for the simulations, this may have resulted in a larger number being rated as not having considered the appropriate alternatives.

The combination of these three factors may have resulted in consideration of more of the appropriate alternative interventions in practice. However, it is possible that a difference between practice and simulation does exist. Subjects may have been more careful in practice because they were interacting with actual patients who could suffer from the consequences of any missed considerations. On the other hand, the subjects knew that the simulated patients would be unaffected by their judgments. In addition, subjects did not receive feedback about how well they did on the simulations. Consequently there were no incentives except for personal motivation for the subjects to consider all the alternatives on the simulations.

Reporting Strategy

There was a significant difference between practice and simulation on the information reporting strategy that subjects used. Subjects tended to be more hypothesis driven and have one-thought-lead-to-another in the practice

situations. Subjects tended to report in terms of the chronology of the events. For example, one subject described a practice situation in which sequential visits were reported. Each thought lead to the next because the description was reported in the order in which events had occurred. The subjects tended to be more cue based and random on the simulations. They tended to jump from cue to cue in the simulation. They paged through the simulation and picked up on phrases in the description. For example, in Case A, a subject noted that Mrs. Ludlow felt like she could not relate to the people she loves (cue from the simulation). The subject recommended that a social worker be involved. The next observation by the subject was that constipation (cue) was a problem and recommended a laxative.

The information reporting strategy was conceptualized as a measure of the organization of thoughts in memory. It was assumed that the manner in which thoughts were organized was reflective of the thinking processes that subjects used in planning the patients' care. This assumption is similar to the one made in diagnostic reasoning studies related to data acquisition strategies. It is assumed that the strategy used to collect information about a problem is reflective of the thinking process used. However, the information reporting strategy in this study used retrospective verbal reports for the practice situations. Analysis of these retrospective protocols assumed that the practice situation had left a memory trace, the recall of the trace was accurate and the memory trace was reflective of the thinking

process that had occurred.

The finding that the subjects were more cue based on the simulations is similar to the findings in the Tanner et al. (1987) study. One difficulty with comparing the two studies is that cue-based and one-thought-leading-to-another were interpreted differently in each study. This may be due to the fact that this study used the scale to rate the reporting strategy that the subject used while the Tanner et al. study used the scale to rate the subject's information gathering strategy. A cue-based information gathering strategy was more systematic because subjects used cues upon which to base their questions. A cue-based reporting strategy was not very systematic because subjects jumped from cue to cue and provided information about treating that cue.

The cue-based reporting strategy may have been used on the simulations because the subjects had a concrete item (the written description of the case) to which they could refer. Once again, this finding could be related to the methodology employed. The cue-based reporting strategy may not occur if high-fidelity simulations were used because subjects would not have any materials to help refresh their memories about the situation.

The subjects may have used the one-thought-leads-to-another strategy in practice because it lent itself to smoother story telling. The subjects who used this strategy tended to use the chronology of events to report the decisions made in practice. More processing of the

information in memory had taken place because of the retrospective nature of the recall. The subjects were attempting to explain to the interviewer what had occurred in an understandable manner. The reporting strategy may change if a concurrent verbal protocol were collected.

However, once again, it is possible that a difference between practice and simulation on information reporting strategy does exist. The assumptions made for this measure may be accurate. The reporting strategies may be reflective of the thinking processes used in planning care. Subjects may use hypothesis driven or one-thought-leading-to-another strategies more in practice than on simulations.

Overall Approach

There was a significant difference between simulation and practice on the overall approach that the subjects used to make a decision. The subjects were more systematic in practice than on the simulations. The subjects in practice tended to follow one problem through to its conclusion before moving on to another problem.

It was somewhat surprising that the subjects were more systematic in practice than on the simulations. However, the retrospective recall methodology may explain this phenomenon. Subjects were describing patient situations in which they had made a decision about pain control. Once again, they were not recalling the individual events and thoughts that occurred as they occurred but rather were attempting to explain to the interviewer what had occurred in some understandable manner. The decision making process

in practice may have been more opportunistic than was actually reported.

Corcoran (1983) found that subjects varied their overall approaches across the simulations. However, this study did not support her findings. Fifty percent of the subjects in this study used an opportunistic overall approach in all three of the simulations. There was no difference in the overall approach on the three simulations.

Once again, there may be a difference between practice and simulation on the overall approach used in making a decision. Subjects may be more systematic in practice because it is conducive to effective decision making. Subjects may be more opportunistic on simulations because the simulations do not represent reality faithfully. This lack of fidelity may result in a different approach.

In summary, some of the findings of this study related to differences between practice and simulations can be explained by the methodology used. The retrospective recall of the practice situations may have affected the description of the situations. Consequently, the interpretation of the thinking processes associated with the practice situations may be affected. However, information processing theory would predict the differences found. The different task environments of practice and simulation should have an effect on the decision making processes used.

Process and Situation Variables

The situation variables of engagement, subjective decision difficulty, complexity and uncertainty in recalling

the practice situation accounted for 29% of the variance of the overall approach in practice. They accounted for 16 to 18% of the variance of the alternatives considered on the simulations, and the initial approach and reporting strategy in practice. Four percent of the variance was accounted for on the reporting strategy on the simulations. None of the variables entered the regressions on the initial and overall approaches on the simulations and the alternatives considered in practice. The situation variables and their relationship to the process variables are discussed.

It was somewhat surprising that engagement did not account for more of the variance in the process variables. Engagement was hypothesized to be a factor in which there were major differences between practice and simulation. Hence, it was thought that it would explain some of the differences between practice and simulation. However, the concept of engagement is immature in its development and this study is the first attempt to quantify it. Although the overall average engagement score on the simulations (60.6) was lower than the practice situations (72.9), it was surprising that the subjects felt as engaged with the simulated patients as they did. This may have occurred because the simulated patients reminded the subjects of patients for whom they had cared.

The degree of difficulty that a subject felt while making the decision entered all of the regressions in which variables entered. The perceived difficulty of decision making may be more predictive of the decision making process

than other factors. This interpretation must be taken cautiously however, since the subjective decision difficulty accounted for at most, 29% of the variance in any of the process variables.

Complexity of the practice situations entered the reporting strategy regression. It accounted for 6% more of the variance after decision difficulty had entered. From information processing theory, it would be predicted that complexity would have an effect on the decision making process since decision making is an interaction between the problem solver and the task environment. A more complex situation may invoke a more opportunistic approach because it is too difficult to maintain all of the components of the situation in working memory. However, this study did not support that prediction.

Corcoran (1986a, 1986b) found that the overall approach varied by complexity of the simulations. Subjects used opportunistic approaches in the more complex cases and a systematic approach in the least complex case. However, this study did not support that finding. In the repeated measures analysis of variance across the simulations, there was no difference in the overall approach used by the subjects.

Uncertainty entered the regression on the overall approach in practice. It accounted for 12% more of the variance after decision difficulty. The negative weight of uncertainty was surprising. This could be interpreted to mean that the less uncertain subjects were in recalling the

practice situation, the more opportunistic they were in their overall approach. However, theoretically, it would be predicted that the more uncertain subjects were in their recall, the more opportunistic they would be in their approach because it would be more difficult for them to be systematic due to forgetting. Additional information would be added in their reports as it was remembered which could make the report jump from problem to problem.

Additional Factors

Factors which may account for some of the difference between practice and simulation on the process variables which were not included in this study were: 1) the degree of risk that the subject was willing to take in recommending alternative interventions; 2) a matching of complexity of the simulations with the practice situations; and 3) the level of fidelity of the simulations.

The degree of risk that a subject was willing to take may affect the decision making process. If a person were willing to take a great deal of risk, more alternatives may be considered because higher risk alternatives may be included. It is difficult to hypothesize about the effects risk may have on the other components of the decision making process.

Although complexity of the practice situations was evaluated in this study, it was not matched with the simulations by each subject. Control of complexity may have given a better understanding of its effect in the processes of decision making. Although complexity did not appear to

have an effect on practice or simulation, a study controlling complexity more closely would assist in determining its actual effect.

The fidelity of the simulations in this study was not varied. A difference in the decision making processes may have resulted if fidelity had varied. Previous studies showed that the use of high-fidelity simulations resulted in no difference in decision making processes while there was a difference between practice and simulation when low-fidelity simulations were used. The differences found in this study may be due to the low-fidelity of the simulations.

Demographic Variables

There was concern that experience and educational preparation may be confounding the results from the analyses of the process variables. However, two factor repeated measures analyses of variance were computed on these variables and no significant differences were found. These findings are contrary to predictions of information processing theory and findings from previous studies.

Information processing theory would predict that differences in the information processing system (the decision maker) would result in different decision making processes. Differences in experience and education represent differences in the information processing system. Hence, different decision making processes would be predicted in this case. However, such a difference did not occur.

Del Bueno (1983) and Verhonick et al. (1968) found that

experience had a relationship with the outcome on simulations. Experienced nurses performed the best on the simulations. Corcoran (1986a, 1986b) found that expert nurses used broad initial approaches significantly more often than novice hospice nurses. This also corroborates Tanner's (1984) hypothesis that experts begin with a general systematic search to avoid premature closure. Corcoran also found that experts varied their overall approach based on complexity and that novices did not vary their overall approach.

Although most studies found differences in the decision making process based on experience or expertise, this study did not support that finding. However, most of the nurses in this study had at least two years of experience as a registered nurse (88%). Because the sample was relatively homogeneous with regard to amount of experience, it may have eliminated any differences. Most studies that investigated experience had a group that was very inexperienced with less than six months of experience or compared students with practitioners.

Davis (1972, 1974), Del Bueno (1983), and Verhonick et al. (1968) found that educational preparation had a relationship with decision making processes. More education correlated with a better performance. Once again, however, this study did not support their findings.

Possible measurement and theoretical explanations for the specific findings of this study were discussed above. Measurement and theoretical issues related to this study in

general, are discussed in the next section.

Measurement Issues

There are three major measurement issues related to this study that will be discussed. They are: 1) the immaturity of the concepts studied, especially engagement and the process variables; 2) the modification of measures designed for use in diagnostic reasoning studies for this investigation of intervention planning; and 3) the summing of the scores of the variables across the simulations and practice situations.

Immaturity of the Concepts

Most of the studies about decision making in the health care literature investigated the processes that individuals use in making a diagnosis or identifying a patient problem. Although other studies (e.g., Tanner et al., 1987) identified interventions pertaining to the problem, Corcoran's (1986a, 1986b) study is among the first to specifically investigate the process of planning interventions. Because of the recency of study of this phenomena and health care decision making in general, concepts related to this area are not well understood or defined. For example, initial and overall approach have been studied in only one prior investigation (Corcoran, 1986a, 1986b). Although these concepts have theoretical underpinnings in information processing and an empirical base from Hayes-Roth and Hayes-Roth (1979), they were not derived directly from the data. It is possible that a qualitative approach to the data would result in a different

description of decision making processes.

The concepts that were used in attempting to explain the difference between practice and simulation also have not been investigated in any depth. For example, the engagement measure was developed specifically for this project. The concept of engagement has not been explored to any degree and has been only briefly alluded to by Benner (1984) and Benner and Wrubel (1989). During the development of the engagement instrument, interviews related to the concept were conducted. However, an in-depth analysis was not undertaken at that time. Face validity was established through the pilot testing of the instrument and interviewing of practicing oncology nurses, but further study of the validity of the instrument was not conducted.

The concept of complexity has been studied to a limited degree in the field of psychology (Hayes-Roth & Hayes-Roth, 1979; Payne, 1976) but once again, Corcoran's (1986a, 1986b) work is the only study in nursing that has specifically investigated complexity. Other studies (e.g., Tanner et al., 1987; Verhonick et al., 1968) have varied the task by providing different simulations and have recognized that the simulations varied in their complexity, but did not specifically study complexity as a variable. The immaturity of the concept of complexity may explain why the complexity of the practice situations did not account for any of the variance of the process variables except for the reporting strategy used.

However, decision difficulty did account for some of the

variance in five of the process variables. Decision difficulty was a subjective measure of how difficult it was to make the decision about the treatment regimen. It may be a better measure of complexity than the objective measure used because it represents knowledge and experience of the person related to the situation rather than fixed characteristics of the situation. In other words, the degree of complexity of a situation may vary as a function of the person rather than the situation itself. Different past experiences and knowledge levels would be reflected in the measure of subjective decision difficulty while a measure using criteria established a priori would not reflect this difference. This subjective measure may help to explain the decision making processes used by a person better than the objective measure of complexity. Further research would need to be conducted to determine if this hypothesis has merit.

The immaturity of the concepts used in this study may help explain some of the findings. Further concept development using qualitative and quantitative methods is needed. Once these concepts are better developed, more effective scales may be formulated so that research in clinical decision making can be improved.

Modification of Measures

Many of the measures used in this study were modified instruments from previous research. Although the modifications had theoretical underpinnings, the resultant instruments were tested only in a small pilot study.

Findings from this study may be related to how the variables were measured.

The reporting strategy used was derived from a measure of diagnostic reasoning. The measure of data acquisition strategies developed by Tanner et al. (1987) was modified so that it was pertinent to intervention planning rather than determining a diagnosis or patient problem. It was also used in a situation in which all information about the patient was known so that no further data could be acquired. In the practice situations, the subjects were recalling the events that had already occurred. With the simulations, all data were provided to the subject and the interviewer could provide no further information.

Other process variables were also modified to fit the practice situations. The initial and overall approaches had been developed for use with simulations. The coding procedures developed by Corcoran (1983) were modified slightly so that they fit the practice situations.

These modifications of the measures may help to explain some of the findings of this study. The findings related to the process variables may be due to the way in which they were operationalized. There were some modifications made in the coding procedures of the variables dependent upon whether practice situations or simulations were being described. This difference in coding may have resulted in the findings related to practice and simulation. For example, on the initial approach for practice, the general description of the patient was not included in the

determination of the initial approach. Most subjects would begin their case descriptions with a few statements about the patient's age, sex and medical diagnosis. This type of information was not verbalized in the simulations because it was included in the written case description. The raters did not need to make judgments about when the initial approach began on the simulations. The subject's first words began the initial approach on the simulations. The raters made inferences about when the subjects stopped giving background information on the patients and began their initial approaches to the situation. The inferences by the raters may have affected the coding of the data; hence, the results would also be affected. The validity of the measures may be questioned.

Further evidence that the process variables may not have construct validity is provided through the analysis of the demographic variables of education and experience. No differences in the process variables were found between those subjects with at least a baccalaureate degree and those with diplomas and associate degrees in nursing. In addition, no differences were found between two levels of experience. These findings are contrary to all other studies of decision making. If the process variables of this study were measuring domains similar to those measured in previous studies, one would expect similar findings especially since all of the previous studies supported these conclusions. However, as was discussed previously, there may be other factors that can explain this lack of

difference.

Although the modification of the measures to fit this study was based on theoretical considerations, the validity of the measures may still have been affected. The findings should be interpreted with this possible limitation in mind.

Summing Across the Stimulus Types

In the results section, statistical procedures which provided evidence that the process and situation variables could be combined across the simulations and across the practice situations were described. However, conceptually this summing across the practice situations and across the simulations is somewhat more difficult to justify. The measures were tied to a specific situation or simulation. For example, the degree of engagement that a subject felt about a patient was related to that particular patient. The degree of engagement usually varied with each patient. However, in the analysis, engagement was averaged across the three situations. Hence, the average engagement across the situations did not account for any of the variance of the initial approach summed across the situations. It is possible that more of the variance could have been accounted for if the engagement for a particular situation was regressed on the initial approach for that situation. This type of analysis was not done because of the lack of independence of the variables and because the probability that significant findings would be found by chance increases with the number of analyses performed (Kirk, 1982). However, the relationship between the situation variables

and the process variables for the individual situations may be closer than for the variables summed across the situations.

In addition, according to information processing theory, the task environment should make a difference in the decision making process. When one considers the task environment to be practice or simulation, this prediction of difference was upheld using three of the measures of decision making summed across the stimulus types. However, if a smaller unit of analysis was used and each of the three simulations and each of the practice situations were considered to be different task environments, then there should be differences among each. Moreover, many studies have found little correlation on performance across situations on at least some measures (e.g., Elstein et al., 1978; Norman et al., 1982; Tanner et al., 1987).

On the other hand, it may be argued that the task environments in the practice situations were similar to one another because the same type of decision was being made. The subjects were making decisions about a patient's pain control regimen. However, Templeton, Ervitti, Bunce and Burg (1977) concluded that an audit of at least ten records was required to get a relatively stable estimate of a subject's performance in a particular setting for a particular medical condition.

In addition, it may be argued that decision making processes are a characteristic of the person rather than a function of the task environment. If this assumption is

made, combining across the practice situations and across the simulations can be justified theoretically. In reality, the truth probably lies between the two extremes. Decision making processes are a result of the interaction between the task environment and the person and it may not be possible to determine that a measure of decision making is representative of the person or the task. However, it is challenging to design studies to examine this interaction.

Three measurement issues were discussed that had an effect on the findings of this study. While no definitive conclusions were made, possible alternative explanations of the findings were explored. This exploration continues in the discussion of theoretical issues in the following section.

Theoretical Issues

The findings from this study both supported and contradicted findings from other studies and information processing theory as posited by Newell and Simon (1972). This section summarizes those contradictions and corroborations.

Findings from Other Studies

Generally, the previous research that described processes of decision making in health care professionals studied diagnostic reasoning and not planning of care. They found that subjects generated hypotheses and usually generated them early in their thinking. These hypotheses became more specific as the subjects progressed in their thinking about the situation. Their data acquisition was

usually systematic except when they were having difficulty with their decisions. Experienced practitioners were more accurate in their decisions and collected more relevant data than the less experienced.

Because it was assumed that diagnostic reasoning and planning use similar thinking processes, a comparison between the findings described above and this study is possible. As in previous studies, subjects did generate hypotheses about alternative interventions. The timing of the generation of these hypotheses and their specificity were not studied. The subjects did not collect information about the patients in this study. However, their information reporting strategy and overall approach were more systematic in the practice situations than on the simulations, as they were in previous studies. The subjects in this study considered more appropriate interventions in practice than on the simulations. Unlike other studies, there were no differences on the process variables when education and degree of experience were considered.

The studies comparing practice and simulation have had mixed results. Two studies (Kirwan et al., 1983; Norman et al., 1982) found that practitioners performed similarly in both practice and on simulations. One study (Page & Fielding, 1980) found that subjects performed differently in the two situations. Two studies (Holzemer et al., 1981; Dincher & Stidger, 1976) had mixed results showing some relationships between practice and simulations. This study

showed that there were differences between practice and simulation on information reporting strategy, overall approach and appropriate alternatives considered. There was no difference in the initial approach.

Information Processing Theory

Information processing theory describes problem solving as an interaction between the information processing system (the problem solver) and the task environment. This theory would predict that changes in either the information processing system or the task environment would produce changes in the decision making process.

Results from this study both supported and contradicted these predictions. The different task environments of practice and simulations produced predicted differences in the reporting strategy, overall approach and appropriate alternatives considered. There was not a difference in initial approach. Theoretically, this lack of difference could exist because the initial approach that an individual uses is a characteristic of the person rather than triggered by the situation or task environment. It is possible that an individual may use the same initial approach because not enough is known about the situation at first to determine if a different approach is needed. As more becomes known about the situation, the approach may change and is reflected in the overall approach to the situation.

Characteristics of the task environment such as engagement, decision difficulty, complexity and uncertainty in recalling the practice situation did not explain very

much of the variance in the process variables. Once again, some of these may be characteristics of the person and may not change from situation to situation. For example, the degree of difficulty that an individual has in making a decision may not vary a great deal. A number of subjects stated that they did not have trouble making decisions, that decision making was easy for them. These individuals rated the decision making difficulty as low in all of the situations. Decision difficulty seemed to be a characteristic of the person rather than one attached to a particular situation with these subjects.

Some characteristics of the information processing systems varied such as level of education and experience. These differences were not related to the process variables. Other explanations of this lack of difference have been offered in previous sections. However, in terms of information processing theory, this lack of difference may be explained by hypothesizing that education and experience are not characteristics which have an effect on the decision making processes. This conclusion, however, is contrary to findings from other research.

The findings from this study were discussed in relation to previous research, measurement issues and the theoretical framework of information processing. Alternative explanations of the findings were offered. The next chapter summarizes the study, discusses the implications and limitations of the study and suggests future research directions.

CHAPTER V

Summary

Simulations have been used for over two decades as a method to evaluate performance of nurses and nursing students and as the basis for a significant portion of the research in clinical judgment. This research in clinical judgment is important to the improvement of nursing practice. The delivery of quality health care requires that clinicians be able to make decisions effectively and efficiently.

However, few studies have been conducted that compare the thinking processes used on simulations with those used in practice. There are differences between practice and simulations that could affect the thinking processes used. For example, nurses may not become engaged with simulated patients. They may take more risks with the hypothetical patients portrayed in the simulations because they know that their decisions will not endanger an actual patient.

The purpose of this study was to determine if there was a difference between practice and simulation on the decision making processes used by hospice nurses when deciding on pain management for patients. A secondary purpose was to investigate factors in the practice situations and the simulations that might account for any differences. The specific research questions were:

1. Is there a difference in the quality and nature of the decision making processes used by hospice nurses in deciding on pain management when the stimulus material is a

simulation as compared to an actual practice situation?

2. What factors in the different conditions (simulation vs. practice) may account for a difference in decision making processes?

Review of the Literature

Studies of clinical decision making of health care professionals have used simulations, practice, or a combination of simulations and practice as their stimulus material. The studies using simulations have generally found that subjects used a hypothetico-deductive approach to making decisions. Subjects began their decision making with an impression about the problem, generated hypotheses about the problem usually early in the encounter, gathered information related to the hypotheses, increased the specificity of the hypotheses, evaluated the hypotheses in light of the information collected and made a decision about the problem. In addition, the studies using simulations investigated the relationship of experience and education to the decision making process. Up to approximately six years of experience, subjects demonstrated better performances in their decision making behavior. The efficiency of their decision making declined after that point. Increased education was associated with better decision making performance.

The studies using practice situations as the stimulus material had different results dependent upon the type of practitioner studied. In medicine, the hypothetico-deductive approach was still described as the primary

process used in decision making. However, in the nursing literature, intuitive processes were described. A portion of this difference in findings may be related to the theoretical framework used. The studies in medicine used information processing as their theoretical framework as did the studies using simulations described above. The nursing studies used a phenomenological perspective.

The studies using both practice and simulations had mixed results. Two studies showed that practitioners performed similarly in both practice and on simulations. One study showed that the subjects performed differently and did better on simulations. Two studies had mixed results and showed that practice and simulations were related on some measures but not on others.

Theoretical Framework

Information processing theory was the theoretical framework for this study. Newell and Simon (1972) described decision making processes as an interaction between the information processing system (the decision maker) and the task environment. Decision making effectiveness rests upon the information processing system's ability to adapt to the limitations of the system. These limitations include the small capacity of short term and working memory, and the ability to encode and retrieve information from long term memory.

Information processing theory would predict that differences in either the information processing system or the task environment should result in differences in the

decision making process. This study investigated that prediction by systematically varying the task environment. Two different task environments were studied, practice situations and simulations.

Methodology

A convenience sample of 34 hospice nurses from ten northwestern institutions were the subjects in this repeated measures design study. The subjects completed three written simulations and described three practice situations where they had made a decision about a patient's pain control regimen. They were randomly assigned to one of two sequences: 1) describing the three clinical situations followed by completing the three simulations, or 2) completing the three simulations followed by describing three clinical situations. No order effects were detected.

Although an effort was made to control for experience and education, it was not possible to recruit adequate numbers of experienced, baccalaureate prepared hospice nurses. Statistical procedures indicated that experience and education did not have effect on the decision making processes.

The data were collected in one or two interview sessions. Subjects were asked to describe three clinical situations in which they had made a decision about a patient's pain control regimen. They were also requested to read three written simulations and make recommendations about the patient's pain control regimen. These interviews were tape recorded and transcribed for analysis. These

verbal protocols were then content analyzed using coding categories that were theoretically derived and empirically based on research by Corcoran (1986a, 1986b), Tanner et al. (1987), Elstein et al. (1978), and Newell and Simon (1972). These coding categories are described below.

Variables

There were four process variables and four situation variables that were studied. The process variables were: 1) the initial approach used by the subject in making the decision; 2) whether or not most or all of the appropriate alternatives were considered; 3) the information reporting strategy used; and 4) the overall approach used in making the decision. The situation variables were: 1) the degree of engagement that the subject felt with the patient; 2) the complexity of the situation; 3) the subjective degree of difficulty that the subject felt while making the decision; and 4) the degree of uncertainty that the subject felt while recalling the practice situation.

The initial approach used was classified as either broad or narrow. A narrow approach was one in which the subject considered only one pain related problem initially. A broad approach was one in which more than one pain related problem was considered initially.

The alternatives considered was a dichotomous variable that indicated whether or not the subject had considered most or all of the appropriate alternative interventions. This dichotomous variable was used rather than frequency counts of alternatives considered because the number of

appropriate alternatives was determined by the practice situation. It was possible to consider one alternative in one case and ten alternatives in another case simply because more alternatives were available in the latter situation.

There were four information reporting strategies: 1) hypothesis driven, 2) one-thought-leads-to-another, 3) cue-based, and 4) random. Hypothesis driven reporting was one in which the subject presented most of the information related to a problem at one point in the verbal protocol. In the one-thought-leads-to-another strategy, the subject presented some information which lead to another thought which was not along the same lines as the first. In cue-based reporting, the subject used cues from the situation to present information. In random reporting, the subject presented information in a nonsystematic manner.

The overall approach was a dichotomous variable that measured the approach that the subjects used throughout the entire verbal protocol. It was classified as systematic or opportunistic. A systematic approach was one in which the subject addressed single problems at adjacent points in the process. An opportunistic approach was one in which the subject jumped from problem to problem.

The measure of engagement was a researcher developed instrument. Engagement was defined as the degree of closeness or involvement that a subject felt with the patients. The instrument consisted of three 100 millimeter analogue scaled items that requested subjects to rate how involved, close and in tune they felt with the patient.

Complexity was a three point scale that was determined by the number of pain related problems presented by the patient, the interrelationships of the pain related problems and the degree to which the problem could be managed by hospice protocols. They were classified as low, moderate and high. Only the practice situations were evaluated for complexity because the simulations developed by Corcoran (1983) had been designed with the three levels of complexity.

Decision difficulty was rated by the subjects for both the simulations and the practice situations. This variable was on a zero to ten scale where zero was not difficult and ten was extremely difficult.

Uncertainty was a measure of the subject's ability to recall the practice situation. Although subjects were requested to describe situations that had occurred within the past two or three days, some were unable to do so. This measure was designed to determine if the inability of the subject to recall information about the situation accounted for any of the variance in the process variables for practice.

Results

There were four major findings from this study. First, there was no significant difference between practice and simulation on initial approach used. Second, there were significant differences between practice and simulation on alternatives considered, reporting strategy and overall approach. Third, the situation variables did not account

for very much of the variance of the process variables. Fourth, experience and education did not have an effect on the differences between practice and simulation on the process variables and there were no interactions between the variables.

Some of the findings related to differences between practice and simulation can be explained by the methodology used. The retrospective recall of the practice situations may have affected the analysis. The manner in which the subjects related the practice situations may not actually reflect their thinking processes. The modification of the coding procedures for practice may have also affected the outcome of the study. The differences found may only be reflections of the differences in coding procedures. The concepts in the study are relatively immature in their development. More development of the instruments may result in larger differences or the differences may not be apparent any longer.

The situation variables were not able to account for very much of the variance of the process variables. It was particularly surprising that engagement did not account for much of the variance in the variables. Once again, the immaturity of development of the situation variables may account for this lack of explanation.

The finding that experience and education did not have an effect on the differences between the process variables was also very surprising. Information processing theory would predict and previous studies demonstrated that there

were differences between different levels of experience and education on performance of decision making skills. However, the levels of experience in this study may not have been extreme enough to result in a difference.

However, most of the findings from this study would be predicted by information processing theory. The different task environments of practice and simulation resulted in differences in the decision making processes as measured by alternatives considered, information reporting strategy and overall approach. The initial approach was not different between practice and simulation but this may have occurred because the measure did not have internal consistency reliability. The initial approach used may be dependent upon the situation and by summing across the practice situations and across the simulations, the difference was washed out by the variability of the measure.

Implications for Nursing

The finding that there were differences between practice and simulation on most of the variables measuring decision making processes could have many implications for nursing. These implications are discussed below.

Based upon this study, the use of simulations for the evaluation of an individual nurse's practice may not be warranted. This study indicated that there was a difference between practice and simulation. Simulations may stimulate different decision making processes than practice; hence, the results from simulations may not be indicative of performance in practice.

The largest potential impact of this study is on nursing research in clinical decision making. The findings of this study imply that decision making processes in practice are different from those on simulations. The validity of using simulations to study clinical decision making becomes questionable. The findings from studies using simulations may not be representative of decision making processes actually employed in practice. If this is so, research on clinical decision making should be conducted using practice situations.

It should be kept in mind that this study is the only one that has been conducted in nursing that compares practice and simulation. Before any conclusions can be drawn, further research on differences between practice and simulation should be conducted with different populations and better measures. It should also be noted that the practice component of this study was retrospectively recalled situations from practice, not actual observations of the subjects in practice. There may be a difference between the decision making processes actually used in practice and those described in the interviews. Other limitations of the study are discussed in the next section.

Limitations of the Study

The major limitations of this study were: 1) the lack of well established measures, 2) the use of retrospective recall of the practice situations, and 3) the relationship of the measures to patient outcomes.

The difficulties with the measures have been described

in a previous section. In summary, many of the concepts used in this study are immature and the instruments have not been tested extensively. These difficulties have probably lead to a great deal of measurement error which may have had an effect on the results.

Although retrospective recall of the practice situations was the most feasible method of data collection, it did present some difficulties in the analysis and interpretation of the results. Concurrent or a retrospective recall that was immediately following the event in practice would have been a more ideal methodology. However, as was stated previously, the logistical problems with a concurrent recall are tremendous. However, in the future it may be possible to overcome these difficulties using advanced technology.

Another concern was whether or not the measures chosen make a difference in patient care. For example, do the initial or overall approaches that subjects use in their decision making alter outcomes of patient care? Is a systematic overall approach associated with a better patient outcome? If the initial approach of a subject was changed from narrow to broad, would the patient outcomes be improved? These questions need to be addressed but it is beyond the scope of this study to attempt to do so. It is possible that the measures chosen for this study do not represent the best predictors of patient outcomes; however, further research in this area needs to be conducted.

Future Research

There are a number of directions that future research in

clinical decision making could proceed based on the findings of this study. Three of these directions are enumerated below. First, more qualitative research on decision making needs to be conducted. Second, concepts from this study need further development. Engagement is a concept of particular interest. Third, further research on methodology to collect verbal protocols in practice needs to be conducted.

Qualitative research on the decision making processes used in nursing needs to be conducted. Many of the studies that have been conducted to this point have used studies from medicine as the basis of their investigations. Using this empirical base and information processing as the theoretical framework, the studies in nursing have tended to confirm the findings. However, studies that have not used this base (e.g., Benner & Tanner, 1987; Pyles & Stern, 1983) found different processes such as intuition involved in decision making. Qualitative research that uses a more emic perspective may result in the description of more decision making processes.

The concepts in this study were very immature in their development. Further research to develop them may assist in explanation of factors that affect decision making processes. In particular, the development of engagement may be very useful. The ability to "read" a patient, to become totally involved with that individual should be a difference that is evident between practice and simulation. However, engagement did not account for very much of the variance in

the decision making process. This lack of explanation may be due to the construction of the instrument measuring engagement. If a valid and reliable measure of engagement can be developed, it may be demonstrated that it is a factor affecting the difference between practice and simulation.

The work that has been begun by Monahan and Tanner (1988) on collecting verbal protocols in practice should continue. The retrospective recall of the practice situations may explain some of the difference that was found between practice and simulation on the decision making processes. If concurrent or retrospective recall immediately following a decision making incident could be conducted, a more direct measure of decision making in practice would result. A concurrent collection of verbal protocols would eliminate the mental processing of the information performed before a retrospective protocol is collected.

The study of clinical decision making is important to nursing practice, education and research. The development of effective, efficient decision makers is necessary for quality health care. This study found that there were significant differences between practice and simulation on measures of clinical decision making. Factors related to these differences were not uncovered. It is hoped that this study has raised more questions about clinical decision making and encouraged others to pursue its study.

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Appendix A

Means, Standard Deviations, and t-values

on Variables by Sequence Groups

Variable	Group 1[a]		Group 2[b]		t-value
	Mean	S.D.	Mean	S.D.	
		Simulation A			
Initial Approach	.41	.51	.29	.47	0.70
Alternatives Considered	.71	.47	.76	.44	-0.38
Reporting Strategy	2.59	.94	2.65	.70	-0.21
Overall Approach	.71	.47	.82	.39	-0.79
		Simulation B			
Initial Approach	.41	.51	.53	.51	-0.67
Alternatives Considered	.65	.49	.59	.51	0.34
Reporting Strategy	2.41	1.06	2.65	.79	-0.73
Overall Approach	.59	.51	.71	.47	-0.70
		Simulation C			
Initial Approach	.41	.51	.47	.51	-0.34
Alternatives Considered	.71	.47	.71	.47	0.00
Reporting Strategy	2.47	.80	2.65	.70	-0.68
Overall Approach	.82	.39	.82	.39	0.00

[a] Simulation first

[b] Practice first

Variable	Group 1		Group 2		t-value
	Mean	S.D.	Mean	S.D.	
Practice Situation 1					
Initial Approach	.53	.51	.76	.44	-1.44
Alternatives Considered	.76	.44	1.00	.00	-2.22*
Reporting Strategy	2.12	.99	1.88	.86	0.74
Overall Approach	.53	.51	.29	.47	1.39
Complexity	1.29	.47	1.24	.44	.38
Practice Situation 2					
Initial Approach	.53	.51	.35	.49	1.02
Alternatives Considered	.82	.39	.82	.39	0.00
Reporting Strategy	1.94	.90	2.18	.88	-0.77
Overall Approach	.76	.44	.59	.51	1.09
Complexity	1.82	.53	1.65	.61	.90
Practice Situation 3					
Initial Approach	.29	.47	.47	.51	-1.04
Alternatives Considered	.88	.33	.71	.47	1.26
Reporting Strategy	2.24	.75	2.06	.90	0.62
Overall Approach	.82	.39	.53	.51	1.87
Complexity	2.29	.47	2.18	.53	.69

* $p \leq .05$

Appendix B

Hospice and Registered Nurse Experience, and Age (n=34)

	N	%
Hospice Experience		
Less than 1 year	4	12
1 up to 2 years	8	23
2 years	6	18
3 years	2	6
4 years	4	12
5 years	3	9
6 years	2	6
More than 6 years	5	15
RN Experience		
Less than 2 years	4	12
2-5 years	11	32
6-10 years	6	18
More than 10 years	13	38
Age		
20-25	3	9
26-30	1	3
31-35	4	12
36-40	6	18
41-45	11	32
46-50	5	15
51 and older	4	12

Appendix C

Consent Form

Karen Padrick, RN, MN, a doctoral student at the Oregon Health Sciences University, School of Nursing, is conducting a study entitled "Validity of Simulations for Studying Clinical Decision-Making in Nursing Practice". The purpose of this study is to compare how nurses make decisions while using a simulation and while in clinical practice.

If I agree to participate in this study, my involvement will include describing three clinical situations in which I made decisions about pain control regimens for patients and completing four written simulations. These descriptions will be audiotaped and transcribed for later analysis. All audiotapes will be kept in a locked file and not identified by my name. Any information concerning me and my patients will be kept strictly confidential. I understand that it will take approximately 2 hours of my time to participate in the study.

I understand that my involvement in this study has no foreseeable risks and will not benefit me directly although a better understanding of nurses' reasoning skills may benefit those receiving nursing care in the future.

I further understand that I may refuse to participate or withdraw from this study at any time without affecting my relationship with or treatment at the Oregon Health Sciences University. Ms. Padrick has offered to answer any questions I might have. She can be contacted at (503) 279-7796.

I have read the foregoing and agree to participate in the study.

_____ _____

Signature Date Witness signature Date

Appendix D

Demographic Data Form

Directions: Please place an X in the space to the left of the response to each question which best describes you.

1. What is your present role in the hospice program?

_____ Clinician

_____ Director

_____ Head Nurse

_____ Staff Nurse

_____ Other (Please specify _____)

2. What is your educational preparation? (In the spaces provided on the left below, please place an X next to as many degrees/diplomas as you hold. In the spaces provided on the right below, please write the major for the degree/diploma.)

Degree	Major
_____ Associate Degree	_____
_____ Diploma	_____
_____ Baccalaureate Degree	_____
_____ Master's Degree	_____
_____ Other _____ (please specify)	_____

3. What is the length of experience that you have had as a registered nurse in a hospice program?

_____ Less than two years

_____ 2 years

_____ 3 years

_____ 4 years

_____ 5 years

_____ 6 years

_____ More than 6 years

4. What is the length of experience that you have had as a registered nurse in any setting or area of nursing?

_____ Less than two years

_____ 2 to 5 years

_____ 6 to 10 years

_____ More than 10 years

5. What is your age?

_____ 20-25

_____ 26-30

_____ 31-35

_____ 36-40

_____ 41-45

_____ 46-50

_____ 51 or over

Appendix E

Instructions and Simulations

GENERAL INSTRUCTIONS

This is a study of decision making. You will be given exercises in which you will be asked to design a plan for patient care.

The exercises include cases which represent persons in hospice programs who are experiencing severe pain. The data you receive about the persons are based on actual cases. Names and other specific information about the persons have been changed to protect their identity. The data consist of written statements, developed by a hospice nurse serving as a consultant, summarizing major categories of information related to the person's pain. If some information of interest to you is not reported, assume it is not available.

Your task in each exercise is to develop a plan for using drugs to control severe pain for the person described. You will be asked to:

1. read the written description of the person, and
2. develop your plan.

You will also be asked to think aloud as you carry out each of the steps.

There will be three study cases in all. You will be given one case at a time.

A sample case will be provided for practice of the task before the study cases are presented. You may take as much time as you like with each situation and each case.

This is a research project and not a test. Interest is

focused on how decisions are made in the process of developing a plan. Your participation is voluntary and confidential as described in the consent form. It is hoped that you will be relaxed and enjoy doing the exercises.

Do you have any questions?

SAMPLE CASE: INSTRUCTIONS AND DESCRIPTION

Instructions

In this exercise you are a nurse on the inpatient unit of a hospice program. You are meeting Mr. Dugan for the first time. You will be given a description of Mr. Dugan at the time of his admission to the inpatient unit.

After you are given the description of Mr. Dugan, please:

1. Read the written description; and

2. Develop a plan for using drugs to control Mr. Dugan's pain.

Please think aloud as you carry out each of the steps.

After you finish developing the plan for Mr. Dugan, you will be asked a few follow-up questions reflecting on your decision making in Mr. Dugan's case.

Do you have any questions?

Are you ready to begin?

SAMPLE CASE

SITUATION

It's Monday afternoon, Mr. Paul Dugan has just been admitted to the hospice program. While you are talking with Dr. Miller, Mr. Dugan's private physician, he tells you that Mr. Dugan has multiple myeloma. He has been treated with chemotherapy and radiation therapy. Nothing more can be done to arrest his tumors. His life expectancy is about 1 month. The focus now is to make Mr. Dugan's remaining life as comfortable and meaningful as possible. Dr. Miller indicates that he has talked with Mr. and Mrs. Dugan about the prognosis and focus of care while in the hospice program.

Dr. Miller tells you that Mr. Dugan is having severe pain which has been poorly managed by Demerol. The drug just doesn't seem to control his pain. The analgesic medication must be changed. Dr. Miller says to you, "You've had more experience working with dying patients who are in pain than I have had. What drugs would you suggest I order?" You indicate that you will talk with Mr. and Mrs. Dugan, and then get back to Dr. Miller with suggestions for a drug administration plan to control Mr. Dugan's pain.

CURRENT DATA

You go to Mr. Dugan's room. Both Mr. and Mrs. Dugan are present. Mr. Dugan is sitting in the chair. His hair is white. He has a ruddy complexion. He appears to be about 5'10" tall and weighs approximately 145 pounds.

Mr. Dugan tells you that he has been in continuous pain

for the past two years. He states, "I just want to die. I can't live with this kind of pain. If only I could get a good night's sleep."

During your initial assessment of Mr. Dugan, you give him a drawing of a front and back view of the body. (See Figure 1.) You ask Mr. Dugan to point to the location of his pain. He points to the hip area and the spine area of the drawing, saying, "It feels like it's in my bones." You ask Mr. Dugan if any particular events or actions seem to make the pain worse. He says, "It's always there, but it's worse after I have a bowel movement." You ask him if it's worse during the day or at night. He says, "It's much worse at night."

Next, you ask Mr. Dugan about the intensity of his pain. You hand him a card with the "Patient Self-Report on Pain" scale on it. (See Figure 2.) In order to help Mr. Dugan become familiar with the scale and to give you baseline information, you ask Mr. Dugan to pick the number associated with the word that he would use to describe a toothache. He picks number 2, "Discomforting." Then you ask him to pick the number associated with the word he would use to describe severe gas pains. He picks 6-7, "Horrible." Finally, you ask Mr. Dugan to pick the number associated with the word that best describes the intensity of his pain right now. He picks 6-7, "Horrible." You tell him that you will develop a plan to try to control the pain. When you ask Mr. Dugan what number he would like to aim for in a week, he picks number 3, "Bearable." He also indicates that he wants to

remain mentally alert.

You ask Mr. Dugan to tell you what he has been taking for the pain. He tells you that Dr. Miller gave him a prescription for Demerol, 100 mg., and told him to take it orally whenever he has pain. Mr. Dugan adds, "But I only take it two or three times a day. I don't want to take it too often. It might not work for me later when I need it even more than I do now."

You note that Mr. Dugan looks exhausted. His face is expressionless. He moves very little, sitting very still in the chair.

Mrs. Dugan tells you that Mr. Dugan is 68 years old. He had been at a normal weight (about 175 pounds) and relatively active until six months ago. Since then, he has lost weight, become dehydrated, and has been less active physically. Lately, he's been depressed and angry. She also tells you that she worries about addiction. She's afraid that when her husband really needs the medication later, it won't do any good.

What plan for using drugs to control Mr. Dugan's pain would you recommend to Dr. Miller? Please share your thinking as you develop your plan.

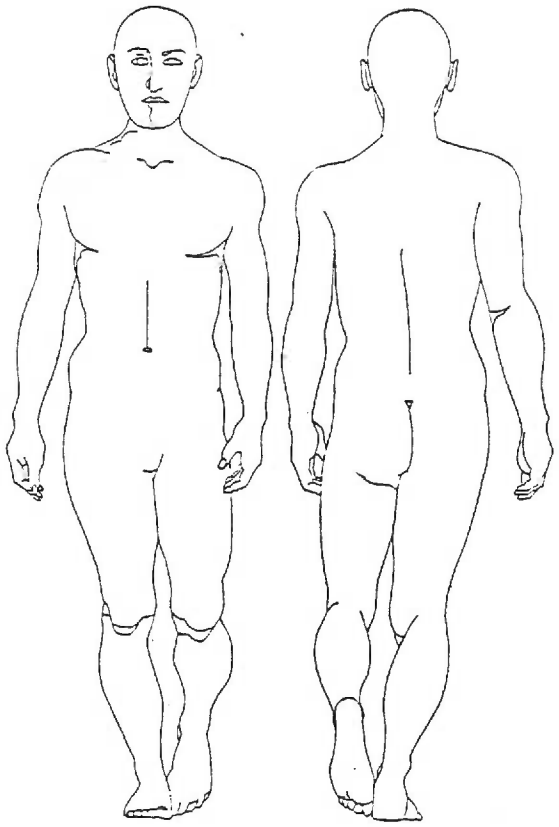

Figure 1.

10	Agony, Intolerable
8-9	Excruciating
6-7	Horrible
4-5	Distressing
3	Bearable
2	Discomforting
1	Mild
0	Pain-free

Figure 2. Patient Self-Report on Pain Scale

CASE A: INSTRUCTIONS AND DESCRIPTION

Instructions:

In this exercise you are a nurse on the inpatient unit of a hospice program. You are meeting Mrs. Ludlow for the first time. You will be given a description of Mrs. Ludlow during her stay on the inpatient unit.

After you are given the description of Mrs. Ludlow, please:

1. Read the written description; and

2. Develop a plan for using drugs to control Mrs. Ludlow's pain.

Please think aloud as you carry out each of the steps.

After you finish developing the plan for Mrs. Ludlow, you will be asked a few follow-up questions reflecting on your decision making in Mrs. Ludlow's case.

Do you have any questions?

Are you ready to begin?

CASE A

SITUATION

It is Tuesday evening. You are working on the inpatient hospice unit. You are assigned to work with Mrs. Ludlow who has just been readmitted after one month at home with hospice home care. Dr. Smith, Mrs. Ludlow's physician, is writing admission orders. As he is doing so, he verbalizes feelings of frustration at his inability to successfully balance pain relief with uncompromised consciousness for Mrs. Ludlow. He walks off the unit saying to you, "Do what you can. You're supposed to be the experts. You plan a medication regimen for Mrs. Ludlow. I'll review the plan; if it seems appropriate, I'll write it as an order on her chart."

PAST HISTORY

You take time to review Mrs. Ludlow's old charts. You find that she is a 76 year old widow. She has one child, a daughter named Pam. Her early health history is unremarkable with the exception of hospitalizations for osteoarthritis and bilateral hip replacements. Two and one-half years ago, in July, 1986, she had a right thoracotomy for a diagnosis of adenocarcinoma of the lung. A liver scan done at that time was suggestive, but not diagnostic of carcinoma. Liver function tests were normal. Following the diagnosis of cancer, Mrs. Ludlow received radiotherapy with subsequent temporary relief of pain in her chest. She consistently refused chemotherapy, stating her life was rich and satisfying. She commented, too, that she

had never seen any of her friends benefit from aggressive chemotherapeutic treatments.

On January 25, 1989, Dr. Smith asked nurses in the hospice service to evaluate Mrs. Ludlow. She was having increasing pain under her left breast. He felt she had less than six months to live and could benefit from the hospice program. Following the evaluation, she was admitted to the program. The nursing notes recorded on the initial evaluation session presented the portrait of Mrs. Ludlow as a capable, articulate, mature woman from a white upper middle class background who valued an organized environment, a well-groomed appearance, privacy, courtesy, and family relationships. Mrs. Ludlow and a hospice nurse identified the following primary objectives for her care:

1. management of symptoms,
2. emotional preparation for ensuing death, and
3. maximum independence at home.

It was decided that inpatient care was required initially to safely determine the appropriate analgesics to control Mrs. Ludlow's pain. Both she and her physician indicated her sensorium was "sensitive" to CNS depressants. Mrs. Ludlow's daughter, Pam, was her primary care giver. Pam, married with two teenage children, was in need of respite from the responsibilities of care giver. Mrs. Ludlow's stated goal was to return to her own home as soon as possible with the pain under control. Pam agreed with her mother's goal.

A trial of Oral Morphine Solution (OMS), 5 mg., every 4 hours was unsuccessful. It induced disorientation,

difficulty articulating words, and mild hallucinations. The interval of administration was increased to every 6 hours; the side effects continued. Next Percocet was tried. Her pain was eventually controlled by Percocet, one tablet every 6 hours along with Ascriptin, gr.v. Her sensorium was undisturbed. In addition, Dalmane, 15 mg., was used irregularly as a sleeping medication. Her bowels were evacuated through daily use of 1 ounce of Milk of Magnesia and every third day use of a Dulcolax suppository.

Mrs. Ludlow was discharged to hospice home care one month ago after 17 days on the inpatient unit. A problem list at the time of discharge from the inpatient unit identified the following:

1. Carcinoma of the lung with questionable extension to the liver (no jaundice, no hepatomegaly upon palpitation, lab work deferred by M.D. during hospice stay);

2. two pillow orthopnea;

3. osteoarthritis with bilateral hip replacements;

4. pain - generalized over chest with acute stabbing episodes under right breast--resolved;

5. weakness, anorexia, fatigue, weight loss (approximately 5'4", lost 33 lbs, in 6 months; current weight 87.7 lbs.);

6. impaired mobility (disuse syndrome, muscle atrophy), pain with movement;

7. constipation; and

8. reported sensitivity to antiemetics, narcotics, and psychotropics.

CURRENT DATA

Dr. Smith's admission notes of today indicate that Mrs. Ludlow is being readmitted for pain which she describes is, "in every joint and part of my body." The pain has increased in intensity over the past week at home. The medications which Mrs. Ludlow has been recently taking are: Percocet, one tablet every 6 hours; Ascriptin, gr. x every 6 hours; and Vistaril, 50 mg. every 4 hours. Constipation has become a serious problem. Disimpaction has required extra medication for the distress created. She also has poor hydration.

You go to Mrs. Ludlow's room to meet her. As you sit down next to her, you observe that she appears disheveled, does not answer all questions, and expresses frustration at being questioned saying, "I hurt too much to keep answering the same questions over and over." She cries out with pain as you transfer her from the chair to the bed. Her voice then becomes monotone and her responses generally curt, though she is able to state, "Dying is something I can deal with as long as I can relate to the people I love . . . and pain keeps the relationship from happening. All I think about is myself, and then I feel guilty." She states that life feels "bleak," and she feels "overwhelmed."

Despite her resistance to questions, you pursue a clarification of her description of pain. You give her a drawing of a front and back view of the body (See Figure 1.) You ask her to point to the locations on the drawing where she has pain. She points to the lower back, rectal area,

and left hip. Next you ask about the intensity of the pain. You hand her a card with the pain scale on it. (See Figure 2.) You ask her to pick the number(s) associated with the word that best describes the intensity of her pain now. She picks number 8-9, "Excruciating." She states that the pain is worse with movement; it doesn't vary at night. She denies "real sleep," which she yearns for desperately.

Going back to the pain scale, you ask Mrs. Ludlow to select the number(s) associated with the word that she would use to describe a toothache. She picks number 2, "Discomforting." Then you ask her to pick the number(s) associated with the word she would use to describe a severe bout of gas. She selects 6-7, "Horrible."

Within the next hour, you stop at Mrs. Ludlow's door several times. You note that she keeps herself motionless with her eyes closed.

Later in the evening, Pam, Mrs. Ludlow's daughter, arrives. She tells you that she has observed progressive time and place disorientation in her mother.

What drug administration plan to control Mrs. Ludlow's pain will you recommend to Dr. Smith? Please share your thinking as you develop your plan.

CASE B: INSTRUCTIONS AND DESCRIPTION

Instructions:

In this exercise you are a nurse on the inpatient unit of a hospice program. You are meeting Ted Johnson for the first time. You will be given a description of Mr. Johnson during his stay on the inpatient unit.

After you are given the description of Mr. Johnson, please:

1. Read the written description; and

2. Develop a plan for using drugs to control Mr. Johnson's pain.

Please think aloud as you carry out each of the steps.

After you finish developing the plan for Mr. Johnson, you will be asked a few follow-up questions reflecting on your decision making in Mr. Johnson's case.

Do you have any questions?

Are you ready to begin?

CASE B

SITUATION

Dr. Tree, a surgeon on the Oncology Service of the hospital calls the hospice unit and asks to speak to you. He asks you to do a hospice consultation for a patient on the oncology unit. The patient, Mr. Ted Johnson, has widespread metastatic cancer. Dr. Tree asks you to evaluate Mr. Johnson for appropriate symptom management and for possible admission to the hospice program. In particular, Dr. Tree asks you for suggestions for using drugs to control Mr. Johnson's pain. You indicate that you will go to the oncology unit to talk with Mr. Johnson, to review the information on his chart, and to talk with the nurses who have cared for Mr. Johnson. You tell Dr. Tree that you will write your recommendations for Mr. Johnson and leave them on the chart for Dr. Tree to review.

PAST HISTORY

You go to the oncology unit and begin by reviewing Mr. Johnson's chart. Four months ago, in November, 1988, Mr. Johnson was diagnosed as having adenocarcinoma of the colon with widespread intra-abdominal metastases.

Three weeks ago Mr. Johnson was admitted to the oncology unit of the hospital for treatment of deep, severe abdominal pain which radiated to his back. The pain worsened when he laid down. It was known that the metastatic involvement was pronounced in Mr. Johnson's liver and periaortic lymph nodes. Dr. Tree inserted a percutaneous transhepatic pigtail-type catheter into Mr. Johnson to improve the

drainage from his biliary tree into the duodenum. The physician's notes of yesterday indicate that biliary drainage into the duodenum was not optimal. A sinogram indicated only partial drainage from the right hepatic duct.

One week ago, Dr. Tree gave Mr. Johnson a palliative course of 5FU to reduce his tumor burden. Subsequent x-rays indicated it was successful in reducing the tumor size, but Mr. Johnson developed nausea, severe stomatitis, and extreme weakness. Mr. Johnson is 6'3" tall; his normal weight was 190 pounds. During the course of his stay on the oncology unit, his weight dropped to 145 pounds. Mr. Johnson was quoted as saying that the side effects of the treatments "pushed him close to death."

The nurse's notes on the chart present a portrait of Mr. Johnson. He is a 60 year old man who was a high school teacher and coach. He was regarded by his former students as being a high profile charismatic figure. During his hospitalization, he has had a steady stream of visitors. Mr. Johnson has been married to his wife, Louise, for 35 years. They have four grown children. The narrative notes indicate that Mr. Johnson described himself as a "Type A" person. He had been active in the community all his adult life in leadership capacities. He indicated that he had always been "in control: the pilot at the helm" in his family and in community groups. Many of his behaviors, while on the oncology unit, seemed related to his struggle to maintain his leader role while he was (as Mr. Johnson stated) "at the mercy of his rapidly growing cancer." He

indicated that he had never been seriously sick before; he was unsure of the "right" behaviors for being ill. He alluded to the staff that he was afraid of dying from a disease which involves a wasting process, but he could not speak with his family about his fears. On one occasion, he was described as bravely saying to his visitors that he hoped the Lord would take him soon. He stated, "I am unafraid." Louise, his wife, acknowledged that his personality had changed in the last month. Both she and the staff noted abrupt alterations between mature and sophisticated reasonableness and child-like insistent demanding behavior. His occasional episodes of crying were short-lived; he tried to disown them as "unmanly."

You talk with one of the nurses on the oncology unit who has worked with Mr. Johnson. She tells you that last night was an especially bad night for him. He was restless and wakeful. Mr. Johnson told her that when the night nurse was helping him to the bathroom, she clutched his abdomen at the site of the transhepatic catheter. Acute pain continued for several hours after that episode. The pain was not relieved by one dose of Tylenol #3 given at that time. The night nurse reported that she had brushed the catheter with her hand. She suspected that Mr. Johnson's anxiety was quite high, and that it potentiated his perception of pain. The nurse with whom you are talking tells you that Mr. Johnson still has great difficulty swallowing because of his severe stomatitis. He refuses any further nursing interventions until he is seen by "someone who knows what they are doing."

CURRENT DATA

You go to meet Mr. Johnson. You enter his room and find him sitting upright in bed with his arms folded around his knees. As he describes his night, he begins to cry and rock back and forth in bed. He tells you that although his complaints of pain were persistent in the past six hours, he has not been medicated any further than the one Tylenol #3. His speech is clear and appropriate, but he is obviously exhausted and is having a difficult time answering your questions. You ask him to describe his pain. You give him a picture of the front and back of the body. (See Figure 1.) You ask him to point to the areas where he is having pain now. He points to the throat and right side of the abdomen. He says, "Everything hurts, but especially my throat and abdomen." You give him a card with a pain rating scale on it. (See Figure 2.) You ask him to pick the number associated with the word that best describes his pain now. He picks 8-9, "Excruciating." When you ask him how he is doing, aside from his pain, he tells you that he is not able to separate the pain from his view of himself.

You examine Mr. Johnson and find his tongue beefy and swollen. His oral mucosa is bright red with white patches and has areas that look raw and peeling. Since lying flat induces much discomfort, you quickly do an abdominal assessment. The liver margins are extended in nearly all directions; they are easily palpable.

Mr. Johnson states that he does not want to be "doped up"; that's why he has been trying to manage his pain with

Tylenol #3. As you discuss pain control with him, he states that he understands that this may be the time to make changes in the analgesic regimen. He would like the pain to be at least bearable. You describe the hospice program to Mr. Johnson. You tell him that he does meet the qualifications for the program, and that you will recommend admission to the inpatient service to Dr. Tree. Mr. Johnson agrees. Together you and Mr. Johnson establish initial goals of improved symptom control and intense family support.

What recommendations will you make to Dr. Tree for a drug administration plan to control Mr. Johnson's pain? Please think aloud as you develop your plan.

CASE C: INSTRUCTIONS AND DESCRIPTION

Instructions:

In this exercise you are a nurse in the home care service of a hospice program. You are meeting Mrs. Jane Taylor for the first time. You will be given a description of Mrs. Taylor.

After you are given the description of Jane Taylor, please:

1. Read the written description; and
2. Develop a plan for using drugs to control Mrs. Taylor's pain.

Please think aloud as you carry out each of the steps.

After you finish developing the plan for Mrs. Taylor, you will be asked a few follow-up questions reflecting on your decision making in Mrs. Taylor's case.

Do you have any questions?

Are you ready to begin?

CASE C

SITUATION

You are a nurse in the hospice program. Dr. Dole, an oncologist, has just requested that you visit Jane Taylor in her home to make a pain assessment and develop a plan for using medications to control her pain. Dr. Dole tells you that Jane is allergic to Compazine and becomes nauseated when she takes Oral Morphine Solution. She needs supervised trials on other medications.

PAST HISTORY

Jane was recently admitted to the hospice program. You review her admission record before going to see her in her home. The record reveals that Jane is a 40 year old woman. At the time of admission to the program, she described herself as "stable and balanced, with appropriate fits of depression." She indicated that she "was always in excellent health until this past 1 1/2 years." She characterized herself as "the strong one, the pillar."

Jane has been divorced for three years. She has two elementary age children, Rusty and Kara.

The record reveals that in December 1986, Jane had a hysterectomy for removal of a malignant ovarian cyst. In March 1987, Jane developed abdominal cramping, nausea, and episodic vomiting and diarrhea. Initially, she attributed her symptoms to an influenza virus which was circulating throughout the elementary school which her two children attended. After the symptoms continued for two weeks, she decided to contact her physician. Dr. Dole recommended

exploratory surgery. She was devastated by the suggestion of surgery, but eventually agreed to it. Tissue biopsy done during surgery revealed adenocarcinoma of the transverse colon with regional node involvement. A colon resection with a colostomy was performed.

Jane had a prolonged recovery period following the surgery. During one conversation with her primary nurse, Jane stated that her divorce occurred after an abortion of which her husband had no prior knowledge. Jane indicated that she saw her malignancies as punishment for having undergone the abortion. She said that she had reached the limits of her coping skills. She was reluctant to go home because there was no primary support person in her life.

After receiving 20 cobalt treatments and Alkeran therapy, Jane resumed her role as a school nurse for a local junior high school. However, in March 1988, she experienced "biting" right upper quadrant pain, a progressive weight loss of 25 pounds (to 102 pounds), and fatigue. She terminated her position at the school. In April, 1988, a liver scan was done. It confirmed extensive liver metastases. While she was on the oncology service for the liver scan, Jane had endless visitors, but none offered her permanent security. Nights were the most difficult for Jane. Her sleep was fitful, and she experienced pain of greater diversity than during the day. She refused further chemotherapy and began ingesting large doses of vitamins.

In May 1988, Jane's former husband, Gage, reentered her life. He assumed custody of their children, which she

willingly allowed. Gage had remarried and was living in Salem. Jane felt less anxious about the welfare of her children, but the transfer of custody meant that she would spend much less time with them.

When Jane was admitted to the hospice program in December 1988, her prognosis was estimated at less than 4 months to live. She was in need of pain and nausea control. A nurse friend, Cleo, volunteered to serve as Jane's primary care giver. Cleo moved into Jane's home.

CURRENT DATA

You go to Jane's home, which is an apartment in the downtown area. Both Cleo and Jane are there when you arrive. Jane appears wasted; at 5'9" tall, she weighs about 95 pounds. Jane tells you that she continues to have severe pain and nausea and vomiting.

You ask her to describe her pain. You give her a drawing of a front and back view of the body. (See Figure 1.) You ask her to point to the locations of her pain. She indicates that during the day her primary pain is in the right upper quadrant of her abdomen, but at night it is in her sternal area. At night, she also experiences shortness of breath and "dull aching" along her right back. This necessitates frequent position changes.

Next you ask Jane about the intensity of her pain. You hand her a card with a pain scale on it. (See Figure 2.) She indicates that her abdominal pain is often at 8-9, "Excruciating" during the day. It does drop to 4-5 "Distressing" without additional medications when other

people and supports are around. She indicates that Cleo is very supportive, and the hospice home health aide is very helpful to her. Jane goes on to describe her sternal pain at night as a 6-7 "Horrible." She states that she looks forward to daylight because it signals a return to "safety, distraction, and relationships."

You ask Jane what medications she has been taking. She tells you that she has been on Oral Morphine Solution with episodic and inconsistent effects. The dosage was increased gradually from 5 to 25 mg. every four hours. Two days ago, she stopped taking the prescribed antiemetic suppositories, Torecan, because they gave negligible relief from her nausea and vomiting. Jane's consciousness does not seem altered in any way, though she responds slowly to questions and asks you to repeat a question on several occasions.

You do an abdominal assessment on Jane which reveals the presence of active bowel sounds in both right quadrants with rumbling noted. In the left quadrant, distal to her stoma, bowel sounds seem slightly less active and fewer high pitched sounds are noted. Her colostomy has not functioned in three days, but she expresses little alarm, stating, "nothing stays down, and my belly is not distended." Inspection verifies the absence of abdominal distention, but occasional peristaltic waves are noted passing across her concave tightly drawn abdomen.

Jane tells you that her ambulatory activity has become more limited in the past month. Ventures outside are always made in a wheelchair, as she is unable to stand for long

periods of time. When she does walk, she requires assistance because her gait shifts to the right.

Jane's friend, Cleo, asks to speak with you frankly about "some dark thoughts and feelings" that Jane shared recently during one of her early morning episodes of pain and wakefulness. Jane nodded her approval for discussing this topic. Cleo described Jane's fear of "going crazy or becoming chronically depressed because of intractable pain." A week earlier, she had contemplated suicide using an overdose of the Morphine Solution. She hesitated because of the effect it might have on her children.

What drug administration plan to control Jane's pain will you recommend to Dr. Dole? Please share your thinking as you develop your plan.

Appendix F

Interview Guides for Practice and Simulation

Debriefing Interview for Simulation

I'd like to ask you some questions about the case.

1. Is the case representative of cases in a hospice program?

2. Is the description of the case realistic?

3. How would you rate this case in terms of difficulty for decision making? (On a scale of 0 to 10 where 0 is not difficult and 10 is extremely difficult.)

Ask questions 4 and 5 during the first session with the simulations.

4. Does the task of recommending to a physician a drug administration plan to control a patient's pain fit within the role of a hospice nurse?

5. Estimate how often you as a hospice nurse have recommended to physicians drug administration plans to control a patient's pain.

Interview Schedule for Actual Patient Situation

Tell me about a patient that you have cared for in the past two or three days in which you had to make a decision about the pain control regimen. I'd like you to tell me about the patient in as much detail as you can so that I could make a simulation out of the information.

1. How did you know that the patient needed a change in his/her pain control regimen?
2. After you thought that the patient needed a change in the pain control regimen, what did you first talk about with the patient?
3. What did that information tell you?
4. Recall for me the information that you elicited from the patient.
5. What did that information tell you?
6. Did you consider any other alternatives?
    a. What alternatives did you consider?
7. What was the plan you finally chose?

Debriefing Interview for Practice

I'd like to ask you some questions about the case you just described to me.

1. Did you discuss this case with others?

2. Did the intervention work?

3. How would you rate this case in terms of difficulty for decision making? (On a scale of 0 to 10 where 0 is not difficult, and 10 is extremely difficult)

4. Were there any special circumstances that contributed to the difficulty of the case?

    a. Did you have a protocol that you could follow to develop the pain control regimen?

    b. Did the patient have any sensitivities or allergies to any medications?

    c. Did the patient have any other medical problems that could contribute to his/her pain?

5. Were there factors that limited the number of interventions that you could consider?

    a. What other strategies could you do if the limiting factors had not been present?

Appendix G

Rules for Coding Each Category of Data

Initial Approach. The initial approach that the subject took in making a decision about the plan of care was categorized as either broad or narrow. Corcoran (1983) defined each term as follows:

"Broad - The subject gained an overview of the patient's situation by overtly attending to two of more pain-related problems presented by the patient before focusing on one problem for decision making."

"Narrow - The subject immediately focused on one pain-related problem presented by the patient and began making decisions about treating that problem." (Corcoran, 1983, p. 398)

Criteria developed by Corcoran (1983) was modified as follows:

The initial approach was determined by:

1. After reading the simulation case description, a subject's initial comments in the protocol revealed the approach.

2. After giving identifying data about the patient described from practice, the subject's initial comments in the protocol revealed the approach.

Procedure:

1. The transcript of the subject's verbal protocol was reviewed. Any comments about the patient's pain-related problems which were made within the first two pages of the protocol was noted.

2. Data obtained from #1 above was reviewed to determine if the subject used a broad or narrow initial approach in decision making.

3. The initial approach and supporting evidence was recorded on a code sheet for each subject.

Number of Alternative Solutions Considered. In each case, both practice and simulation, drug and non-drug solutions to the problem could be considered. The alternatives could be specific or general. For example, a specific drug alternative would be the name of a drug such as Morphine. A general drug alternative would be a category of a drug such as a narcotic. A specific non-drug alternative would be a backrub. A general non-drug alternative would be a diversional type activity. Each type of alternative solution was counted and a grand total was determined.

Procedure:

1. The subject's verbal protocol was reviewed and each type of alternative solution was noted.

a. Only the initial mention of the alternative was counted, no matter how many times it was repeated during the protocol.

b. If a subject made a general alternative more specific within the same line of thought, the count was one. If a subject stated a general alternative and later in the protocol, after the content of the protocol has changed, made the alternative specific, then the count was two. For example, if a subject stated that an antianxiety, muscle relaxant type drug like Xanax should be administered, then the count for the number of alternatives considered would be one. If, on the other hand, the subject stated that an antianxiety drug would be good and then during the description of the final plan stated that Xanax should be administered, the count would be two. This distinction was

made because in the case when the count is one, it was clear that the subject was only considering one alternative and had just made it more specific when stating the name of the drug. However, in the second case when the count is two, the investigator would have to make an inference that the subject considered the general and the specific to be the same alternative. This may or may not be the case.

2. The number of alternatives in each category and supporting evidence was recorded on a code sheet for each subject. A grand total was calculated.

3. A dichotomous variable about the number of appropriate alternatives considered was determined. Using the information provided by the subjects about the factors limiting the number of alternative interventions available, the unwritten rules that the subjects had generated during the interviews, and input from a hospice nurse, the number of alternatives was categorized into two levels. The number one was assigned if the subject considered all or most of the appropriate alternatives. The number two was assigned if the subject did not consider all or most of the appropriate alternatives.

Reporting of Information Strategy. Modification of the categories of data acquisition strategies from the Tanner et al. (1987) study was conducted so that they were more appropriate for this study. Four categories of information reporting strategies were established.

Criteria:

1. Hypothesis driven reporting - Subject presented most information related to a problem/hypothesis at one point in the protocol.

2. One-thought-leads-to-another - As subject presented information, one thought/solution/problem lead to another thought/solution/problem. The subject moved from one content area to another and back to the same content area. Not all information about one topic was presented at one point in the protocol.

3. Cue-based reporting - Subject used cues from the situation to present information. Subject may mention a cue about the situation and then proceed to explain it or the subject may look through the simulation and explain cues that they see in the simulation. The investigator made field notes related to this latter situation.

4. Random reporting - Subject presented information in a nonsystematic manner. Subject moved from one content area to another for no reason that is apparent to the investigator.

Procedure:

1. The verbal protocols of each subject were reviewed and content of major concepts and cues were noted.

2. Data obtained in #1 was reviewed and the information reporting strategy was determined.

3. The category of information reporting strategy and supporting evidence was recorded on the coding sheet.

Overall approach. Corcoran (1983) classified overall approach as either systematic or opportunistic.

"Systematic - The subject addressed one problem at a time and made successive intermediate decisions to refine the selection of treatments for the problem before going on to consider another problem."

"Opportunistic - The subject jumped about from problem to problem. ... The planning appeared unorganized as the subject addressed whatever seemed to be a promising aspect of the plan at that particular time." (Corcoran, 1983, pp. 409-410.)

Procedure:

1. The protocol was reviewed to determine whether or not single problems are addressed at adjacent points in time.

2. The data obtained in #1 above was reviewed and the overall approach used was determined.

3. The overall approach and supporting evidence were recorded on the coding sheet.

Task Complexity. The level of task complexity in Corcoran's (1983) study was determined by three components: 1) the number of sources of pain presented by the patient, 2) the interrelatedness of the sources of pain and 3) the extent to which hospice protocols for pain control could be applied.

Mr. Johnson was the least difficult case. He had both acute and chronic pain and hospice protocol could be followed to relieve his pain.

Mrs. Ludlow's case was of intermediate difficulty. She had both acute and chronic pain but the acute pain was the main source of her problem. She was sensitive to CNS drugs so the protocol could not be followed without some restrictions. She had interrelated physical and emotional sources of pain.

Jane Taylor was the most difficult case. She had no clear form of treatment available to her. She was allergic to compazine and sensitive to Morphine so the hospice protocol could not be followed. She had chronic pain that was very interrelated with emotional factors such as lack of support systems, divorced and had recently given up custody of her children, she had had an abortion and believed that her cancer was punishment for the abortion, she had had a lengthy disease process and had thought about suicide.

The three criteria described above were used to determine the task complexity of the practice situations. In addition, one of the debriefing questions asked the subject to rate the degree of difficulty of decision making for each practice and simulation case. This rating provided

additional data upon which to base a subjective comparison of the difficulty among the practice and simulation cases.

Procedure:

1. The protocol was reviewed for the number of sources of pain, the interrelatedness of the sources of pain and whether or not the hospice protocol could be used to solve the problem. Most of these data were obtained from the debriefing interview. The subject's rating of the difficulty of the case was also considered.

2. Based on the data obtained in #1, the task complexity of the situation was determined.

3. The task complexity and supporting evidence was recorded on the coding sheet.

Uncertainty. Although subjects were requested to describe patient situations that occurred within the past two or three days, some subjects did not adhere to that direction. In order to determine if differences occurred due to the subject's ability to recall the situation, a measure of uncertainty was determined.

Procedure:

1. The protocol was reviewed for the mention of a subject's inability to recall information about the patient situation being described.

2. The number 0 was assigned if the subject made no mention of uncertainty. The number 1 was assigned if the subject reported uncertainty related to details such as medications, dosages, time frames. The number 2 was assigned if the subject reported uncertainty about thoughts such as an inability to remember whether alternatives had been considered. The number 3 was assigned if both types of uncertainty described above were reported.

3. The degree of uncertainty and supporting evidence was recorded on the coding sheet.

CODING SHEET

Subject _____

Case _____

I. Initial Approach — Code

0. Broad

1. Narrow _____

Supporting Evidence

II. Number of Alternatives Considered

A. General Drug _____

B. Specific Drug _____

C. General Non-drug _____

D. Specific Non-drug _____

E. Total number of alternatives _____

F. Consideration of alternatives _____

1. Considered all or most of appropriate alternatives

0. Did not consider all or most of appropriate alternatives

III. Reporting Strategy

1. Hypothesis Driven

2. One Thought Leading to Another

3. Cue Based

4. Random _____

Supporting Evidence

IV. Overall Approach

0. Systematic

1. Opportunistic _____

Supporting Evidence

V. Task Complexity

1. Low
2. Intermediate
3. High _____

Supporting Evidence

VI. Decision Difficulty _____

VII. Uncertainty

0. No mention of uncertainty
1. Uncertainty related to details such as medications
2. Uncertainty related to thoughts
3. Both types of uncertainty _____

Supporting Evidence

Appendix H

ID _____
CASE _____

INTERACTION INSTRUMENT
PRACTICE

Instructions: Please place a vertical slash (|) on the line indicating how you felt about the interaction with the patient.

1. How close did you feel to the patient?

Not close _____ Very close

2. How involved did you feel with the patient?

Not involved _____ Very involved

3. In nursing, as in all personal relationships, it is easier to relate to some individuals than to others. Please indicate on the line below the extent to which you felt "in tune" with this patient.

Not at all in tune _____ Completely in tune

ID _____
CASE _____

INTERACTION INSTRUMENT
SIMULATION

Instructions: Please place a vertical slash (|) on the line indicating how you felt about the interaction with the patient.

1. How close did you feel to the patient?

Not close ——————————————————— Very close

2. How involved did you feel with the patient?

Not involved ——————————————————— Very involved

3. How much does the simulation patient remind you of one you have taken care of?

Not at all ——————————————————— A great deal

4. In nursing, as in all personal relationships, it is easier to relate to some individuals than to others. Please indicate on the line below the extent to which you felt "in tune" with this patient.

Not at all in tune ——————————————————— Completely in tune

ENGAGEMENT INSTRUMENT

Instructions: Please place a vertical slash (|) on the line indicating how you felt about the interaction with the patient.

1. How engaged did you feel with the patient?

Not engaged ——————————————— Very engaged

2. How much empathy did you feel with the patient?

No empathy ——————————————— A great deal of empathy

3. How much rapport did you feel with the patient?

No rapport ——————————————— A great deal of rapport

4. How close did you feel to the patient?

Not close ——————————————— Very close

5. How involved did you feel with the patient?

Not involved ——————————————— Very involved

Appendix I

Frequency Distributions of the Variables

Table I-1

Frequency Distributions of Initial Approach (n=34)

Stimulus Type	Broad		Narrow	
	N	%	N	%
Simulation A	22	65	12	35
Simulation B	18	53	16	47
Simulation C	19	56	15	44
Practice 1	12	35	22	65
Practice 2	19	56	15	44
Practice 3	21	62	13	38

Table I-2

Frequency Distributions of Alternatives Considered (n=34)

Stimulus Type	Did Not Consider Most Alternatives		Considered Most Alternatives	
	N	%	N	%
Simulation A	9	26	25	74
Simulation B	13	38	21	62
Simulation C	10	29	24	71
Practice 1	4	12	30	88
Practice 2	6	18	28	82
Practice 3	7	21	27	79

Table I-3

Frequency Distributions of Reporting Strategy (n=34)

Stimulus Type	Hypothesis Driven		One-Thought-Leads-to-Another		Cue-Based		Random	
	N	%	N	%	N	%	N	%
Simulation A	6	18	2	6	25	73	1	3
Simulation B	8	23	2	6	22	65	2	6
Simulation C	5	15	5	15	24	70	0	0
Practice 1	11	32	15	44	5	15	3	9
Practice 2	8	23	20	59	2	6	4	12
Practice 3	5	15	23	67	2	6	4	12

Table I-4

Frequency Distributions of Overall Approach (n=34)

Stimulus Type	Systematic		Opportunistic	
	N	%	N	%
Simulation A	8	24	26	76
Simulation B	12	35	22	65
Simulation C	6	18	28	82
Practice 1	20	59	14	41
Practice 2	11	32	23	68
Practice 3	11	32	23	68

Table I-5

Means, Standard Deviations, and Ranges of Engagement Scale Items by Stimulus Type (n=34)

Scale Item	Mean	S.D.	Range
	Simulation A		
Close	50.09	23.71	7-92
Involved	59.21	19.32	15-94
In Tune	58.85	19.23	15-92
	Simulation B		
Close	58.09	24.50	5-96
Involved	65.32	18.75	26-94
In Tune	65.47	23.13	11-95
	Simulation C		
Close	59.32	26.74	6-98
Involved	63.91	24.11	12-97
In Tune	64.94	21.28	11-95
	Practice Situation 1		
Close	75.03	22.45	6-99
Involved	80.29	19.78	20-100
In Tune	72.38	20.53	19-99
	Practice Situation 2		
Close	70.00	23.06	1-97
Involved	75.74	20.64	19-99
In Tune	63.53	26.28	7-99
	Practice Situation 3		
Close	70.65	23.64	19-100
Involved	81.44	17.47	33-100
In Tune	66.94	27.33	7-100

Table I-6

Means, Standard Deviations, and Ranges of Decision Difficulty by Stimulus Type (n=34)

Stimulus Type	Mean	S.D.	Range
Simulation A	6.44	2.07	1.5-10
Simulation B	5.12	2.26	0-10
Simulation C	6.38	2.31	2.5-10
Practice 1	3.06	2.28	0-7.5
Practice 2	5.54	2.84	0-10
Practice 3	7.28	2.38	1.5-10

Table I-7

Means, Standard Deviations, and Ranges of Degree of Uncertainty about Practice Situations (n=34)

Practice Situation	Mean	S.D.	Range
1	.74	.86	0-3
2	.82	.72	0-3
3	.74	.75	0-3

Table I-8

Means, Standard Deviations, and Ranges of Complexity Across the Practice Situations (n=34)

Practice Situation	Mean	S.D.	Range
1	1.26	.45	Low to Mod
2	1.74	.57	Low to High
3	2.24	.50	Low to High

Appendix J

Intercorrelations of Variables

Table J-1

Intercorrelations Among Stimulus Type by Process Variable (n=34)

Stimulus Type	Sim B	Sim C	Prac 1	Prac 2	Prac 3
			Initial Approach		
Simulation A	.41*	.09	-.10	.09	.18
Simulation B		.23	-.17	.11	.11
Simulation C			.04	-.07	.03
Practice 1				.04	-.18
Practice 2					.03
			Alternatives Considered		
Simulation A	.21	.05	.40*	.07	.19
Simulation B		.29	.28	.27	.35*
Simulation C			.16	.21	.15
Practice 1				.31	.26
Practice 2					-.24
			Reporting Strategy		
Simulation A	.31	.26	.28	.45**	.18
Simulation B		.22	.28	.11	.25
Simulation C			.18	.32	.26
Practice 1				.59**	.32
Practice 2					.45**
			Overall Approach		
Simulation A	.17	.29	.32	.36*	.06
Simulation B		.30	.24	.28	.54**
Simulation C			.39*	.17	.34*
Practice 1				.58**	.20
Practice 2					.33

*$p \leq .05$

**$p \leq .01$

Table J-2

Intercorrelations Among the Engagement Scale Items (n=34)

		Simulation A			Simulation B		Simulation C		
		I [a]	IT [b]	C [c]	I	IT	C	I	IT
	C	.81**	.80**	.78**	.73**	.58**	.46**	.43**	.47**
Sim A	I		.79**	.76**	.82**	.59**	.68**	.68**	.58**
	IT			.63**	.67**	.45**	.49**	.49**	.61**
	C				.88**	.81**	.54**	.66**	.49**
Sim B	I					.83**	.49**	.65**	.43*
	IT						.46**	.61**	.55**
	C							.91**	.69**
Sim C	I								.75**

		Practice 1			Practice 2		Practice 3		
		I	IT	C	I	IT	C	I	IT
	C	.56**	.79**	.31	-.01	.16	.18	.12	.22
Prac 1	I		.47**	.16	.38*	.01	.11	.17	.08
	IT			.10	.02	.12	.15	.07	.20
	C				.56**	.73**	.00	.24	.10
Prac 2	I					.40*	.04	.29	.09
	IT						.03	.18	.16
	C							.77**	.85**
Prac 3	I								.68**

[a] Involved with the patient

[b] In tune with the patient

[c] Close to the patient

* $p \leq .05$

** $p \leq .01$

Table J-3

Intercorrelations of Decision Difficulty (n=34)

	Sim B	Sim C	Prac 1	Prac 2	Prac 3
Simulation A	.40*	.32	.46**	.35*	.27
Simulation B		.44**	.36*	.24	.03
Simulation C			.36*	.37*	.30
Practice 1				.51**	.35*
Practice 2					.72**

* $p \leq .05$

** $p \leq .01$

Table J-4

Intercorrelations of Uncertainty Among the Practice Situations (n=34)

	Practice Situation	
Practice Situation	2	3
1	.12	.26
2		.47**

** $p \leq .01$

Table J-5

Intercorrelations of Complexity Among the Practice Situations (n=34)

Practice Situation	2	3
1	.52**	.26
2		.44**

** $p \leq .01$

Appendix K

Repeated Measures Analysis of Variance for the Four Process Variables Across the Simulations

Source	SS	df	MS	F
	Initial Approach			
Total	24.86	101		
Between Subjects	12.20	33		
Within Subjects	12.66	68		
Simulation	.25	2	.13	.69
Error	12.41	66	.19	
	Alternatives Considered			
Total	21.96	101		
Between Subjects	9.96	33		
Within Subjects	12.00	68		
Simulation	.25	2	.13	.72
Error	11.75	66	.18	
	Reporting Strategy			
Total	69.02	101		
Between Subjects	35.02	33		
Within Subjects	34.00	68		
Simulation	.14	2	.07	.13
Error	33.86	66	.51	
	Overall Approach			
Total	19.37	101		
Between Subjects	9.37	33		
Within Subjects	10.00	68		
Simulation	.55	2	.27	1.92
Error	9.45	66	.14	

Appendix L

Crosstabulations of Process Variables Matched on Complexity

Table L-1

Crosstabulations on Initial Approach

		Simulation	
		Broad	Narrow
		Low Complexity (n=37)	
Practice	Broad	7	8
	Narrow	11	11
		Moderate Complexity (n=54)	
Practice	Broad	21	8
	Narrow	15	10
		High Complexity (n=11)	
Practice	Broad	6	2
	Narrow	3	0

Table L-2

Crosstabulations on Alternatives Considered

	Simulation	
	Did Not Consider All or Most	Considered All or Most
Low Complexity (n=37)		
Did Not Consider Practice	5	0
Considered All	12	20
Moderate Complexity (n=54)		
Did Not Consider Practice	5	6
Considered All	9	34
High Complexity (n=11)		
Did Not Consider Practice	0	1
Considered All	1	9

Table L-3

Crosstabulations on Reporting Strategy

Practice	Simulation: Hypothesis Driven	Simulation: One-Thought-Leads-to-Another	Simulation: Cue-Based	Simulation: Random
Low Complexity (n=37)				
Hypothesis Driven	5	0	7	0
One-Thought-Leads-to-Another	2	2	14	1
Cue-Based	1	0	1	0
Random	0	0	3	1
Moderate Complexity (n=54)				
Hypothesis Driven	2	0	8	0
One-Thought-Leads-to-Another	6	3	20	2
Cue-Based	0	0	6	1
Random	0	0	6	0
High Complexity (n=11)				
Hypothesis Driven	0	0	2	0
One-Thought-Leads-to-Another	2	2	4	0
Cue-Based	0	0	0	0
Random	0	0	1	0

Table L-4

Crosstabulations on Overall Approach

	Simulation	
	Systematic	Opportunistic
Low Complexity (n=37)		
Practice: Systematic	11	11
Practice: Opportunistic	3	12
Moderate Complexity (n=54)		
Practice: Systematic	3	14
Practice: Opportunistic	6	31
High Complexity (n=11)		
Practice: Systematic	1	2
Practice: Opportunistic	1	7

Appendix M

Intercorrelations Among the Scales

Table M-1

Intercorrelations Among the Situation Variables

	Simulation		Practice		
	DD	Eng[a]	DD[b]	Uncert[c]	Complex[d]
Sim Eng	-.28	.22	-.07	-.08	.26
Sim DD		.10	.47**	-.08	.12
Prac Eng			.22	-.22	.06
Prac DD				-.16	.60**
Uncert					.01

[a] Engagement

[b] Decision Difficulty

[c] Uncertainty

[d] Complexity

** $p \leq .01$

Table M-2

Intercorrelations Among Situation and Process Variables

	Simulation				Practice			
	Init[a]	Alt[b]	Rep[c]	Over[d]	Init	Alt	Rep	Over
Sim Eng[e]	.14	.40*	-.02	.15	.04	.16	-.15	-.05
Sim DD[f]	.07	.04	.19	.12	-.26	-.27	.28	.21
Prac Eng	-.07	.20	-.07	.08	-.00	.12	.04	.16
Prac DD	-.31	.02	.18	.31	-.40*	-.11	.33	.41*
Uncert[g]	.36*	.27	-.06	-.36*	.09	.15	-.01	-.40*
Complex[h]	-.05	.23	.13	.31	-.36*	.04	.00	.21

[a] Initial Approach

[b] Alternatives Considered

[c] Reporting Strategy

[d] Overall Approach

[e] Engagement

[f] Decision Difficulty

[g] Uncertainty

[h] Complexity

* $p \leq .05$

Abstract

Title: Clinical Decision Making in Nursing: A Comparison of Simulations and Practice Situations

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Currently, much of the research related to clinical decision making in nursing has used some type of simulation to stimulate the thinking processes of subjects. No comparisons of the thinking processes stimulated by simulation and those used in actual practice have been conducted.

The purpose of this investigation was to compare the decision making processes that hospice nurses used on simulations with those used in practice. The variables used to measure decision making were: 1) the initial approach used in making the decision; 2) whether or not the appropriate alternatives were considered; 3) the information reporting strategy; and 4) the overall approach used. The situation variables which may explain differences were: 1) the complexity of the situation; 2) the degree to which the subject felt engaged with the patient; 3) the difficulty that the subject felt making the decision; and 4) the uncertainty that the subject had in recalling the practice situation.

Verbal protocols were collected from a convenience sample of 34 hospice nurses on three written simulations and

on three clinical situations in which they made a decision about the patient's pain control regimen. Subjects were interviewed in one or two sessions which were tape recorded and transcribed for analysis.

A content analysis of the verbal protocols using categories based on research by Tanner et al. (1987); Corcoran (1986a, 1986b); Elstein et al. (1978); and Newell and Simon (1972) was conducted. Paired t-tests were calculated on each of the process variables summed across the simulations and across the practice situations. Stepwise multiple regressions were completed with the situation variables regressed on the process variables.

There were four major findings from the study. First, there was no difference between practice and simulation on the initial approach. Second, there were significant differences between practice and simulation on the alternatives considered, the reporting strategy, and the overall approach. Third, the situation variables did not account for much of the variance of the process variables. Fourth, there were no differences between different levels of experience or education on the process variables.

The findings from this study have implications for nursing, especially future research on clinical decision making. If there is a difference between practice and simulation on decision making processes used, then more research on clinical decision making should be conducted in practice. Findings from simulations may not be generalizable to practice. However, further research should

be conducted to determine if the difference between simulation and practice is replicable.