Doctoral Dissertations 1896 - February 2014

1-1-1991

How experienced nurses gather and use data.

Patricia M. Navin
University of Massachusetts Amherst

HOW EXPERIENCED

NURSES GATHER

AND

USE DATA

A Dissertation

Presented by

PATRICIA M. NAVIN

Submitted to the Graduate School of the
University of Massachusetts in partial fulfillment
of the requirement for the degree of
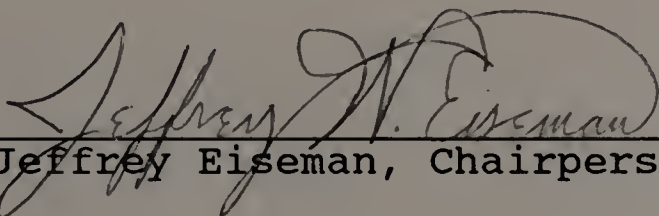
DOCTOR OF EDUCATION

May 1991

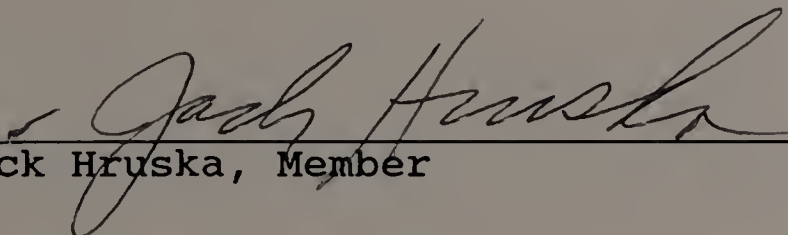School of Education

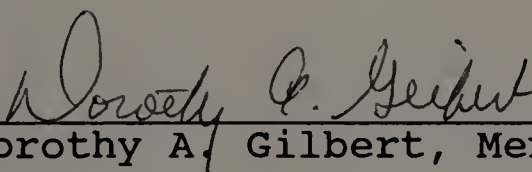HOW EXPERIENCED NURSES GATHER
AND USE DATA

A Dissertation Presented

by
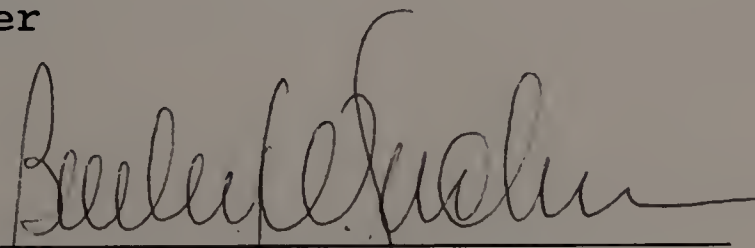
PATRICIA M. NAVIN

Approved as to style and content by:

_____
Jeffrey Eiseman, Chairperson

_____
Jack Hruska, Member

_____
Dorothy A. Gilbert, Member

_____
Marilyn Haring-Hidore, Dean
School of Education

ACKNOWLEDGEMENTS

ABSTRACT

HOW EXPERIENCED NURSES GATHER AND USE DATA

MAY 1991

PATRICIA M. NAVIN, BSN, FLORIDA STATE UNIVERSITY

M. S., UNIVERSITY OF CONNECTICUT

Ed.D, UNIVERSITY OF MASSACHUSETTS

Directed by: Jeffrey E. Eiseman

This exploratory study was designed to add to the
body of knowledge related to clinical decision-making.
It had two purposes. The first was to develop, clarify,
and elaborate concepts that describe nurses' clinical
decision-making. The second was to observe and describe
activities for gathering information used by nurses in
the clinical environment. Six experienced nurses were
observed while they interacted with patients at the
beginning of their shift. Subjects were asked during
post-observation interviews to describe what they were
thinking about when they asked patients questions. A
five-stage model that described the decision-making
process evolved from the analysis of data. Experts in

decision-making were asked to provide reactions to the findings with respect to its clarity, validity and usefulness.

Results of the study indicated that subjects used three modes--scanning mode, focusing mode, and a context building mode--when gathering information at the beginning of their shift in order to plan patient care. Experienced nurses used three activities for gathering information to make clinical decisions--listening or reading report, reading records, and interacting with patients.

Subjects described using information from report together with their knowledge of patients' conditions to decide what information they needed from other sources to make decisions about patients' needs. Findings suggested that subjects made decisions related to what information to gather, what information to accept as sufficient to form hypotheses or conclusions, what information area to drop, and what action to take. Subjects' verbalized that knowledge of patients' conditions and patients' responses determined if they used a scanning mode or a focusing mode to gather information.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

The subject of this study is information gathering
activities used in the clinical area by practicing
nurses. The intent of this study was to add to the body
of knowledge related to clinical decision-making,
specifically, how nurses collect and use information in
the clinical area. This introductory chapter briefly
discusses information gathering and its relationship to
decision-making in nursing, and concludes with a
statement of the problem.

A. Process of Decision-Making

There has been an increased interest in the
processes that nurses use when they make decisions
related to patient care and how these processes might be
improved and taught to students. However, these
processes are not clearly understood (Tanner, 1987;
Corcoran, 1986). Part of the reason for the lack of
clarity regarding the nature of decision-making by nurses
related to patient care is the complexity of information.
This is primarily due to the large amount of information
available, the unique ways patients respond to
situations, and the fact that the information changes.
Clinical decisions are made based on information obtained

and thus information collected is key in determining patient care. Before information can be used, however, the appropriate information must be selected and collected in some sequence (Gordon, 1982). Since data collection is so closely associated with decision-making and since the terms used to describe decision-making in clinical practice vary, the terms were addressed first.

B.   Definition of Decision-Making

The term decision-making is used interchangeably with clinical reasoning, clinical judgment, problem solving, diagnostic reasoning and diagnosis in the nursing literature and medical literature. In 1966, Kelly used the term clinical judgment to describe the series of decisions made by the nurse regarding: (1) the type of observation to be made in the clinical situation; (2) the evaluation of data observed and derivation of meaning (diagnosis); and (3) nursing action that should be taken with or on behalf of the patient (management). Barrows and Tamblyn (1980) used the term clinical reasoning to encompass all the cognitive skills necessary to evaluate and manage a patient's medical problem. Carnevali (1984) used the term diagnostic reasoning to describe only the interpretation of data obtained in

assessment. She also differentiated diagnostic reasoning from problem solving and indicated the relationship with hypothesis determination when she stated, "Unlike the standard problem solving process, which seems to separate data collection from problem identification, diagnostic reasoning integrates initial data gathering with early diagnostic hypothesis generation" (p. 15). The process of clinical reasoning, used to deal with data are applied in any health care discipline (Carnevali, 1984; Albert, Munson & Resnik, 1988).

C. Gathering Information

Gathering information in the clinical environment is a skill needed by nurses who provide patient care. This study proposed that nurses used two different modes or ways of approaching the information gathering task. These modes were: (1) the scanning mode, and (2) the focusing mode. In the scanning mode, nurses use information gathering activities requiring skilled performance using little cognitive effort. Nurses use the scanning mode when the information is routine information and no decision is needed. Nurses use information gathered in the scanning mode to decide that certain areas of inquiry may be abandoned for the moment

or that the patient did not need additional care. In the focusing mode, nurses use information gathering activities requiring skilled performance using complex cognitive effort. Nurses shift into a focusing mode when the information is recognized as relevant information. Nurses use information gathered in the focusing mode to clarify, to interpret, or to make a decision related to patient care.

D.   Problem Statement

Nurses who work in hospitals must gather and process large amounts of information in order to plan patient care. However, little is known about the data gathering activities that they use to make decisions related to patient care. Two ways or modes, a scanning mode and a focusing mode, served as a way to approach the data gathering task. In the scanning mode, the nurse collects information that does not require decisions; in the focusing mode, the nurse collects information that is needed to explain a potential anomaly in the patient's condition.

The extent to which practicing nurses in a hospital setting used these two modes when gathering information was not known and the extent to which different

information gathering activities were used in the two modes had not been explored. In order to increase the body of knowledge related to clinical decision-making, I proposed to add to the existing knowledge about both the frequency and the nature of each mode used in information collection.

E. Significance of the Problem

In order to provide nursing with a model for developing skills in collecting and using information, nursing school faculty and staff development educators must have an accurate idea of how nurses collect and use information to determine patient care. If an accurate understanding of the activities for the collection of information used by nurses were known, learning experiences could be developed to ensure acquisition of this skill by practicing nurses and student nurses.

Gathering and processing information are difficult because clinical data are ill-structured, because the nurse needs to unfold and organize information as it is presented, and because each nurse-patient interaction is unique. If nurses use different information gathering modes depending on the information, the information could be managed more effectively. A model of the information

gathering activities used in each mode would help close the knowledge gap related to this aspect of clinical decision-making. A better understanding of the way information was collection could help faculty and staff development educators design new pre-service and in-service activities focused on improving information gathering and processing skills. These skills should lend to a higher level of patient care.

F. Research Questions

This research will answer the following questions:

1. Can most activities for gathering information be meaningfully and reliably categorized as occurring within either scanning mode, focusing mode, or both modes simultaneously?

2. Are there some activities for gathering information that occur outside the two modes?

3. Does the distinction between scanning and focusing modes of operating match up with what nurses experience as they determine patient care in daily practice?

4. What is an activity for gathering information, and what, if any, are the components that are contained in all such activity?

5. What activities for gathering information are used by experienced nurses within each information gathering mode?

6. Do all experienced nurses use essentially the same activities for gathering information or are there differences among experienced nurses regarding the activities used?

G. Definition of Terms

The following definitions will be used for the terms in this study:

Information collection activity--Behaviors observed or verbally identified by an experienced nurse when collecting information from a patient.

Experienced nurse--Registered nurse identified by the Nurse Manager as expert in information collection and in clinical decision-making.

CHAPTER II

LITERATURE REVIEW

AND DISCUSSION

This chapter explores selected literature relevant to data gathering related to clinical decision-making in the medical and nursing literature. The medical literature was reviewed as well as the nursing literature because (a) more research related to clinical decision-making was completed in the medical field, and (b) some nursing research was based on the medical research. This chapter opens with the presentation of studies of clinical decision-making that described hypothesis generation as a method to guide the information gathered. Hypothesis generation is discussed first because it was the basis for many studies. Studies that described activities used to gather information for clinical decision-making are then explored. The next section deals with the similarities and differences between novice and expert clinicians in the process of making clinical decisions.

Issues from the literature that needed some clarification in order to understand the design of the study are then addressed. One issue was how similar information was used by nurses and physicians. A second

information was used by nurses and physicians. A second
issue relates to the setting used for the observational
component of the study. The third issue revolved around
terms used to describe activities for collecting
information. Several sections are devoted to terms used
in the literature that are relevant to decision-making.
The last section looks at different ways researchers have
characterized novice subjects and expert subjects.

A.   Hypothesis Generation

Hypothesis generation was identified in the medical
and nursing literature as a method used in clinical
decision-making to focus the collection of information.
In 1978, Elstein, Shulman, and Sprafka described
hypothesis generation as a way to conserve short term
memory space by activation of diagnostic hypotheses early
in the diagnostic work-up in order to cluster cues and to
guide further data collection. The researchers for the
study used simulated cases. They categorized three of
these cases as high fidelity as they were designed to
replicate an actual clinical situation with a trained
actor used as the patient. Two groups of physicians were
compared: the members of "the criterial group" were
identified by their peers to be proficient

diagnosticians; the members of "the noncriterial group" were described as "not so identified." Both groups were presented with the chief complaint of the patient in a simulated case scenario. They were told to proceed with the work-up, and to "think aloud"--i.e., to explain their diagnostic reasoning at each step. The interactions between physicians and the simulated patient were then videotaped. The analysis of data obtained from the videotapes suggested that: (a) the diagnostic process was hypothetico-deductive; (b) hypotheses were formulated early in the encounter; (c) subjects rarely considered more than five active hypotheses at one time; (d) diagnostic accuracy was associated with thoroughness of cue acquisition and accuracy of cue interpretation; and (e) physician diagnostic performance was "case specific." By case specific the authors meant that presumably, their behavior was affected by the extent of their experience with the disorder involved in the case. There were no significant differences identified between the criterial and the noncriterial groups.

Tanner and Associates researched the application of the Elstein model to nurses (Tanner, Padrick, Westfall, & Putzier, 1987; Putzier, Padrick, Westfall, & Tanner, 1985). Tanner, Padrick, Westfall, and Putzier (1987)

used videotaped vignettes of three simulated case

studies, describing patients experiencing one or more

problems. The purpose of the study was to identify if

nurses and nursing students used hypothesis generation to

focus the information gathered. The subjects (15 staff

nurses, 15 junior students, and 13 senior students) were

told to ask for additional information from the examiner.

They were also told to "think aloud" until they derived

the most likely nursing diagnosis and intervention. The

verbalization of each subject was then transcribed and

analyzed for number and type of hypotheses, earliness

with which the hypotheses were initiated, number of cues

sought in information gathering, adequacy of the

information used to evaluate the diagnostic hypotheses,

and the accuracy of the diagnoses. The researchers

reported that: (a) all subjects activated diagnostic

hypotheses early; (b) subjects used systematic

information gathering to support or refute hypotheses;

and (c) a trend toward more systematic data acquisition

and greater diagnostic accuracy was found with increased

knowledge and experience. However, they found no

significant differences between groups. Putzier,

Patrick, Westfall, and Tanner (1985) used simulated

patients presented in case studies rather than videotaped simulations, and they too reported early hypothesis generation.

Some studies that examined hypothesis generation as a method to focus data collection reported that some subjects used minimal data to generate hypotheses before history taking occurred (Barrows & Bennett, 1972; Kassirer & Gorry, 1978). For example, Kassirer and Gorry (1978) reported that physicians in their study utilized the patient's age, sex, and chief complaint to generate hypotheses at times before taking a patient's history, then physicians collected more data to refine their hypotheses.

B. Section Summary

The majority of studies in recent literature addressing clinical decision-making were based on the Elstein, Shulman, and Sprafka model. This model contended that hypothesis generation was the method used in clinical decision-making to guide the collection of information. Subjects were given simulated cases and were told either implicitly or explicitly that the task was to identify hypotheses that would lead to the diagnosis of the patient. The "think aloud" method was

most often used to identify hypotheses that subjects were considering for the diagnosis.

C. Activities for Gathering Information

Some studies that described hypothesis generation as the method to guide the gathering of information also identified other activities used to gather information. These activities were generally characterized as data acquisition activities. For example, Tanner, Padrick, Westfall, and Putzier (1987) described four methods used by nurses to gather information in their study that focused on hypothesis generation as a guide for information gathering. These four methods were:

- Cue-based or cue-characterization. In the cue-based or cue-characterization method, each cue was described separately and completely before moving on to the next cue.

- Systematic. In the systematic approach, a review of systems format was used when the nurse was not certain on how to proceed, for example, the nurse would start with a head to toe assessment, using the format learned in their educational process which might begin by inspecting the chest and then checking lung sounds in a systematic way.

- Question directed. In the question directed approach, one question was used to explore answers to the preceding question and the question did not relate to either hypothesis or other cues.

- Hit or Miss. The hit or miss approach, also called the shotgun approach, was described as a nonsystematic, groping approach. The data were "sometimes stimulated by a sudden remembered cue

in the situation, sometimes by information just received in another focal area, sometimes by curiosity about a given attribute" (p. 434). The researchers indicated that this approach lacked either a pattern or the use of one of the other modes.

The researchers reported that, "the most frequent used data acquisition strategies were hypothesis-driven and cue-based; 95% of the subjects used predominately cue-based strategies and 91% used predominately hypothesis-driven strategies in at least one case situation" (p. 361). The researchers reported that all subjects activated at least one hypothesis over the three cases. The researchers did not specify what method of data acquisition subjects used when they did not activate any hypothesis.

Barrows and Bennett (1972) identified differences in the way physicians asked questions when gathering information related to hypotheses. They reported two approaches to questions asked--"routine" and "inquiry"-- used by expert and novice neurologists. According to these researchers, once neurologists identified a hypothesis, they asked questions that they considered not routine; they were inquiry-oriented questions. When questions no longer elicited productive information they switched to a routine functional inquiry, scanning for

other items. Once the physician received a positive response from the patient, the physician switched back to an inquiry mode. These approaches were interpreted as ways of asking questions in order to gather information related to hypotheses during the interview.

Kassirer and Gorry (1978) also identified differences with respect to questions asked when gathering information during interviews. The researchers used the term style to describe the method of asking questions used by six expert physicians in the study. Four of the physicians were expert in nephrology--the content area of the case. Subjects were described as using four styles based on their usual pattern of gathering information: (a) some directed all of their efforts toward the "core of the situation;" (b) some systematically explored a variety of aspects of the patient's condition; (c) some probed a number of different directions; and (d) some began analysis by obtaining historical information.

According to the researchers, the style of expert subjects varied based on whether they had expertise in the content area of the case. Those with expertise in the content of the case asked fewer, highly directed questions, focused on pertinent information regarding the

diseased organ, and mentioned the correct diagnosis earlier. Those experts without expertise in the content area of the case asked less direct questions, explored more symptoms and findings unrelated to the diseased organ, and reverted to a general review of systems when they did not know how to proceed.

Kassirer and Gorry (1978) also reported that questions asked by expert physicians were directed at features of hypotheses. The features were identified as: (a) temporal relations (i.e., patterns were looked for that would identify the condition as an acute or chronic disease); (b) signs, symptoms, and laboratory data that supported, refuted or refined hypotheses; (c) severity of the condition; (d) complications discovered in the laboratory data; and (e) the urgency of the need for action.

D. Section Summary

The literature surveyed indicated that both nurses and physicians used different activities to gather information and some activities seemed to focus information gathering along with hypothesis generation. The other approaches were explicitly or implicitly described as data acquisition activities. Tanner,

Padrick, Westfall, and Putzier (1987) reported that subjects generated hypotheses early and these hypotheses were used to guide the collection of information. However, they also reported that some subjects did not generate a hypothesis. The researchers did not indicate the focus a subject used for gathering information, if no hypothesis was generated. However, several data acquisitions methods were described that used cues and questions to direct the information gathered.

Kassirer and Gorry (1978) reported that content expertise and style influenced the way questions were asked, but they also identified the use of features of hypotheses as a guide for gathering information. The use of these features of hypotheses suggested to the researchers that questioning was hypotheses-driven. The features described general areas of information and cues that could apply across many hypotheses. The researchers did not identify if there were any correlation among subject's style and subject's use of features.

The descriptions of style of the individuals and of the use of features of the hypotheses to direct data gathering (Kassirer & Gorry, 1987) overlapped with the

cue-directed and systematic approach to gathering information described by Putzier, Padrick, Westfall, and Tanner (1985).

E.   Novices versus Experts

Similarities as well as differences between novices and experts with respect to gathering information to make clinical decision were identified. Researchers, describing hypothesis generation, agreed that there were no differences between novice subjects and expert subjects in earliness of hypotheses generation (Tanner, Padrick, Westfall, & Putzier, 1987; Elstein, Shulman, & Sprafka, 1978; Barrows & Bennett, 1972). The difference between novice subjects and expert subjects appeared to be in the amount of information gathered and in the activities used to gather information.

Differences in the amount of information collected by novice and expert clinicians were identified. Researchers reported contradictory results related to the amount of information collected by novice subjects and by expert subjects in the medical literature and nursing literature. In the medical literature, researchers reported that experts asked fewer questions before accurately diagnosing (Kaufman & Patel, 1985; Barrows &

Bennett, 1972). Neufeld, Norman, Feightner, and Barrows (1981) studied three levels of medical students and physicians and reported that as education increased, diagnosis became more specific, with the more experienced student using more general hypotheses and asking fewer questions.

In the nursing literature, researchers reported that experts asked more questions. For example, Itano (1989) reported that Registered Nurses, described as experts, asked more questions and thus collected significantly more cues than senior students, described as novices. The researcher used Gordon's (1980) four categories of cue classification:

- Current State Cue. These were identified as values of current information, such as current blood pressure, comfort level, activity level, and laboratory values.

- Historical State Cue. These were identified as previous values, such as previous blood pressure, appetite, family role, and body perception.

- Current Contextual Cue. These were identified as unchangeable characteristics, such as diet eaten, and kind of family structure.

- Historical Contextual. These were identified as events that have occurred as part of life history, such as birthdays.

The researcher reported that the majority of cues sought by both groups were current state cues. The researcher

reported no significant differences found between the two groups in the _type_ of cues sought; the difference was in the _number_ of cues sought. Broderick and Ammentrop (1979) also reported that expert nurses asked for more information than novice nurses.

Some studies in nursing, however, reported differences between novice nurses and expert nurses related to the type of cues sought. For example, Pyles and Stern (1983) reported that experienced critical care nurses link together basic knowledge, past experience, cues presented by patients, and sensory cues (including what nurses call "gut feelings") to decide what care to give to patients developing cardiogenic shock. The researchers did not specifically identify how novice nurses used cues; a lack of experience was identified as a reason novice nurses did not respond to cues in the same way as experts.

Bruya and Demand (1985) investigated nurses' decisions to search for cues and/or for nursing action. They concluded that: (1) novice nurses relied heavily on standing orders that describe exactly what to do, and (2) expert nurses relied on "chunking" of cues from

experience, such as reviewing all the fluid and electrolyte information and "how the patient looked," before initiating therapy.

F. Chapter Summary

Hypothesis generation was described as a method to focus the collection of information used for clinical decision-making in the medical and the nursing literature. Most studies that described hypothesis generation as a focus for the collection of information related to clinical decision-making used simulated cases, either videotaped or case studies. A few studies found in the nursing literature monitored the collection of information in the actual clinical environment (Bruya & Demand, 1985; Pyles & Stern, 1983). Studies that used the actual clinical environment did not focus on hypothesis generation. These studies described the information expert nurses and novice nurses collected to determine patient care.

Differences in the activities used to gather information were described including, descriptions of methods, style, and ways of asking questions. Differences between the concepts of style of data collection and method of data collection were not clear

with the information from the studies reviewed. In the Kassirer and Gorry study (1978) subjects' degree of expertise in the case content was reported to influence the ways they asked questions. The researchers did not report studying subjects across cases. Using the term style without comparing the activities for gathering information across cases was confusing and did not add to an understanding of the way decisions were made. Describing nurses' activities for gathering information across patient cases should identify if each nurse used a consistent style. Sorting activities for gathering information based on nurses' perceptions of their expertise in the case content should also help clarify if this is a useful way to clarify the processes underlying decision-making.

Differences between novice subjects and experts in the amount of information, the kind of information, and way information was collected was also reported. Researchers hoped that studying differences between novices and experts in clinical decision-making would more clearly identify how experts dealt with data. To date, no one has developed a fully satisfactory explanation of differences between novices and experts.

Some issues related to data collection identified in the studies surveyed remain vague; these issues will be addressed below.

G. Nurses versus Physicians

Nurses and physicians use some of the same information, but often use it for different purposes. This is due to the fact that nurses and physicians provide for different although overlapping needs of the patient. Table 1 summarized differences between nurses and physicians related to the information collected.

Both nurses and physicians collected information from various sources to respond to immediate and long term needs of patients. Physicians' goals include diagnosing and curing diseases, and prescribing therapeutic regimens. Nurses' goals include assisting patients to deal with uncertainty before the disease is diagnosed, to learn to care for themselves given the limitations of the disease and the restrictions necessitated by its treatment, and to function to the highest level of their ability. Nurses collect data to diagnose patients' needs caused by disease states, to determine the physiological response of patients, to determine the extent to which the patient, family or

Table 1

Differences Between Nurses and Physicians Related to
Information Collected

	Things Nurses Do	Things Nurses Don't Do
Things That Physicians Do	Collect data from various sources.	Diagnose disease states.
	Use data to determine immediate patient needs.	Rule in/out disease.
	Uses results from procedures, lab work.	Order procedures or lab work.
	Set goals to deal with response to disease.	Set goals to cure disease.
	Identify learning needs based on disease.	Prescribe therapeutic regimen.
Things That Physicians Don't Do	Identify emotional and social support needed by patient.	
	Assess the extent that emotional needs can be met by family of friends.	
	Attempt to respond to unmet emotional and supportive needs of the patient.	
	Assess patient in order to determine presence of information or lack of correct information.	
	Design and implement instructional program based on identified needs of patients.	

friends can meet needs, and to identify instructional needs. For example, once a patient is diagnosed by the physician as having diabetes and the physician determines that the patient needs insulin to control the elevated blood sugar, the nurse monitors the patient's response to the insulin and teaches the patient to care for himself or herself. When working with such patients, the nurse teaches them how to: monitor their own blood sugar, give their own insulin, determine signs and symptoms of too much or too little insulin, prevent complications that diabetes can cause if care is not taken, and make appropriate adjustments in their life style.

Nurses need some of the same data as physicians to determine the care that patients need. In the example of the diabetic patient, nurses need to know the blood sugar and other laboratory results that indicate a complication of the disease. Other data, not needed by physicians, are needed by nurses such as who would be at home to help the person or how would they get the supplies they need. All data available are evaluated before a plan is developed. Physicians would also evaluate the blood sugar and other lab values, but their purpose is to determine whether further interventions to treat the disease are needed.

H. Setting

Researchers reported that subjects performed consistently better in patient care management problems using simulations than they did in the clinical setting (Goran, Williamson, & Gonella, 1973). This suggested that simulated cases do not adequately represent the clinical environment. Simulated cases, even so called "high fidelity" simulated cases as described by Elstein, Shulman, and Sprafka (1978), cannot replicate stimuli that were present in the clinical environment during the collection of information. The unfolding of information as presented by the patient, the large volume of information available to the clinician, and the many distractions that occur in the clinical environment appeared to affect the activities used for collecting information. Observing the collection of information in the actual clinical situation led to the identification of methods and patterns used to make decisions that are affected by the large amount of data available, by changes in the patient, and by stimuli in the environment.

I. Hypothesis versus Cue Clustering

Hypothesis generation was described as the method

used to guide the information gathered for clinical
decision-making, however, cues were also described as a
focus for gathering information. For example, in the
nursing research done by Tanner and Associates (1987),
hypotheses were reported to focus the information
gathered, but the researchers related that 95 percent of
subjects used cues to direct the information gathered in
all three cases used in the study.

Studies that did not identify hypothesis generation
as a guide to information gathering were also described.
For example, Pyles and Stern (1983) described the
information gathered by nurses in an intensive care unit.
The nursing task in their study was to describe patients,
not generate hypotheses. The researchers reported that
subjects who were experienced nurses collected,
categorized, and differentiated cues to identify patients
developing cardiogenic shock. One subject from the study
described the use of cues as "putting a puzzle together"
(p. 53). Gathering cues seems to be the beginning of a
process needed to structure information to make sense of
it.

J. General versus Specific Hypothesis

The terms general and specific hypotheses were used

in studies of clinical decision making. However, these terms were not clearly defined in the studies surveyed. For example, Barrows and Bennett (1972) reported that novice clinicians (house officers and students) generated "precise" and "specific" hypotheses while expert clinicians kept their hypotheses "broad" and "vague," allowing them to be shaped by data before the final diagnosis was accepted. Barrows and Tamblyn (1980) and Neufeld, Norman, Feightner, and Barrows (1981) refer to "broad" or "general" and "specific" hypotheses. Elstein, Shulman, and Sprafka (1978) reported that physicians generate diagnostic hypotheses early in the clinical encounter and that these may be either "general" or "specific." Kassirer and Gorry (1978) gave examples of "general" and "specific hypotheses" but the terms were not described. No study surveyed described the terms.

K. Hypothesis Testing, Refining, or Evaluating

"Testing" hypotheses, "refining" hypotheses and "evaluating" hypotheses were terms used in the literature to describe additional information collection after hypotheses were generated. For example, Gordon (1980) described methods to refine and evaluate hypotheses as:

- Predictive hypothesis scanning--i.e., using contextual attributes (age, disease state) to reduce quickly the multiple hypotheses;

- Successive testing--i.e., testing hypotheses one by one with additional cues and discarding hypotheses that are not confirmed; and

- Direct testing--i.e., using state attributes (blood pressure, dressing drainage) to evaluate
  or refine hypotheses, one by one with cues.

Each of these methods described the collection of additional cues to evaluate or refine hypotheses. Successive scanning was the method most frequently used by subjects in the study. Thus, cues were used to rule in or rule out each hypothesis, one by one. Subjects in the study were given a list of possible hypotheses and were directed to choose the most likely hypotheses to explain data in the case studies. This may have elicited a cue-hypothesis matching exercise. This aspect of the study did not clarify the underlying thinking processes. Describing why subjects used the particular cue types may have been more descriptive of their thinking.

Kassirer and Gorry (1978) used the term "case building" to describe methods used to evaluate or refine hypotheses, to incorporate new data into existing hypotheses, and to modify or eliminate hypotheses. The "case building" methods include:

- Pattern matching--i.e., comparing cues to subjects' concept of the signs and symptoms of the disease;

- Confirming strategy--i.e., collecting a great deal of data about many aspects of the patient;

- Elimination strategy--i.e., looking for the cue or cues whose absence would provide a basis for rejecting hypotheses; and

- Exploratory strategy--i.e., collecting data to refine hypotheses by making them more specific and checking for complications.

Cues appeared to be instrumental when discussing testing, refining, and evaluating hypotheses. If the hypothesis was eliminated because an essential cue did not fit, then it was said to be tested or evaluated. If the cue fit the hypothesis, the hypothesis was said to be refined to include the new piece of data. Testing, refining, and evaluating hypotheses appeared to describe several activities that used information to make a decision about the state of the patient.

Using the term "case building" may provide a better description of the way the information was structured than using the term hypotheses. "Case building" implies a beginning and forming process.

L. Novice versus Expert

"Novice" and "expert" subjects were described differently in studies surveyed, but results were

reported as if these terms were used consistently across studies. For example, in one study, novice subjects were associate degree nursing students, and expert subjects were associate degree registered nurses (Broderick & Ammentorp, 1979). In another study, both junior and senior baccalaureate students were novice subjects, and baccalaureate registered nurses with two years of experience were expert subjects. Two years experience was the only criterion used to distinguish expert nurses (Tanner & Associates, 1987). In another study, baccalaureate students were also used as novice subjects but only senior students were included. Expert subjects in the study, however, were chosen based on Benner's (1982) characteristics of expert nurses and described as highly-skilled judgment-makers (Itano, 1989).

In one medical study, novice subjects were first year medical students and expert subjects were senior residents (Coughlin & Patel, 1985). In another study, novice subjects were graduate medical students and expert subjects were family doctors (Hobus, Schmidt, Boshuizen, & Patel, 1987). In both nursing and medical literature, when there were more than two groups in a study, differences among and between the groups were usually

reported. The researchers generally reported that as experience increased, performance in diagnosing patients improved.

Experience and expertise in content of the case were variables that were described in the literature that affect clinical decision-making. Using experienced nurses and describing the nurses' perception of their expertise in the particular content area of the patient's case, provided subjects suitable to clarify thinking processes underlying decision-making.

M. Summary

Studies surveyed attempted to clarify clinical decision-making and attempted to describe the underlying processes. In this endeavor, investigators used a variety of approaches to study the phenomena, used a variety of terms to describe the processes, and described a variety of subjects. The information from each of these areas added an understanding to the underlying processes, but the diversity also caused some confusion. Some of the confusion arouse from the lack of clarity in descriptions of terms in each area.

Terms such as specific hypotheses, general hypotheses, hypothesis refining, hypothesis evaluation,

and cues clustering were not clearly described in the studies surveyed. However, researchers reported results of studies as if descriptions of terms were generally accepted. The basis for some misunderstanding in the studies related to clinical decision-making was the assumption that hypothesis generation described one process; accepting the assumption that it was a general term used to explain several processes used for data collection allowed descriptions that added clarity to the decision-making processes.

Using subjects with experience, studying information gathered by subjects in the actual clinical environment, and clarifying terms that characterize decision-making processes could contribute to our understanding of clinical decision-making.

CHAPTER III

DESIGN

This exploratory study was designed to add to the body of knowledge related to clinical decision making. This study had two purposes. The first was to develop, clarify, and elaborate concepts that describe nurses' clinical decision-making. The second was to observe and describe activities for gathering information used in the clinical environment by experienced nurses. In order to meet these purposes, the study had four overlapping components.

- Clarifying concepts. This component involved: reconciling of differences in the literature; setting forth and defining key terms; and elaborating concepts by describing decision-making in greater detail.

- Observing nurses. Experienced nurses were observed as they gathered information at the beginning of the shift.

- Interviewing nurses. Nurses who were observed were interviewed regarding their decision-making processes.

- Interviewing experts. Experts in clinical decision-making were asked to provide reactions to the findings of the study with respect to clarity, validity, and usefulness.

This chapter presents the design for the study. The chapter was divided into seven sections: (1) conceptual approach; (2) setting; (3) sample; (4) instrumentation; (5) data collection; (6) data analysis; and (7)

limitations of the study. In the first section, concepts

that were used to guide initial data collection and

analysis are discussed.

The study was designed to meet the following

research questions:

1.	Can most activities for gathering information
be meaningfully and reliably categorized as
occurring within either scanning mode, focusing
mode, or both modes simultaneously?

2.	Are there some activities for gathering
information that seem to occur outside the two
modes?

3.	Does the distinction between scanning and
focusing modes of operating match up with what
nurses experience as they determine patient
care in daily practice?

4.	What is an activity for gathering information,
and what if any, are the components that are
contained in all such activities?

5.	What activities for gathering information are
used by experienced nurses within each
information gathering mode?

6.	Do all experienced nurses use essentially the
same activities for gathering information or
are there differences among experienced nurses
regarding the activities used?

A.   Conceptual Approach

The need to clarify the thinking processes that

underlie decision-making in the clinical area of a

hospital was introduced in chapter one. This section

describes two modes, scanning and focusing, used to guide

initial data collection and analysis by the researcher.

Recent research surveyed on clinical decision-making

described hypothesis generation as the method to focus

data gathering (Elstein, Shulman, & Sprakfa, 1978;

Tanner, Padrick, Westfall, & Putzier, 1987; Barrows &

Bennett, 1972). Yet these studies reported that other

data gathering methods guided the collection of

information before hypotheses were generated. For

example, the use of cues, such as age, sex, and

presenting symptoms was described as a focus for

generating hypotheses even before assessments began

(Barrows & Bennett, 1972; Kassirer & Gorry, 1978). The

use of cues seem to involve an immediate active

interpretation of some clinical information. Obviously

the information had meaning for the individual who

gathered the information. Describing all approaches that

nurses used to gather information helped to distinguish

activities and helped to clarify the underlying

processes.

The two modes of data gathering--scanning and

focusing--that I identified helped to describe the

approaches that nurses used to gathered information in

the clinical environment. Nurses used a scanning mode

when information gathered was expected information and

did not require further attention. Nurses used a focusing mode when information gathered was recognized by the subject as inconsistent or inadequate. These two modes were useful in categorizing information and provided a beginning focus for my data collection. As I collected and analyzed data related to how nurses gathered information, my way of thinking about these two modes and other concepts evolved and become clearer.

B. Setting

The setting used for this study is described in this section. It includes a brief description of the variety of ways that studies, addressing clinical decision-making, were approached in the literature as well as my rationale for choosing a clinical setting.

Varied methods were used to study the information gathered for clinical decision-making in the medical and the nursing literature. Most of the studies attempted to simulate the actual clinical situation while eliminating distracting stimuli that were present in the clinical environment. Some of the researchers used case studies based on real situations (Putzier, Padrick, Westfall, & Tanner, 1985; Hobus, Schmidt, Boshuizen, & Patel, 1987), some used videotapes of simulated patient situations

(Barrows & Bennett, 1972; Tanner, Padrick, Westfall, & Putzier, 1987), and some used actors or clinicians as the patient (Elstein, Shulman, & Sprafka, 1972; Kassirer & Gorry, 1978). Sometimes the interaction between subjects and the simulated patient was videotaped and replayed for the subjects who were asked to report what they were thinking about as they watched the replay (Kassirer & Gorry, 1978; Barrows & Bennett, 1972). Sometimes the interaction was given a specific time limit (Coughlin & Patel, 1985). Sometimes subjects were instructed to seek data until a diagnosis was made (Kassirer & Gorry, 1978); sometimes only a limited amount of data was available for the subjects to use (Gordon, 1980; Ramsden, Whelan, & Cooper, 1989).

Studies that compared clinical performance to simulated cases using a patient management problem reported that subjects performed consistently better in the patient care management problems than they did in the clinical setting. In one study, using a patient care management problem, subjects were reported to be more thorough in the pursuit of a differential diagnosis, collected more essential history and physical data, and pursued the actual diagnosis consistently with more diligence than the same subjects did with the same

diagnosis in the actual clinical environment (Goran, Williamson, & Gonella, 1973). This suggested that simulated cases do not adequately represent the clinical environment. Simulated cases, even "high fidelity" cases, as described by Elstein, Shulman, and Sprafka (1978) cannot replicate stimuli that were present in the clinical environment during the collection of information. The unfolding of information as presented by the patient, the large volume of information available to clinicians, and the many distractions that occur in the clinical environment could affect a nurse's activities for gathering information. Thus, if information gathering were removed from the environment in which it normally occurred, methods and patterns could have been lost.

Based on results reported in the literature and based on the research questions for this study, the following criteria for choosing the setting were established: (a) clinical environment of a hospital; (b) staffing patterns that were reasonable; (c) nurses who collected data to determine what patients need; and (d) routines that were familiar to the researcher. A clinical environment was chosen since several researchers suggested that simulated cases do not adequately

represent the clinical environment. A nurse's activities for gathering information could be affected by changing conditions of patients in a hospital which add to the stimuli that need to be processed. Stimuli usually are not controlled by subjects and stimuli could affect methods used to organize and process information. Thus, using the actual clinical situation could distinguish data gathering activities that otherwise would not be detected.

Two basic criteria for selecting the hospital were: first that an expectation existed that nurses collected information to determine what patients need, and second that staffing patterns were reasonable. The amount of information gathered by nurses and the methods of gathering information would have been affected if these criteria were not met. Also, if staffing was not adequate, nurses might not have had time to be interviewed.

Familarity with the hospital provided a basis for knowing whether or not the hospital met the criteria. Familarity with the gathering of information in the environment also allowed me to identify patterns in the information gathered without the confusion that unfamiliar routines would have created. Without all

identified criteria present, the kind of data collected by the researcher would have been affected, and the results of the study might not have been as worthwhile.

C. Samples

This section deals with samples for this study. The sampling objectives used to choose subjects for the observations and interviews, including the criteria for choosing patients that were assessed by the subjects are described. The sample size and the rationale for the choice were explained as well as the number of observation and interview cycles I completed. The method to obtain consent, how anonymity and confidentiality were maintained, and an explanation of the permission needed to conduct the study at the setting are then addressed. This section concludes with a description of the panel of experts.

1. Observing and Interviewing Subjects

There were two objectives to achieve in choosing the sample. The first was to choose nurses as subjects who could provide detailed information to clarify the processes used during clinical decision-making. In order to achieve this objective, subjects were needed who articulated the thinking that occurred when they

collected data to determine patient care. Since descriptions of terms were needed, each subject was expected to provide enough information to contribute to the description of what was happening. This required three observations for most subjects.

My second sampling objective was to choose enough subjects to provide variety in the data collected. Some variety was needed in order to determine if there was a common description that fits activities for collecting information by subjects or if there was variability in activities for collecting information among subjects. However, there was a greater premium in this study on the nature of the processes used than on the variety of processes used by subjects. Therefore, I chose a small sample with several observations per subject as opposed to a larger sample size with only one observation per subject.

Several variables were identified from the literature that could affect the way nurses manage information and thus were addressed when determining the sample. These variables were knowledge of the nursing process, gender, experience of the subject with the case, and expertise of the subject in the content area of the case. The nursing process has been widely accepted as

the method used to organize information and make clinical

decisions related to nursing care (deChesnay, 1983;

McCarthy, 1981; Gordon, 1987; Aspinall & Tanner, 1981).

Although this method of organizing information was widely

accepted, there may be other ways that nurses approach

the collection of information. Since knowledge of the

nursing process may affect the way information was

gathered, I asked subjects if they learned the nursing

process in their educational preparation. I also asked

subjects their perception of their expertise in using the

nursing process. Since I did not want to lead the

subjects in any way I asked each subject about the

nursing process at the end of my final interview with

her.

Women were also described as having different ways

of knowing (Belenky, Clinchy, Goldberger, & Tarule, 1986)

and different ways of reasoning from men (Gilligan,

1982). In order to avoid confusion in data

interpretation that combining data from men and women

subjects might create, only women subjects were asked to

participate in this study.

Experience in the area of practice and expertise in

the content of the case were two characteristics of

subjects, identified from the literature, that could

affect the gathering of information. Experience in the area of practice was reported to affect the information gather by nurses in an intensive care unit (Pyles & Stern, 1983; Bruya & Demand, 1985). Expertise in the content area of the case was reported to affect the information gathered in a study of physicians (Kassirer & Gorry, 1978). However, in the studies surveyed, the amount of experience that differentiated the experienced from the non-experienced subjects and a clear description of expertise were never given. Describing the amount of experience that subjects needed in the particular practice area and describing the perception that subjects had of their expertise in the particular case helped standardize these variables. This prevented confusion that differences in these characteristics could cause.

In order to address the variables that could affect the way information was gathered in the clinical area and in order to address the research questions, women were chosen as subjects for this study if they:

- had two years experience as a nurse in a hospital setting,

- had skill in gathering information as identified by their Nurse Manager,

- had agreed to be tape recorded while interacting with patients,

- had agreed to be interviewed on tape, and

- had agreed to provide demographic data.

I decided that two years experience would provide the amount of time needed by the nurse to develop stable patterns of gathering information. This was based on Benner's (1984) distinction that nurses who have been on the job for two or three years are somewhat aware of goals and plans. Using two years experience as a minimum criterion for nurses in this study provided subjects with sufficient background to ensure expertise in most cases on the unit. I also asked nurses during the interview to relate their perceptions of their expertise with the cases.

Educational preparation was also reported to affect information gathering in the clinical area (Coughlin & Patel, 1985). Educational preparation was collected as a part of the demographic data and was used to describe the sample used for the study.

Once nurses who met the criteria were selected, I asked them to participate in the study and explained to them:

- that the purpose of the study was to determine activities for gathering information by experienced nurses;

- that the study involved being observed and tape recorded during the collection of information from patients' assessments and being tape recorded while being interviewed about the assessments;

- that procedures would be followed to maintain confidentiality;

- that participating or not participating would not affect their status in any way; and

- that they could withdraw from the study at any time without any negative consequence.

I also asked subjects to keep information discussed confidential until the study was completed. The purpose of keeping discussions confidential was to avoid contaminating potential subjects so that each subsequent subject enters the study with a fresh perspective.

2. <u>Patients for Assessment</u>

Patients who were assessed by nurses at the beginning of their shift were chosen from the nurses' usual shift assignments provided that:

- They were 18 years of age or older.

- They were able to sign a consent form.

- They were legally competent.

- They did not have a medical condition that might be affected by the tape recording and observation.

I reviewed the nurses' assignments the day or shift
before the observations occurred to ensure patients met
the selection criteria. Patients who met selection
criteria were asked for permission to tape record the
nurse's assessment of them. Patients were told that:

- The purpose of the study was to identify how
  experienced nurses collected information.

- Information collected would be kept confidential.

- Tape recordings would be destroyed after the
  information was transcribed.

- Names would not appear in the study.

3. Sample Size

The next design decision that I made was to
determine the size of the sample and the number of
observations and interviews that were needed to answer
the research questions. Six subjects were observed and
interviewed for this study. These subjects were able to
articulate the decision-making processes they used during
the collection of information and data emerged that
answer the research questions. A small sample size had
advantages that supported the research questions. These
advantages were: (a) observations and interviews of each
subject were done more frequently so that subjects were
more comfortable with my presence; and (b) observations

and interviews of each subject continued until no further

useful information was obtained. The number of

observations and interviews for each subject varied.

Each subject was observed until no additional useful

information was provided. After six subjects were

observed and interviewed sufficient data was obtained to

answer the research questions.

4.   Consent and Confidentiality

I asked each subject and each patient who was

assessed to sign a Consent Form (see Appendix A and B).

The purpose of the study and lack of risk or benefit to

the subject or the patient were explained before they

were requested to sign the form. I ensured

confidentiality of the material collected and anonymity

of subjects and patients by controlling the information

collected. In order to maintain anonymity of subjects, I

assigned an identification number to each subject. The

identification number was used on the Demographic Data

Form, on the Data Recording Form, and on tape recordings

of the subject. Any reference to names on the audio tape

recordings were not transcribed. The audio tape

recordings of patients' assessments were erased after

transcription. The names of patients were not kept.

Confidentiality was maintained by keeping the Data Recording Forms, tape recordings, and names of subjects in a secure place throughout the study, and by destroying all data collected after the study was completed. Control of all data by me ensured confidentiality and anonymity.

5. <u>Permission</u>

Because the study involved nurses as subjects and involved interaction with patients at a hospital, I asked permission to conduct the study before the sample was obtained. I asked for permission to conduct the study from the following:

- Director of Nursing;
- Nurse Managers on identified units;
- Nurses who met the criteria;
- Patients assigned to subjects;
- Nursing Research Committee of the hospital; and
- Human Subjects Committee of the hospital.

The Director of Nursing was asked to identify medical and surgical units that were suitable for data collection; suitable units were those without major changes occurring that could interact with the study. The purpose of the study and the amount of staff

involvement was explained to the Director of Nursing.
Nurse Managers of units identified by the Director of
Nursing were asked to identify nurses who met selection
criteria. I met with each Nurse Manager to explain the
purpose of the study, the criteria for choosing nurses,
and the amount of time involved for each nurse.

I asked permission to conduct the study in the
hospital from the two required committees. The Nursing
Research Committee required the total proposal. This was
submitted to the Chairperson of the Committee. The
second committee, the Committee for the Protection of
Human Subjects in Research for the Medical Center,
required an application and the consent forms that were
used. The application was completed and submitted to the
Administrative Coordinator for that Committee.

6. <u>Interviewing Experts</u>

Four experts in clinical decision-making who met the
following criteria were asked to participate in the
study: (a) prepared at least at the Master level; (b)
identified by peers as expert in problem solving or
clinical decision-making; and (c) approved by my
committee. Four experts provided sufficient feedback
about the concepts developed and kept the feedback

manageable. Once individuals who met the criteria agreed to participate in the study, their role was explained to them. They were asked to review the model for decision-making and the descriptions of the concepts developed, and were asked to provide feedback on the clarity, validity, and usefulness of the concepts. The feedback from experts in clinical decision-making contributed to the answer to the following research question:

Question 4: What is an activity for gathering information, and what if any, are the components that are contained in all such activities?

D. Instrumentation

The data recording forms developed to guide data collection and to answer the research questions are described in this section. The forms included: (a) the Data Recording Form (see Appendix C) designed to be used to guide data collection during the observation phase of the data collection; (b) the Interview with Subjects Guide (see Appendix D) designed to guide data collection during the interview with subjects; (c) the Expert Interview Guide (see Appendix E) designed to guide data collection during the interview with experts in clinical decision-making and (d) the Demographic Data Form (see Appendix F) designed to collect demographic data. The

content of the forms is described and the issue of validity and reliability is addressed.

1. Observing and Interviewing Subjects

Two data recording forms--a Data Recording Form and an Interview with Subjects Guide--were used to guide data collection during the observations and the interviews with subjects. The forms were used for the observation and interview of each subject. After the analysis of data from the first session with the first subject, the content of the Data Recording Form and the Interview of Subjects Form was changed. Taylor and Bogdan (1984) described this kind of data collection instrument as an interview guide and differentiated a guide from a protocol and a structured schedule. According to these authors, a guide is used to make sure key topics are explored; the researcher decides "how to phrase questions and when to ask them" (p. 92). The Data Recording Form and the Interview with Subjects Guide fit the description of an interview guide because the general topic remained the same but the specific content changed. The initial content of the Data Recording Form included the following information: (a) patient's information obtained by the subject at shift report; (b) condition on the clinical

unit during observation; (c) status of patient at the time information was collected; (d) non-verbal communications by both patient and subject; (e) information collected by the subject at patient's bedside or chart; (f) questions asked by the subject that indicate concentration on an area of information; (g) questions asked by the subject that seem unusual or that do not fit the questioning sequence; and (h) my first impression about the data gathering approach of the subject. Two areas on the Data Recording Form were changed. First, instead of writing the information the subject received from report on the recording form, I asked subjects if I could review their assignment work sheets. This was done because I wanted to capture the information subjects felt was important to record from report. Second, questions asked by subjects that indicated concentration on an area were deleted because it was not possible to write all the questions during the observation session. I noted key phrases on the Data Recording Form to allowed me to ask questions during the interview with the subject. The information from the Data Recording Form contributed data to address the following research questions:

Question 1:   Can most activities for gathering
              information be meaningfully and
              reliably categorized as occurring
              within either scanning mode, focusing
              mode, or both modes simultaneously?

Question 2:   Are there some activities for gathering
              information that occur outside the two
              modes?

The Interview with Subjects Guide used for the initial interview with the first subject included questions that: (a) clarified what I observed during the subject's assessments related to questions asked; (b) elicited a description of the decision-making processes that the subject was aware of using; (c) elicited the subject's perception of expertise with the content area of the case; (d) elicited the subject's perception of expertise with the nursing process; and (e) elicited how the nursing process was learned. One question was added after two subjects were interviewed. This question was, "What were you thinking about when you first received information about the patient at report?" The first two subjects were interviewed again and asked this question.

The content of the Interview with Subjects Guide directed data collection to answer the following research questions:

Question 3: Does the distinction between scanning
and focusing modes of operating match
up with what nurses experience as they
determine patient care in daily
practice?

Question 5: What activities for gathering
information are used by experienced
nurses within each information
gathering mode?

2. Expert Interview Guide

The Expert Interview Guide was developed after the

data gathering terms and concepts were described from

data analysis. The guide served to ensure that I

surveyed key topics consistently. The content was

developed to elicit feedback from experts in clinical

decision-making regarding the clarity, validity, and

utility of the concepts developed from data analysis.

This guided data collection to answers to the following

research question:

Question 4: What is an activity for gathering
information, and what, if any, are the
components that are contained in all
such activities?

3. Demographic Data Form

A Demographic Data Form was used to collect

consistent data from all subjects. The information on

the Demographic Data Form included educational

preparation of subjects and the number of years

experience. The information collected on the Demographic Data Form remained constant for all subjects.

4. Validity

Cross checking for validity of the information collected was incorporated into the study design by: (a) validation of the information collected on the Data Recording Form with the subjects at the time of interview; (b) validation of information collected on the Data Recording Form with the tape recording of the nurse's assessments; and (c) feedback from the interview with experts in clinical decision-making regarding the concepts described. I also asked subjects to review findings from their observations and interviews to ensure that my interpretation reflects what actually happened.

5. Reliability

This study used two methods to deal with the concern for consistency and dependability of findings. First, I verified the categories identified by me from analysis of data from the observations and interviews of subjects with four nurses who practice nursing. I gave these nurses the criteria for the two modes and I gave them raw data from the transcribed text of the observations of each subject. I asked them to use the criteria for the

two modes and label the raw data. Their responses

confirmed that I was consistent when categorizing the

data. In this way, my explanation of the categories were

supported for consistency. Second, the methods employed

were explained in detail to allow others to replicate the

study.

E. Data Collection

The data collection for this study was described in

this section. Data collection and analysis were an

ongoing process throughout data collection and analysis.

Data collected and analyzed from one source affected data

collection from all sources. Data collection occurred in

two stages--observation and interview of nurses stage and

the interview of experts stage. During the first stage--

observation and interview of nurses stage--I observed and

took notes on the activities subjects used for gathering

information, while at the same time recording subjects'

interactions with their patients on an audio tape.

During this stage of data collection, I also recorded

interviews with subjects on an audio tape. In the second

stage of data collection--the interview of expert stage--

I recorded on the Expert Interview Guide the responses of

experts in decision-making related to their perspective

of the concepts developed. The subjects, for the observation phase, who agreed to participate also filled out the Demographic Data Form.

1. Observing Subjects

In the first stage of data collection--the observation and interview stage--I recorded information on the Data Recording Form, and I recorded on audio tapes each subjects' assessment of patients. Data collection on the Data Recording Form included:

- condition on the clinical unit during the observation;

- status of the patient;

- non-verbal communication by the patient or subject;

- information and time frames of what the subject looked at and what the subject did at the patient's bedside;

- questions asked by the subject that indicated concentration on an area or an unusual sequence during the assessment of the patient;

- first impressions of the researcher related to the subject's information gathering.

I recorded on the Data Recording Form questions asked the patient by the subject that indicate to me that the subject was concentrating on a particular area or questions that seems to me to be out of sequence. These

questions were further clarified with subjects during the interviews. Data collected for each patient was recorded on a separate Data Recording Form.

During data collection in stage one, I recorded on audio tape the actual assessments done by each subject. The tapes were labeled with subjects' identification numbers for future analysis.

2. Interviewing Subjects

During the interview stage, I asked subjects: (a) to verbalize what they were thinking when they first received information about patients at shift report; (b) to describe what they were thinking about when they asked questions that indicated that they were concentrating on a particular area or asked questions that seemed to me to be out of sequence; (c) to describe their perception of their expertise in the content area of the case; (d) to indicate their perception of their expertise with the nursing process; and (e) to indicate how they learned the nursing process. I recorded subjects' verbalization on audio tape for subsequent transcription and analysis. Each subject was interviewed for about twenty minutes after completion of assessments on all patients for the shift.

The interviews were semi-structured but informal. The interviews were described as semi-structured because I asked some questions of subjects to clarify questions they asked patients. They were informal in the sense that I asked subjects to describe what thinking process was occurring at the time that they were asking questions. Steps were taken to minimize errors in data collection during interviews--specifically, to avoid having subjects exerting effort toward guessing the "right" answer (i. e., what they have been taught was the correct way to proceed) and to avoid suggesting that questions have a "right" answer. Putting subjects at ease was a strategy that could alleviate the possibility of subjects guessing what they think the "right" answer should be. This was accomplished by saying, "What is taught nurses in school often is not what is found to be effective in the actual work environment. If you explain what you are actually doing, it could identify what experienced nurses find effective. Processes described could then be taught to new nurses."

Asking open-ended questions that elicit descriptions also minimized emphasizing a "right" answer in interviews. For example, questions such as, "Describe what you were thinking as you asked the patient...or

looked for...cue."   Words in the questions depended on
data observed during subjects' assessments of patients
and responses given by subjects during the interviews.
Keeping questions open-ended elicited information that
clarified what I observed. Asking questions that offer
choices also avoided directing the answer in the
interview. For example, asking "Is your knowledge of
this kind of case more than usual, about the same, or
less than knowledge about other cases you care for on the
unit?"

The content of the interview changed as data from
early interviews were analyzed. After two subjects were
interviewed, the first subject was asked additional
questions due to the new insights from the data analysis.
I asked the first subject and additional subjects what
they were thinking about when they received report about
the patients. I also asked subjects to judge whether the
themes or patterns characterized by me described
accurately what they experienced. I reviewed and
reanalyzed the feedback. This changing of the interview
structure was described by May (1989): "content of
interviews require adjustment by the investigator in

response to ongoing data collection and analysis. So interview procedures...cannot be accurately described until after the fact" (p. 172).

It was possible that questions I asked changed the way subjects dealt with information. From one perspective, subjects may have become more conscious of what they were doing. From another perspective, subjects may have change mental operations. Changing consciousness of subjects may have contaminated the study or it may have contributed to the study. If subjects became more reflective of what they were doing or experimented with different ways of looking at information, a better way of processing information may have resulted. If subjects became more aware of what they were doing, they could articulate the process more clearly. Unfortunately, it was impossible to determine which of these occurred.

3. <u>Interviewing Experts</u>

In the interviews with experts in clinical decision-making, I solicited feedback related to the concepts developed and explored during data analysis from the other phases of data collection. I asked each expert to think about a clinical decision that they felt had a

positive result. I then gave each expert the model for decision-making and the descriptions of the terms developed from data analysis. The model of decision-making that was developed was explained and they were asked to verbalize their perception of: (a) the clarity of the terms; (b) the usefulness of the concept as descriptors; and (c) the extent to which the concepts fit with what they thought about related to a clinical decision that had a positive result. The responses from the experts in clinical decision-making were analyzed. The Expert Interview Guide was used during the interview to ensure that key points were not missed.

4. Demographic Data

I asked subjects to complete the Demographic Data Form. This was done at the time subjects agree to participate. The items on the Demographic Data Form were derived from the literature that indicated length of experience and educational background may affect data collection (Itano, 1989; Pyles & Sterns, 1983; Gordon, 1980).

F. Data Analysis

Since the purpose of this study was to describe activities experienced nurses used for gathering

information for making clinical decisions, I selected

data analysis methods that could detect subtle changes in

the way that nurses collected information. The methods

of analysis included sorting questions asked by subjects

into categories and sorting statements from transcribed

tape recordings into meaningful categories. These

methods are described in detail when the analysis of data

collected is discussed. Data collected was analyzed

between observation session prior to collecting data from

subsequent subjects. Results obtained from data analysis

from each observation session affected the way subsequent

data were collected and analyzed. As data analysis

continued, the data collected and analyzed changed.

The first part of this section describes the

scanning and focusing modes that guided initial data

analysis. The following part of this section describes

methods used to analyze data collected during

observations of subjects, during interviews with

subjects, on Demographic Data Forms, and during

interviews with experts. The research questions that the

analysis of data was designed to answer is discussed at

the same time. The final section presents the

limitations of this study.

1. Concepts

I began data analysis by sorting questions asked by subjects in the clinical environment into two categories--scanning mode and focusing mode. Each phase of data collection and data analysis was designed to clarify the concepts related to the underlying processes of clinical decision-making.

2. Observing Subjects

During the observation of the first subject, I began data analysis by recording on the Data Recording Form, some questions asked the patient by the subject. The questions that I recorded indicated to me that the subject was concentrating on an area. I also recorded questions that seemed unusual or out of sequence. I asked the subject during the interview to describe what she was thinking about when she asked the question or questions. The data elicited from the subject during the interview became a part of the analysis of data from the interview of the subject.

I transcribed as a whole the audio tape recording of each subject's assessments of patients as soon as possible after the observation session in order to maximize recall of data. Each statement of this

transcribed information was sequentially numbered. The

numbered statements were analyzed. I labeled questions

asked patients by the subject into focusing and scanning

modes. I placed questions into the scanning category if

the questions were directed at obtaining routine

information that the subject usually gathered, especially

when attempting to verify that everything was going as

expected--i.e., that no new developments had occurred. I

placed questions into the focusing category when there

was a change in the pattern of questioning that indicates

that the subject was clarifying information, interpreting

information, making a decision about the information, or

deciding that additional information was needed.

Once questions were sorted into the two modes, the

criteria for the two modes were reviewed to determine if

the data gathered fit the modes as described. The

criteria for the modes were modified so that questions

could be categorized easier. Questions that were sorted

into categories were further sorted into the following

categories:

- What was described, either a body system or state
  of the patient.

- What time they were obtained, either at report,
  early in the encounter, middle of the encounter,
  or end of the encounter.

- What information was collected after the encounter.

- What themes linked cues and questions together.

In this way, I looked at data from another perspective to determine if there were other ways of approaching information besides the two identified modes. Analyzing questions for patterns or themes after the second sorting described a different way subjects dealt with information and it identified what information the subject considers relevant. Once data were analyzed in this way, the following research questions were examined:

Question 1: Can most activities for gathering information be meaningfully and reliably categorized as occurring within either the scanning mode, focusing mode, or both modes simultaneously?

Question 2: Are there some activities for gathering information that occur outside the two modes?

Question 5: What activities for gathering information are used by experienced nurses within each information gathering mode?

Question 6: Do all experienced nurses use essentially the same activities for gathering information or are there differences among experienced nurses regarding the activities used?

3. <u>Interviewing Subjects</u>

I transcribed as a whole the audio tapes of the

interviews with subjects. Once transcribed, each statement was sequentially numbered. An analysis of the numbered statements was then undertaken. Words that described the meaning of a statement or group of statements were written in the column next to the numbered statement and these words were considered as a possible way to code the statements. Statements with the codes were read and reread and the codes continually reviewed.

As data were analyzed from the first nurse, I wrote-up ideas about codes and their relationships as they developed. Codes were used to guide data collection and analysis for the next subject. Coded categories were re-evaluated as additional data were collected from each subject. As categories were analyzed, descriptions that characterize activities evolved. Once new descriptions evolved, I re-evaluated data previously coded in light of the new descriptions. As new data from each subject were collected, I analyzed the data using the methods described. Information collected from subjects earlier in the research were re-evaluated in light of the new information because a sequence of questions or the use of questions became clear after repeated review of data and after introduction of new data. Ongoing analysis and

ongoing coding of data suggested other categories that changed the description of what was going on. As descriptions of concepts were developed with data analysis, some terms were eliminated, and other terms tried as I explore new way of thinking about activities for gathering information. Analyzing the data collected in this way answered the following research questions:

Question 3: Does the distinction between scanning and focusing modes of operating match up with what nurses experience as they determine patient care in daily practice?

Question 4: What is an activity for gathering information, and what, if any, are the components that are contained in all such activities?

Question 5: What activities for gathering information are used by experienced nurses within each information gathering mode?

4. Demographic Data

Data collected on the Demographic Data Form were analyzed using descriptive statistics. The number of subjects with each type of education preparation was reported as well as the range and mean amount of experience of subject. The data gathering activities

identified for each subject were reviewed for

any relationships with educational preparation and with

the amount of experience.

5. <u>Interviewing Experts</u>

After I finished analyzing the data collected from

observing and interviewing subjects, I presented the

descriptions of the concepts with the model of decision-

making to experts in clinical decision-making for their

review. Feedback from the experts in clinical decision-

making was elicited using the Expert Interview Guide. A

guide was used to ensure relevant questions were

addressed. Changes in the model of decision-making were

made based on the feedback from the experts in decision-

making. The following research question was clarified by

review of feedback from experts in clinical decision-

making:

> Question 4: What is an activity for gathering
> information, and what, if any, are the
> components that are contained in all
> such activities?

G. Limitations of the Study

This descriptive study was completed in one

institution, thus it can only describe activities for

gathering information by experienced nurses in that

institution and cannot be generalized to all

institutions. Many variables, such as interpersonal

relationships and the personality of the individual could

affect information collected in nursing practice.

However, these variables were not addressed in this

study.

Validity of the study may have been threatened by my

presence during information gathering by subjects. This

was minimized by observations of subjects on more than

one day so that they became accustomed to my presence.

Validity of data could also be affected by the possible

need of subjects to tell what they perceive to be the

"right" answer rather than what they actually do when

they collect information. Steps were taken in data

collection methods to minimize this effect. Using

different sources for data collection and different

methods for data analysis could also serve as a cross

check for the validity of data collection and analysis.

CHAPTER IV

PRESENTATION AND DISCUSSION OF RESULTS

This chapter deals with the findings related to information gathered by nurses in a clinical environment. It is divided into three parts. It opens with a description of two approaches--a scanning mode and a focusing mode--used by subjects to gather information. It covers how subjects responded to answers to questions they asked patients and the decisions made related to the information. The content of the information gathered is then described. It includes activities used to gather information and the information gathered within each activity. The style of questions asked and the mode used by subjects to gather information in each activity are included. A model for decision-making and a description of terms derived from analysis of data is the then presented.

A. Nature of the Findings

Data for this study consisted of transcribed information from audio tapes of subjects collecting information during patients' interactions, of interviews with subjects after collecting information from patients, and of notes taken by me during observations of subjects collecting information from patients. These included:

- data collected from thirty-four hours of audio tapes recorded during six subjects' interaction while collecting information from 52 patients.

- data collected from my observations recorded on 52 Data Recording Forms when subjects' collected information during patients' interactions.

- data collected from three hours of taped interviews with subjects after interactions with patients.

First, I transcribed the first subject's interviews of patients, my interviews with the subject, and my observations of the subject. Then, I sequentially numbered the transcribed statements. I examined the numbered statements for ways to describe this data. I wrote descriptions of the data that could clarify the information gathered by the subject. I labeled the numbered statements with the descriptions. As I analyzed data from additional subjects, I continually revised descriptions of information gathered. In this way I was able to answer the following research questions:

Question 1. Can most activities for gathering information be meaningfully and reliably categorized as occurring within either scanning mode, focusing mode, or both modes simultaneously?

Question 2. Are there some activities for gathering information that occur outside the two modes?

Question 3.   Does the distinction between scanning
              and focusing modes of operating match
              up with what nurses experience as they
              determine patient care in daily
              practice?

Question 4.   What is an activity for gathering
              information, and what, if any, are the
              components that are contained in all
              such activities?

Question 5.   What activities for gathering
              information are used by experienced
              nurses within each information
              gathering mode?

Question 6.   Do all experienced nurses use
              essentially the same activities for
              gathering information or are there
              differences among experienced nurses
              regarding the activities used?

B.   Demographic Data

Six nurses were subjects for this study. Three
subjects were between age 26 and age 30. Three subjects
were over thirty years of age. Experience in nursing of
subjects ranged from three and one-half years to twenty-
one years. The mean number of years experience was six
years and the median for experience was five and three-
fourths years. Two subjects received their basic
education from a diploma program, one subject received
her basic education from an Associated Program, and three
subjects received their basic education from a
Baccalaureate Program. The one subject with an ADN

completed a BSN Program. There was no apparent relationship among data gathering activities, years of experience, and educational preparation.

C. Modes

In order to categorize data into modes consistently, I described specific criteria for the two modes. Using the criteria, I sorted questions asked patients by the first subject into a scanning mode, or into a focusing mode.

After I sorted questions asked by the first subject into the modes, I refined the criteria for the two modes and used the new criteria to sort questions asked by additional subjects. Criteria for the two modes were further refined after new information from analysis of the transcribed data clarified the criteria for the two modes. I reanalyzed data from all subjects using the revised criteria. Criteria used for the final sorting of questions asked by subjects into the two modes were:

Criteria for the Scanning Mode

1. Information gathered was expected and was not used.

2. Information area was abandoned without gathering additional items of information.

Criteria for the Focusing Mode

1. Information gathered appeared to trigger
    gathering of additional information in
    the same or related information area.

2. Additional information gathered was used to make
    a decision about the relevance of previously
    gathered information, or to make a decision.

Subjects sometimes asked questions using a scanning
approach and appeared to change modes to a focusing
approach. At first, I considered this type of
information as data gathered in both modes
simultaneously, and I sorted the information as a
separate category. However, when I examined questions in
the context they were asked, they fit the criteria for
the focusing mode. Then, I sorted all questions subjects
asked into either a scanning or a focusing mode.

Once I sorted all questions asked by subjects into
the two modes, I examined questions in each mode for
variables that could describe the mode. As could be
anticipated, subjects asked the same questions in both
modes; the context of the question determined the mode.

1. Scanning Mode

When I analyzed questions that I sorted into the
scanning mode, in the context they were asked, data

suggested that subjects asked questions in a scanning

mode based on information from:

- Report

- Records

- Knowledge of condition

- Routine Assessments

- Patient's response

Patients' responses to questions asked in a scanning

mode determined whether subjects dropped an area of

questioning or used a focusing mode to gather more

information in the area.

2. Focusing Mode

When I examined questions that I sorted into the

focusing mode, in the context they were asked, I noticed

two things. One was the way questions were clustered

together. The other was the stimulus that initiated

subjects' use of a focusing mode.

a. Clustering. When I examined questions that I

had sorted into the focusing mode, I saw two patterns in

the way questions were clustered together. In one type

of question clustering, subjects asked a series of

questions that dealt with the same area of information.

In the other type of question clustering, subjects asked

a series of questions that had a potential causal

connection to answers previously given or to information

actively being considered by subjects.

For example, Subject Five asked a series of

questions that all dealt with one area of information--

pain:

```
Subject:  How is your pain?
Patient:  What pain?
Subject:  So you don't have any pain anywhere?
Patient:  All I have is knee pain.
Subject:  Is it in both knees?
Patient:  Yes.
Subject:  Is it mostly when you move around?  Or is
          it always there?
Patient:  When I move around.
Subject:  Does the pain medication help you?
Patient:  Oh, yes.
Subject:  How about the pain in your belly?
Patient:  No problem.
Subject:  None at all?
```

The subject grouped questions together related to

pain based on previous knowledge of the patient and based

on the subject's knowledge of pain.

Subject Two asked a series of questions together

that had a potential causal connection:

```
Subject:  I just want to listen to your stomach.
          (listening to bowel sounds)
          Are you passing any gas?
Patient:  Everyone keeps asking me that.
Subject:  You have noises in there.
          Are you hungry?
Patient:  No.
Subject:  Are you nauseous at all?
Patient:  No.  But I am not going to eat until I can
          get up and around.
```

```
Subject:   Did you start liquids yesterday?
Patient:   I had some water and then I had a frappe.
Subject:   What happened?
Patient:   I upchucked.
Subject:   How does your stomach feel today?
Patient:   OK.
Subject:   Are you nauseous at all, today?
Patient:   No.Subject:You feel pretty good?
Patient:   I feel good if I could just get up and
           walk.
Subject:   It is hard to digest food when you are
           lying down.
           How are your bowels?
Patient:   If I could get up, I could go.
Subject:   I will have to talk to the doctor to see
           what he has planned.  If you are not going
           to get up, I'll get something for your
           bowels--to prevent a problem.
```

The subject knew the relationship of the patient's nausea to lying flat and the bowels. She asked questions so she could determine what she needed to plan for this patient. The information she asked about was related but in a different area of information. Subjects' knowledge of patients' conditions guided question clustering.

b. <u>Stimuli</u>. I describe two kinds of information that were stimuli for subjects to use a focusing mode. These were:

- Inconsistent Information--information from the patient was not consistent with previously gathered information.

- Inadequate Information--information from the patient was not sufficient to make a decision.

i. <u>Inconsistent Information</u>. I described information as inconsistent when information the subject gathered during the interaction with a patient was different from information previously gathered from other sources. Inconsistent information included treatment orders that were not followed and information that subjects knew was not appropriate as a result of their education and experience.

For example, Subject Five asked a patient what he used the nebulizer for when she noticed it on the bedside table and it was not ordered. She asked the patient, "Does this help? How long have you used that? Did you see a doctor because you were having a tough time breathing? When I asked the subject what she was thinking when she asked the patient about the nebulizer, she responded,

> I wasn't aware he had a history of COPD so I wasn't
> sure why he was getting the nebulizer treatments. I
> wanted to figure out why he was on it because he is
> here with hepatic obstruction. They didn't report
> respiratory complications.

Subject One asked a patient, "I noticed that you don't have your oxygen on." I asked the subject during the interview what she was thinking about when she asked the patient about the oxygen. She responded,

> It said in his kardex that he had oxygen ordered;
> but I will have to check the doctor's order to see
> what his last pulse oximetry was. What he was on
> [was] room air. He doesn't seem to be uncomfortable
> breathing right now.

The subject asked questions because the order was not carried out; what the patient was doing was inconsistent with what was ordered. The subject gathered more information from the patient and the patient's record to determine if the patient needed the oxygen that was ordered. Subject Three discovered that a patient was not wearing a cervical collar that was prescribed; she asked, "You don't have to wear the soft collar any more?" When the patient said, "I leave it off," the subject responded, "I'll check on that, then." When I asked the subject during the post-observation interview about this she said, "I talked to the doctor and he said he still should have it on to prevent extension and flexion." The patient was not following the order. Because of the inconsistent information, the subject gathered more information to see if the patient needed the collar.

ii. <u>Inadequate Information.</u> I described inadequate information as information that was not sufficient to make a decision about patient care, and/or information from a physician about the plan for the patient was

needed to determine the patient's care. The subject did make a decision; the decision was that the information was inadequate to form a conclusion or form a hypothesis. The subject used a focusing approach to ask the patient additional questions. The subject asked questions in the same area, or verbalized a need to seek additional information from the record and/or physician regarding the treatment for the patient or plan for the patient.

For example, Subject Two responded to a patient on bedrest who had x-rays done, "I'll have to talk to the doctor to find out what they have planned" and at a later time during the interaction said, regarding the bedrest, "That is what you are waiting for? I'll try to find out." In response to another patient regarding when he would be getting out of bed, the subject said, "I'll have to talk to them. That would be nice to know."

In response to a patient who was having pain, Subject Four, focused on this area of information: "Do you want me to see if I can get something for you now?" The patient asked, "What can I have?" The subject responded, "I'll have to talk with the doctor." The subject knew the patient needed more pain control. She said to the patient, "But if you are in pain--what are you going to do when you go home?...You don't want to

come back for pain control." For another patient who used a pain medication to sleep, the subject asked, "Do you think you would benefit more from a sleeping pill?" and then said, "We can ask."

Based on information gathered from a patient, Subject Five identified that the patient was having difficulty with his bowels. She knew from his record that he was on codeine, a medication for pain that caused constipation. The subject said, "Maybe if we gave you a stool softener it would help. Let's get an order for you."

c. <u>Use</u>. I examined the information I labeled as inconsistent and inadequate to describe how often each type of information was a stimulus for subjects to use a focusing mode. Table 2 displays numbers and percents of time each subject used inconsistent information or inadequate information as the stimuli for using a focusing mode. Inadequate information was most often the stimulus for subjects to use a focusing mode. Subject One responded to inadequate information with a focusing mode eighty-eight percent of all times she used a focusing mode. Subject Five responded to inadequate information eighty-three percent of all times she used a

Table 2

Stimuli for a Focusing Mode--Inconsistent and Inadequate Information

	Times (%)	
	Inconsistent	Inadequate
Subject 1	2 (12%)	15 (88%)
Subject 2	10 (56%)	8 (44%)
Subject 3	4 (44%)	5 (56%)
Subject 4	2 (33%)	4 (67%)
Subject 5	2 (17%)	10 (83%)
Subject 6	5 (63%)	3 (37%)
Mean:	37.5%	62.5%
Median:	38%	61%
Range:	17%-63%	37%-88%

focusing approach. Subject Six responded to inadequate information only thirty-seven percent of all times a focusing mode was used. Subject Six used a focusing mode most often in response to inconsistent information.

d. <u>Decision</u>. I reviewed data that I labeled inconsistent and inadequate from each subject to determine the reason the subject made the decision that information was inconsistent or inadequate. Data suggested that subjects used knowledge of patients' conditions and information from report to make a decision that information was inconsistent or inadequate. Subject One and Subject Two also used a focusing approach o gather more information based on a question asked by a patient. They needed additional information about the topic before they could respond to the patient.

e. <u>Knowledge and Report</u>. I described subjects as using knowledge of patients' conditions to decide that information was inconsistent or inadequate when the information gathered was not included in the report. Subjects also related at the post-observation interviews that their knowledge of the types of conditions or risk factors related to conditions guided the information they

gathered. For example, Subject Three clearly articulated this at the post-observation interview when she said:

> When I listen to report something clicks--like the new admission--a complaint of head pain and they were giving her narcotics. My first priority when I went into her is to check neuro signs. I still do an assessment--what I heard at report wasn't complete. I start from the basics. A new person--I introduce myself and do vital signs, first. I then check head to toe. I check lungs sounds on a brand new patient and ask them if they smoke. The bowel sounds, the CSMs to both extremities--I wouldn't do a complete neuro check on everyone but on this one I did. I do overall well being, "How are you? How was your night?" Then I go on from there.

Table 3 displays numbers and percents of time that knowledge or report information was the reason each subject made the decision to use a focusing approach for inadequate information. All subjects used their knowledge most often to make a decision to use a focusing mode for inadequate information. Subject Four and Subject Six used knowledge of the condition to make a decision to ask questions in a focusing mode 100 percent of the time that they used a focusing mode.

Table 4 displays numbers and percents of time knowledge or report information was the reason for each subject to make a decision to use a focusing approach for inconsistent information. Most subjects used their knowledge of patients' conditions to decide that information was inconsistent. Subject Three and Subject

Table 3

Focusing Mode--Inadequate Information--Reason for Decision

| | Times (%) Used | |
	Knowledge	Report
Subject 1	7 (54%)	5 (38%)
Subject 2	7 (78%)	1 (11%)
Subject 3	3 (60%)	2 (40%)
Subject 4	4 (100%)	0 (0%)
Subject 5	9 (90%)	1 (10%)
Subject 6	3 (100%)	0 (0%)
Mean:	80.33%	16.5%
Median	84%	11%
Range:	54%-100%	0%-40%

Table 4

Focusing Mode--Inconsistent Information--Reason for
Decision

	Times (%) Used	
	Knowledge	Report
Subject 1	1 (33%)	2 (67%)
Subject 2	8 (89%)	1 (11%)
Subject 3	4 (100%)	0 (0%)
Subject 4	0 (0%)	2 (100%)
Subject 5	2 (100%)	0 (0%)
Subject 6	3 (60%)	2 (40%)
Mean:	63.66%	36.33
Median	75%	25%
Range:	0%-100%	0%-100%

Five used knowledge of patients' conditions 100 percent of the time to make a decision to use a focusing approach in response to inconsistent information. Subject Two used knowledge of patients' conditions to decide to use a focusing approach eighty-nine percent of the time that the focusing mode was used in response to inconsistent information. Subject Four used information that came from the report 100 percent of the time to decide information was inconsistent.

Analyzing the data in this way contributed to the answer to the following research question:

Question 4. What is an activity for gathering information, and what, if any, are components that are contained in all such activity?

D. Subject Response

Once I analyzed all questions asked in both modes, I examined the transcribed data to describe how subjects responded to answers to questions they asked. Subjects made a decision in response to the information gathered. They decided whether (a) they had sufficient information to come to a conclusion or form a hypothesis, or (b) they had insufficient information. Information that was insufficient was either inconsistent or inadequate.

1. Conclusion

I described data as a subject forming a conclusion when there was evidence that the subject acted on the information or that the subject dropped the area of questioning.

2. Action

I described data as an action when the subject used the information gathered. I described three types of actions taken by subjects; the subjects

- taught the patient,
- prescribed a treatment,
- explained the plan of care to the patient.

Subject Five illustrated a decision to teach the patient based on an abnormal vital sign. After taking the patient's temperature, the following occurred:

```
Subject:  You have a temp.
Patient:  I did this morning?
Subject:  usually right after surgery a slight temp is
          from the lungs.  You probably don't expand
          the lungs.  You should take good deep
          breaths every chance you get.
```

The subject explained to the patient what they needed to do because the routine assessment information was abnormal.

3. <u>Dropped Area</u>

I described an area of questioning as dropped if a

question or cluster of questions were asked by a subject

and no response to the answer was evident. If a subject

used a focusing approach to an area of questioning and

dropped the area of questioning, I asked the subject

about the area of questioning during the post-observation

interview.

Subject Three illustrated a dropped area of

questioning in a scanning mode:

    Subject: You are pretty comfortable on the
              medication?
    Patient: Yes.
    Subject: Did they change this yesterday? (looking at
              the IV)
    Patient: Yes.
    Subject: Would you take a deep breath for me so I can
              check your lungs?
    Patient: OK.

Based on the patient's positive response to questions,

the subject switched to ask questions in another area of

information.

Subject Three illustrated questions that were asked

in a focusing mode and then the area of information was

dropped:

    Subject: How about your toes?
    Patient: They are tingly.
    Subject: They are still tingly?
    Patient: I think that is my biggest problem.
    Subject: Has it improved or stayed about the same?

```
Patient:   The same.
Subject:   Can you feel underneath when I touch it?
Patient:   Yes.
```

The subject went on to gather vital signs. The subject asked questions in a focusing mode because of the patient's answer to the question, "How about your toes?" The subject gathered more information because the subject knew that tingly toes could indicate a problem that needed action. The subject dropped the line of questioning when she determined with additional information that the toes tingling was not new and did not require an action.

4. Hypothesis

I described the data as a hypothesis when the subject gathered information in an area of information and then resumed asking questions in the same or related area or when the subjects stated during the post-observation interview that they made a decision to act based on an idea. They gathered more information in order to verify or eliminate their idea or they gathered information to determine if the action resolved the patient's problem. They used a focusing approach to gather information using the hypothesis or using the patient's response to the action as a starting point.

5. <u>Insufficient Information</u>

I described information as insufficient information when the subject used a focusing approach to gather information based on the patient's response. The subject interpreted the information from the patient as inconsistent or inadequate information and gathered more information in the same or related area of information.

E. Decision-Making--Knowledge

Subjects' knowledge guided the decision-making process. For example, Subject Five related, "I guess just working with patients and figuring out what systems are involved in their diagnosis--the pathophysiology-- what could be some complications--you assess the things that could go wrong." This subject articulated the use of knowledge when asked what she was thought about a particular patient when she heard the diagnosis of the patient at report, she said:

> Well post-op patients--check vital signs, and
> incisions, and drainage, and assess pain. I knew
> she would probably be going home, based on the
> surgery she had. So--find out if she has made
> arrangement for discharge and if she knows how to
> care for herself at home."

This subject knew about this type of patient. She knew the patient would probably be discharged because of the

type of surgery, although this information was not given
during report.

Subject Three also demonstrated the knowledge used
to determine patient care. I asked Subject Three what
she was thinking about when she went into a particular
patient's room. She said:

> I looked at the window-sill for the trach set. She
> [at report] didn't say anything about an anterior
> approach. I felt more comfortable when I saw the
> trach set. He wasn't edematous at all. Often the
> back surgery--the fusions are very swollen. His
> color was good--he didn't have edema and his
> breathing was ok. I felt better right away.

When I asked this subject what she was thinking
about when she asked the patient, "Is your throat tight?"
the subject responded, "If he became swollen inside he
would have difficulty breathing but it could feel tight
first." The subject's knowledge of this type of patient
guided what information she needed to gather to make a
decision about the status of the patient.

Knowledge of the condition and knowledge of possible
complications continually guided the information subjects
collected throughout their interactions with patients.
Subjects knowledge guided decisions regarding what
information to collect and what action to take. Their
knowledge also help them decide that enough information
had been collected. Subjects were flexible and changed

what and when they gathered information depending on their knowledge and patients' responses.

F. Summary

This part of the chapter described the process that subjects used to make decisions from the information. It included two approaches, scanning mode and focusing mode, used by subjects to gather information. Information that guided the scanning mode and the stimulus for subject to use the focusing mode were addressed. Responses subjects made to the answers to questions were also described. The key role of subjects' knowledge in the data gathering activities and decision-making was also included. The next part of this chapter describes the activities used to gather information and the information gathered.

CHAPTER V

CONTENT

In this section of Chapter IV, I describe the activities used for gathering information and the kinds of information gathered within the activities. The frequency each subject used each activity is also reported. This section of the chapter ends with a description of the mode or modes used for each activity for gathering information.

G. Data Gathering Activities

After I reviewed all questions subjects asked, I examined the numbered statements for all activities subjects used for gathering information. I described three data gathering activities used by subjects:

- reading or listening to report from the previous shift, including reading the patients' kardexes;

- reading records and/or asking physicians for information; and

- interacting with patients, including routine assessments and questions asked.

After I sorted the transcribed data by activities, I described the activities and the kind of information gathered within each activity.

1. Report Information

1. <u>Report Information</u>

I described report information as information
subjects gathered at the beginning of the shift. This
information included information from a taped report or
information from a written report completed by nurses
from the previous shift and information on patients'
kardexes (a kardex is a form that contains the most
recent orders for the patient). All subjects began
gathering data at the beginning of the shift by
collecting report information. Three subjects listened
to the report taped by nurses from the previous shift,
and three subjects read the report written by nurses from
the previous shift. All subjects wrote some information
from the report and patients' kardexes on their
assignment sheets.

I recorded the information from subjects' assignment
sheets with my observations for analysis. All subjects
wrote the following information on their assignment
sheets:

- Age
- Diagnosis
- Physician
- Diet
- Allergies

- Vital Signs

- Intravenous Fluids, if prescribed

- Intake and Output, if prescribed

- Treatments/Comments

- Medications

All subjects except Subject Six used assignment sheets
with a printed format with the information. Subject Six
wrote the same information as the other subjects on a
form that had lines and blank spaces. The third
subject's assignment sheets had space for laboratory and
BM (bowel movement). The fourth and fifth subjects'
assignment sheets had spaces for assessment, radiation,
and chemotherapy. Subjects Four and Five worked on an
oncology unit.

Table 5 displays numbers and percents of patients
and the information from report that each subject wrote
on assignment sheets. All subjects recorded 100 percent
of patient's age, diagnosis, frequency of vital signs
monitoring, and activity on their assignment sheets.
Subjects varied in the number of patients that they wrote
physicians' names and allergies on assignment sheets.
Subject Six did not record any physicians' names on the
assignment sheets. When asked why she had not recorded
any physicians' names on assignment sheets this subject

Table 5

Information on Assignment Sheet

| | Patients (%) Recorded Report Information | | |
	Age Diagnosis Vital Signs Activity	Physicians	Allergies
Subject 1	9 (100%)	9 (100%)	6 (67%)
Subject 2	10 (100%)	10 (100%)	10 (100%)
Subject 3	9 (100%)	9 (100%)	4 (44%)
Subject 4	7 (100%)	7 (100%)	7 (100%)
Subject 5	6 (100%)	6 (100%)	3 (50%)
Subject 6	10 (100%)	0 (0%)	10 (100%)
Mean:	100%	83.33%	76.83%
Median:	100%	100%	84%
Range:	0%	0%-100%	44%-100%

indicated that she checked the patient's record for the physician covering, if she needed anything for the patient.

2.   Record Information

I described record information as:

o   information in patients' medical records located in patients' rooms, and

o   information in patients' medical records located at the desk, including information from physicians.

a.   Patients' Rooms.   I described the information gathered by subjects from patients' medical records located in patients' rooms as information from:

● Nursing Care Flow Sheets,

● Patient Medication Records,

● Patient Care Plans, and

● Patient Data Bases.

Table 6 displays numbers and percents of patients and the type of record in patients' rooms that subjects checked.   Subjects checked Patient Flow Sheets and Patient Medication Records either before or immediately after the initial interaction.   Four of the six subjects checked the Nursing Care Flow Sheets and Patient Medication Records before entering the rooms on all

Table 6

Records--Patients' Rooms

| | Patients (%) Records Checked | | | |
	Flow/Med. Records Before	Flow/Med. Records After	Care Plan	Data Base
Subject 1	8 (89%)	1 (11%)	1 (11%)	5 (56%)
Subject 2	9 (90%)	1 (10%)	1 (10%)	4 (40%)
Subject 3	9 (100%)	0 (0%)	4 (44%)	3 (33%)
Subject 4	7 (100%)	0 (0%)	1 (14%)	1 (14%)
Subject 5	6 (100%)	0 (0%)	1 (17%)	1 (17%)
Subject 6	9 (90%)	1 (10%)	3 (30%)	2 (20%)
Mean:	94.83%	5.16%	21%	30%
Median:	95%	5%	15%	26%
Range:	89%-100%	0%-11%	10%-44%	14%-56%

patients. Two of subjects checked the Nursing Care Flow Sheets and Patient Medication Records after their initial interaction with one patient. The two subjects who checked a patient's record after the initial interaction indicated that they were called into the room because each patient had an urgent need.

One subject checked 56% of Patient Data Bases; another subject check as few as 14% of Patient Data Bases. I asked subjects why they checked Patient Data Bases at the initial interaction with patients. All subjects replied that they checked Patient Data Bases on patients they did not know.

Subjects checked Patient Care Plans less frequently than other records during the initial interactions at the beginning of the shift. I asked each subject during the last interview session why they checked Patient Care Plans at the beginning of the shift. Subjects indicated that if they had time, they checked Patient Care Plans at the time they checked Nursing Flow Sheets and Patient Medication Records. Subjects indicated that they usually checked all Patient Care Plans at some time during the shift. However, four subjects related that the Patient Care Plans were not always up to date and thus were not used for gathering data at the beginning of the shift.

All subjects recorded treatments and times treatments needed to be done on their assignment sheets. Four subjects recorded medications and times they needed to be delivered on their assignment sheets. Two subjects did not record medications that needed to be delivered during their shift. I asked the two subjects who did not record the medications on their assignments sheets, how they decided what to record on their assignment sheets. They indicated that they recorded things on the assignment sheet that they wanted to ask patients; they did not include anything that was on the Patient Medication Records because they checked records frequently. I noted on this particular unit that there were not many routine medications for patients. Most of the medications were daily and as needed medications.

b. <u>Desk</u>. I described information gathered by subjects from patients' medical records located at the desk as information found in:

- Patients' Progress Notes
- Laboratory Reports
- Physician's Orders, including questions asked physicians.

Questions asked physicians were included with the record information because subjects would ask physicians

questions if the information was not written in the
Patient's Progress Notes. For example, Subject Six
described checking medical records at the desk, by
saying,

> If I can, I like to check the charts right--
> somewhere when I get out of report, because...they
> are gone for tests and the chart is gone and the
> orders don't get to the secretary and you find
> things. I try to check at the beginning--like W's
> blood. I like to see it for myself. Like S's--I
> need to go back--her coumadin has been on hold--
> report told me the PT was high yesterday so she got
> Vitamin K. It has been on hold so maybe they
> overlooked it.

3. <u>Patient Interaction</u>

Approaches subjects used when they asked questions
was addressed in an earlier section. This section
describes the content of questions.

When I reviewed the transcribed data from all
subjects, I described two ways that subjects gathered
information during interactions with patients:

- Assessments

- Questions asked.

a. <u>Assessments</u>. I described two kinds of
assessments completed by subjects--routine and specific.

i. <u>Routine</u>. Routine assessment information was
described as information that subjects gathered

routinely. Subjects gathered routine assessment
information from three sources:

- Vital signs--taking temperature, pulse, respirations, and blood pressure.

- Lung Sounds--assessing the lung sounds with a stethoscope.

- Equipment--checking intravenous, feeding machines, feeding tubes, foley catheters, drains, etc.

Table 7 displays subjects, numbers and percents of
patients and the routine assessment information
gathered. All subjects assessed vital signs on 100
percent of their patients. Sometimes an ancillary helper
collected the vital signs but all subjects either
collected vital signs, or reviewed vital signs collected
by the ancillary helper.

Subjects did not assess lungs sound on all patients.
Five of the six subjects assessed lung sounds on some
patients. Subject Six did not assess lung sounds on any
patients during the initial interaction with patients at
the beginning of the shift. When I asked this subject
what she did to routinely assess patients, she indicated
that she checked lung sounds on patients when she
delivered care during the evening.

All subjects checked all equipment in patients'
rooms. Equipment included all machines used to deliver

Table 7

Routine Assessments--Vital Signs, Lung Sounds, and Equipment

	Patients (%) Routine Assessment		
	Vital Signs Taken	Lung Sounds Done	Equipment Checked
Subject 1	9 (100%)	5 (56%)	9 (100%)
Subject 2	10 (100%)	2 (20%)	10 (100%)
Subject 3	9 (100%)	6 (67%)	9 (100%)
Subject 4	7 (100%)	5 (71%)	7 (100%)
Subject 5	6 (100%)	3 (50%)	6 (100%)
Subject 6	10 (100%)	0 (0%)	10 (100%)
Mean:	100%	44%	100%
Median:	100%	53%	100%
Range:	0%	0%-71%	0%

intravenous fluids and tube feedings, and machines on beds. Equipment also included all intravenous solutions, tube feedings, foley catheters and tubing, drains from patients, and oxygen flow rates. Sometimes subjects asked questions when gathering information about equipment. Subjects asked questions about equipment when they found something abnormal. For example, one subject asked the patient, "Did the machine give you any trouble today?" The subject asked the question because the feeding machine was turned off when the subject checked it. Subjects would also ask questions if something at the bedside was not expected. For example asking, "What do you use this for?" when discovering a respiratory inhalator on the bedside table. When subjects asked questions about equipment, I analyzed questions with the other questions asked.

ii. Specific. I described specific assessments as physical assessment information other than the physical assessment included in routine assessments. Subjects completed specific assessment based on the patients' conditions and their knowledge that this information was needed to determine the state of the patient.

b. <u>Question Types</u>. I examined questions asked during the patient interaction in both modes for patterns or themes that could describe questions asked. I described three types of questions asked by subjects to gather information. These types of questions were:

- Exploring

- Clarifying

- Validating

i. <u>Exploring</u>. I described the subject's question as an exploring question when the subject asked a question to gather information about a specific sign or symptom, about what the patient knew, or about a treatment or a test.

Most questions asked by subjects were exploratory questions. The subject asked exploring types of question based on information received from report, based on knowledge of the condition, or based on the patient's response.

For example, Subject Two, asked the patient, "Are you breathing ok?" When the patient responded, "Yes," the subject asked another exploring question, "Does it hurt here?" The subject was touching the patient's knee that was bruised.

ii. <u>Clarifying</u>. I described the subject's question as a clarifying question when the subject restated what the patient said, rephrased what the patient said, or asked the patient the same question later in the interaction.

Subject Five illustrated clarifying questions when interacting with a patient:

```
Patient:  I can't eat anything.
Subject:  Nothing at all?
Patient:  Nothing.
Subject:  What about being able to drink?
Patient:  I drink a lot of water when I have it.
```

Subjects used clarifying questions to gather more information in the area of inquiry. They asked clarifying questions to ensure that they interpreted the information the same way that the patient interpreted the information.

iii. <u>Validating</u>. I described the subject's question as a validating question when the subject asked the question to determine whether or not a patient understood a particular fact or content.

Subject Two illustrated validating questions when she was trying to determine what the patient knew:

```
Subject:  Do they want it this way?
Patient:  I don't know.
Subject:  Are they going to do anything to it?.
```

Subjects asked validating questions to identify the patient's perspective and to determine the knowledge the patient had of the situation.

c. Differences. I reviewed the question types--exploring, clarifying, and validating--by subject to determine if there was a difference among subjects. Table 8 displays number and percent of types of question each subject asked during the patient interaction.

All subjects asked more exploring questions than other types. Subjects use of exploring type of questions was expected because subjects were gathering information at the beginning of the shift. Most questions subjects asked in both modes were exploratory questions. Subjects did ask clarifying and validating questions in the scanning mode but most of these types of questions were asked in the focusing mode. Once I labeled questions within each mode with types of question, I analyzed questions in each mode for other ways to describe questions. I analyzed questions asked for ways to describe the content of the questions.

d. Questions--Content. Initially, I described three categories that characterized the content of the information gathered. These categories were general

Table 8

Question Types

	Exploration	Validation	Clarification
Subject 1	23 (63%)	9 (13%)	12 (28%)
Subject 2	49 (42%)	32 (27%)	27 (23%)
Subject 3	55 (45%)	30 (24%)	10 (8%)
Subject 4	24 (49%)	9 (18%)	10 (20%)
Subject 5	35 (60%)	4 (7%)	9 (16%)
Subject 6	30 (61%)	7 (14%)	4 (8%)
Mean:	53.33%	17.16%	17.16%
Median:	55%	16%	18%
Range:	42%-63%	7%-27%	8%-28%

questions, questions about the state of the patient, and
questions about body systems. After collecting data from
all subjects and after reading the transcribed data
frequently, I renamed one category. I changed the
category "State of the Patient" to "Pain and Discomfort."
I changed the label of this category because all
questions sorted into this category described information
related to patients' pain or discomfort. I labeled a
group of questions as "Other" since there was no common
focus for questions. After I analyzed data from all
subjects, I described three areas of concentration of
questions that emerged in the "Other" category.

     e. <u>Questions--General</u>. Subjects either introduced
themselves or asked questions such as, "How are you?" or
"How was your night?" when they first entered patients'
rooms. Table 9 shows numbers and percents of patients
asked these questions by each subject. Subject Five
asked all patients how they were doing. Subject Four
asked 100 percent of patients, "How was your night?" and
Subject Three asked 78 percent of patients, "How was your
night?" Subject Two did not ask any patients how their
night was but asked 70 percent of patients, "How are you
doing?" This subject introduced herself to the three
patients that she did not ask how they were. Subject

Six, who worked evenings, asked one patient how the previous night was. Some subjects also asked patients questions about how they slept later in the interview. They asked questions, such as, "Did you sleep ok?" or "Were you able to get any rest?" or "Did you sleep last night?" to elicit additional information from patients. Subject Three indicated during the interview after the observation was completed, "Sometimes asking them, 'How was your night' they go on from there. If something is wrong with them, you notice. Just that one question opens up many things." Subjects asked patients other general questions during the interviews to provide an opportunity for the patient to give information. Questions such as, "What happened?" or "What is going on?" or "You look comfortable, are you?" allowed an opportunity for patients to describe their impressions.

Subjects asked two other general questions, "Do you need anything?" or "Is there anything I can do for you right now?"   These questions gave patients an opportunity to indicate if they needed anything.

f. <u>Questions--Pain/Discomfort</u>. All subjects asked some patients about pain or discomfort during their

Table 9

General Questions

	Patients (%) Questions Asked	
	How Night Was	How They Were Doing
Subject 1	4 (66%)	7 (78%)
Subject 2	0 (0%)	7 (70%)
Subject 3	7 (78%)	3 (33%)
Subject 4	1 (14%)	7 (100%)
Subject 5	0 (0%)	6 (100%)
Subject 6	1 (10%)	8 (80%)
Mean:	28%	76.83%
Median:	12%	79%
Range:	0%-78%	33%-100%

initial interaction. Table 10 shows each subject and numbers and percents of patients asked about pain or discomfort. Three subjects asked 80% or more of their patients questions related to pain or discomfort.

Subject Six asked 20% of patients questions related to pain or discomfort. For example, Subject Six said to a patient whose pain medication was changed from around the-clock pain medication to "as needed for pain," "They made that percocet PRN. If you need it, ask for it. Is the shoulder pain better?" When the patient responded, "What pain?" The subject said, "You don't need the percocet, do you?"   The subject asked the other patient about a sore foot. The subject discovered this problem when she was helping the patient back to bed and said, "How are you doing on your feet there?" The patient responded, "Alright. I have a sore foot, the left one." The subject further pursued this problem.

Subject Four asked 43% percent of patients questions related to pain or discomfort. This subject also asked all patients general questions to elicit how they were doing. This gave patients an opportunity to disclose pain or discomfort.   Subjects asked questions related to pain or discomfort when the question was relevant for the patient.

Table 10

Questions Asked Related to Pain/Discomfort

	Patients (%) Questions Asked	

	Pain/Discomfort
Subject 1	8 (89%)
Subject 2	7 (70%)
Subject 3	8 (89%)
Subject 4	3 (43%)
Subject 5	5 (83%)
Subject 6	2 (20%)
Mean:	65.66%
Median:	76%
Range:	20%-89%

g.   Questions--Body Systems.   Most subjects asked questions about three body systems: respiratory system, gastro-intestinal system, and neurovascular system. Numbers and percents of patients asked questions related to these systems by each subject are displayed in Table 11.   When these data were analyzed questions related to body systems fit the condition of patients.   For example, Subject One asked a patient with asthma and a tracheostomy, "How is your breathing this morning?"   This subject asked questions related to the respiratory system or assessed lung sounds on every patient except one. There was not a need to check respirations on the one patient because he did not have a condition that affected the respiratory system and because he was to be discharged.   Subject Four who asked 14% of patients questions related to respiratory system, assessed lung sounds in 77% of patients.   Two patients who were not asked questions related to their respiratory system or who did not have lung sounds assessed were to be discharged the next day.

Subject Five who asked 17% of patients questions related to respiratory system assessed lung sounds in 50% of patients.   There were two patients who were not asked questions related to respiratory system or who did not

Table 11

Questions Asked Related to Body Systems

| | Patients (%) Questions Asked | | |
	Resp.	GI	Neuro-vascular
Subject 1	3 (33%)	2 (22%)	0 (0%)
Subject 2	5 (50%)	7 (70%)	3 (30%)
Subject 3	4 (44%)	5 (56%)	8 (89%)
Subject 4	1 (14%)	6 (86%)	0 (0%)
Subject 5	1 (17%)	5 (50%)	1 (17%)
Subject 6	4 (40%)	1 (10%)	2 (20%)
Mean:	33%	49%	26%
Median:	37%	53%	25%
Range:	14%-50%	10%-86%	0%-89%

have lung sounds assessed. The subject had one of the patients two days in a row. One patient was to be discharged the next day the other was waiting placement at another facility.

h.   <u>Questions Asked--Other</u>. I described three areas of concentration in questions categorized as "other." These areas of concentration--numbers and percents of patients asked these questions by each subject--are displayed in Table 12. Subject One did not ask any questions in this grouping. The type of patients that this subject cared for did not have needs in these areas. Subjects asked questions in this category related to the particular need of a patient.

<h2 style="text-align:center">H. Mode</h2>

I used the established criteria for the scanning mode and the focusing mode to review all activities used by subjects to gather information. Table 13 displays activities for gathering information and the mode used for each activity. I reviewed information gathered during report by subjects to determine if they approach the information received from report in a scanning mode or a focusing mode. Using the established criteria for modes, I could not reliably categorize all information

Table 12

Questions Asked About ADLs, Discharge, and Educational
Needs

	Patients (%) Questions Asked		
	ADLs	Discharge	Educational Needs
Subject 1	0 (0%)	0 (0%)	0 (0%)
Subject 2	1 (10%)	5 (50%)	2 (20%)
Subject 3	3 (33%)	7 (78%)	9 (100%)
Subject 4	1 (14%)	1 (14%)	1 (14%)
Subject 5	6 (50%)	4 (67%)	2 (33%)
Subject 6	3 (30%)	4 (20%)	6 (60%)
Mean:	22.83%	38.16	37.83%
Median:	22%	35%	26%
Range:	0%-50%	0%-78%	0%-100%

collected from report into a scanning mode or a focusing mode. It was more meaningful to consider information collected during report as a context used for further information gathering by subjects. Describing this approach to gathering information as a context building mode seemed more descriptive of the activity. Knowledge of the patient's condition also helped build the context for gathering information.

When I reviewed the information subjects gathered from patients' records, I determined that they used a scanning approach to gather information from records in the patients' rooms. If information on the record in the patients' rooms was inconsistent with previously gathered information or subjects' knowledge, the subjects used a focusing mode to gather additional information in order to make a decision about the information. Subjects always approached the information gathered from patients' medical records at the desk in a focusing mode. Subjects usually gathered information from patients' Medical Records in response to inconsistent or inadequate information.

Subjects used three methods, routine assessment, specific assessment, and asking questions, to gather information during patients' interactions. Sometimes

Table 13

Modes and Activities for Gathering Information

Data Gathering Activity	Modes	
	Scan	Focus
Report	NA	NA
Records		
Rooms	X	X
Desk		X
Interaction		
Routine Assessments	X	X
Specific Assessments	X	X
Questions	X	X

subjects asked questions during patients' interactions in a scanning mode; sometimes subjects asked questions in a focusing mode. The patient's response and the subject's interpretation of information determined the mode.

Subjects usually gathered information during the routine assessments using a scanning mode. However, sometimes the routine assessment information was relevant, and then subjects used a focusing approach by collecting more information around the routine item. If a vital sign was abnormal, the subject determined if this was a significant abnormality or whether further information was needed. For example, one subject checked an apical pulse when the radial pulse was difficult to obtain. Another subject explained to a post-operative patient that her temperature was slightly elevated which was expected after surgery.

Subjects completed specific assessments on patients when the subjects determined that the specific assessment was needed information to make a decision. Sometimes a subject completed a specific assessment in a scanning mode. Sometimes the subject used a focusing approach to gather specific assessment information in response to inconsistent information or inadequate information.

Of the three data gathering activities identified, I could reliably categorize two activities into either scanning or focusing approach, reading records and interacting with patients. I could not meaningfully categorize report information into the modes because the information was not always obviously used. It was more meaningful to consider report information as a method to build a context for gathering information. I called this use of the information a context building mode.

Explaining the modes used to approach information gathering in this way answered the following research questions:

Question 1. Can most activities for gathering information be meaningfully and reliably categorized as occurring within either scanning mode, focusing mode, or both modes simultaneously?

Question 2. Are there some activities for gathering information that occur outside the two modes?

I also described the activities used within each mode. This answered the following research question.

Question 5. What activities for gathering information are used by experienced nurses within each mode?

The descriptions of the activities used for gathering information addressed the following research question:

Question 4.   What is an activity for gathering information, and what, if any, are the components that are contained in all such activities.

I. Summary

I described activities for gathering information used by subjects. I categorized the information gathered from each activity into either a scanning mode or a focusing mode, except information gathered from the report from the previous shift. Data from the report was more meaningfully labeled as a context building mode since most of the information was used to guide further information gathering. Thus I considered report data as an information gathering activity occurring outside the two modes.

CHAPTER VI

MODEL

In Part three of Chapter IV, I introduce a five-
staged model that I developed from the analysis of data.
I incorporated into the model, subjects' approaches used
to gather information, activities used to gather
information, decisions made, and actions taken. This
part of the chapter opens with the feedback from experts
in decision-making. The model representing the steps
that described decision-making by experienced nurses in a
clinical environment is then presented.

J. Interviewing Experts

Experts in decision-making were asked to review a
model for decision-making with the description of terms
and provide feedback. First, I asked these experts to
think about a clinical decision that they made that they
had a good feeling about. Then, I gave them the model
for decision-making presented in Figure 1, and I gave
them the description of terms delineated in the model. I
asked the experts in decision-making to answer the
following questions:
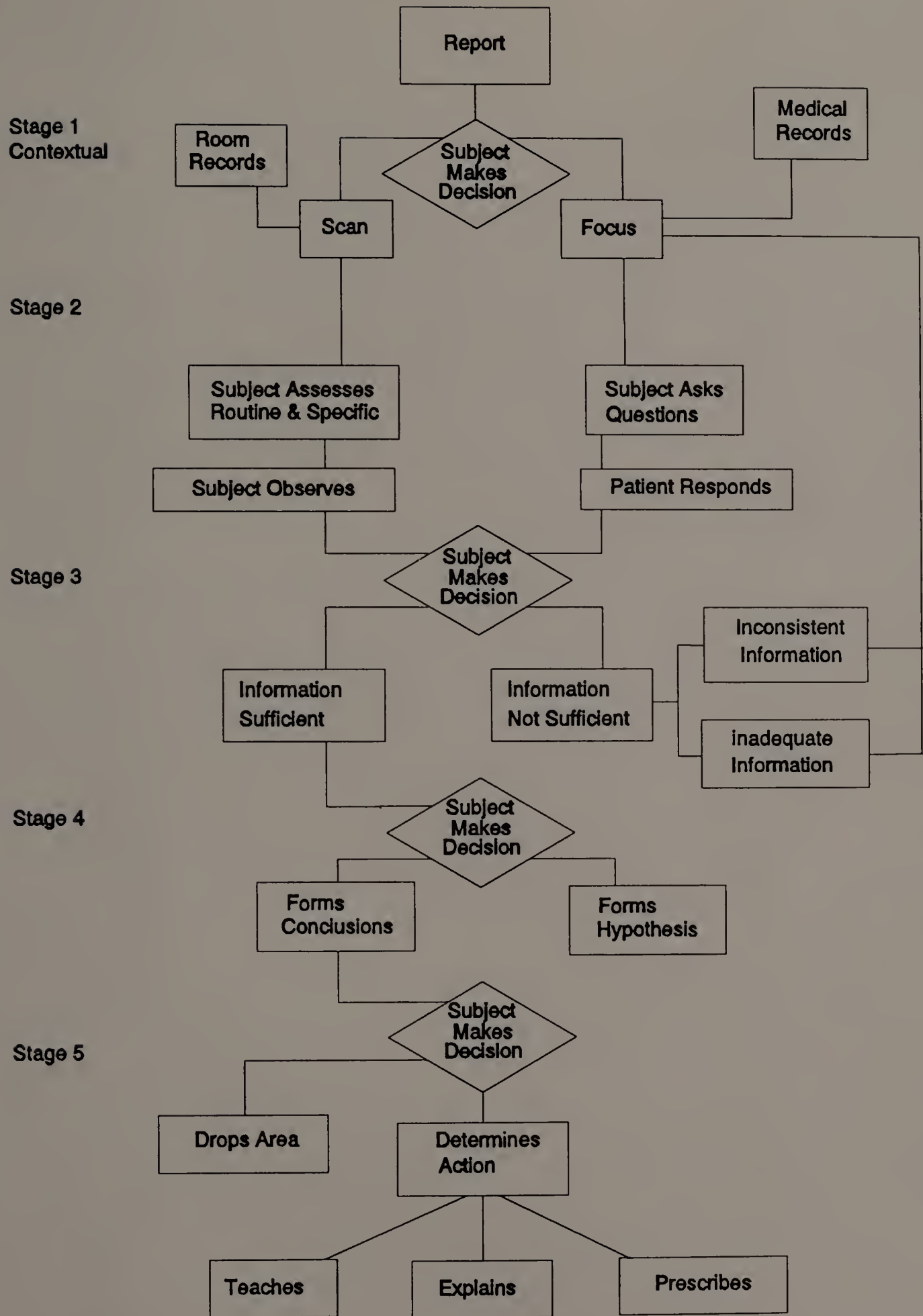
Figure 1
MODEL FOR DECISION MAKING BEFORE INPUT FROM EXPERT

- Does this model fit with what you were thinking about?

- Are the descriptions of the concepts clear?

- Do the concepts fit with your impression of what is going on in clinical decision-making?

- Would this model be useful for describing clinical decision-making in a hospital setting?

Experts confirmed that nurses use data as a guide for gathering information. All experts agreed that report information together with nurses' knowledge guided information gathered in the clinical environment. They agreed that many decisions are made before most hypotheses are formed. In fact, one expert related that an incorrect action resulted when she formed a hypothesis early. All experts related that the model and the descriptions of terms were clear, useful, and valid.

Several experts described that actions were taken based on hypotheses. I had included this in my description of the model but had failed to include it into the original diagram of the model. This change was to add to the model.

One major change was made to the model and to the description of the model based on the feedback from the experts. All experts confirmed that actions were taken based on hypotheses and then the results of the action

were evaluated. If actions were not successful more data
would be gathered, and another action taken. Based on
this feedback from the experts in decision-making, a
feedback loop back to the focusing mode from an action
taken was included in the model.

K. Model

The model presented in Figure 2 was the final model
developed from the analysis of data, including feedback
from experts in decision-making. The model provided a
way of conceptualizing the processes experienced nurses
used when gathering data, beginning with the information
gathered and ending with actions taken.

1. Stage 1

In stage one, subjects gathered information, using a
context building mode, prior to interactions with
patients. Data analysis suggested that subjects used
information from report and knowledge of patients'
conditions to guide further information-gathering before
entering patients' rooms. At this point, subjects began
to decide what information needed to be gathered.

2. Stage 2

In stage two, subjects gathered information from
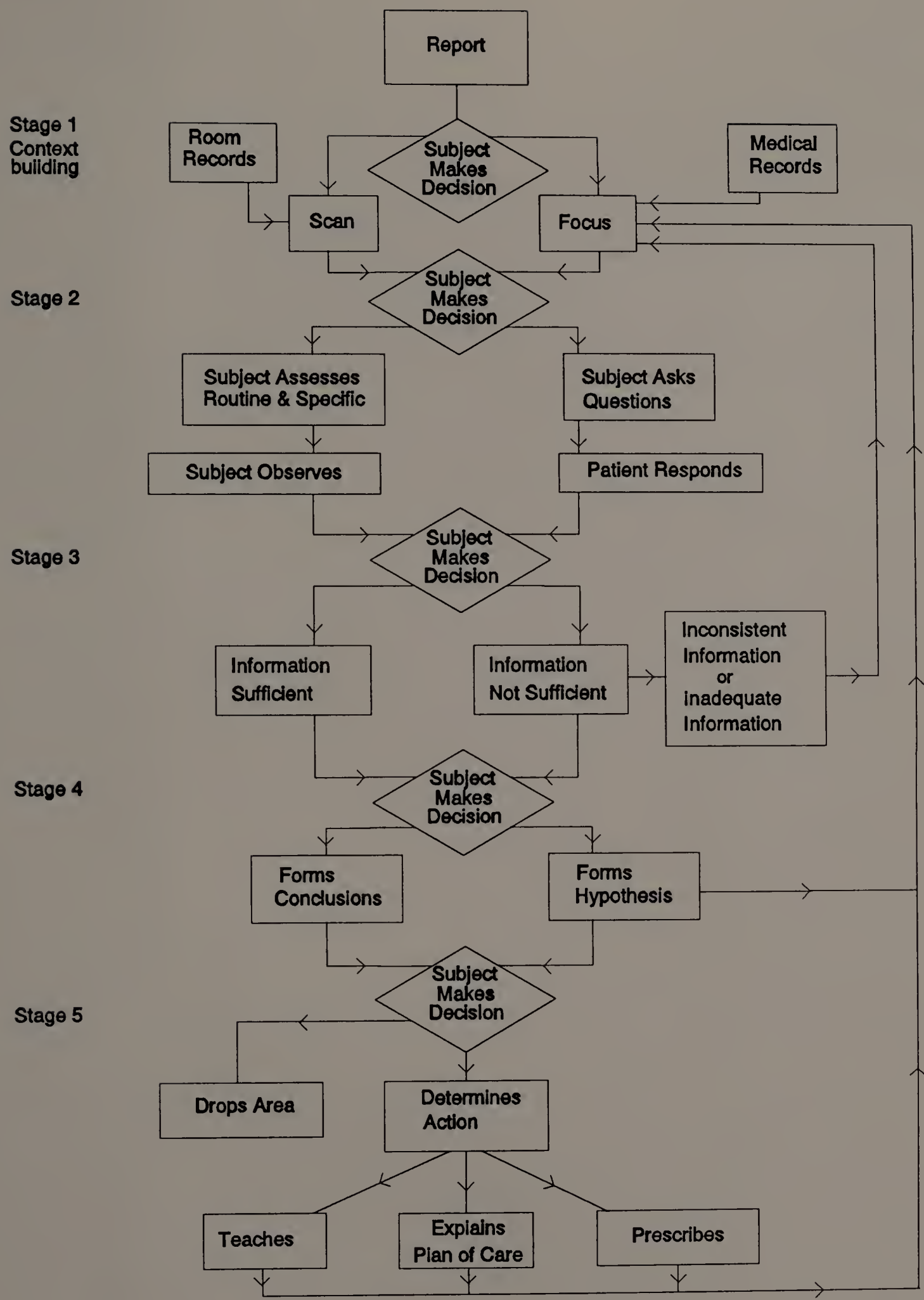
Figure 2 MODEL FOR DECISION MAKING

patients' records at the bedside and during interactions with patients. Subjects reviewed patients' records at the bedside for information to help plan patients' care. During interactions with patients, subjects asked questions and completed routine and specific assessments of patients, including risk factors. Subjects used a scanning or a focusing mode for asking questions and completing assessments based on responses from patients and on subjects' observations. Subjects' knowledge guided the assessments completed and questions asked. Subjects used a focusing mode when gathering information from patients' records at the desk.

Subjects asked general questions, in a scanning mode, to give patients an opportunity to relate any concerns and to provide an opportunity for subjects to observe patients. Routine assessment information provided a method to determine any gross abnormality. Subjects were flexible in the sequence for gathering information; patients' responses and subjects' observations guided the sequence. Subjects continually made decisions about the information as they received it. Subjects' knowledge guided the decisions made.

3.   <u>Stage 3</u>

In stage three, subjects made one of two decisions about the information obtained. They decided whether the information was sufficient or insufficient to form a conclusion or to form a hypothesis. If the information was sufficient to form a conclusion or to form a hypothesis, subjects went on to stage four. If the information was not sufficient to form a conclusion or to form a hypothesis, it was described as inadequate or inconsistent. Subjects responded to inadequate or insufficient information with a focusing approach, and they gathered more information. Subjects' knowledge supported their decision that the information was sufficient or insufficient.

4.   <u>Stage 4</u>

In stage four, subjects formed a conclusion or formed a hypothesis. In this stage they made one of two decisions: they decided if an action was needed, based on the conclusion or hypothesis. If an action was needed, they went on to stage 5. If no action was needed, subjects made a decision to drop the area of

information.   If they did not have sufficient information about a hypothesis to determine an action, they used a focusing approach to gather more information.

5.   Stage 5

In stage five, subjects made a decision about what action to take in response to the conclusion or hypothesis.   They either taught the patient, explained the plan of care to the patient, or prescribed a treatment for the patient.   Sometimes subjects determined an action and then gathered additional information about the results of the action.   They gathered information in a focusing mode in order to evaluate the action.   If the additional information confirmed that the action met the identified need of the patient, the area of information was dropped.   If the action was not adequate to meet the patient's need, a different action was taken.

L.   Summary

This chapter described activities experienced nurses used for gathering information.   It included the modes-- scanning and focusing--used to approach information gathering.   The content of the information gathered was also described.   Subjects' responses to the patients'

responses to questions asked was also described. A model

for decision-making derived from analysis of data was

presented.

CHAPTER VII

FINDINGS, DISCUSSION, AND SUGGESTIONS

A. Introduction

The purpose of this study was to analyze the
activities used by experienced nurses to gather
information for clinical decision-making. In order to
achieve this purpose, the study had four overlapping
components: 1) clarifying concepts related to decision-
making, 2) observing nurses as they gathered information,
3) interviewing nurses who were observed, and
4) interviewing experts in clinical decision-making to
elicit their reaction to the findings.

The following questions guided this study:

1. Can most activities for gathering information be
    meaningfully and reliably categorized as
    occurring within either the scanning mode,
    focusing mode, or both modes simultaneously?

2. Are there some activities for gathering
    information that occur outside the two modes?

3. Does the distinction between scanning and
    focusing modes of operating match up with what
    nurses experience as they determine patient care
    in daily practice?

4. What is an activity for gathering information,
    and what, if any are the components that are
    contained in all such activities?

5. What activities for gathering information are
    used by experienced nurses within each
    information gathering mode?

6. Do all experienced nurses use essentially the same activities for gathering information or are there differences among experienced nurses regarding the activities used?

From the analysis of data I have: a) described activities that nurses used to gather information in a clinical environment; b) described consistent language for the terms related to decision-making by nurses in a clinical environment; c) developed a model for decision-making; and d) explained the role of knowledge in decision-making.

The setting for this study was a teaching hospital and involved six experienced nurses as subjects. Methods employed to gather data included: a) observations of interactions of subjects with patients as they gathered information at the beginning of the shift, b) interviews with subjects about their thinking after the observation sessions, and c) interviews with experts in decision-making, to elicit their reaction to findings. All observation sessions and interviews with subjects were audiotaped. The audiotapes were transcribed and analyzed for data gathering activities and for approaches subjects used to gather information. Experts in decision-making were asked to react to the model for decision-making and to the descriptions of terms that were developed.

B. Model for Decision-Making

From the analysis of data, I developed a five stage model for decision-making (see Figure 2 in Chapter IV). This model represents ways nurses gathered and used information in a clinical setting. In stage one and stage two, nurses gathered information from the report from the previous shift, from records at the bedside and desk, and from patients' interactions. They used the information from the report and their knowledge of patients' conditions to develop a context to guide the gathering of additional information. They decided what information from report needed to be checked when they interacted with their patients. Nurses decided to use either a scanning approach or a focusing approach based on patients' responses and/or their observations.

In stage three, nurses decided if the information gathered was sufficient to form a hypothesis or form a conclusion. If nurses decided that the information was not sufficient to form hypotheses or to form conclusions, they used a focusing approach to gather additional information in order to make decisions. If nurses decided that the information was sufficient to form hypotheses or to form conclusions, they went to stage four.

In stage 4 and stage 5, nurses formed hypotheses or formed conclusions. Sometimes when hypotheses were formed, nurses used them to guide the gathering of additional information. Sometimes when hypotheses were formed nurses decided on actions based on hypotheses. When actions were taken in response to hypotheses or conclusions, nurses evaluated the results of the actions. If the actions were successful in meeting the patients' needs, no additional information was gathered. If actions were not successful in meeting patients' needs, more information was gathered and other actions were taken.

C. Major Findings and Discussion

The major findings of this study related to the activities used for gathering information to make decisions in the clinical area by experienced nurses. The major findings were:

1. Most activities for gathering information could be categorized as occurring within either a scanning mode or a focusing mode. Report information could not be reliably categorized as occurring within either a scanning or a focusing mode with the established criteria for the

modes. A context building mode more accurately described the approach subjects used for report information.

2. Activities used by experienced nurses for gathering information to make clinical decisions at the beginning of their shift were listening or reading report, reading records, and interacting with patients.

1. <u>Modes</u>

I described three approaches--scanning mode, focusing mode, and context building mode--that subjects used when they gathered information at the beginning of their shifts. Subjects described using information from the report together with their knowledge of patients' conditions to decide what information they needed from other sources to make decisions about patients' needs. I labeled this initial approach to gathering information as a context building mode. Subjects used a scanning mode or a focusing mode to gather information based on their observations of patients and patients' responses to questions asked. Subjects made decisions about

approaches to the information gathering task based on their interpretation of the information as it was gathered.

Two of the modes--scanning mode and focusing mode-- that I described were similar to the two approaches-- inquiry and routine--that were described by Barrows and Bennett (1972). Physicians in the Barrows and Bennett study asked "routine" questions until something patients said triggered hypotheses and then they asked "inquiry" oriented questions. Subjects asked "inquiry" oriented questions until no further information was obtained; then they switched to a "routine" approach. According to the researchers, "routine" questions were used to scan, to build rapport, and to gain time to think.

The difference between What they called the "routine" approach and what I label the scanning mode is in the use of the information. The scanning mode was an active process of acquiring and interpreting information in order to make decisions about patients' needs. The difference between what they called the "inquiry" approach and what I labeled the focusing mode is in the ways subjects used hypotheses. Subjects used an "inquiry" mode when they interpreted the information as hypotheses. Subjects usually used a focusing mode when

they made a decision that the information was
insufficient to form a hypothesis or form a conclusion.
I described insufficient information as inconsistent or
inadequate. Sometimes hypotheses did trigger a focusing
mode; but this occurred when additional information about
hypotheses was needed before actions could be taken.
Hypotheses were then used to guide the gathering of
additional information. A focusing mode was also used to
gather additional information to evaluate actions taken
in response to hypotheses.

Subjects from this study described the use of report
information and their knowledge as a guide to the initial
gathering of information. The use of report information
and subjects' knowledge to guide initial information
gathering is different from the use of hypotheses to
guide information gathering as described by Tanner and
Associates (1987). Tanner and Associates (1987) applied
a model of clinical decision making used with physicians
to nurses. This model described by Elstein, Shulman, and
Sprakfa (1978) suggested that hypotheses focus the
information gathered. Tanner and Associates reported
that subjects developed hypotheses early and these
hypotheses guided the gathering of information.

Subjects in this present study described hypotheses as a
guide to gather information later in the process.

2. Activities

From the analysis of data, I described three
activities used by experienced nurses at the beginning of
the shift to gather information and I described the
content of these activities. The activities that the
experienced nurses used were listening or reading report,
reading records, and interacting with patients. I only
described activities that subjects of this study used at
the beginning of their shifts; other activities that
might have been used at other times during the shift were
not addressed.

Findings from data analysis suggested that subjects
used similar information from report, but data suggested
that most information gathered was case-specific.
Findings from this study suggested that subjects used
their knowledge of patients' conditions and patients'
responses to make decisions related to the activity used
and the information to collect in each activity.
Subjects in this study reported that knowledge of
patients' conditions guide decisions made regarding what
information was needed, when sufficient information was

obtained, and what action to take. The use of knowledge supported results from studies by Pyles and Stern (1983) and Bruya and Demand (1985). These researchers reported that knowledge and experience were crucial for gathering information to make clinical decisions.

Some of the methods used to gather information described by Tanner and Associates (1987) contain some of the information that was included in this study as content of the activities. The subjects did a head-to-toe assessment in the method described by Tanner and Associates (1987) as "systematic." This assessment information was similar to the routine and specific assessments done by subjects in this study. The difference was in how the information was used. Tanner and Associates described subjects using a "systematic" approach when they were not certain on how to proceed. I described the routine and specific assessments completed by subjects during their interactions with patients as a method to obtain information to make decisions about the state of the patient.

D. Suggestions for Further Research

This study was limited in that it was conducted in one institution, a teaching hospital. Additional studies

observing and interviewing nurses gathering information in many institutions and in different types of institutions and comparing the findings might add another dimension to the knowledge in this area.

This study was also limited in that it only described the activities used by nurses at the beginning of the shift. It did not address all the activities that nurses used to gather information. Further studies observing the gathering of information by nurses throughout the shift and during admissions of patients rather than just at the beginning of the shift would be helpful to identify all the activities used by nurses to gather information.

Further studies are needed to expand on the concepts developed from this study. Effect of the use of modes on the information gathered should be further explored. The relationship between conclusions and hypotheses needs to be further clarified. Why subjects decide to make decisions that actions should be tried based on hypotheses, or why they decide to gather additional information based on hypotheses should be explored.

Further research is needed to evaluate the use of the model as a strategy for improving decision-making. It would be useful to investigate whether the model can

be used to facilitate the learning of both student nurses in baccalaureate programs and experienced nurses through continuing education programs. Studies that compare the decision-making skill of students when the model was used and when the model was not used could prove beneficial. Investigating if the model assisted new nurses to become more efficient decision-makers might also add to the body of knowledge related to clinical decision-making.

E. Conclusions

This study described three approaches used by subjects to gather information in the clinical area. Findings suggested that approaches to gathering information depended on subjects' knowledge, patients' responses, subjects' observations, and subjects' decisions related to the information. This study also described three activities and the content of the information in the activities used by subjects to gather information. Subjects gathered information from report, from records, and from interactions with patients. Findings suggested that subjects made decisions about the information as it was gathered. The decisions that were made related to what information to gather, what

information to accept as sufficient to form hypotheses or conclusions, what information area to drop, and what actions to take.

APPENDIX A

NURSES CONSENT FORM

Dear Colleague:

Experts do not have a clear idea regarding how experienced nurses collect data to make decisions when caring for patients. Increasing our understanding of data collection activities may help to design educational programs to help new nurses and students learn the processes more effectively.

I am a graduate student interested in studying the data gathering activities used by experienced nurses in their daily practice. I am requesting your participation. If you choose to participate, I will ask to observe you while you are assessing patients. Immediately afterwards, but away from the patient, I will ask you questions about the information you collected and about how you decided what to do. If you and your patients give permission, I will tape record your conversation with your patients. The information that you will give will be combined with that obtained from other nurses to determine if there are trends or themes in the way nurses collect data. All information will be kept confidential and reported only as aggregate data. Your name will be separated from the data once the observations are complete. At the end of data collection the list of names of participants and the tapes will be destroyed. At no time will names of patients be used. You are free to withdraw from the study at any time. There is no known risk or benefit to you or your patients in this study. Your choice of participating in this study will not affect your employment status in any way.

Your participation in the study could help clarify the data gathering activities that are involved in everyday decisions that nurses make about patient care. Please feel free to ask any questions you may have about the study or about your involvement in the study.

* * * * * * * *

The purpose and the procedure of this research project have been explained to me, and I understand them. I agree to participate as a subject in this research project, and give permission to tape record my discussions with you and my patients, provided that they also agree.

Signature_____   Date _____

Patricia Navin   Jeffrey W. Eiseman, PH.D.
Doctoral Candidate   Faculty Advisor
University of Massachusetts   University of Massachusetts
Amherst, Massachusetts   Amherst, Massachusetts
Phone (508) 872-7087   Phone (413) 545-4214

APPENDIX B

PATIENT CONSENT FORM

CONSENT TO PARTICIPATE IN THE RESEARCH PROJECT, HSC DOCKET_____,
ENTITLED: Data Gathering and Experienced Nurses_____
SUBJECT'S NAME:_____ P.I. NAME: Patricia Navin___

I am a graduate student interested in studying the data gathering
procedures used by experienced nurses in their daily practice. I am
inviting you to participate in this research study. I will be observing
and tape recording the nurse assigned to you during the time that
information is collected from you at the beginning of the shift.

> YOUR PARTICIPATION IN THE PROJECT IS ENTIRELY VOLUNTARY. YOU MAY
> WITHDRAW FROM THE STUDY AT ANY TIME. THE QUALITY OF CARE YOU RECEIVE
> AT THIS HOSPITAL WILL NOT BE AFFECTED IN ANY WAY IF YOU DECIDE NOT TO
> PARTICIPATE OR IF YOU WITHDRAW FROM THE STUDY.

This study will not affect the care you receive in any way. There
are no known risks or benefits to you. All tape recordings will be
under the control of the researcher, will be kept confidential, and will
be erased after the content of the tape is transcribed which will occur
as soon as possible after the assessment. Your name will not appear in
the study.

Please feel free to ask any questions you may have about the study
or about your rights. If other questions occur to you later, you may
ask Patricia Navin, telephone 856-2484, the principal investigator. If
at any time during or after the study, you would like to discuss your
experience with someone, you may contact Jane Miner, at 856-4261. She
is the Administrative Coordinator for the Committee of Human Subjects in
Research at UMMC.
. . . .

The purpose and the procedures of this research project have been
explained to me, and I understand them. I have been told about all of
the risks and benefits that might result, and I understand them. I
understand that I may end my participation at any time.

_____   _____
Subject's Signature   Date
. . . .
INVESTIGATORS DECLARATION

I have explained to the above-named subject the nature and purpose
of the procedures described above, and the foreseeable risks and
benefits that may result. I have asked the subject if any questions
have arisen regarding the procedures and have answered these questions
to the best of my ability.

_____   _____
Principal Investigator   Date

APPENDIX C

DATA RECORDING FORM

The actual form used for data collection had more space available since the margins were reduced.

Information from report	
Condition on the unit.	
Impressions of researcher	
Bedside--what nurse does/ non-verbal communication/ unusual questions asked	
Information gathered after assessment of patient.	

APPENDIX D

INTERVIEW WITH SUBJECTS GUIDE

The actual form used for data collection had more space since the margins were reduced.

Introduction: What is taught nurses in school often is not what is found to be effective in the actual clinical environment. If you explain what you are actually doing, it could identify what experienced nurses find effective. Processes described could then be taught to new nurses.

Describe what you were thinking about when you asked the patient _____

or looked for_____ (information)

How do you decide what to ask the patient?

Why did you ask the patient_____?
Describe what you were thinking about when you heard about patient_____during report.

Is your knowledge about_____ case more than, about the same or less than your knowledge about the usual cases seen on this unit?
Case 1.

Case 2.

Case 3.

Case 4.

Case 5.
Last interview session:
Did you learn nursing process in your basic education?

APPENDIX E

EXPERT INTERVIEW GUIDE

Think about a clinical decision that you have made that you had a good feeling about. Does this model fit with what you were thinking about?

Are the descriptions of the concepts clear?

Do the concepts fit with your impressions of what is going on in clinical decision making?

Would this model be useful for describing clinical decision making in a hospital setting?

APPENDIX F

DEMOGRAPHICS DATA FORM

Name:_____ ID Number:_____

Age:

    21-25_____

    26-30_____

    Over 30   _____

Basic Nursing Education: Diploma:_____ AD:_____

                        BSN:_____

Additional Education: BSN:_____ MSN: _____
                         Other:_____

Years or months practicing nursing: _____

Years or months practicing nursing since additional
education:

REFERENCES

Albert, D. A., Munson, R., & Resnik, M. D. (1988).
    Reasoning in medicine: An introduction to clinical
    inference. Baltimore: John Hopkins University
    Press.

Aspinall, M. J., & Tanner, C. A. (1981). Decision making
    for patient care: Applying the nursing process.
    New York: Appleton-Century-Crofts.

Barrows, H. S., & Bennett, K. (1972). The diagnostic
    (problem solving) skills of neurologists. Archives
    of Neurology, 26, 272-277.

Barrows, H. S., & Tamblyn, R. M. (1980). Problem-based
    learning: An approach to medical education. New
    York: Springer Publishing Co.

Belenky, M. F., Clinchy, B. M., Goldberger, N. R., &
    Tarule, J. M. (1986). Women's ways of knowing. New
    York: Basic Books.

Benner, P. (1982). From novice to expert. American
    Journal of Nursing, 82, 402-407.

Benner, P. (1984). From novice to expert: Power and
    excellence in nursing practice. Palo Alto, CA:
    Addison-Wesley.

Broderick, M. E., & Ammentorp, W. (1979). Information
    structures: An analysis of nurses performance.
    Nursing Research, 28(2), 106-110.

Bruya, M. A., Demand, J. K., (1985). Nursing decision
    making in critical care: Traditional versus
    invasive blood pressure monitoring. Nursing
    Administrative Quarterly, 9(4), 19-31.

Carnevali, D. L. (1984). Nursing diagnosis: An
    evolutionary view. Topics in Clinical Nursing,
    5(4), 10-20.

Corcoran, S. A. (1986). Planning by expert and novice
    nurses in cases of varying complexity. Research in
    Nursing and Health, 9, 155-162.
Coughlin, L., & Patel, V. L. (1985). Adapting a paradigm
    from cognitive science to medical education:

Coughlin, L., & Patel, V. L. (1985). Adapting a paradigm from cognitive science to medical education: Problems and possible solutions. <u>Research in Medical Education</u>, <u>24</u>, 97-102.

deChesnay, M. (1983). Problem solving in nursing. <u>Image: The Journal of Nursing Scholarship</u>, <u>15</u>(1), 8-11.

Elstein, A. S. (1976). Clinical judgment: Psychological research and medical practice. <u>Science</u>, <u>194</u>, 696-700.

Elstein, A. S., Shulman, L. S., & Sprafka, S. A. (1978). <u>Medical problem solving: An analysis of clinical reasoning</u>. Cambridge Massachusetts: Harvard University Press.

Gilligan, C. (1982). <u>In a different voice</u>. Cambridge: Harvard University Press.

Goran, M. J., Williamson, J. W., & Gonnella, J. S. (1973). The validity of patient management problems. <u>Journal of Medical Education</u>, <u>48</u>, 171-177.

Gordon, M. (1982). <u>Nursing diagnosis: Process and application</u>. New York: McGraw-Hill.

Gordon, M. (1987). The nurse as a thinking practitioner. In K. J. Hannah, M. Reimer, W. C. Mills, & S. Letourneau (Eds.), <u>Clinical judgement and decision making: The future with nursing diagnosis</u> (pp. 8-17). New York: John Wiley & Sons.

Gordon, M. (1980). Predictive strategies in diagnostic tasks. <u>Nursing Research</u>, <u>29</u>(1), 39-45.

Gordon, M., & Sweeney, M. A. (1979). Methodological problems and issues in identifying and standardizing nursing diagnosis. <u>Advances in Nursing Science</u>, <u>2</u>(1), 1-15.

Hobus, P. P., Schmidt, H. G., Boshuizen, P. A., & Patel, V. L. (1987). Contextual factors in the activation of first diagnostic hypotheses: Expert-novice differences. <u>Medical Education</u>, <u>21</u>, 471-476.

Itano, J. K. (1989). A comparison of the clinical judgment process in experienced registered nurses and student nurses. Journal of Nursing Education, 28(3), 120-126.

Kassirer, J. P., & Gorry, A. (1978). Clinical problem solving. Annals of Internal Medicine, 89(2), 245-255.

Kaufman, D. R., & Patel, V. L. (1985). Expertise in the clinical interview: A cognitive analysis. Research in Medical Education, 167-172.

Kelly, K. (1966). Clinical inference in nursing: A nurse's viewpoint. Nursing Research, 15(1), 23-26.

May, K. A. (1989). Interview techniques in qualitative research: Concerns and challenges. In J. M. Morse, Qualitative Nursing Research, Rockville, Maryland: Aspen Publications.

Matthews, C. A., & Gaul, A. L. (1979). Nursing diagnosis from the perspective of concept attainment and critical thinking. Advances in Nursing Science, 2(1), 17-26.

McCarthy, M. M. (1981). The nursing process: Application of current thinking in clinical problem solving. Journal of Advanced Nursing, 6, 1773-1777.

Neufeld, V. R., Norman, G. R., Fieghtner, J. W., & Barrows, H. S. (1981). Clinical problem-solving by medical students: A cross-sectional and longitudinal analysis. Medical Education, 15, 315-322.

Putzier, D. J., Padrick, K., Westfall, U. E., & Tanner, C. A. (1985). Diagnostic reasoning in critical care nursing. Heart and Lung, 14(5), 430-435.

Pyles, S. H., & Sterns, P. N. (1983). Discover the nursing gestalt in critical care nursing: The importance of the gray gorilla syndrome. Image, 15(2), 51-57.

Ramsden, P., Whelan, G., & Cooper, D. (1989). Some phenomena of medical students' diagnostic problem-solving. <u>Medical Educator</u>, <u>23</u>, 108-117.

Tanner, C. A. (1987). Teaching clinical judgment. In J. J. Fitzpatrick, and R. L. Tauton (Eds.), <u>Annual Review of Nursing Research</u>, <u>5</u>, 153-173.

Tanner, C. A., Padrick, K. P., Westfall, U. E., & Putzier, D. J. (1987). Diagnostic reasoning strategies of nurses and nursing students. <u>Nursing Research</u>, <u>36</u>(6), 358-363.

Taylor, S. J., Bogdan, R. (1984). <u>Introduction to qualitative research methods</u>. New York: John Wiley and Sons.

Wolff, L., Weitzel, M. H., & Fierst, E. (1979). <u>Fundamentals of nursing</u> (6th ed.). New York: J. B. Lippincott.

Yura, H., & Walsh, M. B. (1983). <u>The nursing process: Assessing planning, implementing and evaluating</u>. Norwalk, Conn.: Appleton-Century-Crofts.

BIBLIOGRAPHY

Aspinall, M. J. (1979). Use of a decision tree to improve accuracy of diagnosis. <u>Nursing Research</u>, <u>28</u>(3), 182-185.

Balla, J. I. (1982). The use of critical cues and prior probability in decision making. <u>Method Information in Medicine</u>, <u>21</u>, 9-14.

Barrows, H. S. (1985). <u>How to design a problem based curriculum for the preclinical years</u>. New York: Springer.

Barrows, H. S. (1990). Inquiry: The pedagogical importance of a skill central to clinical practice. <u>Medical Education</u>, <u>24</u>, 3-5.

Barrows, H. S. (1983). Problem-based, self-directed learning. <u>JAMA</u>, <u>250</u>(22), 3077-3080.

Barrows, H. S., & Feltovich, P. J. (1987). The clinical reasoning process. <u>Medical Education</u>, <u>21</u>, 89-91.

Barrows, H. S., Norman, G. R., Neufield, V. R., & Fieghtner, J. W. (1982). The clinical reasoning of randomly selected physicians in general medical practice. <u>Clinical and Investigative Medicine</u>, <u>5</u>, 49-55.

Benner, P. (1983). Uncovering the knowledge embedded in clinical practice. <u>Image: The Journal of Nursing Scholarship</u>, <u>15</u>(2), 36-41.

Benner, P., & Tanner, C. (1987). How expert nurses use intuition. <u>American Journal of Nursing</u>, <u>87</u>, 23-31.

Benner, P., & Wrubel, J. (1982). Skilled clinical knowledge: The value of perceptual awareness. <u>Nurse Educator</u>, <u>7</u>(3), 11-17.

Berner, E. B. (1984). Paradigms and problem-solving: A literature review. <u>Journal of Medical Education</u>, <u>59</u>, 625-632.

Berner, E. B., Bligh, T. J., & Guerin, R. O. (1977). An indication for a process dimension in medical problem-

Berner, E. B., Bligh, T. J., & Guerin, R. O. (1977). An indication for a process dimension in medical problem-solving. Medical Education, 11, 324-328.

Bordage, G., & Allen, T. (1982). The etiology of diagnostic errors: Process or content? An exploratory study. Research in Medical Education, 171-176.

Bourbonnais, F. F., & Baumann, A. (1985). Stress and rapid decision making in nursing: An administrative challenge. Nursing Administrative Quarterly, 9(3), 85-91.

Brykcznski, K. A. (1989). An interpretive study describing the clinical judgment of nurse practitioners. Image: Scholarly Inquiry for Nursing Practice, 3(2), 75-104.

Cebul, R. D. (1988). Decision making research at the interface between descriptive and prescriptive studies. Medical Decision Making, 231-232.

Chan, C. H., Donnelly, M. B., & Caspary, E. (1986). An approach to teaching and evaluating diagnostic reasoning. Research in Medical Education, 25, 129-134.

Cheng, P. W., & Hyloak, K. L. (1985). Pragmatic reasoning schemas. Cognitive Psychology, 17, 391-416.

Chinn, P. L. (1989). Nursing patterns of knowing and feminist thought. Nursing and Health Care, 9(4), 710 715.

Corcoran, S. A. (1986). Decision analysis: A step-by-step guide for making clinical decisions. Nursing and Health Care, 7, 148-154.

Corcoran, S. A. (1986). Planning by experts and novice nurses in cases of varying complexity. Research in Nursing and Health, 9, 155-162.

Corcoran, S. A., & Narayan, S. (1988). "Thinking aloud" as a strategy to improve clinical decision making. Heart and Lung, 17(5), 463-468.

Cosier, R. A., & Aplin, J. C. (1982). Intuition and decision making: Some empirical evidence. Psychological Report, 51, 275-281.

Cutler, P. (1985). Problem solving in clinical medicine. Baltimore: William & Wilkins.

delBueno, D. J. (1983). Doing the right thing: Nurse's ability to make clinical decisions. Nurse Educator, 8(3), 7-11.

deTornyay, R. (1968). The effect of an experimental teaching strategy on problem solving abilities of sophomore nursing students. Nursing Research, 17(2), 108-114.

deTornyay, R. (1968). Measuring problem-solving skills by means of simulated clinical nursing problem test. Journal of Nursing Education, 7(3), 3-8.

Dincher, J. R., & Stidger, S. L. (1976). Evaluation of a written simulation format for clinical judgment: A pilot study. Nursing Research, 25,(4), 280-285.

Dryfus, T., & Eisenberg, T. (1984). Intuition on function. Journal of Experimental Education, 52(2), 77-85.

Elstein, A. S. (1976). Clinical judgment: Psychological research and medical practice. Science, 194, 696-700.

Elstein, A. S., & Bordage, G. (1979). Psychology of clinical reasoning. In G. C. Stone, F. Cohen, & N. E. Allen, Health Psychology, San Francisco: Josey-Bass.

Ericsson, K. A., & Simon. H. A. (1980). Verbal reports as data. Psychological Review, 87(3), 215-251.

Farrand, L., Holzemer, W. L., & Schleutermann, J. A. (1982). A study of construct validity: Simulations as a measure of nurse practitioners' problem-solving skills. Nursing Research, 31(1), 37-42.

Frederiksen, N. (1984). Implications of cognitive theory for instruction in problem solving. Review of Educational Research, 54(3), 363-407.

Gale, J., & Marsden, P. (1982). Clinical problem solving: The beginning of the process. Medical Education, 16, 22-26.

Gordon, M., & Sweeney, M. A. (1979). Methodological problems and issues in identifying and standardizing nursing diagnosis. Advances in Nursing Science, 2(1), 1-15.

Grant, J., Marsden, P. (1987). The structure of memorized knowledge in students and clinicians: An explanation for diagnostic expertise. Medical Education, 21, 92-98.

Grier, M. R. (1984). Information processing in nursing practice. In H. H. Werley, and J. J. Fitzpatrick, Annual Review of Nursing Research, 2, New York: Springer Publisher.

Grier, M. R., & Schnitzler, C. P. (1979). Nurses' propensity to risk, Nursing Research, 28(3), 186-191.

Groen, G. J., & Patel, V. L. (1985). Medical problem-solving: Some questionable assumptions. Medical Problem Solving, 19, 95-100.

Hammond, K. R. (1966). Clinical inference in nursing: A psychologists viewpoint. Nursing Research, 15(1), 27-38.

Hammond, K. R., Hursch, C. J., & Todd, F. J. (1964). Analyzing the components of clinical inference. Psychological Review, 71(6), 438-456.

Hammond, K. R., Kelly, K. L., Schneider, R. J., & Vancini, M. (1966). Clinical inference in nursing: Analyzing cognitive task representative of nursing problems. Nursing Research, 15(2), 134-138.

Hammond, K. R., Kelly,, K. J., Schneider, R. J., & Vancini, M. (1966). Clinical inference in nursing: Information units used. Nursing Research, 15(3), 236-243.

Hammond, K. R., & Summer, D. A. (1972). Cognitive control. Psychological Review, 79, 58-67.

Hayes-Roth, B., & Hayes-Roth, F. (1979). A cognitive model of planning. _Cognitive Science_, _3_, 275-310.

Henderson, V. (1987). Nursing process--a critique. _Holistic Nursing Practice_, _1_(3), 7-18.

Henry, S. B., LeBreck, D. B., & Holzmer, W. L. (1989). The effect of verbalization of cognitive processes on clinical decision making. _Research in Nursing and Health_, _12_, 187-193.

Holbert, C. M., & Abraham, C. (1988). Reflections on teaching generic problem-solving. _Nursing Education_, _13_(2), 23-27.

Holden, G. W., & Klingmer, A. M. (1988). Learning from experience: Differences in how novice vs. expert nurses diagnose why an infant is crying. _Journal of Nursing Education_, _27_(1), 23-29.

Holzmer, W. L., Schleutermann, J. A., Farrand, L. L., & Miller, A. G. (1981). Simulation as a measure of nurse practitioners' problem-solving skills. _Nursing Research_, _30_(3), 139-144.

Holzmer, W. L. (1986). The structure of problem-solving in simulations. _Nursing Research_, _35_(4), 231-236.

Jenkins, H. M. (1985). A research tool for measuring perceptions of clinical decision making. _Journal of Professional Nursing_, _1_, 221-229.

Jenkins, H. M. (1985). Improving clinical decision making in nursing. _Journal of Nursing Education_, _24_(6), 242-243.

Jones, J. A. (1988). Clinical reasoning in nursing. _Journal of Advanced Nursing_, _13_(2), 185-192.

Jones, J. A. (1989). The verbal protocol: A research technique for nursing. _Journal of Advanced Nursing_, _14_, 1062-1070.

Kelly, K. J. (1964). An approach to the study of clinical inference in nursing. _Nursing Research_, _13_(4), 314-322.

Kelly, A. W., & Sime, A. N. (1990). Language as research data: Application of computer content analysis in nursing research. <u>ANS</u>, <u>12</u>(3), 32-40.

Larkin, J., McDermott, J., Simon, D. P., & Simon, H. A. (1980). Expert and novice performance in solving physics problems. <u>Science</u>, <u>208</u>, 1335-1342.

Leinhardt, G., & Smith, D. A. (1985). Expertise in mathematics instruction: Subject matter knowledge. <u>Journal of Educational Psychology</u>, <u>77</u>(3), 247-271.

Maloni, J. A., Stegman, C. E., Taylor, P. M. Brownell, C. A. (1986). Validation of infant behavior identified by neonatal nurses. <u>Nurses Research</u>, <u>35</u>(3), 133-138.

McGaghie, W. C. (1980). Medical problem solving: A reanalysis. <u>Journal of Medical Education</u>, <u>55</u>, 912-921.

McGuire, C. H. (1985). Medical problem solving: A critique of the literature. <u>Journal of Medical Education</u>, <u>60</u>, 587-595.

McLane, A. M., & Fehring, R. J. (1987). Nursing diagnosis: A review of the literature. In M. J. Kim, G. K. McFarland and A. M. McLane (eds). <u>Classification of Nursing Diagnosis: Proceedings of the Fifth National Conference</u>. St. Louis: C. V. Mosby.

Miller, G. A. (1956). The magical number seven, plus or minus two: Some limits on our capacity for processing information. <u>The Psychological Review</u>, <u>63</u>(2), 83-97.

Miller, M. A., & Malcolm, M. S. (1990). Critical thinking in nursing curriculum. <u>Nursing and Health Care</u>, <u>11</u>(2), 67-73.

Neufeld, V. R., Feightner, J. W., & Barrows,H. S. (1981). Clinical problem-solving by medical students: A cross-sectional and longitudinal analysis. <u>Medical Education</u>, <u>15</u>, 315-322.

Nisbett, R. E., & Wilson, T. D. (1977). Telling more than we can know: Verbal reports on mental process. <u>Psychological Review</u>, <u>84</u>(3), 231-259.

Norman, G. R., & Feightner, J. W. (1981). A comparison of behavior on simulated patients and patients management problems. Medical Education, 15, 26-32.

Norman, G. R., Tugwell, P., Feightener, J. W., Muzzin, L. J., & Jacoby, L. L. (1985). Knowledge and clinical problem-solving. Medical Education, 19, 344-356.

Padrick, K. P., Tanner, C. A., Putzier, D. J., & Westfall, U. E. (1987). Hypotheses evaluation: A component of diagnostic reasoning. In A. M. McLane (ed.) Classification of Nursing Diagnosis: Proceedings of the Seventh Conference. St. Louis: C. V. Mosby.

Pardue, S. F. (1987). Decision-making skills and critical thinking ability among associate degree, diploma, baccalaureate, and master's prepared nurses. Journal of Nursing Education, 26(9), 354-361.

Pierson, M. G., Funk, M. (1989). Technology versus clinical evaluation for fluid management decisions in CABG patients. Images: Journal of Nursing Scholarship, 21(4), 192-195.

Prescott, P. A., Dennis, K. E., & Jacox, A. K. (1987). Clinical decision making of nurses. Image: Journal of Nursing Scholarship, 19(2), 56-62.

Putzier, D. & Padrick, K. P. (1984). Nursing diagnosis: A component of nursing process and decision making. Topics in Clinical Nursing, January, 21-29.

Putzier, D., Padrick, K., Westfall, U. E., & Tanner, C. A. (1985). Diagnostic reasoning in critical care nursing. Heart and Lung, 14(5), 430-435.

Rew, L. (1988). Intuition in decision making. Image: Journal of Nursing Scholarship, 20(3), 43-45.

Rew, L., & Barrows, E. M.(1987). Intuition: A neglected hallmark of nursing knowledge. Advances in Nursing Science, 10(1), 49-62.

Rimaldi, H. J. (1988). Diagnosing the diagnostic process. Medical Education, 22, 270-278.

Rogers, J. C. (1983). Clinical Reasoning: The ethics, science, and art. <u>The American Journal of Occupational Therapy</u>, <u>37</u>(9), 601-616.

Schaeder, B. D., & Fischer, D. K. (1986). Using intuitive knowledge to make clinical decisions. <u>Maternal and Child Nursing</u>, <u>11</u>, 161-162.

Schwartz, P. R., & Meleis, A. I. (1988). Nursing epistemology: Traditions, insights, questions. <u>Image: Journal of Nursing Scholarship</u>, <u>20</u>(4), 217-221.

Simon, H. A. (1974). How big a chunk? <u>Science</u>, <u>183</u>, 482-488.

Tanner, C. A. (1988). Curriculum revolution: The practice mandate. <u>Nursing and Health Care</u>, <u>9</u>(8), 426-430.

Tanner, C. A. (1987). Teaching clinical judgment. In J. J. Fitzpatrick, and R. L. Tauton (ed). <u>Annual Review of Nursing Research</u>, <u>5</u>, 153-173.

Thiele, J. E., Baldwin, J. H., & Hyde, R. S. (1986). An investigation of decision theory: What are the effects of teaching cue recognition. <u>Journal of Nursing Education</u>, <u>25</u>(8), 319-324.

Verhonick, P. J., Nichols, G. A., Glor, B. A. K., & McCarthy, R. T. (1968). I came, I saw, I responded: Nursing observation and action survey. <u>Nursing Research</u>, <u>17</u>(1), 38-44.

Westfall, U. E., Tanner, C. A., Putzier, D., & Padrick, K. P. (1986). Activating clinical inferences: A component of diagnostic reasoning in nursing. <u>Research and Health</u>, <u>9</u>, 269-277.