STUDENT NURSES' CLINICAL DECISION-MAKING:
KEY TO PROFESSIONAL PRACTICE

by

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A thesis submitted in conformity with the requirements
for the degree of Doctor of Education
Graduate Department of Adult Education, Community Development and
Counselling Psychology
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ABSTRACT

Expertise in clinical decision-making is a hallmark of professional nursing. Changing demographics, technology, and health care have increased the complexity and importance of nurses’ clinical decision-making (DM). Developing students’ clinical DM ability is a prime goal of nursing educators, but understanding of this complex phenomenon is fragmentary.

The literature related to clinical DM reveals many disagreements, while alternative cognitive processing theories (Information Processing, Skill Acquisition) have led to several DM models. Nursing research in this area has used simulations and focused on RNs and university nursing students. Research into college students’ DM, and into the effects of context is lacking.

The purpose of this research project was to learn about university and college nursing students’ clinical DM while giving patient care. The research questions were: What are the DM patterns of student nurses engaged in patient care and how appropriate are they? Are there observable differences in DM patterns and appropriateness based on program type or age/life experience? How does the context affect students’ clinical DM? Does clinical DM change during a clinical rotation?

This was a focused ethnography with a volunteer sample of 7 college and 8 university nursing students. The researcher observed participants giving care on medical/surgical in-patient units. Data were analyzed within the context of Information Processing Theory (IPT) which postulates short-term and long-term memory constraints. The study indicated cognitive processing limitations similar to those postulated by IPT.
The sample’s nature precludes generalization, and the study’s results are limited to a description of student nurses’ clinical DM in a particular semester and location.

The major finding was the powerful influence of context on participants’ DM. The context was strong enough to nullify differences based on program type and age/life experience. Participants made five types of decisions in short, irregular sequences. Participants’ DM improved during the rotation.

The study identifies the importance of increasing clinical teachers’ awareness of the clinical environment’s complexity from the students’ standpoint. Students need a supportive atmosphere and freedom to practise decision-making within the limits of patient safety if they are to develop the clinical DM abilities needed in professional practice.
Dedication

To my husband, Jim, children at home, Eden and Scott, and other family members who have travelled this long road with me in love and support.
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CHAPTER ONE

INTRODUCTION

The essence of professional nursing is the ability to make autonomous, appropriate, individualized judgements about client care. Nurses have an extensive knowledge base drawn from the physical and social sciences, humanities, and nursing research. Patients have a variety of health care needs and problems to which they react individually and in ways that change as the situation evolves. Because nurses deal at the level of human response to health needs (Carpenito, 1991a), nursing care must adapt to patients' changing needs. To choose selectively from a diverse knowledge base and to design care which will help individuals cope with their changing health care needs is characteristic of nursing excellence. Because it involves the higher order thinking skills (e.g. analysis and synthesis) and transfer of knowledge across domains, it is also one of the most difficult aspects of nursing for students to master.

In the 1990's, clinical decision-making and its presumed antecedent, critical thinking, have become major foci of nursing educators in North America. The Journal of Nursing Education devoted an entire issue to these topics in November of 1993, and a second in October, 1994. New and recently revised nursing textbooks have integrated critical thinking into their content framework, and several recent texts are devoted entirely to these concepts (Carnevali & Thomas, 1993; Iyer, Taptich, & Bernocchi-Losey, 1995; Rubenfield & Scheffer, 1995). The intensity of nursing educators' heightened interest in these areas not only attests to their importance in the profession, but also suggests something of their problematic nature. The intuitively appealing assumption that good
critical thinking skills taught in the classroom automatically translate into sound clinical decision-making in the client care setting is, in my thirty years’ experience as a clinical nurse educator, often patently false.

The purpose of this research is to learn how student nurses make patient care decisions in the actual clinical setting, in order to understand the processes they use and how the context affects them. For the purposes of this study, "student nurse" included diploma and generic baccalaureate students in the final year of their respective nursing programs. The settings were medical or surgical units in general hospitals on which the students were currently obtaining their clinical experience.

**Research Questions**

1) What are the decision-making patterns (types, frequency, sequencing) evidenced by student nurses when providing client care in the actual clinical setting?

2) How appropriate are students’ decisions?

3) Are there identifiable differences in decision-making (DM) patterns and degree of insight into their own DM processes between student nurses with good and poor DM skills?

4) Do DM patterns change with increasing task/contextual complexity?

5) Does DM appropriateness improve during a medical/surgical clinical rotation?

The study examined the students’ clinical judgement processes within the context of information-processing theory (Newell & Simon, 1972) which postulates strict limitations on subjects' short-term memory (STM) capacity, and the importance of storage structures
to the accessibility of knowledge in long-term memory (LTM). It also considered the applicability of the Nursing Process and Hypothetico-Deductive Reasoning Models to these processes.

**Rationale for the Study**

Health care in Ontario in the late 1990's is in transition. Changing population demographics, life-saving technological advances, and severe financial constraints are forcing a re-envisioning of the whole system. Nursing is currently in a state of crisis, under great pressure from severe cutbacks in health care budgets and burgeoning ranks of less educated workers on the one hand, and increasing numbers of patients with more complex health care problems on the other (Coutts, 1996; Dreidger, 1997; Gordon, 1997; Huston, 1996; Mace, 1997). Within this crisis lies the opportunity and the impetus to develop both the vision and the voice of nursing for the future. The opportunity arises from recognition of the need for change which has been highlighted by health care restructuring (Mace, 1997). The motivation comes from fears about patient safety and RNs' lack of job security (Coutts, 1996; Dreidger, 1997; Mace, 1997). Because nursing has been relatively inarticulate about it's contribution to patient welfare, as a profession it is largely invisible to the public and thus lacks public support (Gordon, 1997). The survival of professional nursing and its contribution to health care depend on nursing's ability to create and communicate its vision of the future.

In the past, the health care system was focused primarily on the treatment of illness. Escalating costs and the recognition of the contribution of lifestyle factors (e.g. diet, lack of exercise, stress, smoking) to the major health problems of the late twentieth century in
North America (cardiovascular disease, cancer, diabetes, etc.) have led to a change in focus. Now health care is expanding to include health promotion, illness prevention, and the individual's responsibility for health. Nursing, with its emphasis on health teaching, emotional support, and client advocacy (as well as physical care), has a major contribution to make to the health care system of the future. To do so, however, nursing needs a clearly articulated vision of its potential contribution, a unified voice, and demonstrated clinical excellence. The nature of nursing, and the current system of nursing education have both impeded our ability to develop and articulate a unified viewpoint. I will examine each of these issues briefly below.

By nature, nursing is broad-based and full of intangibles. Unlike other health professions which tend to focus on specific areas (e.g. pathophysiology and treatment for doctors, nutrition for dietitians), nursing centres on the human response to health/illness, treatment, and environment (Carpenito, 1991b). The nurse is interested in identifying how the person, family, or group is experiencing the health situation, and how he/she can help the individual/group to cope with it in a constructive fashion. The client is viewed within the context of family and community, and nursing care addresses physical, mental, emotional, spiritual, educational, and advocacy needs. This broadness of scope, and the ambiguity inherent in real client care situations contribute to debate about the nurse's role within the profession, and to nursing's ability to articulate it to others.

Within this broad scope, nursing operates in both interdependent and independent spheres (Lewis & Collier, 1992). In the interdependent sphere, the one most familiar to the public, the nurse is responsible for monitoring the client's condition in relation to
his/her medical diagnoses, treatments, and possible complications, and in providing care delegated by other health professionals (usually physicians). The independent sphere of nursing is much greater and is largely outside of public awareness. It involves helping individual clients/families come to terms and live successfully with their health conditions. It has to do with assisting clients to attain and maintain maximum independence and quality of life within the context of their particular health situations. There is scope for autonomous decision-making in both spheres, although it is larger and less well-defined in the independent one. The less clear-cut the choices, the more complicated the judgement task, and it is precisely this ability which is at the heart of professional nursing.

Diversity in nursing education has also contributed to difficulty in developing a clear, well articulated vision and unified voice for the profession. Unlike other professions, each of which requires a single basic level of preparation (e.g. university degree) for its beginning practitioners, registered nurses in Ontario may come from one of two different educational streams (university degree or college diploma). The result of this varied educational preparation has been a lack of congruence in both theoretical background and outlook among nursing graduates which has inhibited nursing's development as a unified force in Ontario health care.

A move to requiring a baccalaureate degree as the minimum level for entry to practice by the year 2000 is currently underway in nursing. Many universities (e.g. Ryerson, York, McMaster) already offer post-diploma programs of two to three years in length leading to a baccalaureate degree for currently practising RNs. Several universities and colleges (e.g. University of Western Ontario and Fanshawe College) throughout the
province are developing collaborative programs leading directly to a baccalaureate. A coherent educational system will provide a more uniform knowledge base for dealing with the complexity of nurses' decision-making. Furthermore, by erasing the differences in status and outlook between college and university nurses, it can facilitate the development of a unified vision of nursing which can be clearly articulated to the public and other health care providers.

In addition to a well articulated vision and a unified voice, nursing's contribution to the future of health care depends on demonstrated clinical excellence. The quality of clinical performance rests on nurses' decision-making abilities; thus nursing educators' intense interest in helping students to learn clinical decision-making. Nursing teachers in the classroom place considerable emphasis on the development of critical thinking skills in the hope that they will translate into good clinical judgement during patient care. Janzen (1990), in her comparative study of Ontario college and university nursing programs, discovered that university nursing graduates had a significant edge in critical thinking scores over college graduates on the registration examinations, a finding which has generally been supported by other nursing research. However, virtually all research into the clinical decision-making of nursing students (Brooks & Sheppard, 1990; Pardue, 1987) has failed to show any significant difference between the two groups. Thus, the university students' higher critical thinking skills did not translate into better clinical decisions. The reasons for this are unknown. One possibility is that college students, who have more teacher-supervised clinical experience, are able to hone their clinical judgement skills to the level of their university counterparts. This finding may not represent a failure
on the part of university students, but rather a strength of college students based on the way their clinical experience is structured. Because of the confusion surrounding this issue, I decided to study students in both types of programs to learn what commonalities and differences exist in their decision-making processes. Hopefully, learning more about how student nurses make decisions in actual client care situations will lead to improvement in the quality of future students' clinical judgement and care.

**Limitations of the Study**

Most of the study's limitations relate to the methodology. Qualitative research is a very labour-intensive, time-consuming process which limits sample size and type, and therefore, generalizability and replicability. This focused ethnological study, with its small, volunteer sample, was no exception. Field studies do not allow for the control of variables, which precludes establishing causal relationships. Verbal protocols are not uniformly effective in accessing participants' thinking processes, and it was frequently difficult to get at the rationales for their decisions. Because I am a nurse, participants usually assumed that I knew the rationales, and attempts to elicit reasons tended to confuse them. The slowness of tape transcription made it impossible to complete the analysis while participants were still available to validate it. Nevertheless, with all its imperfections, the method was appropriate to the type of information sought. The intent was to increase understanding of the phenomenon and the study accomplished its purpose.

Data collection by a single researcher also introduces threats to the validity and reliability of the study. Triangulation of data sources (participant observation records and
checklists, tape recordings of ongoing judgement processes, retrospective interviews of the same decision-making processes, and repeated observations) and analysis (having data analysed by two independent expert nurse educators in addition to the researcher) was used to enhance validity and reliability.

Other limitations resulted from conditions imposed by the educational and health care agencies, and by the nature of the situation itself. Because the educational institutions declined to identify groups of students with good and poor decision-making skills, I was unable to look for differences in DM processes between these two groups. Since the health care agencies limited my access to patient data, my ability to assess decision appropriateness was constrained by what participants thought important. Finally, because the situations were all so variable, I could find no way to measure the degree of contextual complexity. For these reasons, some of the original research questions were changed (see Chapter Four: Analysis of Data and Discussion of Results for changes in research questions #3 & #4).

The thesis is organized into four additional chapters. The Literature Review discusses the literature relating to critical thinking and clinical decision-making, including issues related to generalizability of knowledge across settings, theories related to cognitive processing, and models of nurses’ decision-making, and it identifies gaps in the literature which led to this study. The Methodology chapter describes in detail the methodology chosen for the study and the analysis. The chapter on Analysis of Data and Discussion of Results describes the findings of the research and discusses implications. The final chapter outlines Conclusions and Recommendations.
CHAPTER TWO

LITERATURE REVIEW

Clinical decision-making is a complex phenomenon embedded in the overall context of human cognition. Any investigation into this field requires some awareness of the issues and problems involved in human cognition. The literature review for this project draws from several bodies of literature: critical thinking and clinical decision-making in nursing and other disciplines; cognitive processing and generalizability of learning; and the heuristics and biases research. The review in this chapter spans the time frame from 1967 to early 1997, and is focused on North American content with some contributions from Europe and Australia. It includes definitional and measurement issues, examination of influences affecting the decision-making process, and consideration of a number of models proposed to describe decision-making. Following an overview, it focuses on the research related to critical thinking and clinical decision-making in nursing.

Definitional Issues and Relationships

The terms “critical thinking”, “reasoning” and “clinical judgement” tend to be used almost interchangeably in the literature, but there are no standard definitions of these terms and their relationship to each other tends to be assumed rather than explicated. This complicates the process of comparing the literature in the field because authors and researchers from various disciplines have used the terminology somewhat differently. I will examine each of these terms individually and consider the relationship between them.
Critical Thinking

Critical thinking is an educational construct which involves identifying assumptions, drawing inferences from data, seeking and evaluating evidence, and judging the reliability of sources. Norris (1985), in a synthesis of research on critical thinking, notes that it is a relatively uncommon ability, highly sensitive to context, which involves attitudes and skills, and encompasses avoiding thinking errors, generating alternatives, and being willing to critique one's own thinking in the same way that one critiques others'. The assumption behind the teaching of critical thinking is that the students will thus acquire a process which they will ultimately apply to everyday life (i.e. that it is generalizable).

Johnson (cited in Norris, 1992) identifies five major definitions of critical thinking (those of Ennis, McPeck, Paul, Lipman, and Siegel) which are embedded in reasonably developed theories of critical thinking. They share the notions of reasonable, reflective, disciplined, skillful thought which may lead to either appropriate action or justifiable conclusions. Paul alone introduces the idea that critical thinking is domain specific. Watson & Glazer (cited in Miller & Malcolm, 1990) describe critical thinking as a composite of attitudes, knowledge and skills, and Schank (1991) allies it to the higher order thinking skills in Bloom's taxonomy (application, analysis, synthesis, and evaluation).

(1997) have operationalized critical thinking in nursing as the “repeated synthesis of relevant information, examination of assumptions, identification of patterns, prediction of outcomes, generation of options and choice of actions with increasing independence” (p 20). Ford & Profetto-McGrath (1994) state that the definition of critical thinking depends on the curricular worldview in use. In the “curriculum as product” model (where decisions are made by the nurse for the patient), it is defined as a rational-linear problem-solving activity exemplified by the Nursing Process. In the “curriculum as practice” view, nurse and patient become co-decision-makers but continue to work within the status quo. In the “curriculum as praxis” model, nurse and patient together become empowered to change the world, and critical thinking is the mediator between knowledge and action.

Pless & Clayton (1993) and Facione, Facione, & Sanchez (1994) quote the definition of the American Philosophical Association’s Delphi Research Project, “the process of purposeful, self-regulatory judgment, an interactive, reflective, reasoning process” (Facione et al., p. 345).

It is clear from the foregoing that there is no general agreement on a definition of critical thinking. There is reasonable agreement about the nature of the cognitive skills involved, and that critical thinking is goal-directed, with somewhat less agreement about whether it also includes affective dispositions and knowledge. Major areas of disagreement include whether the goal of critical thinking is some type of action (and if so, what type) or the evaluation of products of thought, and whether critical thinking is generalizable or domain-specific.
Reasoning

Definitions of reasoning are much harder to find. The Shorter Oxford English Dictionary (Onions, 1973) defines it as "the process by which one judgement is deduced from another or others which are given" (p. 1758). However, there are different kinds of reasoning which cover a fairly broad spectrum of thought processes.

Formal reasoning involves highly structured, rule-governed thinking. There are many different types (e.g. syllogistic reasoning, conditional reasoning, statistical reasoning), each with its own form and set of rules which act as criteria for judging the truth and validity of the outcomes. The product of reasoning is rational thought, which is based on carefully identified assumptions and valid inferences, and which leads to sound conclusions. The conclusions can be defended by arguments which are derived from the logic of the reasoning process. Violation of the rules renders the outcome or conclusion invalid. Learning the structure and rules of various types of reasoning helps one to recognize the inadequacies in one's own and others' arguments pro or con any particular issue (Dr. K. D. Stanovich, personal communication, Sept. 1994).

Inductive and deductive reasoning are less formal processes commonly used by investigators in many disciplines. Induction is "the process of inferring a general law or principle from the observation of particular instances" (Onions, Shorter Oxford English Dictionary, 1973, p. 1061). Deduction is "inference by reasoning from generals to particulars" (Ibid., p. 504).

Diagnostic reasoning is a type of deduction used by doctors and other health professionals to arrive at patient-related diagnoses. While it follows a pattern involving
data collection and analysis leading to diagnosis, as exemplified by the Hypothetico-Deductive Reasoning Model (Elstein et al., cited in Tanner, 1983) and by the Nursing Process (Lewis & Collier, 1992), it is far less structured than formal reasoning methods. Because of its relative lack of structure, diagnostic reasoning is fluid enough to cope with "real world" uncertainties, but is also highly vulnerable to error.

**Clinical Decision-making**

Clinical decision-making (definitions of which are also very scarce) is the process by which health care practitioners (physicians, psychologists, nurses, etc.) arrive at client-related decisions appropriate to their field of expertise. According to Tanner (1983), the components of nurses' clinical judgement can be assessment, diagnostic, or management/intervention decisions. Carnevali & Thomas (1993) have added a fourth category: prognostic decisions. It would seem reasonable that these decision types apply to other health care professionals as well.

**Relationships between Critical Thinking, Reasoning, and Clinical Decision-making**

Critical thinking and formal reasoning are similar in that they tend to be fairly abstract, goal-directed mental activities aimed at discovering supportable conclusions. Critical thinking, however, involves mental habits/skills and dispositions, while formal reasoning operates within clearly defined rules. Induction, deduction, and diagnostic reasoning are less formal and more applicable to real-world situations. The outcomes of diagnostic reasoning represent one type of clinical decisions. Clinical decision-making is generally assumed to be the application of critical thinking/reasoning processes in the clinical area.
Generalizability versus Domain-Specificity

One of the major issues still under debate is whether reasoning and critical thinking skills are domain-specific or generalizable from one area to another. Lehman, Lempert, & Nisbett (1988) point out that for centuries, subjects like mathematics, logic, and classical languages were taught in the belief that in addition to their content, they provided training in formal rule systems and mental discipline which would generalize to the thinking of everyday life. Psychological experiments in the early 20th century showed little transfer of skills from one area to another, so this belief fell into disrepute. Piaget believed in the existence of formal operations and abstract conceptualization, but he believed that they are acquired through maturation and self-discovery rather than through education. Current philosophers hold quite varied viewpoints on the issues of educability and generalizability of critical thinking skills.

Norris (1992) states that definitional issues about critical thinking and reasoning have an impact on the question of generalizability. Depending on their definitions of critical thinking, some theorists (e.g. Ennis) tend to accept generalizability, while others (e.g. Paul) believe that it is primarily domain-specific. Furthermore, "subject specificity", "domain specificity", and "discipline specificity" are vague terms which are often used interchangeably and which need to be clearly defined before this debate can proceed.

Johnson (cited in Norris, 1992) notes that these philosophers would likely agree on the generalizability of the attitudinal component, and on the need for domain knowledge (although they accord this different weights), but that the major point of disagreement relates to the cognitive component.
Leaving aside the definitional and philosophical debates, some recent psychological experiments have provided support for the transferability of different types of critical thinking and reasoning skills. An experiment by Lehman et al. (1988) tested graduate students in law, psychology, medicine, and chemistry on different kinds of reasoning (conditional, methodological, and statistical). Students in medicine and psychology made large gains in statistical and methodological reasoning, and students in psychology, medicine, and law demonstrated significant gains in conditional reasoning throughout their programs. Chemistry students showed no gains in any of the types of reasoning tested. The authors state that the ability to transfer reasoning skills which are taught within the discipline suggests that there was merit in the formal discipline hypothesis.

Fong & Nisbett (1991) trained introductory psychology students in the statistical law of large numbers through the use of examples in a particular domain. Subjects were then tested immediately after the training and two weeks later on their ability to apply the rule in the same or a different domain. On immediate testing, subjects could apply the rule equally well in the trained and untrained domain. On delayed testing, application in the untrained domain had declined significantly but was still better than for controls who had received no training in the rule. The authors state that memory for the rule remained, even though memory for the specific examples declined, and thus that it was the rules which were being applied across examples and domains.

In summary, the answer to the question about the generalizability of critical thinking and reasoning is that this is not a single question. There are many definitional issues to be resolved, and points of convergence to be sought. It appears that parts of
critical thinking/reasoning (e.g. the affective component) might be generalizable while other parts (e.g. some cognitive skills) might be domain-specific. Although early 20th century research showed little transfer of cognitive skills across domains, recent research has demonstrated some forms of generalizability.

**Measurement Issues**

**Critical Thinking/Reasoning Measures**

There is no universally accepted standard measure of critical thinking or reasoning. A number of tests have been devised to measure critical thinking and most include a similar core group of skills, but they vary somewhat according to the definition of critical thinking they exemplify. The most common test mentioned in the literature for measuring critical thinking is the Watson-Glaser Critical Thinking Appraisal (WGCTA) which was originally developed in the 1960s and has been revised several times since then. Watson & Glaser defined critical thinking as including knowledge, skills, and attitudes (Miller & Malcolm, 1990). The test focuses on a general knowledge base, using examples of statements, arguments, and problems which might be found in the media, in the classroom, or at work. Gross, Tazakawa, & Rose (1987) note that it contains five subtests which measure the cognitive component (inference, identification of assumptions, deduction, interpretation, and evaluation of arguments) but it does not attempt to measure the affective component. It has been widely used in a variety of fields and has good validity and reliability figures.

The Cornell Critical Thinking Test (CCTT) is based on Ennis's definition of critical thinking as "reasonable reflective thinking that is based on deciding what to believe or do",
and it includes both dispositions and abilities (Ennis, 1985). The dispositions have to do with seeking clear questions and reasons, being open-minded and well-informed, keeping the total situation and main concern in mind and dealing with its parts in an orderly fashion, seeking alternatives, taking a position but changing it if warranted by new data, seeking as much precision as the situation permits, and keeping others' feelings and knowledge level in mind. The abilities include elementary clarification, basic support, inference, advanced clarification, and strategy and tactics. The test items are intended to identify whether respondents know and can use these thinking principles/abilities (Norris, 1985). The CCTT has been used primarily in the educational field.

The California Critical Thinking Skills Test (CCTST) and its companion instrument, the California Critical Thinking Dispositions Inventory (CCTDI), were developed by Facione, Facione & Sanchez to test the core critical thinking skills and dispositions included in the APA Delphi Research Project's definition of critical thinking. The CCTST tests for the cognitive skills of interpretation, analysis, inference, evaluation, and explanation. The CCTDI includes seven subscales which address the affective component: inquisitiveness, systematicity, analyticity, truth-seeking, open-mindedness, critical thinking self-confidence, and maturity (Facione, Facione, & Sanchez, 1994).

The WGCTA and CCTST + CCTDE have been used in research on critical thinking in nursing, the latter combination less frequently than the former because it is newer. The tests have been used alone or in combination with other measures to try to determine whether they are useful as predictors of success within nursing programs or on registration examinations, or as assessments of the increase in critical thinking skills which
are assumed to occur during the program itself. They have also been used to measure the critical thinking skills of graduate RNs. The results have been quite varied.

Videbeck (1997a) has proposed a model which can be used to evaluate both individual nursing students’ critical thinking abilities and the nursing program’s effectiveness in promoting critical thinking among its graduates. Initially, faculty need to describe critical thinking, identify evidence of it in clinical practice (operational definition), and specify their expectations of program graduates. Next, faculty must outline curricular objectives throughout the program which will demonstrate ongoing CT development, and devise teaching strategies to foster it. Finally, summative evaluation methods which are closely related to the curricular objectives need to be developed. This model is specifically designed to evaluate CT in nursing, and it integrates both theoretical and clinical components. However, because faculty definitions and criteria will differ among programs, the model cannot be used to compare CT across nursing programs.

Clinical Judgement Measures

Most clinical judgement research (in nursing and other disciplines) has been done using simulations. A number of instruments have been developed for this purpose. In nursing, these include the Nursing Performance Simulation Inventory and the Stewart Evaluation of Nursing Scale, as well as several individually constructed case studies and tests used in different research projects. However, as Tanner (1983) points out, simulations cannot reproduce the complexity of the actual situation, thus limiting the capacity to understand how contextual variables affect the process.
Most of the simulation testing involves paper and pencil or computer responses, but verbal protocols have been used in conjunction with some of them. With verbal protocols, subjects are encouraged to verbalize their thinking processes as they are happening or on stimulated recall shortly after the event. The hope is that this will allow some insight into the actual processes as they occur, rather than having to infer them from the decisions which result.

Some concerns have been raised about the validity of verbal protocols (whether the subject is actually aware of his/her own higher-level mental processes, and whether the results are at all generalizable since they are usually based on a small number of subjects). While these concerns may be valid, there may be ways to overcome them (e.g. doing more studies with fewer subjects, rather than fewer studies with more subjects, may permit the observance of repeated patterns). Furthermore, imperfect as verbal protocols may be, they appear to offer the best way of learning about subjects' actual thinking processes as they are occurring that we currently possess.

One major advantage of verbal protocols is that they are transferable to the actual clinical setting. They offer the potential for gaining insight into the decision-making processes of subjects under real world conditions, provided that they are carefully triangulated with participant observation.

**Theories Related to Clinical Judgement**

Theories about judgement processes can be classified as descriptive, prescriptive, or normative. Descriptive theories attempt to describe what people *actually* do when making decisions. In 1972, Elstein and his colleagues developed the Hypothetico-
Deductive Reasoning Model to describe the decision-making processes of physicians, which Tanner (1983) later found could also be applied to nurses' decision-making.

Prescriptive theories outline what people should do to improve their decision-making. The Nursing Process (Carpenito, 1991b) is a precriptive model which has been used for many years as the basis for teaching clinical decision-making to student nurses. Normative theories describe the best possible way to make decisions, and they provide rules for decision-making in much the same way that different types of formal reasoning provide a structure and criteria for analyzing arguments. Probability Theory (Bayes' Theorem) and Utility Theory are examples of normative decision-making theories whose teaching has been recommended in an effort to improve the clinical judgement of students in a variety of disciplines. I will discuss the normative theories first, followed by the prescriptive and descriptive models.

Normative Theories

Bayes' Theorem is a statistical tool for evaluating the probability of a particular hypothesis being correct. It requires the decision-maker to consider "(a) the frequency of occurrence of a diagnostic sign and (b) a disorder in the population being observed (i.e., the 'base rates'), as well as (c) the probability that someone with the disorder in question will or will not exhibit the sign, and (d) the probability that normal individuals will also exhibit the sign" (Elstein, 1988, p. 32). By forcing the clinician to consider other relevant data which are frequently ignored (e.g. How often does the condition occur in the target population? How frequently does the diagnostic sign occur in the absence of this
condition?) before arriving at a decision, this process can significantly increase the accuracy of diagnostic decisions.

Utility Theory (UT) combines the concepts of the probability of outcomes with their value. Unlike Bayes' Theorem which is concerned with hypothesis testing, Utility Theory is concerned with action evaluation. In the Decision Analysis Model (a way of applying UT), a model of the problem is constructed and then all possible options (actions) are shown (Harbison, 1991). Each action is associated with a variety of possible outcomes. Each outcome is assigned a subjective probability (likelihood of occurrence) and a value (desirability of occurrence). The probability multiplied by the value gives the utility for that outcome. The sum of the utilities of all the outcomes of a particular action gives the expected value of that particular action. The action with the highest expected value is the best one to choose. By requiring a detailed consideration of alternatives prior to choosing an action/intervention, Utility Theory offers the possibility of markedly improving intervention decisions.

These normative decision-making theories deal with different parts of the clinical decision-making process, and offer the potential for significant improvement. Whether they can survive the transfer from the training situation (classroom) to the application setting (clinical situation) remains to be seen.

Prescriptive Theories/Models

The Nursing Process is a systematic problem-solving method which has been the primary vehicle for teaching clinical decision-making to student nurses in North America over the last 20-25 years. Initially, it was conceived as a four-step, linear process which
included assessment, planning, implementation, and evaluation (Baumann & Deber, 1989). Later, the concept evolved into a circle (evaluation becoming reassessment and beginning the process again), and eventually a spiral (each evaluation/reassessment point happening at the same place in the circle but on a slightly higher plane). Later still, the initial four stages were expanded to incorporate considerable amounts of decision theory (Baumann & Deber, 1989).

The Nursing Process is expressed through the nursing care planning system which was eventually systematized under the auspices of the North American Nursing Diagnosis Association (NANDA). To improve communication among nursing caregivers and a reasonable standardization of approaches to the same problems in different patients, NANDA developed a set of approximately 90 nursing diagnoses, each with its own assessments, outcome/goal statements, and interventions. The intent is that the nurse will select appropriate diagnoses and will individualize them and their related assessments, outcomes, and interventions to fit the particular patient, and that other caregivers will use the plan to provide continuity of care, updating the plan as necessary.

The nursing process (using the NANDA system) has been used in the classroom as a method of organizing and using the nursing knowledge base. Student nurses have regularly been required to produce clinical care plans both to facilitate transfer of learning, and to demonstrate their knowledge. Hospital Staff Development departments have taught nursing care planning and have tried a variety of techniques (Fitch, Baker, Baird, Berryman, Gibson, Mattiuzzi, Savage, & Wabin, 1987) to induce staff nurses to maintain ongoing care plans for their patients. Probably because the wording of NANDA diagnoses
is long and complex, and because of time constraints experienced by most nurses, staff
nurses have adopted this system reluctantly and only to the extent required by their
institution (Fitch et al., 1987). Thus, it has remained primarily prescriptive rather than
descriptive of nurses' actual clinical decision-making.

Descriptive Theories/Models

The Hypothetico-Deductive Reasoning Model (HDMR) is a model developed by
Elstein and associates (Tanner, 1983) which describes the clinical decision-making process
of physicians. The only consistent strategies found among doctors doing a diagnostic
work-up on simulated patients (trained actors) were early hypothesis generation and
further data gathering to rule in/rule out potential diagnoses. Usually hypothesis
generation occurred quite early (about 10% of the way through the work-up), but it varied
according to the problem and the doctor. The number of hypotheses developed ranged
from 4 to 7, which suggests that this is a chunking strategy used to conserve the limited
resources of short-term memory (STM) (see later discussion of Information Processing
Theory). The hypotheses generated tended to affect subsequent data collection.

Diagnostic accuracy was related to the thoroughness of the assessment (cue acquisition)
and to the accuracy of analysis/inference (cue interpretation).

In a study of senior baccalaureate nursing students, Tanner (1983) also found early
hypothesis generation and testing, which contradicts the Nursing Process's emphasis on
delaying hypothesis generation until assessment is completed. The major factor in
determining diagnostic accuracy was whether or not the correct diagnosis was included in
the first set of hypotheses generated. Given that hypothesis formation affected subsequent
data collection, this is not surprising and it is consistent with some of the errors identified in the heuristics and biases research.

Cholowski & Chan (1995) have suggested that the Knowledge-Driven Problem Solving Model (KDPSM) is more effective in accounting for the differences in novice-expert decision-making than is the HDRM. In contrast to the HDRM which focuses on the reasoning process, the KDPSM is focused on the way in which knowledge is stored in long-term memory (LTM). The experts' rich, elaborate knowledge structures (schemata), which are easily accessible for matching with patient data in STM, enhance their diagnostic accuracy. These knowledge structures result from a combination of experience and the way in which the knowledge base is taught. That is, the emphasis in teaching novices should be on the acquisition of good knowledge structures rather than on the deductive problem-solving process. Thus, Cholowski & Chan see the KDPSM as descriptive of experts' clinical decision-making, but as prescriptive for students.

Judgement Errors and Corrective Strategies

Heuristics and Biases

Psychologists have conducted a considerable amount of research into the decision-making processes of a variety of professionals (primarily other psychologists), and have identified a number of common errors (Arkes, 1981; Elstein, 1988; Fagley, 1988; Tversky & Kahneman, 1974). Heuristics are shortcuts which simplify the decision-making process and reduce the demands on STM, and can be quite useful. However, they can also lead to systematic errors in the judgement process. Examples of heuristics are availability, representativeness, and anchoring and adjustment. Availability leads the decision-maker to
overestimate the frequency or commonness of a condition because of the ease with which examples can be brought to mind. It is affected by the vividness and recency of examples. Representativeness is the tendency to believe that an object belongs to a particular class because of superficial/surface similarities. Anchoring and adjustment is the tendency for one to become "anchored" to an initial estimate of a situation, and to be overly conservative in revising the estimate as new information becomes available. Early hypothesis generation in diagnostic reasoning is a form of heuristic. By focusing the attention in particular directions, it facilitates data collection and conserves the resources of STM. However, by this very mechanism, it tends to screen out data which appear irrelevant to the hypotheses under consideration and thus skews subsequent data collection and analysis.

Many biases have been identified in the research on clinical judgement (Arkès, 1981; Chapman & Chapman, 1969; Fagley, 1988; Evans, 1989; Lord, Ross, & Lepper, 1979; Tversky & Kahneman, 1974;). Probably the best known is confirmation bias in which one searches only for evidence which confirms one's hypothesis while ignoring any contradictory evidence which happens to appear. This is one of the ways in which early hypothesis generation (in HDRP) tends to skew subsequent data collection. Another common bias is base rate neglect, the tendency to ignore the frequency of a condition in the population under consideration, and thus to overestimate its prevalence based only on the occurrence of a diagnostic sign. Illusory correlation is a bias in which two items are believed to be closely related (usually based on strong verbal association) when no valid correlation exists. Insensitivity to sample size exists when people treat results from small
samples as equally representative of the population under study as those from large samples. Hindsight bias occurs when subjects who already know the correct outcome/diagnosis indicate that they would have chosen that outcome anyway, based only on the evidence (which may be equivocal), before the correct outcome was known. Overconfidence occurs when one's belief in one's diagnostic accuracy is considerably greater than the level of accuracy warrants. Accumulation of additional evidence often results in increasing confidence in one's judgement without increasing its accuracy. Other biases include value-induced bias (errors linked to the cost of mistakes, especially among physicians) (Elstein, 1988), insensitivity to the role of chance, failure to recognize regression toward the mean as a possible explanation, the tendency to overestimate the occurrence of conjunctive events (those which go together) and to underestimate the occurrence of disjunctive events (either-or happenings), and the tendency to make insufficient adjustments to initial estimates in the face of additional data. Errors linked to the way problems were represented (framing and context effects) (Kahneman & Tversky, 1984) were also identified. This is not an exhaustive list of judgement errors, but serves to illustrate the range of problems to which we are prone.

There is also a considerable body of research (Dawes, 1991, 1994; Dawes, Faust, & Meehl, 1989; Faust, 1986) that supports the supremacy of actuarial (formula-driven) judgements over human (clinical) judgements, even when the human judges are acknowledged experts in the field. This is due to the fact that actuarial processes are perfectly reliable (always use the same factors weighted the same way in each decision), whereas human judges are prone to the biases noted above. When the complexity
of the situation exceeds the cognitive processing capacity of the human judge, reliance on heuristics tends to produce one or more of these thinking errors. Increasing the information available to the judge tends to improve his/her confidence in the decision, without improving its accuracy. Studies showed that the strength of human judges lay in pattern recognition and identification of predictive variables; actuarial formulae were much superior in terms of data integration. The authors' suggestion is to combine the strengths of both methods in order to improve our decision-making processes and outcomes.

Debiasing Techniques

In the absence of actuarial formulae for decision-making, Arkes has suggested some strategies for reducing biases in human judgements. Most centre around generating and maintaining multiple hypotheses for an extended period of time in order to ensure that all alternatives are thoroughly investigated before the ultimate choice is made. Teaching Bayes' Theorem for calculating probabilities is also highly recommended. This requires the decision-maker not only to entertain alternative hypotheses, but also to consider base rates and likelihood ratios (thus combatting two of the most common errors, confirmation bias and base-rate neglect). The use of external aids (e.g. written notes and summaries) to reduce reliance on memory helps to overcome the biasing effect of selective memory. A final suggestion is to frame the problem in more than one way in order to overcome context and framing effects.

Cognitive Processing Theories

Underlying the issues of critical thinking, reasoning, and clinical decision-making are the deeper questions about how we mentally process data. There are two schools of
thought which have led to opposing theories of cognitive processing. Those working in the field of artificial intelligence (AI) see the human brain as a linear, sequential processor which is constrained by its memory structure. Newell & Simon (1972) developed Information Processing Theory (IPT) based on this concept. More recently, other researchers have found IPT inadequate to explain the performance of many everyday activities (e.g. walking, driving a car) and of experts in their particular fields. Dreyfus & Dreyfus (1986) have thus developed their Skill Acquisition Theory (SAT) which is based on the view of the brain as a holistic, simultaneous processor which recognizes patterns rather than individual bits of data.

Although these theories describe cognitive processing in fundamentally different ways, both may, in fact, contain elements of truth. In the 1960s, Sperry & Gazzaniga did ground-breaking research on individuals in whom the connection between the two hemispheres of the brain had been severed. What they discovered suggested that the hemispheres process and store information differently. The left hemisphere is a linear processor which interprets information serially (as in reading a line of text one word at a time). The right hemisphere is a holistic processor which sees and stores whole patterns (as in viewing a painting). Subsequent research with people who are not brain-damaged has supported these findings (Williams, 1983). Thus, both cognitive processing theories may be necessary to an understanding of human thought. ITP relates to the functioning of the left hemisphere, and SAT to that of the right. If viewed as complementary rather than exclusive, they may bring us to a greater comprehension of cognition than we currently possess.
**Information Processing Theory**

This is a theory of human cognitive processing and memory derived from the work of Newell & Simon in 1972 in artificial intelligence (Newell & Simon, 1972; Tschikota, 1993). IPT postulates sequential processing of data in a linear fashion. Cognitive processing is limited in accordance with memory structure and the relationship between long-term (LTM) and short-term memory (STM). It also postulates very strict limitations on short-term memory (STM) of 7 plus or minus 2 items. This means that humans can only keep approximately 5 to 9 items in the range of conscious attention at one time. The capacity of STM can be extended by "chunking" related items into groups (i.e. 7 plus or minus 2 chunks at one time). The larger the chunks, the greater the capacity for retaining and working with data in STM. However, the ability to chunk information is related to both knowledge base and experience. Novices, with limited experience and a growing knowledge base, have difficulty recognizing the relevance of data and tend to treat all of it as equally important. Thus they have many chunks with fewer bits of information in each, and this limits the amount of information they can hold in STM at one time. STM is dependent for its input partly on sensory stimulation from the internal and external environment and partly on retrieved information from LTM.

LTM, on the other hand, appears to be virtually limitless. The catch, however, is the potential difficulty of retrieving information from LTM when it is needed. Unless the neural pathways are firmly established when the information is originally stored, it is like entering information into a computer hard drive without an address - it can't be relocated at will. Moreover, facts stored at random are like bits of information without a filename - they are
easily lost. Multisensory input and active processing as one attempts to relate the new information to what is already known helps to entrench the neural pathways for easier access. Storing related information in coherent patterns or schemata not only makes it easier to remember, but also provides a place for the instantiation of new information as it is acquired. By this mechanism, schemata can be modified and enriched as the knowledge base expands. Potentially relevant schemata can be retrieved by STM as required for comparison with new information in the process of hypothesis formation. As each schema becomes larger and more complex, it brings more information back to STM as a single chunk.

**Skill Acquisition Theory**

Dreyfus and Dreyfus (1986) found that IPT was inadequate to explain some of the cognitive processing found both in many everyday activities (e.g. walking, driving a car) and in expert human decision-making (e.g. chess masters, airline pilots). In particular, the limitations of serial processing and STM constraints proposed by IPT did not fit with what Dreyfus and Dreyfus found in their observations. They postulated a theory of holistic cognition based on pattern recognition. For example, consider how one recognizes a familiar face in a crowd. According to the serial processing argument of IPT, it would be necessary to contemplate each feature individually (eyes, nose, mouth, forehead, cheekbones, jawline, hairline, etc.) and compare it with a representation in LTM in order to know whether the face was familiar. However, using the holistic processing of Dreyfus & Dreyfus' theory, one would see the whole face as a meaningful pattern which would then be compared with face patterns stored in LTM to search for a match.
In their research, Dreyfus & Dreyfus observed five levels of skill development in the process of becoming an expert (novice, advanced beginner, competent, proficient, and expert), and the primary factor in movement from one level to another was experience. Novice decision-making is slow, rule-driven, and decontextualized because novices are unable to identify the most important elements in the situation and thus treat all information as equally important. Over time, practitioners build a repertoire of experiences which serve as pattern matches in memory against which new situations can be evaluated. Their decision-making improves and they become less dependent on the rules and more sensitive to context. Not all practitioners progress to the expert level, regardless of their length of experience. As long as decision-making remains primarily rule-driven, it does not progress beyond the competent level. Movement into the last two categories depends largely on the development and use of intuition. Experts have long since abandoned rules and make decisions intuitively which are tailored to fit the context.

**Nursing Research into Critical Thinking**

and Clinical Decision-Making

Research into Critical Thinking and Nursing

Research into the acquisition of critical thinking (CT) skills by nursing students has yielded mixed results. Most quantitative studies have used the Watson-Glaser Critical Thinking Appraisal (WGCTA) to measure students’ CT skills on program entry and exit, together with a variety of other comparators such as program grade point average (GPA), the National League for Nursing’s (NLN) Preadmission Test, and the NCLEX (national licensure examination). In a study of Ontario nursing programs, Dr. K. Janzen (1990)
used the CNATS (Canadian nurse registration examination) to compare the critical
thinking of college and university nursing graduates, and discovered a significant
difference in favour of the university graduates. Dr. Noreen Facione (cited in Sedlak,
1997) is currently conducting a meta-study of nursing students’ critical thinking, and she is
using a variety of instruments including the California Critical Thinking Skills Test and the
California Critical Thinking Dispositions Inventory, but the results of this study are not
available yet.

In four studies which used the WGCTA (Frederickson, Berger, and Miller, all cited
in Miller & Malcolm, 1990; and Gross, Tazakawa, & Rose, 1987), students’ CT scores
were higher on exit than on entry, but relationships with other comparators were
inconsistent. Frederickson and Miller both found a positive relationship between exit
WGCTA results and program GPA, although Frederickson discovered no relationship
between entry WGCTA scores and GPA. Berger found no relationship at all between
WGCTA and program GPA. Gross, Tazakawa, & Rose (1987), found that although
WGCTA scores increased from program entry to exit, the program GPA was a better
predictor of success on the NCLEX (nurse licensure) examinations than the WGCTA.

Some studies showed no increase in WGCTA scores on program entry and exit.
Bauwens & Gerhard (1987) found no significant relationship between entry and exit
WGCTA results, and therefore concluded that the program did not contribute to the
development of critical thinking. However, they found correlations between the entry
level WGCTA, GPA, and NCLEX results which suggested the use of the WGCTA as a
pre-admission screening tool. Sullivan (1987) studied the development of critical thinking,
creativity, and academic and clinical performance among RNs enrolled in a post-diploma baccalaureate program. She used the WGCTA, Torrence Test of Creative Thinking (TTCT), Stewart Evaluation of Nursing Scale and program GPA as her measures. Scores for flexibility, clinical performance, and mean program GPA were significantly higher on exit than on entry. Originality and overall creativity scores were significantly lower, and critical thinking scores were unchanged.

Some studies used the WGCTA scores as one method of evaluating curriculum change. Richards (cited in Miller & Malcolm, 1990) compared entry and exit CT scores of two cohorts of students, one in the old “block curriculum” (blocks of theory were interspersed with blocks of clinical), and the other in the new “integrated curriculum” (theory and clinical experience happened concurrently). Students in the new curriculum had significantly lower CT exit scores than those in the old curriculum. Pepa, Brown, & Alverson (1997) compared the CT scores of traditional and accelerated baccalaureate nursing students to determine the effects of the accelerated program on students' CT skills. The accelerated group, all of whom had had previous college/university education prior to entering the nursing program, had higher WGCTA scores than the traditional students on program entry, but there were no significant differences on program exit. The traditional students' WGCTA scores increased significantly from entry to exit, but the accelerated students' increases were not significant.

The WGCTA has also been used to measure the CT skills of non-student groups (Hartley & Aukamp, 1994; Howenstein, Bilodeau, Brogna, & Good, 1996). Hartley & Aukamp assessed the CT skills of 50 full-time nurse educators (classroom and clinical) in
baccalaureate nursing programs, and compared the scores with values previously obtained for baccalaureate nursing students. The nurse educators' scores were higher than the students'. However, Saarman, Freitas, Rapps, & Reigel (cited in Howenstein et al., 1996) found no significant difference between the CT ability of faculty and sophomore nursing students. Howenstein et al. used the WGCTA and a biographical survey to examine the relationship of RNs' CT scores with their ages, levels of education, years of experience, and specialty areas. Only education level was positively correlated with the WGCTA scores. Age and experience were negatively correlated. The authors suggested the need to encourage older, more experienced RNs to pursue further education. However, they did not appear to consider whether the WGCTA adequately captures the critical thinking/decision-making processes of very experienced nurses. In fact, Perciful & Nester (1996) and Sedlak (1997) note that many theorists are questioning whether the WGCTA is the most appropriate instrument for use with nursing students.

Perciful & Nester (1996) did a quasi-experimental study of baccalaureate nursing students during a psychiatric rotation. They investigated the effect of computer assisted instruction (CAI) and a collaborative teaching model on the students' knowledge and CT skills. The authors used the psychiatric part of the Mosby Assess Test and two parts of the National League for Nursing's (NLN) Psychiatric Nursing Exam as their instruments. The experimental group had significantly higher CT scores than the control group, but there was no difference in their knowledge. Unfortunately, since the study involved two experimental variables (the collaborative teaching model as well as the CAI), it was not possible to identify the effects of each separately.
Using qualitative methodology, Sedlak (1997) researched the development of critical thinking among seven baccalaureate nursing students during their first clinical nursing course. Data, which were analysed according to Paul's dimensions of reasoning, revealed four major themes: development of professional self-perspective, and of perfectionist, caring, and self-directed learning perspectives. Unlike most studies of nursing students' critical thinking, this one examined the development of critical thinking at the earliest point in the students' clinical experience and led to suggestions about how to enhance it throughout the program. Although sample size prohibits generalization, this study has investigated a previously unexplored area which merits further consideration.

In a related but slightly different vein, McGovern & Valiga (1997) studied the effect of particular instructional strategies designed to promote the “cognitive development” of baccalaureate nursing students by administering the Learning Context Questionnaire (LCQ) at the beginning and end of the freshman year. This instrument was used to measure subjects' positions on Perry's scale of Intellectual and Ethical Development. Perry hypothesized a progression through four stages of moral and intellectual development: dualism, multiplicity, relativism, and commitment. Each of the first three stages is divided into two positions on the scale (early and late), while the final stage is divided into three. Thus, there are a total of nine different positions on the scale. While the LCQ demonstrated no statistically significant differences between experimental (those with whom the specific teaching strategies were used) and control groups (who received regular teaching of the same nursing material) in terms of their positions on the
Perry scale, the authors stated that some cognitive growth was apparent on class assignments and discussions.

Seeking a different perspective, Jones & Brown (1991) questioned administrators in baccalaureate and higher-degree nursing schools about how CT was conceptualized and operationalized in their programs. Most respondents (deans and directors in U. S. baccalaureate and post-graduate nursing programs) identified critical thinking as "a rational-linear process; as a function of deductive logical thinking" (like the Nursing Process). The authors view critical thinking as "an orientation to cognition predicated on reflective thought and a tolerance for ambiguity rather than on linear problem solving" (p.530). They also note that "Decision-making in clinical nursing practice, in reality, is more often composed of contextually defined value judgments...[and that] the problems of everyday nursing practice are rarely settled in a rational, linear manner" (p.532).

Almost all of these studies were done in the United States, and most used the WGCTA, whose applicability to nursing some authors question, to measure critical thinking. The majority involved baccalaureate students only (mostly in generic programs, some in post-RN degree completion programs); one study included a group of associate degree students; and one involved university and diploma nursing students in Ontario. Most showed some improvement of CT scores from program entry to exit, but the degree of relationship between CT scores, program GPA, and other measures was variable. Three research projects used different instruments and methodologies to study CT, while one study examined cognitive development. Some studies used full cohorts of students, others used volunteer samples. Two studies examined the CT scores of non-student
groups, and one enquired into the definitions of CT used in undergraduate and graduate university nursing programs. Given the variety of research foci, study samples, programs, and comparators, the mixed results are hardly surprising. Since no non-nursing groups were used as controls, it is difficult to separate the effects of nursing education and experience on critical thinking from the effects of the maturation process.

Research into Clinical Decision-Making and Nursing

Tanner (1983) reviewed the research literature on clinical judgement and stated that it could be classified by: (1) component(s) studied, (2) variables which influence both process and outcome, and (3) theoretical perspective and methods used. Most of the research falls into more than one category. Component decisions include assessment, diagnostic, and management/treatment decisions. Carnevali & Thomas (1993) have added a fourth (prognostic), but I have found no research on this component. Variables which influence both process and outcome can be classified as task, clinician, contextual, and risk/benefit variables. Most research has been done on clinician variables, with a minor amount on task variables and virtually none on the other two areas. From a theoretical perspective, most research has used either statistical decision theory (probability theory, utility theory) or information processing theory.

The following 17 studies are all reviewed in Tanner (1983).

In the area of component decisions, the majority of studies have concentrated on diagnosis, and/or its relationship to assessment. Five studies (Allal, 1973; Tanner, 1977; Taylor & associates, 1978; Sprafka, 1973; and Gordon, 1973) involving medical and nursing students suggest that appropriate hypothesis generation might be a function of
level of education and experience. Elstein and associates (1978) identified that thoroughness in data gathering is associated with diagnostic accuracy. Several additional studies looked at the relationship of early hypothesis generation and diagnostic accuracy, and other strategies (verbalization, specific heuristics) and came up with mixed results.

In the realm of task variables, most studies have shown the task-specific nature of the strategies used (e.g. assessment and diagnostic strategies differ). Six studies (Elstein et al., 1978; Kassirer & Gorry, 1978; Barrows & Bennett, 1972; Gordon, 1972, 1978; Kraus, 1976; and Tanner, 1977) investigated the information-seeking strategies of doctors (the first three) and nurses (the last three). In general, all the subjects started with broad, general questions and used some mechanism (e.g. early hypothesis generation) to narrow the focus as data acquisition progressed. Experienced clinicians used strategies to avoid the risk of premature closure leading to inaccurate or incomplete diagnosis. Elstein and his associates (1978) found that cues are clustered to generate hypotheses and inconsistent cues tend to be ignored (confirmation bias). Later hypotheses tend to be refinements of earlier ones. An unexpected finding was that low cue consistency (several cues that tend to be only marginally related or unrelated) was correlated with the generation of fewer hypotheses than high cue consistency (most cues pointing to a single diagnosis).

In the area of clinician variables, studies have tended to concentrate on either logical reasoning measures or personality measures as predictors of clinical judgement skill. Four studies (Tanner, 1977; Matthews & Gaul, 1979; Gordon, 1972; and Elstein et al., 1978) found no relationship between clinical judgement measures and logical reasoning measures. Two of the studies used the WGCTA, one used the Graduate Record
Examination (GRE) and the Miller Analogies Test (MAT), and one used three logical problems to measure logical reasoning ability. A variety of measures of clinical judgement were used. Tanner (1983) suggests that "it is likely that the kind of reasoning tested by these standardized measures differs from that used in clinical judgment" (p. 21). Elstein (1978) and Koehne-Kaplan & Tilden (1976) compared several measures of personality type with clinical problem-solving measures and found no consistent significant relationships.

A number of studies examined clinical decision-making from the perspective of normative statistical decision theory. Hammond (1967) studied the accuracy and self-consistency of nurses' probability revisions of their diagnoses in the light of new evidence, and found that the revisions were in the direction indicated by Bayes' Theorem, but that they were much too small (anchoring and adjustment heuristic). Grier (1976) studied the intuitive decisions of 50 nurses who were asked to rank order three possible courses of action for each of four simulated patients, and then asked to assign probability estimates and values for the outcomes of each action. In almost sixty percent of the cases, the nurses' intuitive judgements were in agreement with the statistically-derived preferred choice. Aspinall (1979) studied the use of decision trees on nurses' diagnostic accuracy and found them effective on simulations. These three studies suggest that although nurses may use some of the principles of decision theory on simulated situations, they are not consistently utilitarian or Bayesian decision-makers.

Within the realm of information processing theory, Elstein et al. (1972) studied medical diagnostic decision-making and discovered the processes of early hypothesis
generation and testing which ultimately led to the Hypothetico-Deductive Reasoning Model. Tanner (1977) found the same strategies used by senior baccalaureate nursing students, and concluded that this model was appropriate for nurses also. Research on hypothesis activation indicates that it is likely linked to the way knowledge is stored in LTM. When the presenting cues are strongly associated with a particular diagnostic category or schema in LTM, that hypothesis is activated and the schema is brought into STM for comparison. If the cues are linked to more than one diagnostic category, competing hypotheses may be activated.

All of the above research has been summarized by Tanner (1983). She notes that most clinical judgement research involves simulations which lack validity in showing how decision-making is carried out in actual practice, and that there have been no studies on contextual variables. She therefore recommends that "the study of clinical judgment in nursing use both approaches - simulation and naturalistic observation - with an eye toward a single theory which describes the development of skill in clinical judgment" (p. 27).

Baumann & Deber (1989), in another excellent literature review of clinical decision-making and problem-solving research, noted that attempts to identify one overall diagnostic problem-solving strategy used by physicians have failed. Politser (cited in Baumann & Deber) stated that the strategies used seem to be task specific and vary with the nature of the case and the doctor's role. They include pattern recognition, hypothetico-deductive, and exhaustive methods. There has been an increasing recognition that expert performance is dependent on a large, well organized knowledge base. Consequently, interest is shifting from the search for a process which will ensure good
decisions to the structure of the knowledge base which will facilitate pattern matching. Gold standards (criteria, developed from concrete evidence, on which to base treatment decisions), clinical algorithms (step-by-step rules for treating common situations), decision analysis (a process based on statistical probabilities for use under conditions of diagnostic uncertainty), and expert systems (specialized computer systems which serve as decision consultants) are other methods used to facilitate medical decision-making.

In nursing, there are problems related to the development of these decision-making support systems. Tanner (cited in Baumann & Deber, 1989) stated "that nursing, unlike much of medicine, lacks the scientific base to link outcomes to actions" (p. 21), which complicates the development of gold standards and expert systems. Baumann & Deber also note that "the use of decision analysis requires the presence of a well-defined problem and the presence of mutually exclusive alternatives", and that "clearly defined situations are not always encountered by nurses" (p. 21) which may limit the use of decision analysis in nurses' decision-making. Furthermore, many nursing decisions are made quickly, without the time required for adequate reflection, and there is little research about what happens under these conditions. However, Baumann & Deber note that "time pressures can degrade performance by introducing stress" (p. 22), and by inhibiting the ability to distinguish between relevant and irrelevant cues. Thus, in spite of many similarities between nursing and medical decision-making, there are also important differences which require further research.

In addition to those summarized by Tanner (1983) and Baumann & Deber (1989), a number of other nursing researchers have investigated various aspects of clinical
decision-making. To maintain consistency, I will continue to follow Tanner's classification system of components studied, task/clinician variables which influence process and outcome, and theoretical perspective.

In the area of components studied, most of the research focused on assessment (Thiele, Baldwin, & Hyde, 1986; Itano, 1987; Lamond, Crowe, Chase, Doggen, & Swinkels, 1996) and diagnosis (Westfall, Tanner, Putzier, & Padrick, 1986; Lange, Haak, Lincoln, Thompson, Turner, Weir, Foerster, Nilasena, & Reeves, 1997). Shamian (1988) investigated intervention decisions following teaching about decision theory, and will be included in this thesis in the discussion of theoretical perspective. Liukkonen (1992) studied all the Nursing Process components (data collection/assessment, problem identification, goal-setting, interventions, and evaluation).

Three studies involved various aspects of *assessment* decision-making. Using simulations, Thiele et al. (1986) studied the effects of teaching cue recognition on nursing students' ability to identify cues and make clinical decisions. The results indicated that both junior and senior baccalaureate students improved in cue recognition and diagnostic accuracy following this intervention. In her study of senior baccalaureate students and experienced RNs, Itano (1989) explored the type and number of cues elicited and the judgement processes employed. Participants were assessing actual hospitalized patients, but in a controlled research situation rather than in the context of the real work situation. Although students and RNs collected cues in the same proportions, the RNs collected more cues and used the cue types differently. Lamond et al. (1996) studied the information sources used by RNs on medical/surgical units in English hospitals to make
assessment decisions. Content analysis of the interview data revealed four major sources: verbal information from patient/staff/family/other, observation, the RNs' own prior knowledge, and written information (e.g. chart, kardex). Of these sources, verbal information was used approximately twice as much (41%) as each of the others (17 - 21%).

Two studies concentrated on the diagnostic component. Westfall et al. (1986) examined nursing inferences of both students and RNs within a framework of Information Processing Theory. They found that inference activation is an important component of nursing diagnostic reasoning in both students and graduates, but that graduates activate more complex inferences. Lange et al. (1997) investigated the use of Iliad (a computerized expert system previously used effectively with medical students) as a teaching method to improve the medical diagnostic skills of nurse practitioner students. Nurse practitioners (NP) are primary health caregivers with advanced education whose role includes combining the nurse's focus on the human response to illness with expanded medical (disease-focused) diagnostic skills. The results of the study, which involved testing on computer simulations, indicated that this expert system was effective in improving their medical diagnostic skills, and that there was an interaction with their prior experience. Nurses have some experience with data collection and generating tentative medical diagnostic hypotheses, but not with diagnostic verification strategies. Iliad was more effective in areas where the students had less prior experience.

One study considered RNs' facility with the entire Nursing Process. Using a naturalistic method, Liukkonen (1992) examined the overall decision-making process of
psychogeriatric nurses working in a Finnish mental hospital. The results indicated that the nurses had little difficulty with problem identification, but goal-setting, intervention selection, and evaluation were troublesome. Data collection tended to concentrate on the physical aspects, rather than on the cognitive, social, and emotional areas.

In the realm of task and context variables, researchers looked at task nature/complexity and its relationship to other variables (Corcoran, 1986; Hughes & Young, 1990; Lauri, 1995), diagnostic reasoning strategies (Tanner, Padrick, Westfall, & Putzier, 1987), and the decision-making related to the discharge of elderly patients from hospital (Wells, 1995). Two of the studies examining task nature/complexity will be discussed here. The third (Hughes & Young, 1990) will be discussed under theoretical perspective.

Corcoran (1986) investigated task complexity and nursing expertise as factors in decision-making. She used Information Processing Theory and verbal protocol methods to describe the initial and overall planning approaches used by novice and expert RNs on case studies of varying complexity. The results suggested that decision-making strategies employed were dependent on the nature of the task. Using a Likert-type questionnaire, Lauri & Salantera (1995) looked at the decision-making models of 100 Finnish nurses working in in-patient clinics and of an equal number of their public health counterparts. The results indicated four different types of decision-making: questioning/unquestioning, creative-diversive, patient/nurse oriented, and rule- and situation-based. The researchers note that “the main variables showing a statistically significant relationship were experience, structure of knowledge and the nature of the nursing task and context” (p.
525). Some changes in decision-making occurred with increasing experience, but the primary differentiating factor was the nursing task and context. "Public health nurses were questioning and patient-oriented...while [clinic] nurses were unquestioning and nurse-oriented" (p. 526).

Tanner et al.'s (1987) study of reasoning strategies also showed some degree of task specificity, while Wells' (1995) research into hospital discharge decision-making identified the contextual forces which were driving the process. Tanner et al. studied the diagnostic reasoning strategies used by junior and senior nursing students and practising RNs working on medical or surgical units of a large university medical centre. The subjects' diagnostic reasoning strategies fit with Elstein's Hypothetico-Deductive Reasoning Model. The data acquisition strategies chosen were fairly generalizable across simulations, but the number and earliness of hypothesis generation and the degree of diagnostic accuracy were task-specific. In a study of the decision-making related to the discharge of elderly patients from hospitals, Wells (1995) discovered that the process was largely driven by systemic forces (e.g. bed turnover rates, hospital economic viability) rather than by consideration of the patients' clinical trajectories and patient/family needs. Wells examined case records of 31 discharged elderly patients and analysed the data within the framework of Jurgen Habermas's critical theory. She recommended that nurses be educated about the relationships between institutional practices, the health care system, and the larger society, in order to help them recognize the need for change. This is a small, non-generalizable study which is strongly influenced by the author's critical theory
perspective, but it does raise an important point about the effect of the hospital structure on nurses’ and other health professionals’ decision-making.

A large amount of research has been done in the area of clinician variables. Researchers have investigated the development of clinical competence in RNs (Benner, 1984; Cruikshank, Mackay, Matsuno, & Williams, 1994); decision-making types/styles (Lutzen & Norden, 1993; Valentine, 1992) influences on decision-making (Jenks, 1993; Luker & Kenrick, 1992; and Tschikota, 1993), and characteristics of the decisions/decision-makers (Hughes & Young, 1992; Loving, 1993). Both Benner (1984) and Cruikshank et al. (1994) noted the importance of experience to the development of expertise in clinical decision-making. Using a phenomenological approach, Benner (1984) did ground-breaking work on the development of clinical judgement in graduate nurses. She found that clinical competence developed in a manner consistent with the Dreyfus’ model of Skill Acquisition which postulates five stages: novice, advanced beginner, competent, proficient, and expert. The development of expertise is related to experience, and is highly context-dependent (i.e. experts in one specialty might be novices in another). Cruikshank, Mackay, Matsuno, and Williams (1994) studied the clinical competence of RNs in Western Australia. Education and clinical experience were separately related to clinical competence, but there was no significant interactive effect on increasing competence.

Valentine (1992) and Lutzen & Norden (1993) examined the decision-making types/styles of nurses in different settings. Valentine (1992), using case study methodology, investigated the decision-making styles of Canadian female nurse educators
in a hospital school of nursing. She discovered that subjects' decision-making was primarily cooperative, collaborative, and consensual, which reflects similar findings in feminist literature. She recommended that female nurse administrators should promote this style, rather than aspiring to the more hierarchical decision-making styles of their male counterparts. Lutzen & Norden (1993) investigated the moral decision-making of experienced RNs in a psychiatric setting via in-depth interviews using the grounded theory method. They discovered that benevolence, defined as "the wish to do good" (p. 1107), was a central theme of subjects' decision-making. The nurses frequently experienced conflict between the clients' wishes and the imperatives of the medical regime. This conflict was exacerbated when the client was confused and unable to express clearly his/her wishes and to understand the benefits of proposed interventions. This small, exploratory, qualitative study cannot be generalized, but it has raised important questions for further investigation.

Three studies investigated factors which influenced the decision-making of nurses/nursing students. Luker & Kenrick (1992) studied the influences which affected the clinical decision-making of community nurses in Britain. It was a qualitative study involving participant observation, interviews and group discussions, and an examination of nursing records. The researchers discovered that, although the nurses acknowledged the importance of scientific knowledge, their decisions were primarily based on experience rather than on knowledge base and they were not "positively disposed toward research knowledge" (p. 457). The authors questioned whether subjects were subconsciously reclassifying scientific knowledge as experiential. Jenks (1993), using naturalistic inquiry,
investigated the pattern of personal knowing (including knowledge of patients, physicians, and peers) in RNs' clinical decision-making. Respondents indicated that the success of their clinical judgements was highly dependent on their relationships with patients, peers, and doctors. Tschikota (1993) looked at the relationship between Canadian student nurses' clinical decision-making and their locus of control. Six decision-making elements and eight patterns were identified, and the way in which these were used varied between internally- and externally-oriented subjects. However, all subjects made decisions consistent with novice decision-making patterns, and with Information Processing Theory.

Hughes & Young (1992) and Loving (1993) researched characteristics of the decisions/decision-makers. Hughes & Young (1992) looked at the stability of surgical and ICU RNs' clinical decisions in three different hospitals. Slightly more than half the nurses made stable decisions (which were not reversed by the addition of insignificant clinical data). The stability of decisions appeared to be linked to both the employing hospital, and to the country in which the RNs received their nursing education. Those educated outside North America tended to make less stable decisions. Loving (1993) investigated baccalaureate students' perceptions of learning clinical judgement, and developed a model ("competence validation") which describes how students acquire a concept of themselves as competent nurses. If students perceive their clinical experience as primarily evaluative, rather than as primarily educational, this interferes with the development of cognitive flexibility which is important in the clinical judgement process.

From the standpoint of theoretical perspective, the research of Shamian (1988) and Hughes & Young (1990) involved the use of decision theory in different ways. Shamian
(1988) studied the effects of teaching decision analysis on the clinical decision-making of baccalaureate nursing students. She used a posttest quasi-experimental design involving case studies and questionnaires. The experimental group made more correct decisions and made them more consistently than did the control group. Therefore, the results indicated that learning decision analysis had a beneficial effect on the students' decision-making. However, generalizability was limited by the convenience nature of the sample, and there was no follow-up to examine the effects over time. Hughes & Young (1990) examined the relationship between the consistency of RNs' decisions and the complexity of simulated tasks, using a statistical decision-making model. They discovered that the nurses made some decisions which were consistent with the normative model, but that the decisions varied from the normative model as task complexity increased. Also, more predictor variables were needed to explain consistency as the tasks became more complex.

Most research into the clinical decision-making of nurses has involved baccalaureate students (not college students) and RNs, and almost all of it has been done using simulated client situations. In general, the research results suggest that nurses and nursing students make decisions in line with Information Processing Theory and the Hypothetico-Deductive Reasoning Model. However, since nursing students are at the novice level according to the Skill Acquisition Theory, their decision-making generally fits equally well with this framework. Some consistency with normative decision-making has been noted, but it quickly degrades with increasing task complexity. Research into the effects of contextual variables is extremely limited because simulations don't lend themselves to studying context. However, Benner's (1984) phenomenological study of the
development of clinical competence in RNs with varying levels of experience has shown that the development of clinical judgement is highly context dependent. Very few Canadian studies have been done into nurses’ clinical decision-making. Of the three included here, one involved baccalaureate students and simulations, another involved nurse educators and interviews/observations, and the third studied hospital discharge procedures via interviews and patient records. There are clearly some significant gaps in the jigsaw puzzle of nurses' clinical decision-making that we are gradually beginning to assemble.

Nursing Literature Linking Critical Thinking & Clinical Decision-Making

Two studies specifically link the concepts of critical thinking and clinical decision-making in nursing. Pardue (1987) investigated the differences in critical thinking skills and clinical judgements among associate degree, diploma, baccalaureate, and masters' prepared nurses (all RNs). The baccalaureate and masters' level nurses had the highest critical thinking scores on the WGCTA. There were no significant differences among the four groups in clinical decision-making on simulations. Knowledge and experience were the most important factors.

Brooks & Shepherd (1990) looked at critical thinking and clinical decision-making among four groups of senior nursing students (associate degree, diploma, generic baccalaureate, and post-diploma baccalaureate). Critical thinking scores on the WGCTA were higher in both groups of baccalaureate students than in the other two groups. However, only the post-diploma baccalaureate students demonstrated significantly better clinical decision-making on the Nursing Performance Simulation Inventory. There was no significant difference among the other three groups. In other words, the generic
baccalaureate students' higher CT scores failed to translate into better clinical decision-making. Some, if not all, of the post-diploma baccalaureate group likely had some work experience which is probably the most significant factor in their higher decision-making scores. There was a weak but significant correlation between CT and clinical decision-making across all four programs.

In relation to measurement issues, Facione, Facione, & Sanchez (1994) have suggested the potential of critical thinking dispositions as predictors of clinical decision-making accuracy. They (primarily Dr. Noreen Facione who is a nurse) have developed the California Critical Thinking Dispositions Inventory based on the Delphi Research Project's definition of critical thinking (described earlier). The premise is that individuals who value the CT skills will be more motivated to master and employ them. The instrument has been pilot-tested in conjunction with the California Critical Thinking Skills Test with good results.

Kataoka-Yahiro & Saylor (1994) have developed a Critical Thinking Model for Nursing Judgment. It has five components (specific knowledge base, experience, CT competencies, CT attitudes, and CT and professional standards), and three levels (basic, complex, and commitment). Although there are no research studies based on this model in the literature, the first two components are well documented as essential parts of clinical decision-making. The CT competencies and attitudes are also generally believed to be related to clinical decision-making, although the exact mechanism continues to elude researchers. The fifth component (CT and professional standards) is a unique addition specifically for nursing and, as such, it deserves further consideration.
The nursing research literature which specifically links the concepts of critical thinking and clinical judgement/decision-making is very sparse. Much of the clinical judgement research literature assumes a connection, but the studies reported above have surprisingly not supported this assumption. This is an area which obviously requires much more research before we can begin to understand how thinking skills and attitudes come to be manifested in decisional outcomes in the real world.

**Summary**

In developing the theoretical base for this research project, I have examined the literatures related to critical thinking and clinical decision-making in nursing and other disciplines. There is disagreement about the exact nature of critical thinking, reasoning, and clinical decision-making; how they relate to each other; and how they should be measured. There are also differences of opinion about whether critical thinking and reasoning are generalizable or domain-specific, and whether clinical decision-making is based on good CT/reasoning processes or on a well-structured knowledge base. Clinical judgement research has demonstrated a number of common decision-making shortcuts and errors, and a variety of theories and models have been proposed to describe how individuals should and do make clinical decisions. Fundamental to these disagreements are deeper questions about the nature of cognitive processing (linear or holistic) and the constraints implied by the cognitive processing theory being used. From this literature review, a picture of nurses’ critical thinking and clinical decision-making has begun to emerge but it is incomplete.
Most of what we know relates to baccalaureate nursing students and RNs. Some (but not all) studies indicated that CT (most commonly measured by the WGCTA) increased during nursing programs, but whether due to the program or to maturation is unclear. Some theorists have questioned whether the WGCTA (which uses general knowledge to test CT) is appropriate for measuring the processes used in nurses' decision-making (which appear to be largely task/domain-specific). The majority of studies have also used small and/or non-random samples which precludes their generalizability to the target population.

The most commonly studied clinical decisions are diagnostic hypotheses and their relationship to assessment. Studies have been done of the clinical decision-making of RNs in a variety of fields (medical/surgical, psychiatric, clinics, community health). In the assessment process, RNs collect more cues, use them differently, and activate more complex inferences than students do. Several different teaching methods have been used, with varying degrees of success, to improve students' clinical decision-making. Experience has been identified as a major factor in graduate nurses' development of clinical decision-making expertise, and students' decision-making has been found to be consistent with the novice pattern.

There is comparatively little research relating to college nursing students' CT and clinical decision-making, but what there is has been provocative. Although baccalaureate students generally have higher mean CT scores than college students, a few studies have shown no significant difference between the two groups' clinical decision-making. This
would seem to negate the general assumption that good critical thinking translates directly into good clinical decision-making.

Furthermore, the vast majority of clinical decision-making research has been done using simulations. Apart from Benner (1984), only in the last five years have researchers begun to investigate clinical decision-making in the actual situation, and virtually all of these studies involved graduate nurses, not students. Simulations, however good, cannot duplicate the complexity of the real clinical setting (Tanner, 1983), and Benner (1984) and others have noted the importance of context to clinical decision-making. The question remains, "What happens to the 'reasonable, reflective' thinker when you place her/him into the complex and demanding clinical situation?" This is a question about which we know virtually nothing in regard to student nurses. We don't really know what kinds of decisions they are making and in what patterns or configurations, what influences their decision-making, or how the context affects it. It was from these gaps in our understanding of student nurses' clinical decision-making that this research project evolved.

The research questions to be answered in this study are:

1) What are the decision-making patterns (types, frequency, and sequencing) evidenced by student nurses when providing client care in the actual clinical setting?

2) How appropriate are students' decisions?

3) Are there identifiable differences in the decision-making patterns and degree of insight into their own decision-making processes between student nurses
with good and poor decision-making skills?

4) Do decision-making patterns change with increasing task/contextual complexity?

5) Does decision-making appropriateness improve during a medical/surgical clinical rotation?

The nature of the research questions determined the methodology chosen for the project. A field study approach seemed most appropriate, and it is described in detail in the next chapter.
CHAPTER THREE
METHODOLOGY

The purpose of this research was to learn about the process of student nurses’ clinical decision-making while they were actually involved in patient care. The nature of the investigation required a field study approach. Since field study falls into the research tradition of ethnography (Morse, 1989), I will begin this chapter with a discussion of ethnographic field research, and outline its strengths and weaknesses. Within this context, the implementation of the research project is discussed, including: choosing the specific methodology, gaining access, sample selection, data collection, preliminary analysis of pilot test data, completion of data collection, choice of final sample, and transcription and analysis.

Ethnography

Ethnography is a type of qualitative research which focuses on the study of cultural groups or subgroups within their natural setting. The researcher’s objective is to learn about the “natives” (emic) view of their world as opposed to the outsiders’ (etic) view (LoBiondo-Wood, 1990; Morse, 1994). In order to do this, the researcher goes into the natural setting to collect the data (a field study). Because of their interest in how various groups experience different aspects of health/illness and health care, nurse researchers have become increasingly interested in field studies (LoBiondo-Wood, 1990; Morse, 1989; Morse, 1994; Polit & Hungler, 1993). According to Polit & Hungler (1993), “the purpose of field studies is to examine in an in-depth fashion the practices,
behaviours, beliefs, and attitudes of individuals or groups as they normally function in real life” (p195). In a traditional ethnography (e.g. in anthropology), the researcher lives within a cultural group over a prolonged period of time (several months to years) in an attempt to learn about the entire culture. However, other disciplines (e.g. nursing) have adopted this technique and used it to study particular aspects of a culture or a group’s everyday experience. These types of studies are called “focused” or “mini” ethnographies, and they tend to be more specific, more focused, and shorter (Morse, 1989). This research project falls into the “focused ethnography” category.

Morse (1989) states, “Ethnographic field research...always involves face-to-face interviewing, with data collection and analysis taking place in the natural setting” (p259). The primary instrument of data collection is the researcher and the main method is participant observation. The major strength of ethnographic field research is its basis in reality; results don’t have to be extrapolated from a laboratory setting into everyday life where the degree of fit is open to question. The major problems of field studies are bias, and lack of generalizability and replicability.

The researcher as the primary instrument of data collection brings his/her own particular bias to the observation. To help overcome biases, LoBiondo-Wood (1990) suggests “bracketing”, a technique in which the researcher tries to identify and set aside personal biases in an attempt to understand the situation from the emic viewpoint. As a nursing professor with many years of experience in clinical teaching, I believed that knowledge base was the primary factor in students’ decision-making, but that context was
also important. During the course of the research project, I attempted to focus on the participants' experiences of the situation rather than my own.

Other problems are the small sample size and nonrandom selection of participants (key informants) which limit the generalizability of results. However, since the intent of qualitative research is to increase understanding and to build theory rather than to prove/disprove specific hypotheses, the concern with generalizability is not the same as it is with quantitative research. Morse (1989) states, "sampling techniques that ensure quality of a quantitative study should not be used for qualitative research; in fact, they may invalidate the study" (p 119). Similarly, replicability is viewed differently in qualitative than in quantitative research. Sandelowski (1993) suggests that since "reality is assumed to be multiple and constructed rather than singular and tangible" (p3), there may be perfectly legitimate differences in representations of the same phenomenon among different researchers. She feels that in the attempt to interpret complex reality according to rigid rules, we may lose the spirit and real meaning of the phenomenon under study.

Choosing the Methodology

Since I wanted to study student nurses' clinical decision-making in the "real world" situation of providing patient care, I chose to do a mini-ethnographic field study. As a participant observer, I followed each of my informants (participants) throughout the first four hours of a clinical shift, finishing with a 20 - 30 minute retrospective interview. I used audio tape recordings and observational field notes as described in "Data Collection" to gather the data. I developed a verbal protocol with open-ended questions to capture participants' decisions and thoughts on an ongoing basis throughout the observational
period, and a semi-structured interview protocol using stimulated recall for the retrospective interview (see Verbal Protocol Questions and Stimulated Recall Questions, Appendix A1). I also developed two forms for recording field notes throughout the course of the observation (Researcher's Observations of Student Performance, Appendix A2; and Client Care Time Record, Appendix A3) whose use is described under "Data Collection". Each participant was observed twice, once as early as possible in her clinical rotation and again closer to the end. Triangulation, or the use of multiple methods of data collection (ongoing tape recordings, observational field notes, and retrospective interviews) was employed in order to provide different perspectives which help "to converge on an accurate representation of reality" (Polit & Hungler, 1993, p. 656).

**Gaining Access**

Gaining access proved to be much more complex and time-consuming than I had anticipated and it occurred in two distinct phases. Since the focus of the study was student nurses’ clinical decision-making, I needed nursing students who were engaged in patient care. However, in Ontario at this particular time, nursing students are prepared through two different streams: one in college, the other in university. With the ultimate goal of requiring beginning registered nurses to have a baccalaureate degree, many colleges and universities are currently working with each other toward articulated or collaborative programming agreements. For this reason, I wanted participants from both educational streams included in the study.
Phase 1: Gaining Access to Participants

In June of 1995, I initiated contacts with the nursing program administrations in two universities and two colleges. Considerations of distance and travel time negated one of the university programs, but I continued to pursue negotiations with the two colleges and remaining university. By August I had received permission to address the student groups I had chosen for the study as soon as classes started in the fall. The university nursing administrator’s acceptance was contingent upon the approval of the university’s ethical review board which fortunately was granted promptly. This was the second ethical review of the project; the first was by an ethical review committee of the Ontario Institute for Studies in Education.

During the process of negotiating access to the students, I had been required to change one facet of the study. Because I wanted to look for differences between students with good and poor decision-making skills, I had wanted to ask for volunteers from two groups which had been preselected by the institutions based on the students’ previous clinical performance. The institutions declined to so identify students; therefore, I proposed to speak to all students beginning their senior year in the respective nursing programs (see Sample Selection) and to explain what I was trying to do. Thus during the last week in August and the first two weeks of September, I made presentations to all the senior nursing classes in the three institutions, asking for volunteers to participate in the study. Ultimately a total of eighteen students (eleven from university, three from College A, and four from College B) agreed to participate and signed the participants’ “Informed Consent Form” (Appendix B1).
Phase 2: Gaining Access to Health Care Agencies

Then began the phase of gaining access to the clinical agencies in order to observe the students interacting with patients. Since the focus of the study was the student, not the patient (or staff), and since I had spent the majority of my professional career following nursing students as they provided patient care, I mistakenly assumed this would be a simple task. In fact, this became one of the most difficult aspects of the entire project. Between them, the participants were receiving their clinical experience at a total of nine different hospitals and one community health clinic.

None of the health care institutions had received this kind of research request before (i.e. one which involved them only indirectly) but they were nonetheless rightly concerned to protect their patients’ right to privacy. After careful consideration, the community health centre decided that its clientele would feel threatened by the presence of the researcher so permission was denied, and that volunteer (the only male nursing student) was lost to the study. In six of the nine hospitals, the proposal had to be accepted by their ethical review boards (a third ethical review and a very lengthy process) as well as by the administration of the nursing departments, while in the other three, the decision was made by nursing administrators alone. Ultimately all nine hospitals granted permission for the study, and their appropriate representatives signed the “Agency Administrative Consent Form” (Appendix B2). For those that required patients’ written consent, I developed a patient consent form (Appendix B3.1). Others accepted patients’ verbal consent as long as it was documented on my research records. In addition to the adult patient consent form (Appendix B3.1), one institution also required a consent form for
parents/guardians (Appendix B3.2) and one assent form for children below the age of majority but old enough to understand the study in simple terms (Appendix B3.3).

The time of receipt of the agencies' consents determined the order of scheduled observation periods, at least initially. The process of gaining access to all the hospitals lasted from early September to late October. The first hospital gave permission in the last week in September. I began data collection there the morning after I received permission and had just enough time to complete the six required observational periods before those participants finished their rotation. Data collection lasted from the end of September to the middle of December at which time all participants had completed the clinical rotations chosen for the study.

**Sample Selection**

While the criteria for qualitative sample selection are different from those in quantitative research (Sandelowski, 1993), they are no less important. Morse (1989) states that informants (participants) must be “experts” in the subject in the sense that they are or have been involved in the experience of interest, that they must be articulate about their experiences, and that they must have sufficient time and patience to participate in the interviews. She lists four types of qualitative samples: purposeful (the researcher selects participants according to the needs of the study), nominated (one participant is asked to suggest or “nominate” the next), volunteer (potential participants are asked to volunteer for the study), and total population (used when all informants live or work in a small area, e.g. members of a nuclear family). Qualitative samples are evaluated on the basis of appropriateness and adequacy. Morse (1989) states, “Appropriateness refers to the
degree to which the choice of informants and method of selection 'fits' the purpose of the study as determined by the research question'...and...adequacy...refers to the sufficiency and quality of the data." (p. 122)

There were several considerations involved in selecting the population from which this volunteer sample was ultimately drawn. Potentially the population could have been all student nurses at the participating educational institutions at any point in their educational process. However, clinical decisions must be based on discipline-specific knowledge; the knowledge base in the early stages of the programs would be too limited to yield the types of decisions and the process I wanted to study. On the other hand, once students had spent enough time in the clinical area that some of their decision-making became automatic, it would be less visible and more difficult to study. Thus I chose to observe student nurses during the first semester of their final year, at which time they had had the majority of their theoretical knowledge but only half or less of their clinical experience.

As indicated under "Gaining Access", I presented the research project to all appropriate classes in the participating educational institutions and asked for volunteers. I stressed that the intent of the project was to learn about students' decision-making in order to facilitate this process for future students, that volunteers could gain an improved understanding of nursing research and their own DM processes, and that all participants would remain strictly anonymous, with no feedback about them being given to their program personnel. Because I realized that most students were likely to find the presence of an observer an added stress in an already demanding situation, I offered an honorarium of twenty-five dollars for each completed observational experience (a total of fifty dollars
per participant). How influential the honorarium was in volunteers' initial decision to participate I don't know, but by the time of the observations most had forgotten about it. In any case, eighteen senior student nurses (eleven from the university, seven from the two colleges) agreed to take part in the study, and signed the Informed Consent Form (Appendix B1).

Initially, in the interest of maintaining some degree of consistency, I had asked for volunteers who were in medical-surgical rotations during the fall semester. For all college students, one of their two clinical rotations during the fall semester was in a medical-surgical area. However, the university volunteers, who spent the whole semester in one rotation, were in a variety of placements (e.g. emergency departments, labour and delivery, outpatient clinic, community health centre) as well as medical and surgical units. Since all of these areas were focused primarily on the care of clients with physical conditions (which provided a certain amount of consistency), I therefore broadened the criteria to include all except psychiatric areas.

Of the eighteen original volunteers, one had to be removed from the study because his placement declined permission. Another subsequently chose not to participate due to personal problems, and a third reluctantly withdrew because she felt that her placement (a clinic situation in which she did a lot of interacting with patients by telephone) was not suitable (even though the institution had given permission). Thus the final sample comprised eight university students and seven college students.

This sample met Morse’s (1989) criteria for qualitative samples. Since participants were currently involved in the experience which was being studied, the sample was
appropriate and the data from thirty observational periods (including participants' biographical data) was more than enough. The only concern was the issue of participants having enough time to express their thoughts appropriately. Having the retrospective interview at the end of the observational period helped to overcome this problem.

**Data Collection**

Data collection took place over a three month period from late September to mid-December, 1995. I contacted each participant by telephone to arrange a mutually agreeable schedule for the observational periods and then met them at the beginning of their shifts on the prearranged dates. Occasionally observation periods had to be rescheduled because of a participant’s illness or personal difficulty, but all fifteen final volunteers completed their participation in the project. Usually the observation took place on the day shift, but one occurred on a 12-hour night shift, one on an evening shift, and two others on a modified afternoon shift (starting at one o’clock in the afternoon).

The administrations of the nursing schools and hospitals initially notified the appropriate personnel (teachers, unit administrators) about the research project and gave permission for my observational visits. The participant was responsible for explaining to her teacher/preceptor about the project and when I was coming for the observational period. I also had contacted both teachers and unit administrators prior to the observation periods so that they were prepared for my visits. Often, however, the information had not filtered down to the unit staff, so I explained the situation to them individually when the occasion arose.
Gaining access to information about the participants' patients was somewhat complicated. Because of restrictions placed on me by the hospitals, I had access only to information which the participant was able to give me about her patients (i.e. I was not allowed to attend change-of-shift report or to review the chart independently for additional information). The patients themselves, however, were frequently valuable sources of information, and all were quite willing to allow me to observe for the purposes of the study once it was explained to them.

At our first meeting, I explained to each patient in the informant's caseload the purpose and nature of the research and obtained his/her verbal and/or written consent, assuring each one that the focus of the research was the student (not the patient), that all patients would remain anonymous, and that no tape-recording would be done in patients' rooms. While in the patients' rooms, I wrote observational field notes on the Researcher's Observations of Student Performance sheet (Appendix A2) detailing the informants' activities. Each time we left a patient's room, I tape-recorded brief conversational interludes (often 2-3 minutes in length in the hall walking from one patient's room to the next, with longer periods in the nursing station, utility rooms, etc.) during which I used individualized variations of the verbal protocol questions. On the Client Care Time Record (Appendix A3), I noted informants' activities during each fifteen minute segment of the observational period. At the end of the four hour segment, I used individualized variations of the stimulated recall questions to lead the informants back through their decision-making during the observational period. This allowed them to clarify and enlarge on the data that had been captured during the brief conversational interludes between patients'
rooms and on the observational field notes. The interviews typically lasted twenty to thirty minutes and usually took place during a meal break. The intent of this method was to interfere as little as possible with the informants’ usual decision-making during the course of patient care, but also to provide an opportunity during the retrospective interview to add data which might have been overlooked because of the pressure of work. Following this same pattern, I observed each informant twice during the course of her clinical rotation, once as early as possible during the rotation and the other time close to the end.

In the clinical situation, I wore my nurse’s uniform and a short white clinical jacket. The tape recorder, a Realistic brand, 2-speed microcassette recorder, was in the jacket pocket and the small pin microphone was attached to the jacket collar. Although informants were fully informed about when the tape recorder would be operating, I chose to keep it as inconspicuous as possible to minimize their nervousness. In fact, most participants forgot about the tape recorder early in the shift. Writing the field notes was a much more obvious reminder of the research process, but both patients and participants seemed generally unfazed by the note-taking. In order to ease the strain of being constantly observed by a stranger, I participated minimally in patient care (e.g. occasionally helped with bedmaking) and periodically interjected social remarks into the conversations. Coffee breaks (when time was available) also provided time for social interaction which helped to make participants and preceptors more comfortable with me. The final interview usually took place in an unoccupied lounge or a quiet section of the
cafeteria. The in situ recordings plus the final interview resulted in approximately 60 - 90 minutes of taped verbal interactions for each observation.

**Preliminary Analysis**

Polit & Hungler (1993) state that, unlike the step-by-step approach of traditional research studies, data collection and analysis usually occur simultaneously in field studies. Initially in this research project, data collection and analysis proceeded concurrently. However, because of the time constraints on the data collection period and the labour intensive nature of transcription and analysis, it rapidly became impossible to transcribe and analyze the tapes on an ongoing basis while data collection continued. Thus, tapes of the first observational periods for one college and one university participant were transcribed and analyzed as a pilot test to validate the methodology and instruments (see Transcription and Analysis). Thereafter, primary emphasis was placed on completing data collection by the end of the semester. Informal analysis (e.g. mental review of adequacy of data collected, adjustments of questions and conversational style to match unfolding situations, etc.) occurred throughout the data collection period, but the formal analysis was postponed until after the completion of data collection.

The preliminary analysis of the pilot test data demonstrated the appropriateness of the methodology, but also pointed out some areas for change in both the interviewing process and field notes. In the interviewing process it was necessary to be slightly more directive than I had originally anticipated. Because individuals responded differently to the presence of the researcher and some were more articulate than others in verbalizing their thought processes, the verbal protocol questions (Appendix A1) were used as a guideline
only, rather than as a set format. The intent of the questions was to get at participants' thought processes without leading them. However, if questions were too nondirective, participants frequently asked for some guidance about their meaning, so I gave minimal cueing (e.g. asking about a patient's assessment) as needed. Similarly, in the retrospective interview, most participants needed some prompting to help them sort through the mass of remembered data from the observational period.

Of the two observational records developed for use in the project, the Client Care Time Record (Appendix A3) was very useful, requiring only modification of actual observation times to fit nonstandard shifts (e.g. nights or evenings). The “Researcher’s Observations of Student Performance” (Appendix A2) was much too rigid to be used in the way it was originally intended because it required judgements by the researcher which could really only be made in retrospect. Consequently, I ignored the headings and used it to describe detailed information about the patient, and about the participant’s actions while in the patient’s room (when the tape recorder could not be used). Thus, the written records were used in conjunction with the tape recordings in order to provide as complete a picture as possible of the participant’s functioning during the observational period. With these modifications based on preliminary analysis of data from the pilot test, the methodology proved appropriate for the completion of the data collection.

Choice of Final Sample for Analysis

The fifteen participants (7 from college, 8 from university) who actually took part in this project generated very large amounts of data, so a decision was made to select a subset of six for intensive analysis. The subset was defined initially on the basis of two
parameters: location of experience (on medical or surgical units within acute care general hospitals) and program type (three each from college/university). All college students were in medical/surgical rotations at some point during the semester, and thus were equally eligible for selection. Four of the university students were in specialty placements (emergency, labour & delivery, and clinic settings) and so were excluded. This left a potential pool of 7 college students and 4 university students from which to choose.

Among the college students another division presented itself. The seven college students represented two different college programs (3 from College A, 4 from College B). The students from College A did their medical/surgical rotation in the first half of the semester, while those from College B did theirs in the latter half. I had already begun doing the transcription and analysis on the first two participants from College A when the decision was made to choose the subset. Hence, these participants became part of this group. The choice to select the third college participant from College B, rather than to take the remaining participant from College A, was based on the fact that all participants from College A were under the guidance of the same clinical teacher, while there were different teachers/preceptors involved with College B and university participants. In order to offset the potentially large effect of this one individual on the data, I chose to select the third college participant from College B. The remaining college participant was selected by drawing a name randomly from among the four potential subjects (names on folded slips of paper placed in a hat).

Of the four university participants assigned to medical/surgical units throughout the whole semester, I had already begun transcription and analysis for the one involved in
the pilot test. Consequently, she was included in the subset. Two additional university participants were chosen from the three remaining subjects in the same manner as the college students. The subset of six was then complete. Because all the participants were female, the personal pronouns used in the writing of the analysis are exclusively female.

Transcription and Analysis

The most time-consuming segment of the research project was that devoted to tape transcription and analysis. These two processes are discussed in depth below. The subset of six participants chosen for intensive analysis produced twelve 60-90 minute audio tapes and their accompanying field observation records. Each tape was transcribed word for word to the greatest extent possible, although the environmental noise on the tapes made this a challenging task. While occasional words were lost, the meaning was generally clear. I transcribed ten of the twelve tapes myself. One tape was transcribed by an RN and the other by a nursing student after both had received a brief orientation period to the project and the individual voices on the tapes. I checked the transcriptions of the final two tapes before analyzing them. The completed transcriptions averaged approximately 25-30 single-spaced, typed pages each.

Once the tape was transcribed, I began the process of augmenting it with the data from the observational field notes (Field & Morse, 1985). I used the Client Care Time Record (CCTR) to divide the transcript into time segments, noting the times and activities from the CCTR in the left margin of the transcript at the appropriate places. Finally, I added the detailed information from the Researcher's Observations of Student Performance piece by piece into the left margin where appropriate interludes were
indicated on the transcript. Thus, the augmented transcript contained all the data from audio tape and accompanying observational records.

Once some augmented transcripts were completed, the first stage of analysis began and continued concurrently with completion of the remaining transcriptions. In general, I followed Colaizzi's six steps (LoBiondo-Wood, 1990) for analyzing qualitative data (read the transcripts, identify significant statements and phrases, formulate meanings from significant statements, cluster meanings into themes, integrate into an exhaustive description of the phenomenon under study, and validate the results with the participants).

Initially, I read each transcript thoroughly and coded it manually for decision types (e.g. assessments, hypotheses, interventions), then counted the frequency of decision types for each transcript. Next, I followed each decision sequence through the transcript to track the order in which decision-making was occurring. For example, a participant was concerned about bowel function in a patient with a spinal cord injury. She began with assessment data from the night report (bowel sounds present) and her knowledge about the effects of immobility, developed an hypothesis that his bowel function was still hypoactive, considered potential interventions (unit's bowel routine) but did not choose any at this time, and followed up at two later points by reassessing bowel sounds (assessments) and charting the results of her assessment (interventions). By following this format, I was able to see each participant's overall decision-making patterns. Finally, I examined the appropriateness of the decision-making in relation to the patient's situation and the participant's knowledge and level of experience, looking for inappropriate or omitted areas. I was then able to look for similarities and differences in decision-making
patterns among participants from different programs and age groups. This constituted the first level of analysis.

Then followed a deeper level of analysis in which I reread all the transcripts looking for factors which impinged on the participants' decision-making. During this process, I focused my attention away from the decisions themselves and onto the surrounding data. From this second-level analysis a set of contextual factors emerged which powerfully affected students' decisions by placing demands on their limited time and cognitive processing resources. These contextual factors are discussed at length in the Analysis of Data & Discussion of Results chapter.

The process described above fits within Colaizzi's first five steps, but there was a problem with regard to validation. By the time this process had been completed, participants had graduated and were no longer accessible to review the analysis. In lieu of validating the information with the participants, I obtained two nursing experts to act as external raters. One was a retired nursing professor from a community college; the other was still actively teaching in a university nursing program. These raters examined portions of the augmented transcripts and independently coded them. Initially, the level of agreement between the researcher and each rater ranged between 60 - 65%. Following discussion and clarification of the coding scheme, the agreement level exceeded 90%. While this procedure is not the same as validating the results with the actual participants, it did help to clarify questionable areas, offset biases introduced by the researcher, and validate the efficacy of the analytical process.
CHAPTER FOUR
ANALYSIS OF DATA & DISCUSSION OF RESULTS

Revised Research Questions

This research was designed to answer questions about the clinical decision-making of student nurses while they were actually involved in patient care. Initially, the research questions were:

1) What are the decision-making (DM) patterns (types, frequency, sequencing) of student nurses who are engaged in patient care?

2) How appropriate are students’ decisions?

3) Are there identifiable differences in DM patterns and degree of insight into their own DM processes between student’s with good and poor DM skills?

4) Do decision-making patterns change with increasing task/contextual complexity?

5) Does decision-making appropriateness improve during a medical/surgical clinical rotation?

Since participants were recruited from all students in the appropriate semester at participating educational institutions, rather than from selected groups with identified strengths and weaknesses in clinical decision-making, Question #3 remains unanswered. However, naturally occurring divisions within the sample allow for exploration of
differences between university and college nursing students, and students of different ages and life experiences. Because it was difficult to measure "increasing contextual complexity" objectively, Question #4 was also changed. The revised Questions #3 and #4 are:

3) Are there identifiable differences in DM patterns among participants based on program type or age and life experience, and if so, what are they?

4) What contextual factors influence student nurses’ clinical decision-making and how do they do so?

Questions #1, #2, and #5 remain unchanged.

Data from six participants (three diploma nursing students and three baccalaureate nursing students) were analysed to yield the following results. All were in the penultimate semester of their respective programs (Semester 5 for college students, Semester 7 for university students). At this point in their programs, participants had had the majority of their classroom instruction, but less than half of their clinical experience. During the final two semesters of both types of programs, there is an increasingly heavy concentration of clinical experience which is intended to prepare students for entry to practise as beginning staff nurses.

Research Findings

The main findings in relation to the research questions are that: 1) participants generally did not follow normative (best) decision-making (DM) patterns while they were engaged in providing patient care, 2) the majority of participants’ decisions were
generically appropriate, 3) participants' DM patterns showed very few differences based on program type or age and life experience. 4) contextual factors exerted powerful influences on participants' DM processes, and 5) most participants' DM patterns did improve during the course of the clinical rotation.

Each of the main findings is discussed in detail in this chapter. The chapter is organized into several sections according to the research questions as follows:

Identification of participants by program and age/life experience

Discussion of decision-making patterns

Decision Types and Frequencies (assessment, analysis/hypothesis, intervention, subcategories - nursing/procedural, organization/priority-setting, administrative/communication)

Decision Sequences

Discussion of decision appropriateness

(assessment, analysis/hypothesis, intervention, organization/priority-setting, administrative/communication, errors)

Summary of decision-making patterns and appropriateness

Differences in decision-making patterns based on program type and age/life experience.
Contextual factors and how they influenced participants’ DM.

Abundance of Data, Scarcity of Time, Conflicting Priorities, Relationships, Participants’ Preoccupations/Knowledge/Experience, Hospital Culture

Changes in participants’ DM over the course of a clinical rotation

Overall Summary

Participants

<table>
<thead>
<tr>
<th>Participant (Pseudonym)</th>
<th>Program and Age/Life Experience Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alison</td>
<td>College A; mature (35+ yr); family responsibilities</td>
</tr>
<tr>
<td>Beth</td>
<td>College A; young (20-25 yr); single</td>
</tr>
<tr>
<td>Cindy</td>
<td>College B; mature (35+ yr); family responsibilities</td>
</tr>
<tr>
<td>Debbie</td>
<td>University; young (20-25 yr); single</td>
</tr>
<tr>
<td>Eve</td>
<td>University; mature (35+ yr); family responsibilities</td>
</tr>
<tr>
<td>Fran</td>
<td>University; young (20 - 25 yr); single</td>
</tr>
</tbody>
</table>
The first observational periods with Alison and Debbie were used in the pilot study which yielded appropriate data and confirmed the adequacy of the methodology. Since no major changes were required in the methodology after undertaking the pilot study, Alison and Debbie were appropriately included in the final analysis of data.

**Decision-making Patterns**

**Decision Types and Frequencies**

Tanner (1983) identified *three* types of decisions which nurses make in the course of providing patient care: assessment decisions (what to observe), diagnostic decisions (what the observations mean), and treatment (intervention) decisions (what to do about problems identified). At the beginning of data analysis, these were the decision types I expected to find, and I anticipated that they would be easily separable.

Both the process and the results of the analysis produced surprises. First, it quickly became apparent that nurses' decision-making is a holistic entity which is not easily divisible. Not only does one type of decision flow easily into another, sometimes without clear demarcation, but also nurses' decision-making is frequently a collaborative, rather than an individual, process. Hutchins (1995) points out that cognition in a team working environment is a distributed, rather than an individual, function: distributed across time, across people, and across locations. This is no less true of nursing students giving patient care on a hospital unit than it is of the navigational team aboard an aircraft carrier that Hutchins studied in his research project. Trying to separate an integrated process into component parts without losing the meaning of the whole presents difficulties.
Secondly, analysis of the data revealed additional types and subtypes of decisions which I had not expected to find. Within each of Tanner's three decision types, two subcategories could be distinguished. One subcategory included decisions which fall within the independent sphere of nursing (those which can be independently implemented by nurses, which I have called "nursing" decisions); the other included decisions which fall within the interdependent sphere of nursing (those which require an order from another health professional, which I have called "procedural" decisions). In addition, two other categories (organization/priority-setting and administrative/communication) emerged which were fairly consistent among participants. The definitions of these categories and subcategories are listed in Table 2. The coding guidelines used to identify all of the above types of decisions are included in Appendix C.

Finally, Tanner's "diagnostic decisions" use a terminology which is no longer as popular as it was when she did her study, and describe a particular concept (i.e. NANDA diagnoses) which did not match the data well. Thus, I renamed this category "analysis/hypothesis".

In Table 2, the decision types identified with a (C) represent the major categories. Those which are indented, italicized, identified with an asterisk (*), and followed by (SC) represent the two subcategories found in each of the first three major categories. To clarify and further explain the categories listed in Table 2, I will discuss each of the decision types separately.
### Table 2

**Decision Types Found Among Participants During Observational Periods**

<table>
<thead>
<tr>
<th>Decision Type</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment (C)</td>
<td>Observations which participant chose to make/questions initiated by participant during observational period</td>
</tr>
<tr>
<td>Analysis/Hypothesis (C)</td>
<td>Assignment of meaning to assessment data/development of tentative conclusion based on data</td>
</tr>
<tr>
<td>Intervention (C)</td>
<td>Patient care activity (other than reassessment) instituted by participant during observational period.</td>
</tr>
<tr>
<td><em>Nursing (SC)</em></td>
<td>Decisions related to <em>independent</em> nursing functions</td>
</tr>
<tr>
<td><em>Procedural (SC)</em></td>
<td>Decisions related to <em>interdependent</em> nursing functions (those ordered by another health care professional)</td>
</tr>
<tr>
<td>Organ/Priority-Setting (C)</td>
<td>Decisions about the relative importance of various aspects of patient care (both intra- and inter-patient)</td>
</tr>
<tr>
<td>Admin/Commun (C)</td>
<td>Decisions about patient assignment, communication with doctors re initiation of orders, transcribing orders, etc.</td>
</tr>
</tbody>
</table>
Decision type 1 - assessment.

The sources of data for participants' assessment decisions were relatively straightforward, but the choice of what constituted these decisions was not. Lamond, Crowe, Chase, Doggen, & Swinkels (1996) identified four main information sources used by RNs (verbal, observation, prior knowledge, and written) to make assessment decisions, and noted that verbal information was used twice as much as each of the others. Participants in this study used the same sources, and used verbal information most often.

Separating assessment decisions from assessment data proved somewhat complex. Participants were bombarded with assessment data (that they had not necessarily chosen to collect) from a variety of sources (primarily patient, teacher/preceptor, other nursing staff). Also, they often had data which they had collected during previous interactions with the same patient. These data did not represent participants' assessment decisions during the observational period, but they often formed part of participants' subsequent decision-making. For the purpose of setting reasonable boundaries on the analysis of participants' assessment decision-making, I included only those observations/questions which the participant herself initiated during the observation period, including continued monitoring/reassessment of a situation. In examining the overall sequence of decision-making, however, consideration was given to all assessment data possessed by the participant, regardless of how or when she acquired it.

Decision type 2 - analysis/hypothesis.

As previously noted, the term “diagnostic decisions” presented a number of difficulties. Although nursing diagnosis is a major component of the Nursing Process
which has been in common use for the last several years, growing numbers of nursing educators and administrators are becoming uncomfortable with its “medical”/illness-related overtones. There is a move toward a more holistic, health-oriented worldview with its primary focus on the patient (client) as definer and co-creator of his/her own health. Consequently, many participants talked in terms of patients’ “issues”, “concerns” or “priorities”, rather than of nursing diagnoses. Nevertheless, participants used a process (however labelled) to determine what was important in terms of patient care. This process included obtaining/dealing with large amounts of data, assigning meaning to data (sometimes overtly), and choosing what to do for patients. The part of this process which involves deciding what data mean and reaching a tentative conclusion is the diagnostic step: I chose to label these decisions as “analysis/ hypothesis” to avoid the problems associated with the term “nursing diagnosis”. Although conceptually different, analysis and hypothesis proved difficult to separate in practice; therefore these two categories were collapsed into one. Analysis/ hypothesis is the least well articulated part of the overall process, and is often either completely implicit or simply omitted. However obvious the hypothesis may have appeared, the participant had to verbalize at least part of this component in order to be given credit for an analysis/ hypothesis decision.

**Decision type 3 - intervention.**

Intervention (treatment) decisions were defined as those in which the participant chose to perform some aspect of nursing care (e.g. hygiene, bedmaking, exercise/positioning/mobility, nutrition, emotional care, teaching/explanation, etc.). I also counted a decision to consult with/report to another health care professional (e.g. nurse, teacher,
preceptor) about some aspect of patient care as an intervention decision because this represented the participant obtaining additional resources on behalf of the patient.

The above categories (assessment, analysis/hypothesis, and intervention) reflect the decision types that Tanner (1983) described in her work on nurses' decision-making. However, she was focusing specifically on nurses' decisions in relation to individual patients. I was interested in the whole range of decision-making required of student nurses, because this more clearly represents the time and cognitive processing demands imposed on them during the course of a clinical shift. Thus, during my data analysis, I noted some additional categories/subcategories of decisions made by participants. The following decision types and subtypes (organization/priority-setting, administrative/communication, and nursing/procedural) were apparent in addition to those described by Tanner.

**Decision subcategories - nursing and procedural.**

I found two subcategories among the assessment/hypothesis/intervention decisions: nursing and procedural decisions. Procedural decisions relate to *interdependent* nursing functions (those which require an order from another member of the health care team, usually a physician). Interdependent nursing functions include giving medications, managing intravenous (IV) therapy, implementing ordered treatments (e.g. dressings, wound care), et cetera. Nursing decisions relate to *independent* nursing functions (those which may be independently instituted by nurses based on the body of nursing knowledge, e.g. emotional care, health teaching, and many aspects of physical care).
Initially I had not planned to include data related to procedural decisions, as I assumed that these data did not represent nurses' decision-making, but rather implementation of another professional's decisions. However, on examination it became abundantly clear that there is a considerable amount of nurses' decision-making in relation to this implementation process. For example, giving a regularly scheduled oral medication (a relatively straightforward procedure) involves recognizing the drug by both its generic name (as it is usually found in the patient's drawer in the medication cart) and one of several trade names (as it is most often identified in the doctor's order sheet), being able to select the appropriate pill package from among several in the drawer, ensuring that the dosage is correct and within the appropriate range for the patient's age and condition, knowing whether it should be given with or without food/dairy products/juice/other medications which may be scheduled for the same time, and ensuring that the patient has no allergies to this medication or others within the same chemical family. Furthermore, there is a generally accepted convention that medications scheduled for a particular time (e.g. 1000 hr) may be given anywhere within a 1-hour "window" surrounding this time period (i.e. 0930 hr to 1030 hr), so there is also judgement involved in when to give even scheduled medications. For experienced RNs this process becomes highly automatized, so that the decision-making surrounding familiar delegated procedures is minimal. However, for nursing students, each of these decisions must be separately considered and together they make extensive demands on the student's cognitive processing capacity, as well as on her time (both of which are extremely important factors). When this process is extended to include the many different ordered procedures (dependent functions) for which the
nursing student is responsible in the course of her patient care, it becomes apparent that to ignore these data is to overlook a major portion of the student’s decision-making activities. See Figure 2 for the relative frequencies of nursing and procedural decisions.

Decision type 4 - organization/priority-setting.

Organization/priority-setting decisions involve identifying the relative importance of patients' needs, and they followed a fairly common, predictable pattern. Most participants demonstrated both inter- and intra-patient priority-setting. Inter-patient decisions involved evaluating the needs of two or more patients and choosing what to do first (e.g. “While I’m waiting for someone to supervise the insulin administration, I’ll do quick initial assessments of all the patients”, or “Patient A is my sickest patient so I’ll see him first”). Intra-patient organization and priority-setting involved deciding what to do first for an individual patient (e.g. “First the patient needs her insulin, then breakfast; later I’ll do her bath”). Most often there was one initial priority-setting exercise (including both inter- and intra-patient decisions) near the beginning of the shift, followed by periods of reassessment of work done and reprioritization of remaining work, usually 3-4 times during the shift. Most participants articulated a pattern or strategy for organizing their patient care, and the elements were fairly common, although the details varied. This will be discussed more extensively during the section dealing with appropriateness of decisions.
Decision type 5 - administrative/communication.

Administrative/communication decisions are those which involve specific types of communication with other health care providers on issues related to patient care. They include decisions related to the nature and scope of the participant's patient assignment, direct communication with a doctor when requesting a new order or renewal of an expiring order, transcription of doctors' orders, communication with a back-up RN about what the student is/is not responsible for with regard to a patient's care, and reporting off to a covering RN about the current state of each patient. In each instance, there are decisions to be made about the patients' situations/needs, the participant's relative abilities to meet the needs, and what and how to communicate to other appropriate professionals. Some of these decisions were more common among university participants (e.g. some degree of choice in their patient assignment, direct communication with doctors, and transcription of doctors' orders) than among their college counterparts, but each participant demonstrated some of the administrative/communication type of decisions.

Below is the composite summary of decision types and frequencies for both observational periods for all six participants. Figure 1 (Summary of Decision Types & Frequencies) shows the relative frequencies of all categories of decisions identified in the transcripts.
Figure 1 illustrates certain commonalities about participants' decision-making. First, the vast majority of participants' decisions were of the three types identified by Tanner (assessment, analysis/hypothesis, intervention). The remaining two categories (organization/priority-setting and administrative/communication), while important, constitute a much smaller part of their decision-making. The subcategories of procedural and nursing decisions will be examined in Figure 2.

Secondly, with the exception of organization/priority-setting, all decision types increased in frequency from the first to the second observation period. It is likely that the frequent repetition of many types of decisions (e.g., those involved in giving scheduled oral medications) reduced the amount of time and cognitive processing initially required, thus freeing participants to make more decisions in the same time period. In addition, learning
more about the usual symptomatology and treatments for the types of patients most often seen on the unit is likely to have enhanced participants' ability to chunk related data, leading to a broader range of assessment, analysis/hypothesis and treatment decisions for these patients. In retrospective interviews following the second observation, participants stated that increased familiarity with unit routines and with the types of patients on the unit greatly facilitated their decision-making. Why the organization/priority-setting decisions decreased, rather than increased, from the first to the second observational period is unclear. Perhaps as organizational and priority-setting skills increase, each priority-setting exercise might encompass a broader time span and range of concerns, thus decreasing the frequency with which it needs to be done.

Thirdly, the relative frequencies of assessment, analysis/hypothesis, and intervention decisions deserve some comment. In the initial observations, the frequencies of assessment and intervention decisions were almost identical (324 assessment, 325 intervention), while analysis/hypothesis decisions were much less common (175). During the second observational periods, analysis/hypothesis and intervention decisions increased by similar amounts (46 for the former, 60 for the latter), but the increase in assessment decisions was much greater (173). Some of this large increase was due to an anomaly in one participant’s starting time. Because she came into a shift already in progress, she was given credit for actively pursuing much of the information which other participants passively received at change-of-shift report (thus not counted as assessment decisions). This factor has inflated the assessment data for the second observational period, giving it more prominence that it actually deserves. However, it is unlikely to account for all of the
change. The implications of the greater increase in assessment decisions are unclear but lead to interesting speculation. One possibility is that assessment decision-making improves faster than analysis/hypothesis and intervention decision-making. Alternatively, perhaps all decision-making improves at similar rates but an increased ability to chunk related assessment data might lead to fewer (but better supported) analysis/hypothesis or intervention decisions.

Figure 2 (below) illustrates the relative frequencies of nursing and procedural subcategories of the assessment, analysis/hypothesis, and intervention decision types.

Figure 2

SUMMARY OF NURSING AND PROCEDURAL DECISIONS

From Figure 2 it can be seen that in the assessment and analysis/hypothesis categories, nursing decisions (those related to the independent function of nursing) regularly outweigh procedural decisions, but the same is not true of the intervention
category. This may be partly a reflection of the fact that the majority of items delegated by doctors to nurses are interventions rather than assessments. With regard to assessments and analyses/hypotheses, the communication more often travels in the other direction (from nurse to doctor). Another partial explanation may be that, in a limited time frame (e.g. a nursing shift) with limited cognitive processing resources, the more time and effort spent on dealing with delegated aspects of care, the less remains for the independent nursing functions (e.g. emotional support, teaching, basic comfort measures, etc.). For experienced nurses, this is only partly true (i.e. experienced nurses can combine the emotional and teaching aspects with whatever else they are doing with/for the patient). For students who are much less familiar with the situation, the procedures themselves often demand the majority of the student’s cognitive processing capacity, leaving little extra for therapeutic interaction with the patient at the same time. Furthermore, unfamiliar procedures take longer and thus take up more of the student’s available time resources.

**Decision Sequences**

The issue of decision sequencing is crucial to developing an understanding of participants’ decision-making processes. The individual decision types and frequencies described above are components of the larger process of clinical decision-making. Participants’ decision types and frequencies provide the building blocks, but these blocks have to be assembled in a coherent fashion before a structure begins to emerge. It is the *sequences* of their decisions that begin to provide a picture of their actual decision-making *processes*. 
The Nursing Process (the most common nursing decision-making process taught in undergraduate nursing education over the last several years) assumes an assessment-diagnostic-intervention-evaluation (reassessment) cyclical sequence (Baumann & Deber, 1989). Moreover it assumes the coalescing of several pieces of related data (cues) to form a well-supported hypothesis/diagnosis which then leads to a number of appropriate interventions. Although the frequencies of the respective decision types shown in Figure 1 superficially appear to support this view, an examination of the actual decision sequences paints a different picture. The data from this research project indicate that the Nursing Process decision sequence is the exception rather than the norm.

The majority of decision sequences tended to be brief and to omit the diagnostic (analysis/hypothesis) step. Furthermore, the sequence could begin at any of the three points and flow in any direction. In many instances, assessment data/decisions led directly either to interventions, or to further assessments without any explicit indications of analysis or hypothesis formation. For example, assessment of the patient’s vital signs (temperature, pulse, respirations, blood pressure) usually led directly to intervention (charting); occasionally (e.g. if one or more were considered abnormal) this assessment led to another assessment (rechecking) plus intervention (reporting the results to another nurse). In the infrequent cases where assessments led to explicit hypotheses, the hypotheses were generally based on a very limited amount of data (usually not more than 2-3, sometimes only 1 piece of data). Many intervention decisions were generated directly from the basic body of nursing knowledge (e.g. the need for hygiene, elimination, exercise/mobility, etc.) rather than being the result of assessments or hypotheses. Not
infrequently, they *led* to assessment decisions (e.g. assessment of skin integrity during bathing) and to further intervention decisions (e.g. massaging bony prominences, turning/repositioning the patient). These are appropriate responses under the circumstances, providing abnormalities are not overlooked. This is a type of heuristic which serves to conserve both time and cognitive processing capacity.

Three participants who provided particularly interesting examples of decision sequences were Beth, Eve, and Fran. Their examples will be described in detail in order to illustrate important points about participants' decision sequences.

In an unusually extensive decision sequence, Beth provided an almost classic example of Carnevali & Thomas's (1993) description of nurses' diagnostic reasoning. Carnevali & Thomas have expanded the assessment-diagnosis part of the Nursing Process to include nine steps: collection of pre-encounter data (e.g. report), entry into patient situation, data collection, "chunking" related data in working memory, selection of high priority cue/cluster for initial diagnosing, retrieval of possible explanations from long-term memory (LTM), use of recognition features from retrieved diagnostic concepts as guides for observation, comparison of patient data with recognition features, and assignment of a diagnosis. The authors note, however, that "in practice, the process is much more integrative" (p 44) than the linear progression suggested above.

Beth's patient, "Karen", was a middle-aged woman with paraplegia resulting from a motor vehicle accident (MVA) three weeks previously. Karen had had a number of complications (e.g. abdominal abscess, colostomy), but was now starting to show small signs of improvement. She had a catheter for draining urine from her bladder, and when
Beth first went in to see her, Karen stated that she had voided around the catheter. Beth assessed for leaking and wetness around the catheter (assessment) and cleaned Karen up (intervention). She recognized this as abnormal and formed three tentative hypotheses: 1) the balloon which anchors the catheter in the bladder might be deflating, 2) the catheter might be too small, and 3) bladder spasticity could be a sign of returning bladder function in a paraplegic patient. She overlooked the possibility that the leaking could be caused by a blockage in the catheter. Her suggested intervention for this situation was to change the catheter. However, Beth identified additional assessments she would make first to confirm/rule out hypotheses #1 & #2 (check size and location of catheter and inflation of balloon). In consultation with her teacher and a pre-graduate student who was acting as her back-up nurse for Karen (intervention), Beth decided to postpone the catheter change (or irrigation, as suggested by the teacher) and continue to observe the situation (assessment). Although the situation repeated itself later in the morning, Beth decided that no further intervention was required since the catheter continued to drain clear urine (assessment). Interestingly, Beth never reconsidered her third hypothesis. Even when Karen complained of some pain and an awareness of the pulse in her right leg, Beth made no connection between this and the catheter situation data, but assessed for signs of a thrombus (blood clot) in that leg (assessment). In fact, Beth stated that although she planned to do spinal cord testing (assessment) at some point, she did not consider it a priority because the RN staff weren't doing it regularly and she herself had seen no changes in Karen's spinal cord functioning over the two days she had cared for her!
This example illustrates two important points about Beth’s decision-making. First, she did follow much of the sequence described above (selection of high priority cue/cluster for initial diagnosing, retrieval of possible explanations from LTM, use of recognition features and comparison of client data with recognition features). However, because ongoing assessment ruled out some of her hypotheses, she concluded that the situation had spontaneously resolved and required no further intervention. Secondly, Beth demonstrated limited ability to chunk data. She did coalesce cues related directly to the catheter’s functioning (e.g. it was draining clear urine and the balloon was correctly inflated) in terms of testing her first two hypotheses. However, in spite of the fact that she briefly considered the relationship of bladder spasticity to returning spinal cord function, she did not recognize that changes in leg sensation could be another manifestation of the same thing. Her hypothesis (thrombus) and investigation of the leg were quite local. Thus, she was unable to go beyond the local explanations in each situation and recognize an overarching hypothesis. Beth was not alone in having difficulty with chunking related data. For most participants, data chunks were relatively small and disconnected from each other.

Eve’s decision sequence was more typical in that it was much briefer and that her hypothesis was based on limited data. It also illustrated some common thinking errors. Eve noted that her patient, “Peter”, had an irregular pulse rate (assessment), which also complicated his blood pressure measurement (assessment), and that he was somewhat anxious (assessment). Her immediate hypothesis was that Peter was developing atrial fibrillation (he had a history of cardiac problems but his main diagnosis was pneumonia).
Although this was one possibility, there were other factors which Eve neglected to consider (confirmation bias). First, night shift report had indicated that Peter was stable from a cardiac standpoint. Secondly, Peter had just returned from X-ray where he had had a very bad coughing spell during which he feared he was choking, and this could well have contributed to both his anxiety and his cardiac response. Thirdly, Eve checked his radial pulse, and only for 15-30 seconds. When I suggested rechecking his apical rate for a full minute (e.g. to eliminate a possible problem with pulse deficit which might have made the radial pulse inaccurate), Eve stated that she would do this later but didn’t want to increase his anxiety at the moment. Clearly Eve’s own anxiety was a factor in her decision-making (an example of value-induced bias related to fear of the consequences of overlooking a cardiac arrhythmia).

Fran showed unusual skill and persistence in reasoning and reassessment to confirm/disconfirm an hypothesis. She had cared for an elderly female patient, “Sheila” the previous week and again for two days during the week of the second observational visit. Fran knew that Sheila had a history of hypertension and had been on an antihypertensive medication the previous week. When Sheila was reassigned to Fran the day before the observational visit, Fran noted with surprise that the antihypertensive drug had been discontinued (assessment). However, since Sheila’s blood pressure was somewhat lower than the previous week’s (assessment), Fran decided that the medication was discontinued because it was no longer necessary (hypothesis). During the time of the observational visit, Fran noticed that Sheila’s blood pressure was again elevated (assessment), which disconfirmed her initial hypothesis. Then Fran began checking
through the doctors’ orders (assessment) to discover when the medication had been discontinued. Not only did she find no order to discontinue the drug, but no new orders at all for the previous two weeks (assessment). She then decided that there had been a transcription error (revised hypothesis) which she promptly brought to her preceptor’s attention (intervention). The preceptor was suitably impressed that Fran had discovered an error which had eluded the staff. This incident not only demonstrates unusual decision-making for a student at this level, but also gives an example of Elstein’s Hypothetico-Deductive Reasoning Model (cited in Tanner, 1983) in which the practitioner generates hypotheses early in the process and then shuttles between assessment and hypothesis until a confirmed diagnosis is chosen.

The preceding information about participants’ decision-making sequences certainly supports the view that this is not a linear, or even a cyclic process. It is variable in its starting point and direction of flow, and is often quite fragmented. Much more often than not, assessment decisions do not lead to hypotheses and subsequently to interventions despite the assumptions of nursing texts. Furthermore, some of this fragmentation appears to be an appropriate time and cognitive processing conservation technique.

This section (decision types, frequencies, and sequences) completes the examination of the overall pattern of participants’ decision-making.

**Decision Appropriateness**

The issue of decision appropriateness relates to the content rather than the process of participants’ decision-making, and both aspects are necessary to an understanding of clinical judgement. No matter how good the process is, if the content is inappropriate or
incomplete the outcome will also be inappropriate. The content of participants’ decisions was related to both knowledge base and ability to transfer knowledge into the clinical setting. In this section, I will discuss the appropriateness of decisions in each of the categories previously identified.

Appropriateness is difficult to determine because it requires a benchmark against which the decision is being measured. It is unrealistic to expect a student’s judgement to be equivalent to that of an experienced RN. In evaluating the appropriateness of participants’ decisions, I have used patient safety as the basic requirement and considered both the patients’ major needs and the participants’ levels of knowledge and experience. Of the many decisions that participants made, the great majority were appropriate, especially in the areas of physical care. Most deficits in decision-making were in the area of omitted rather than inappropriate decisions. The greatest number of inappropriate decisions was in the area of organization/priority-setting.

Decision appropriateness (type 1) - assessment.

The majority of participants’ assessment decisions were made in relation to patients’ physical needs, similar to Liukkonen’s (1992) findings in her study of psychogeriatric RNs’ decision-making processes. Most of these decisions, especially those related to the medical diagnoses, were appropriate. Student nurses learn to do a brief overall screening assessment (often called “head to toe” or “body systems” assessment) at the beginning of a shift, followed by a more in-depth “focused assessment” of areas that appear/are expected to be problematic, usually those derived from the patient’s medical diagnoses. Tanner (1983) reviewed several studies which indicated
similar information-gathering strategies among doctors and nurses. Participants generally did reasonable screening assessments with a more in-depth focus on appropriate areas of concern (e.g. blood sugar/nutrition for diabetic patients, cardiorespiratory for patients with heart disease, cognitive functioning for patients with neurological problems). The one area of physical assessment which was almost totally lacking was the patient’s need for sexuality as it related to his/her illness and hospitalization. Eve was distressed by the sexually uninhibited behaviour of one patient following a stroke, but this led to an avoidance reaction rather than to assessment of the meaning of this behaviour to the patient. Other than this instance, patients’ sexuality was not mentioned although there were several patients for whom this would have been an important consideration (e.g. three with spinal injuries following motor vehicle accidents). Whether this omission was due to participants’ discomfort with the subject, to their lack of recognition of its importance, or to their belief that the timing was inappropriate from the patients’ standpoint (e.g. too soon after the accident) is not clear.

Although physical assessment decisions were generally appropriate, they were not usually comprehensive. For example, all participants gave pain assessment a high priority, although the focused investigation was usually limited to degree of severity. Rarely did participants address the nature, location, radiation, duration, and meaning of pain to patients and factors which increase or alleviate it. Beth was an exception. She did a fairly comprehensive pain assessment (nature, location, radiation, and duration) with “John”, who had had a cervical laminectomy one week earlier to relieve intractable pain resulting from a car accident many years previously. In spite of this detailed assessment, Beth still
missed a crucial piece of data. Although she was aware that John was fearful about a new pain in his left arm, she failed to discover the meaning of this new pain to him. His major fear was that any compromise in the function of his left arm would rob him of his independence because he had had his right arm amputated years ago after the accident. The tendency to inquire into only the most salient characteristics of a given assessment area was quite common.

Assessments of patients’ mental and emotional statuses were mostly indirect, gleaned from their nonverbal communication as well as their comments during aspects of physical care (e.g. bathing, bedmaking). Participants did specific cognitive assessments (usually a formal process involving the Glasgow coma scale) for patients with potential neurological deficits (e.g. pre- or post-operative neurosurgery patients), and Fran looked for other cues to the cognitive functioning of comatose and confused patients.

Generally, participants did not pursue an in-depth assessment of emotional needs. In this respect, Alison was unusual. She carefully investigated both a young man’s fears and nightmares following a recent car accident, and the coping strategies and support systems of an elderly woman with a broken arm and arthritis. However, Alison was so experienced with many of the physical aspects of care (she was a Registered Practical Nurse) that she was able to focus on the emotional aspects to a greater degree than other participants. Eve considered the loneliness and isolation of some patients who were dying with limited family support, but was hampered in this assessment by language barriers, patients’ conditions, time constraints, and possibly her own uncertainty about how to broach the subject.
Assessments of patients' knowledge about their medical conditions and treatments, and about health promotion generally were quite rare. Often participants made assumptions about clients' knowledge or lack thereof, but they did not systematically assess it.

Assessment of patients' spiritual, self-esteem, and self-actualization needs in relation to their illnesses and hospitalization was almost nonexistent. Many participants mentioned the importance of self-esteem, but did not regularly assess it. Other than Fran, who noted the relationship between one patient and her priest, the other two areas were not mentioned. From the standpoint of Maslow’s Hierarchy (Mosby, 1986), which postulates five levels of human needs in ascending order (physiological, safety, love and belonging, self-esteem, and self-actualization), participants were primarily dealing with the three bottom levels. This was not unexpected, given participants’ lack of experience.

Decision appropriateness (type 2) - analysis/hypothesis.

Participants made analysis/hypothesis decisions relating to many aspects of patients’ needs (physical, cognitive, emotional, knowledge, etc.). As described earlier, the majority of these decisions were based on relatively small amounts of data (due partly to limited focused assessments and partly to limited ability to chunk related cues) and therefore were more likely than assessment decisions to be inappropriate. Analyses/hypotheses related to patients’ physical needs were usually more solidly grounded in assessment data than those related to mental, emotional, and knowledge needs although this did not necessarily guarantee an appropriate outcome. The example quoted earlier of Beth’s analysis of Karen’s leaking around her catheter and feeling changed sensations in
her leg demonstrated some reasonable initial hypotheses and some appropriate reassessments to rule out incorrect ones. However, it also demonstrated Beth’s inability to go beyond the local explanations (catheter too small, balloon deflated, clot in leg) to reconsider the one overarching hypothesis with which she started (possible indications of returning spinal cord function). In a retrospective interview, Beth expressed embarrassment at having overlooked an important hypothesis (that the catheter might be blocked) in this situation and stated, “If this had been on a test, I would have thought of that”. This is an interesting example of failure to transfer knowledge rather than inadequate knowledge base.

Analyses/hypotheses related to patients’ mental, emotional, and knowledge needs tended to be based on even less data. Participants often picked up appropriately on patients’ verbal and nonverbal indications of anxiety, but then assumed that they understood the cause of the anxiety without further assessment. For example, Cindy assumed that her patient, who had had a laryngectomy for cancer of the larynx, was anxious because of the test (barium swallow) she was about to have. The patient was very anxious about losing her independence as a result of having to go and live with her sister instead of returning to her own apartment. Similarly, participants usually assumed that patients lacked knowledge about tests, treatments, medications, and procedures without assessing for specific misunderstandings and knowledge deficits.

**Decision appropriateness (type 3) - intervention.**

Student nurses learn a number of nursing interventions which are commonly used in the treatment or prevention of particular problems related to medical diagnoses (e.g.
frequent deep breathing and coughing, regular repositioning, and increased fluid intake for patients at risk for respiratory problems). Because interventions based on this body of knowledge are intended to be generically applicable (i.e. appropriate, if not optimum, even in the absence of a specific hypothesis), the majority of participants’ intervention decisions related to patients’ physical needs were appropriate. As with assessment decisions, intervention decisions were more often incomplete than inappropriate. For example, bedridden patients were turned fairly regularly but were usually not massaged around bony prominences or given range of motion (ROM) exercises each time.

Interventions related to patients’ mental, emotional, and knowledge needs tended to be generic and incidental. I did not see specific attempts at reality orientation for patients with apparent or assumed cognitive deficits, although participants conversed (including assessments and explanations) with these patients during the provision of care. Emotional interventions were the time-honoured, supportive, nonspecific, comfort measures (e.g. hand-holding, staying with a distressed patient, making a cup of tea). The provision of health teaching, usually based on assumptions about patients’ needs, was given automatically for specific situations/events (e.g. teaching about medications, tests, treatments; pre-operative teaching; pre-discharge teaching).

Decision appropriateness (type 4) - organization/priority-setting.

Organization/priority-setting decisions were more often inappropriate than assessment, analysis/hypothesis, and intervention decisions. Given the nature of the skill involved, this is not surprising. Organization and priority-setting require a higher level of decision-making skill because they involve consideration and ranking of a large number of
factors. Restrictions on short-term memory capacity (STM), limited ability to chunk related data, and difficulty identifying the relative importance of data all contributed to participants' problems with this highly complex cognitive activity.

In general, participants gave higher priority to patients' physical needs and procedures than to cognitive, emotional, and knowledge needs. Part of the reason for this was likely that participants felt more confident in their ability to meet the physical needs. Considering that these patients were hospitalized with physical illnesses, this was not necessarily inappropriate in itself. Because the needs were intertwined (e.g. patients were often emotionally upset because of an unmet physical need), care designed around physical needs often resulted in other benefits as well. Thus there were many instances of reasonable priority-setting at a novice level.

The following examples demonstrate some of the participants' problems with priority-setting and organization. Alison was most skillful in this area because of her many years of experience as an RPN. However, in one instance she had expectations that a discharge order would probably be delayed because appropriate services had not yet been arranged for the patient, so she temporarily put aside the discharge teaching she planned to do for him. When she discovered the patient was leaving immediately, it was too late to do it. Beth's elderly, somewhat confused, diabetic patient with a chronic subdural hematoma complained of being wet (incontinent of urine) when we first saw her in the morning. Initially Beth planned to clean and change her, but then decided that her insulin and breakfast were priorities so the patient remained wet for approximately 1 1/2 hr until Beth had time to do her bath. Eve had a patient who had been vomiting on the floor and
in the wastebasket before she entered the room. The visitor who was present was very agitated about the state of the patient, and kept asking to get the floor cleaned up. Eve, feeling panicked by the visitor’s reaction, spent time trying to calm the visitor and find the housekeeper which she later felt she should have spent assessing the patient. Debbie had planned to do a nutrition assessment on one of her patients whose eating patterns seemed poor, but it was omitted because of an unexpected problem with another patient which set her whole organizational schedule back by an hour or two. Later in the morning the first patient was vomiting, and Debbie had had no idea that she was even feeling nauseated.

Cindy, with only one patient, had fewer organizational demands made on her but still had trouble setting intra-patient priorities. She suctioned her tracheostomy patient, then delayed reconnecting him to the oxygen while she made his bed and he walked in the hall, even though she knew the importance of rebuilding the oxygen level in his blood.

Most participants articulated an overall organizational strategy, and these are worth examining. Debbie described her priority-setting as,

the most urgent, immediately confronting situation that needs to be dealt with, I would deal with first...and anything else that need(s) to be done...like dressings or...lab tests...I prioritize them...there’s a certain order...on floors that you...tend to fall into doing things in...you have to be flexible...it’s important to get all your assessments done and know where everybody stands right off the bat and then...take it from there.

She also stated that her preceptor continually emphasized “time, time, time, time, time!”.

Eve’s general priority-setting process was based on patients’ needs and physiological conditions, but she related it specifically to particular patients and particular days.
I initially assess the patients and... think... Pt D's (with aortic aneurysm, waiting for surgery) going to be somebody to keep in the back of my mind... Pt A (terminally ill with metastatic cancer)... she's being managed properly with pain; her family's in... she's... not going to be my first priority... Pt C (with cardiac arrhythmias, waiting for insertion of internal defibrillator)... the same kind of thing... Pt B (aged 90 with urosepsis and active GI bleeding)... would be somebody to check more regularly... but... top priority would be Pt E (with pneumonia, cardiac history and irregular pulse) now... because I don't like what's happening there... I don't feel... that's controlled.

Eve qualified the above, stating,

any... given day it might be something else... like if I had Pt B1 (previous patient with terminal lung cancer to whom Eve had become quite attached), that would be a priority because that's something that really upsets me personally... I just can't stand to see somebody in that much pain... so that would cloud the way I would judge the priorities of other patients.

Fran set her priorities according to the status of the patient/acute of illness, and then worked around medication schedules and other unit routines. She also took into consideration how the family would want the patient to be cared for, and ensured that all patients knew how to call her if they needed her (e.g. via the call bell).

Cindy's organizational strategy was individually based because she only had one patient, and it centred on questioning the patient. First, she would ask if the patient was feeling pain, "that (is) probably the most important thing... I hate discomfort... because... pain will tell me... OK, something's wrong". She elaborated further on this strategy, "probably the most important thing about patient care is asking questions... going in... not just looking at things... it's important too... but questioning... the patient". Her questions were tailored according to what she knew about the patient from the kardex and other sources (e.g. the patient had had abdominal distention the previous day so Cindy
investigated that). Her standard set of observations included assessing the patient’s incision and drains, checking on voiding and bowel elimination. Other determining factors were the times of scheduled medications, tests and treatments, and the availability of the teacher for supervision. Cindy worked her basic nursing care in around the structure provided by the hospital routine.

Beth struggled with organization and priority-setting, very aware that she had a problem with it. During the first observational period she stated,

most of my decision-making is based on, ‘Can it wait for 5 minutes? Can it wait for an hour? Or does it have to be done right now?’...I have my personal organization plan (but) I never go to that to control....

She was finding the plan useful as a reminder of things that had to be done, but ineffective as a guideline because it was insufficiently flexible to cope with new things that happened during the day. During the second observational period (1 week after the first) Beth again commented,

there always seems to be a time factor...there. You’d really like to do more than you (do) ...but I don’t have the organization to get it done...and I’m also not quite sure the best way of going about doing it.

Beth was unhappy that many of the emotional, individualized aspects of care got lost in the constant battle with time.

It’s really important to get that kind of information (about how the patient had been coping with pain at home)...but you just don’t have time to do these things...that gets pushed off to...social workers...or...the physiotherapist...to discuss more with him. We learn in school that you’re supposed to be holistic...looking at the whole client but...I’m really only looking at a very small area of the client.
Alison's organizational strategy was based on adequate preparation time and she felt seriously disadvantaged by not having her patient assignment early enough on the day of the second observational period.

I am not the kind of person that likes to...just go in cold...I like to organize things in my mind...I like to know what medications I'm giving...and I like to be able to see my patients before I go into report and...assess all that so that during report there are things going on in my mind, and I'm thinking, 'This is what I have to do first and second and...'.

Her priorities were based on the acuity of the patients' illnesses, ('he's my sickest patient so I'll go in and see him first...and do an assessment''), demands of the hospital routines ('I've got to give him his insulin and all the 8 o'clock meds''), and the need for supervision by the teacher ('until I've got the teacher, I'll just quickly do my assessments...because then...I can leave them for a little while while I concentrate on something else').

In summary, participants' organizational and priority-setting strategies demonstrated some common themes including early assessment of all patients and priority-setting based on the acuity of their physical needs, intertwined with the demands of the hospital/unit routines (e.g. times of medications, tests, etc.). Basic nursing care (e.g. hygiene, ambulation, etc.) and procedures (e.g. dressings) were interspersed throughout the structure imposed by the routines, some participants preferring to do the procedural items first while others began with comfort measures. Concern with pain and pain control was also a predominant theme among participants. An additional factor in the college students' priority-setting which did not affect their university counterparts was the need to wait for the teacher before doing supervised procedures. This created significant time problems because, while each university student had one preceptor/supervisor with whom
her patient assignment was shared, each teacher had ten students with separate (and often geographically scattered) patient assignments. Noticeable by its absence among participants’ articulated organizational strategies is an explicit focus on emotional care and patient teaching. This is not to suggest that participants did not include these aspects in their patient care (earlier parts of this analysis indicate that they were regularly incorporated), but it is interesting to note that participants did not mention them as part of their mental framework for organizing care. Only Beth, who was struggling with inadequate organizational skills, was vocal about not having the time to do the kind of emotional assessment and care she had been taught in her nursing program.

Decision appropriateness (type 5) - administrative/communication.

Administrative/communication decisions were generally appropriate, probably because in most instances there was a considerable degree of guidance or coaching involved. University participants were guided by their preceptors through choosing their share of the patient assignment, communicating with doctors about needed orders, and transcribing orders, and the degree of preceptor involvement decreased as the participants’ experience in these areas increased. College participants were similarly guided by their teachers or back-up nurses as necessary through communications with other health team members and occasional partial transcriptions of orders. Both groups independently selected the information they passed on to colleagues during reports, but could be prompted by the receiving nurse if some important information was missing.
**Decision errors - heuristics, biases, knowledge gaps, and red herrings.**

Although the majority of their decisions were relatively appropriate (even if nonspecific), participants also demonstrated some faulty reasoning processes which preoccupied them for fairly lengthy periods. These errors included choice of irrelevant issues ("red herrings"), biased hypothesis selection, heuristics, and reasoning from an inadequate knowledge base. Alison, Eve, and Debbie each demonstrated a bias toward a particular hypothesis because of the meaning it had for them personally. This preference was strong enough that it precluded consideration of other reasonable possibilities. Alison, whose patient complained that whatever he drank came out of his tracheostomy, clung to the idea that he probably had a tracheo-esophageal fistula without investigating whether this equally might indicate a misunderstanding of the anatomy involved (confirmation bias, and possibly base rate neglect). Alison’s relationship with the teacher was a complicating factor here and this will be discussed in the Contextual Factors section. Eve, preoccupied with death because of her father-in-law’s recent and unexpected death (availability heuristic), became extremely anxious about her patient’s irregular pulse and anxiety. She decided that he probably had developed atrial fibrillation, but she failed both to assess his heart rate adequately and to consider the possible effect of his serious coughing episode in X-ray (confirmation bias). Debbie’s minor example of inappropriate decision-making involved the hypothesis that her patient would be at risk for infection if she used tap water to mix oral medications given by gastrostomy tube (illusory correlation between oral and parenteral drugs). Consequently she chose to use sterile normal saline for this purpose although intellectually she understood that this was not really necessary.
Debbie acknowledged that the decision was primarily based on what she would want someone to do for her in the same situation.

Beth became caught up in a red herring issue. Noting that Karen (the paraplegic patient mentioned earlier) had two IV bags hanging which were no longer in use (an antibiotic which had been discontinued, and a 1/2-strength normal saline for flushing the tubing), Beth was concerned that these bags represented a possible risk to Karen and should be removed. The bags were part of a complicated TPN/IV set-up and could not be easily discontinued without breaking the continuity of the whole set-up; furthermore, they did not pose any threat to the patient as long as they remained clamped. However, they preoccupied Beth for a considerable period of time before other priorities crowded them out and she simply abandoned the issue.

Cindy provided a fascinating example of the difficulties of reasoning with serious gaps in her knowledge base. She knew that her tracheostomy patient was scheduled to have a barium swallow x-ray, but did not know why. Knowing that the patient had had diarrhoea the previous day, that this was a gastrointestinal x-ray, and that barium is constipating, Cindy decided that the test was being done to investigate/treat the diarrhoea. The barium swallow was actually being done to rule out leakage from the esophagus into the trachea before allowing the patient to start taking oral fluids. This was a classic example of essentially correct but incomplete pieces of information being put together to reach a totally erroneous conclusion.
Summary of Decision-Making Patterns and Appropriateness

Participants made five types of decisions during their clinical shifts: assessment, analysis/hypothesis, intervention, organization/priority-setting, and administrative/communication decisions. The most common types were assessment and intervention decisions, followed by analysis/hypothesis; these three categories could be further divided into nursing (related to independent nursing functions) and procedural (related to interdependent nursing functions) subcategories. Participants’ decision sequences did not follow the assessment-analysis/hypothesis-intervention-reassessment cyclical process presumed by nursing texts. They tended to be short, fragmented, and variable in starting point and direction of flow. The majority of participants’ decisions were appropriate (given their level of knowledge and experience) but were not comprehensive. Organizational and priority-setting decisions tended to be less appropriate than the other types, primarily because this area requires participants to consider multiple options simultaneously and to rank them. Occasional errors in reasoning involved use of heuristics, biased hypothesis selection, choosing irrelevant issues, and reasoning with insufficient knowledge. In rare circumstances, it was possible to differentiate between inadequate knowledge base and inadequate transfer of knowledge.

Differences in Decision-Making Patterns by Program Type and Age/Life Experience

There were very few differences in the decision-making patterns of participants based on either program type or age/life experience. Figure 3 and Figure 4 illustrate the similarities and differences by program type and age/life experience respectively.
Figure 3 shows the comparison of decision types and frequencies by program.

Figure 3 demonstrates that university participants made more decisions than their college counterparts in all categories but organization/priority-setting, but the differences are small. The Administrative/Communication category is greater among university participants because it is a feature of the preceptorship experience which college students do not have until their sixth semester (see discussion of preceptor's vs. teacher's role under “Contextual Factors”). The frequency of assessment decisions is greater among the university students because one of them started a shift late and was given credit for actively seeking information which other participants received passively at change-of-shift report (see discussion of Figure 1). This leaves unexplained a relatively small difference between analysis/hypothesis (A/H) decisions made by university and college participants.
Whether the greater number of university students' A/H decisions indicates more frequent hypothesis formation or increased facility with verbalizing the process is not clear.

Figure 4 illustrates the comparison of decision types and frequencies by age group and life experience.

Figure 4

SUMMARY OF DECISION TYPES & FREQUENCIES BY AGE GROUP

From Figure 4 it can be seen that young (ages 20 - 25) students made fewer assessment and analysis/hypothesis (A/H) decisions and more intervention (I) decisions than mature (ages 35+) students, but again, the difference is not large. Since the participant who started the shift late was a mature student, this has inflated the assessment decisions in favour of that group. Conceivably, differences between A/H and I decisions could suggest that young students tend to prefer the concreteness of intervention, while mature students are more willing to engage in the reflective abstraction of hypothesizing. Alternatively, the mature students' increased ability to empathize with patients because of their greater life experience could facilitate their analysis and hypothesis formation. Given
the very small sample size, it is impossible to do more than speculate on possible implications. The differences in the other categories are negligible.

Figure 5 illustrates the total number of decisions made by participants and the size of their patient assignments during the second observational period. Cindy had one patient; Alison and Beth each had three; Fran had four, and Debbie and Eve each had five.

Figure 5 demonstrates no clearcut relationship between patient numbers and frequency of decisions. It is interesting to note that participants with one, four, and five patients made similar numbers of decisions. As mentioned earlier, Eve’s assessment
decisions were somewhat inflated by starting the shift late. Under normal circumstances, her decision frequency would likely be closer to those of Alison and Beth. The implications of this lack of relationship are not clear. It may suggest that participants' decision-making was constrained by some overall limitations on time and cognitive processing resources, but this would need to be investigated further.

Analysis of the data from these six participants demonstrated that it was not possible to differentiate clearly between participants' decision types and frequencies based on either program type or age and life experience. Decision sequences were also similar. With regard to appropriateness, the majority of decisions made by participants in all groups were appropriate. College students in both age groups had slightly more opportunity to make inappropriate decisions because they were more often left to their own devices while the teacher was otherwise occupied; university students' preceptors tended to be ever-present. Cindy (mature college student) was most prone to inappropriate decision-making because her knowledge base was less complete than that of other participants, and more of her cognitive processing resources were committed to making up for these deficits. On the whole, there was little difference between the decision-making patterns of university and college students, and those of young and mature students.

The inability to distinguish between university and college participants based on their decision-making patterns suggests that something more powerful than program type (e.g. the hospital organizational culture) is affecting both groups' decision-making more or less equally. This is an idea to which I will return later. The rough similarity in overall
decision frequencies among the participants may suggest that cognitive processing limitations place some sort of boundary or ceiling on the overall numbers of decisions with which the students can cope in a given time span. Obviously this is an area which would require a great deal of further research before any definitive conclusions could be reached, but it gives rise to some interesting speculation.

**Contextual Factors**

Up to this point, I have examined the content and process of participants’ decisions while they were giving patient care. However, these decisions were not made in a vacuum. They were an integral part of a larger context which powerfully affected the whole process. An in-depth examination of the data revealed several factors which influenced participants’ decision-making including: abundance of data; scarcity of time; conflicting priorities; relationships; participants’ internal preoccupations, knowledge base and experience; and the hospital culture. I will examine each of these factors individually in the sections which follow.

**Abundance of Data**

The wealth of data in the clinical situation is quite overwhelming. For each patient there are all the assessments related to his/her complex medical condition, knowledge base and coping mechanisms for dealing with current/chronic health problems, family and support systems, emotional reactions to the situation, and so on. There are also hospital and unit policies, procedures, and customs which delimit patient care. To this mixture, the student brings a large knowledge base drawn from nursing, the physical and social sciences (e.g. human biology, microbiology, pharmacology, psychology, sociology), the
humanities, and ethics. When particular conditions are being studied in the classroom, the teacher can limit the amount of data presented and focus students’ attention on the most relevant features in the process of demonstrating how theory from different disciplines relates to the situation. In the clinical area, data can not be limited in the same way. That which seemed clear in the classroom becomes easily obscured in masses of information. Initially the clinical teacher or preceptor helps the student to focus on the most important areas, but fairly quickly the student must learn to do this for herself. Within the constraints of short-term memory and the students’ limited ability to chunk related data, this is a difficult task. As the examples under “Decision Appropriateness” illustrate, participants generally demonstrated some problems coping with large amounts of data and selecting the most relevant information.

**Scarcity of Time**

Concern with time constraints was a predominant theme among all participants. As Debbie said, her preceptor kept stressing “time, time, time, time, time!” Baumann & Deber (1989) noted that time pressures negatively affect decision-making by introducing stress and inhibiting the ability to distinguish between relevant and irrelevant cues. Not only must the student be able to select relevant data from large amounts of extraneous information, compare them to her body of knowledge as she seeks their meaning, and identify appropriate courses of action, but she must implement her decisions, all within an 8-hour or 12-hour shift. Each shift brings its own set of patient care activities, so there is limited tolerance for things left uncompleted by one shift which overlap into the following one. Furthermore, nursing care must be worked around many other scheduled and
unscheduled activities in which patients are involved (e.g. laboratory and diagnostic tests, treatments, visits from other health care professionals, visits from family and friends). As the patients’ conditions sometimes deviate from the expected course, nurses need to be flexible enough to cope with sudden changes in workload. Students also face time demands related to their learning: They are slower than RNs at implementing nursing care activities, and the frequent requirement to describe/demonstrate procedures step-by-step to teacher/preceptor as they are implementing them slows things even further. In addition, college participants often had to wait for their teachers before proceeding with activities which needed to be supervised. All of these time constraints had a major impact on participants’ decision-making.

Conflicting Priorities

In their efforts to deal with large amounts of data, heavy workload requirements, and time constraints, participants frequently sought advice from others on the unit, sometimes to discover that suggestions varied depending on their source (teacher, preceptor, other nursing staff, other health care provider). Different sources had different priorities in terms of patient care and student learning. The choice of whose advice to follow depended on a variety of factors including the source’s perceived authority and presence during implementation, the participant’s comfort with the advice, and the participant’s confidence and conviction about the issue in question.

Preceptors and clinical teachers shared interests in both patient care and student learning, but the emphasis for each was different. For the preceptor, the major focus was patient care, with student learning second; since both responsibilities rested with the same
individual, there was no division of opinion on how these activities should occur.

Preceptors tended to coach participants to do things in the way that they would do them themselves. Clinical teachers' major focus was student learning, with patient care as a close second. In the teacher's absence, college students sought advice from their back-up nurses (RNs responsible for the students' patients) whose focus was patient care. Because the primary responsibilities for patient care and student learning were divided between two individuals in this instance, the potential for conflict existed. Teachers were prepared to permit a degree of latitude in decision-making and some time delays in order to facilitate the development of students' reasoning processes and independence. Staff simply wanted to get the job done in the most efficient and effective way possible (theirs). Therefore, college participants sometimes received conflicting advice from teachers and back-up nurses.

In addition to teachers and preceptors, both groups of participants also sought and/or received advice from other nursing staff (RNs/RPNs not assigned to the patient, other students at the same or more advanced level), and other disciplines (e.g. physiotherapists). At the risk of oversimplification, each discipline has its own particular perspective (e.g. the pharmacist's is drug therapy; the dietitian's is nutrition; the physiotherapist's is mobility and muscle strengthening; the nurse's is supposedly the whole patient, but often it becomes ensuring that all tasks are completed), and within a discipline there may be individual differences. Often these points of view were in conflict with each other, or with the participant's tentative decision.
Participants' choices about which advice to follow depended largely on their degree of comfort with the suggestions and their conviction about the issue involved, as well as with the perceived authority of the source. Preceptors and teachers were recognized as authorities, but preceptors' suggestions were more likely to be followed because they (preceptors) were present on an ongoing basis. Teachers' directions were sometimes ignored if they were in conflict with those of other staff and/or with the participant's own preferences. Beth's teacher wanted her to get her paraplegic patient up in the chair during the morning (both for mobility and self-esteem reasons) and back to bed before she (Beth) left the unit. However, Beth lacked the confidence to proceed with getting the patient up even though she and the teacher had discussed the technique involved. When the physiotherapist offered to help get the patient up in the early afternoon, Beth was happy to wait until then. However, Beth was resistant to ambulating her other patient as early and for as long as the physiotherapist wanted because she was concerned that the patient needed pain medication and tended to fatigue easily when up. Advice from RNs tended to be evaluated in the context of the participants' own knowledge or degree of conviction about the situation. Alison's patient had a decubitus ulcer (bedsore) on his coccyx which needed to be covered with a dressing before the physiotherapist could fit him with a brace. A wound care specialist was to see the patient sometime during the day. The RN wanted Alison to apply the dressing quickly so that the physiotherapist's work would not be delayed. Alison, who believed that the decubitus was deteriorating, wanted the wound care specialist to view the ulcer first. When the RN accepted responsibility for having seen the bedsore, Alison capitulated and applied the
dressing. As the foregoing illustrates, different caregivers had different priorities and agendae for patient care, and the participants frequently found themselves pulled in several competing directions. Generally notable by its absence in this sea of conflicting priorities is the patient's agenda.

Relationships

In this research, as in Jenks' study (1993), participants' relationships with teachers/preceptors, other staff, and patients also played a significant role in their decision-making. These relationships were based on a number of factors both internal and external to the participant including the perceived power, expertise, and goodwill of the other in relation to the self, and the participant's feeling of identification with the other (including teacher/preceptor, unit staff, and patients). Where the relationships were perceived as positive, this facilitated participants' decision-making. Negative relationships tended to impede it. Both positive and negative relationships with patients had a tendency to bias participants' decisions.

Preceptors and teachers had very different relationships with their tutees, primarily because of perceived differences in their power over participants. Although preceptors do evaluate their preceptees, this was not seen as a major feature of the role. Participants admired their preceptors' clinical expertise, openly demonstrated their eagerness to learn from it, and assumed their goodwill. Debbie's, Eve's, and Fran's preceptors treated them as if they were junior staff colleagues whom they were coaching. By the time of their first observational periods these relationships were well established. It was clear that the
participants found their preceptors helpful and supportive, and generally felt comfortable enough to ask the preceptors whatever they wished.

For college students, the power imbalance between themselves and their teacher is a considerable source of anxiety. Evaluation is a major feature of the teacher's role and the student's continued progress in the program depends on it. Loving (1993) noted that fear of evaluation inhibited the development of cognitive flexibility which was important to clinical judgement. How participants in this study responded to the power imbalance depended on a mixture of other factors which included the teacher's clinical expertise in the specific area, the student's self-confidence and expectations of herself, and the teacher's perceived goodwill. Alison, Beth, and Cindy all displayed distinctly different reactions to their clinical teachers. Alison and Beth shared the same clinical teacher, who was a very experienced clinical teacher with an ICU background. While both respected her clinical expertise and high level of demands on them, Alison felt threatened by her while Beth generally felt supported. Both were hard-working and eager to learn. However, Alison (a mature student with several years' experience as an RPN) had a self-image of previously successful health care worker which was seriously threatened by finding herself in the student role. Alison had high expectations of herself but lacked confidence in her ability to meet the teacher's perceived demands. Because Alison was self-critical, she also saw the teacher as critical rather than supportive. Beth, a young student with no earlier health care experience and no previous self-image to protect, had very different expectations of herself in the situation. She was comfortable with acknowledging her lack of understanding and generally saw the teacher's guidance as
supportive rather than evaluative. Cindy had a different clinical teacher with whom she was able to identify in a number of ways. Cindy, a mature student with no previous health care experience, had considerable life experience and was in the same age group as the teacher. Her teacher, with several years’ teaching experience but no recent medical/surgical experience, lacked the specific clinical expertise which was a strong feature of the other clinical teacher and the preceptors. Thus, the teacher’s focus was on helping the students to become independent learners, able to locate and use the most appropriate resources (including manuals, protocols, texts, and staff) to assist them in their acquisition of knowledge and skills. This approach fitted well with Cindy’s learning style so she found the teacher quite supportive, and the teacher’s lack of recent experience in the specific clinical area made her much less threatening as an evaluator.

Participants’ relationships with other staff on the units were very secondary. Although staff had clinical expertise and thus were sometimes needed as resources, they had no direct authority over students and variable degrees of goodwill toward them. Staff generally thought of participants collectively as “the students”. Mostly they did not appear to feel any degree of responsibility toward them and were reluctant to get involved unless a student was assigned to care for one of their patients. Eve’s remarks during the second observational period about feeling good because the staff displayed a growing trust in her judgement suggests that the unit staff had a greater tendency to accept the university participants into their group than was generally true for the college participants (none of whom made a similar remark). Considering that university participants were being mentored by insiders (other staff members) and were on the unit over a much longer time
span than college participants who were taught by essentially an outsider, this attitude is not surprising. College students on the same unit often sought advice from each other or from another student at a higher level, (e.g. the pre-graduate student to whom Beth went for help) in preference to asking a staff member if the teacher was not available.

Participants’ relationships with individual patients also had an important impact on their decision-making. Fear of a power imbalance was not a factor in participants’ relationships with patients, because it was participants who held the power (although they probably did not see it that way). Neither were things like clinical expertise unless the patient had a health care background (e.g. nurse, doctor) which tended to make participants insecure. In these relationships, perceived goodwill toward the self and feelings of identification with patients significantly influenced participants’ decisions.

During the first observational period, Eve had three middle-aged female patients, all quite sick. Patient A had been admitted 3–4 weeks earlier with cardiac problems, to be evaluated as a candidate for a heart transplant. Soon after admission, she had a CVA (stroke) which left her fairly disabled and depressed, and her personality had undergone a significant change (she had become uninhibited, demanding, and unappreciative of staff).

Patient B was a well-educated, pleasant lady with terminal lung cancer and pleural effusion who was in extreme pain most of the time, but who continued to maintain good relationships with caregivers. Patient C had extensive abdominal cancer and she had been recently admitted with vomiting and diarrhoea. During the observational period, she was too sick (vomiting frequently, having considerable pain, becoming seriously hypertensive) for more than minimal communication. Eve knew both Patients A and B through having
cared for them earlier, but she had not met Patient C before this particular shift. Eve readily identified with Patient B (although the patient was older, they came from similar backgrounds and had shared interests) but not with Patients A and C. Furthermore, Patient B demonstrated goodwill toward Eve, while Patient A was somewhat negative and Patient C was neutral in this regard. While Eve worked hard at distributing her nursing care fairly throughout the shift, she was well aware of a desire to respond preferentially to Patient B. Although it is possible to control the time spent and to divide the interventions relatively equitably among patients, it is much more difficult to recognize the way in which these relationships and feelings skew the assessment process (e.g. both Patient B and Patient C had pain during the shift, but Eve was much more attuned to Patient B’s pain than to Patient C’s).

Participants’ Preoccupations, Knowledge Base, and Experience

Most of the contextual factors which influenced participants’ decision-making were primarily external (e.g. those described previously), but internal factors (e.g. individual preoccupations, knowledge base and experience) also formed part of the context in which decisions were made. Unlike the external factors which participants experienced more or less equally, most internal factors, with the exception of knowledge base which was similar among those from the same program, tended to be individualized and quite variable. Examples are included in the discussion which follows.

The one common preoccupation which participants shared was with pain and its management. Since all had had some personal experience with pain in addition to what they had learned about it in their programs, they readily identified and empathized with this
aspect of the patient's situation. Alison compared two of her patients who had been on patient controlled analgesia (PCA) and had been, or were about to be, weaned off it onto oral analgesics. She believed that the second patient would not make this transition as successfully as had the first and that the attempt would jeopardize the second patient's cooperation with treatment and need for increased mobility. Although she recognized the potential for addiction, she felt that it was a secondary consideration in this instance. Cindy generally began her assessments by asking about pain, not only in order to intervene promptly (she had experienced pain and didn't wish to leave anyone in discomfort), but also because it gave her an indication that something was wrong with the patient. Eve recognized that her own inability to watch patients in pain affected her decision-making, especially regarding priority-setting. Beth was concerned about the pain experienced by her patient with a laminectomy for intractable pain and about his coping strategies.

Participants' individual preoccupations were generally related to recent life experiences and/or to the ease with which they could identify with patients. Eve, whose father-in-law had died very recently and unexpectedly of a cerebral haemorrhage following a sudden, uncontrolled hypertensive episode, was highly preoccupied with death, loneliness, and hypertension. When she discovered Patient C's severely elevated blood pressure, she was very frightened and requested her preceptor more than once to recheck the reading. Later, finding Patient C lying on her back with eyes closed, Eve thought the patient was dead but realized on closer inspection she was only sleeping. During the course of the two observational periods, Eve cared for several patients who were either terminally ill or potentially critical (e.g. the patient with the huge aortic aneurysm who was
waiting for corrective surgery), and she found this extremely nerve-wracking ("just like one of these time bombs"). She was aware of the fact that this was affecting her, stating, "you're tempered by everything that goes on in your life...", but she had chosen to continue rather than take time off during the semester because, as a mature student, she didn't want to delay graduation any further.

Beth had a young female patient ("Sally") close to her own age who had been left comatose following a severe car accident a few months earlier. She was aware of her tendency to identify with this patient and her own emotional reaction to the situation.

Beth stated,

This is a girl whose life was perfect...I mean she had everything (youth, health, interests, nice boyfriend) in the world, and then...boom! It really hit home for me when I saw a picture of her with her girlfriends. I thought, 'Oh my God, this could be any kid walking down the street'...it could happen to me in an instant...but I really try not to think too much about that because it gets me upset...

Beth coped with these feelings by focusing exclusively on the present, trying to make each day valuable for Sally.

Participants' own knowledge base and experience also affected their decision-making. The amount of knowledge and experience they had and their degree of self-confidence were important factors. Furthermore there was nursing knowledge and there was "other" knowledge (e.g. that derived from life experience) that affected their judgement. The less nursing knowledge the participant had, the more time and cognitive resources she had to commit to research and reasoning in order to make up for knowledge deficits. Each participant brought a unique blend of knowledge (nursing and other) and variable degrees of confidence in that knowledge to the nursing situation. Alison brought
a considerable amount of both nursing and other knowledge to her patient care, but she lacked confidence when dealing with the teacher. Cindy’s nursing knowledge appeared to be more limited than that of the other participants (e.g. she had not learned the normal values of common laboratory test results), but her other knowledge was extensive and she had developed techniques for surviving in challenging situations. She thought her way through things and used appropriate resources to look things up. However, these knowledge gaps put extra demands on her which were not shared by the others who had more information stored in long-term memory. Both Debbie and Eve brought considerable nursing knowledge but relatively little practical experience to the clinical situation initially. Fran’s nursing knowledge was similar to Debbie’s and Eve’s, but she also had considerable practical experience derived from working in a nursing home. In addition, Eve brought a greater amount of other knowledge which helped her to relate to patients in a different way than Debbie did. For Eve, at that particular time in her life, that was both an advantage and a liability. While it gave her greater insights into patients’ situations, it also made her more vulnerable to their pain and relative isolation.

Part of the participants’ knowledge base related to ethics, and the types of conflicts they were likely to encounter. Lutzen & Norden (1993) found in their study of psychiatric nurses that subjects frequently experienced conflict between patients’ wishes and medically prescribed treatment. Similarly, three participants experienced ethical dilemmas in which their major concern was a possible violation of the patients’ rights to self-determination or safe care. In common, all three instances involved intervention decisions related to implementation of a medication order and at least one other complicating factor, and all
placed additional time and cognitive processing demands and emotional stress on the
participants. The participants consulted their teacher/preceptor/back-up nurse, but
ultimately tried to resolve the situations in their own way, with varying degrees of success.

When Alison went to give her patient’s insulin, he stated that he had already had it. This
raised the spectre of a serious medication error: Either giving a double dose of insulin or
omitting a dose can have grave consequences. Thorough checking ultimately revealed that
the patient was mistaken, but he remained convinced that he was right. This left Alison
with the dilemma of needing to give the insulin but not wanting to force on him something
he believed he had already had. She resolved the situation by finding an alternative
explanation (the medication he had been given earlier was not insulin), so that he was
willing to accept the dose that she brought him. Beth believed that her confused elderly
patient was having pain and should have medication for it before getting up. The
complicating factor was the patient’s altered cognitive level which impaired her ability to
evaluate both her need and desire for analgesic. Like Alison, Beth was concerned about
forcing something on a patient that the patient might not want. Beth was unable to come
to a decision about this situation before the patient was ambulated by the physiotherapist.

Eve had inadvertently given her patient an overdose of narcotic the previous evening and
had spent an anxious night observing the patient’s respirations. The doctor, on reading the
medication error report and learning that the patient had slept well for the first time,
increased the dosage of the bedtime narcotic. Eve, concerned that the increase might be
unsafe for the patient, was faced with the classic dilemma of whether or not to implement
an order with which she disagreed. She discussed the issue with the doctor and was finally
reassured both by his explanation and by the fact that Pharmacy had agreed the increase was safe.

Hospital Culture

The final factor which powerfully influenced participants' decision-making was the hospital organizational culture. As in other cultures, hospital workers share values, beliefs and a language which can be quite confusing to neophytes. The shared values include an emphasis on efficiency and effectiveness, a belief in the efficacy of Western medicine (with its hierarchical structure), and a language full of medical jargon and short forms (e.g. NPO for "nothing by mouth", AAT for "activity as tolerated"). All hospital nursing activities (not only those of students) take place within the constraints of this culture, and it dictates to a large extent what happens and when. Wells (1995) noted that hospital contextual factors were the forces driving discharge decision-making for the elderly patients in her study. Nursing care is given within the boundaries of shift change and around the activities of other health team members and departments involved with patient care. Experienced staff nurses have internalized the culture so thoroughly that most of its demands are handled automatically. For students, this is not the case. The rituals and routines of the hospital must be investigated and calculated along with the rest of their decision-making which puts an added cognitive processing burden on them.

Participants had acquired some of the language and cultural values (e.g. importance of good time management, and belief in the system of care), and were struggling to develop the skills to operationalize them. However, they were still unaware of many of the unwritten rules and nuances of language which made them prone to
inadvertant transgressions and miscommunications. On the other hand, most nurses were so immersed in the hospital culture that they had trouble perceiving what the students didn't understand. The following example indicates the size of the cultural gap which existed between a staff nurse and one of the participants, and the way in which it affected the participant’s decision-making.

Beth’s preoperative patient had an order for two of his regular ten o’clock oral medications to be given at eight o’clock on the day of surgery. Beth had many questions about this order and only a brief period of time in which to get answers. Neither her teacher nor the back-up nurse assigned to the patient were available, so she sought advice from another nurse (“Tania”), thereby breaking an unwritten rule about not asking for help from someone who was not responsible for her or the patient. Tania, patently unwilling to get involved, started with the generic rule, “If they are not preop meds, don’t give them”. These were not preoperative medications as Beth understood them (usually sedation ordered to calm the patient prior to surgery); nevertheless, the doctor’s order could not be ignored so Beth persisted until Tania read it and told her to give the medications. This directive still did not solve Beth’s original problem. One of the medications was beclomethasone which Beth knew should be given with food, but the patient was allowed nothing by mouth (NPO) prior to surgery. Interestingly enough, giving the two medications with sips of water (which also violates the NPO rule) did not bother her, but giving the beclomethasone without food was a major stumbling block. She was also concerned about giving medications at eight o’clock which were usually given at ten o’clock (possibly because of the shortened inter-dose interval). To an experienced nurse
like Tania, the need for these questions was quite incomprehensible and she was further irritated by this demand on her time for something that was not her responsibility. For Beth, faced not only with a new situation (she had not cared for a preoperative patient before) but also with one which strayed from the textbook outline, these were legitimate and very important questions.

**Changes over Time**

Over the course of their clinical rotations, participants' decisions increased in frequency (see Figure 1) and appropriateness. An improvement in the basic decision types (assessment, analysis/hypothesis, intervention) also facilitated the enhancement of organizational/priority-setting skills. Good organizational skills are essential to the provision of nursing care in modern health care settings. They are also very complex and take time to learn. However, even in as short a time as one clinical rotation, most participants' organizational skills improved noticeably, and these skills were highly valued by their possessors.

The changes in clinical decision-making which occurred over the course of the rotation were much more clearly evident in the university participants than in their college counterparts, and some of the reasons for this are quite obvious. First, the university participants' clinical rotation ran for the entire 4-month semester which not only gave them more time to develop this ability, but also allowed the observational periods to be spaced farther apart. The college participants (who did two 2-month rotations in the same period) had only half as long to improve their decision-making and the observational periods were necessarily fairly close together. Furthermore, at the point at which data
collection was started, two of the college participants were already more than halfway through their rotation which meant that their observational periods were extremely close together.

Secondly, the focus of the learning situations was different between college and university participants. The teachers’ focus with the college students was primarily on the application of theoretical knowledge to actual patients and situations. Because college students’ patient assignments were limited both by the numbers of patients available and by the teacher’s ability to supervise the group adequately, they rarely exceeded three patients. This meant that the overall organization of larger assignments and the administrative aspects of care were purposely delayed until the college participants moved into the preceptor situation in their final semester. The preceptors’ focus with the university participants, on the other hand, was to help them acquire not only experience with a variety of patients and problems, but also the organizational and administrative skills to function in a “junior staff” capacity. This had implications for the types of situations and decision-making to which the university participants were exposed and in which they were coached by their preceptors.

Generally participants from both types of programs were aware of changes in their clinical decision-making over the course of the rotation. Cindy, Debbie, Eve, and Fran were all quite articulate about the changes they recognized in themselves. Cindy saw herself as being much more able to handle things, more confident in her procedures, and much more independent than at the beginning. She also felt that she had learned to keep things in better perspective (e.g. that it was important but not the end of the world if a
medication was late), so that her anxiety was decreased to a level where it acted as a motivator rather than as an immobilizer. Debbie felt that her decision-making had improved because she was more familiar with the unit routines and the usual types of patients, so she knew what needed to be done and could organize and set priorities much better. She also stated that she had more confidence in her decisions. Eve stated that she was a lot braver by the end of the rotation than at the beginning. She was no longer afraid to go into a patient’s room in case there was a situation she might not know how to handle, neither was she afraid any longer to ask questions or to approach doctors. She also felt more confident with her skills and with both patients and staff. Indications of other nurses’ growing trust in her (e.g. reporting off to her when they went on break) made her feel good. Fran stated that she was now starting to problem-solve independently (e.g. finding the transcription error in which the antihypertensive was incorrectly discontinued), whereas at the beginning, she was just trying to ensure she completed all the work prior to the end of shift.

I did not ask the first participants (Alison and Beth) about their perceptions of changes in their own clinical decision-making over the course of the rotation, so I don’t have comparable data for these two students. From my own observation, I could see that Beth was able to handle a 3-patient assignment more effectively during the second observational period than she did a 2-patient assignment the week before. She was better able to focus on the important aspects of patient care, in spite of still showing a tendency to become sidetracked occasionally. Alison’s performance the second time was less smooth and well co-ordinated, despite having the same number of patients with the same
relative acuity of illness. I believe this was due partly to the lack of preparation time (the first time she knew about the patient assignment the day before, the second time she only received it approximately half an hour before report), and partly due to her anxiety about the teacher (which she had already told me was interfering with her performance).

In summary, participants generally felt that their decision-making skills had improved over the course of the rotation. Factors relating to the improvement included increased familiarity with skills, patients, and unit routines, and increased feelings of self-confidence and independence. This pattern was more pronounced among university participants than among their college counterparts mainly because of a longer rotation and a longer time between observational periods.

**Overall Summary**

This research involved an examination of the clinical decision-making (DM) patterns of six student nurses while they were actually providing patient care in the hospital. Participants were in the final year of their college and university programs. The data were analysed for information about: the types, frequencies, sequences, and appropriateness of participants' decisions; differences between participants' DM patterns based on program type and age/life experience; the influence of contextual factors on the DM process; and changes in DM patterns over the course of a clinical rotation.

Participants made five types of decisions: assessment, analysis/hypothesis, intervention, organizational/priority-setting, and administrative/communication. Assessment and intervention decisions were most numerous, followed by analysis/hypothesis, organizational/priority-setting, and administrative/communication, and the first
three types could be further divided into two subcategories (nursing and procedural).

Rather than following the expected assessment-hypothesis-intervention pattern, decision sequences were mostly short, fragmented, and variable in point of origin and direction of flow. The majority of decisions were appropriate, given participants' level of previous clinical experience, but were generic rather than individualized and comprehensive.

Organizational/priority-setting decisions were more often inappropriate than other types because of the complexity of selecting from and ranking multiple options. There were no clearcut differences between participants' decision-making patterns based on either program type or age and life experience.

Contextual factors exerted a powerful influence on participants' decision-making. These factors included both external influences (amounts of data, time constraints, others' conflicting priorities, relationships, and the hospital organizational culture) and internal influences (participants' preoccupations, knowledge base, and experience).

Participants' decision-making improved over the course of the clinical rotation, primarily due to increased familiarity with types of patients, unit routines, and procedures, and to increased self-confidence. The changes were more noticeable among university participants than in their college counterparts primarily because the former were assigned to the same unit over a longer period of time.
CHAPTER FIVE
CONCLUSIONS AND RECOMMENDATIONS

Decision-making has most often been studied as an abstract concept involving the decision-maker and the object of his/her consideration (e.g. the student nurse and the patient respectively). The most valuable contribution of this research project is its demonstration of the limitations of this vision. Decision-making in the real world cannot be understood as an abstract, decontextualized process because it is determined as much by contextual factors as by the individual decision-maker. Unlike a photographic portrait in which the main figure is simply superimposed on an inconsequential background, the process of student nurses' clinical decision-making is largely shaped by the context.

The ability to make appropriate, autonomous, individualized clinical decisions when providing patient care is one of the hallmarks of professional nursing. It is a very complex phenomenon which requires the integration and application of theory from a variety of disciplines (nursing, the physical and social sciences, ethics, etc.). Benner (1984) noted that experience is the major factor in the development of graduate nurses' expertise in clinical decision-making, and that this development takes place over a period of several years. Yet before student nurses graduate and begin to practise as independent professionals, they must be able to make clinical decisions which are consistent with patient safety.

Nurse educators' efforts to enhance students' clinical decision-making have usually been concentrated in two primary areas: 1) teaching critical thinking/decision-making theory in the classroom, and 2) providing opportunities for practice in the clinical area.
The assumption has been that improving students’ critical thinking skills and/or knowledge of decision-making theory will lead directly to better decision-making in actual clinical practice. However, some of the existing research has contradicted this assumption. In two studies involving both university and college nursing students/RNs, both Pardue (1987) and Brooks & Sheppard (1990) found significant differences in subjects’ critical thinking skills, but none in their clinical decision-making. These tantalizing results lead to many more questions than answers.

Other gaps in our understanding of this important phenomenon relate to both research populations and methodology. Most of the research has used baccalaureate nursing students and/or graduate nurses as subjects; few studies have included college nursing students. Furthermore, the vast majority of clinical decision-making research has been done using case studies or simulations which precludes any investigation of the effects of context. So far, research has concentrated on particular groups of decision-makers, and on both the process and products of their deliberations. By so doing, it has omitted other groups and overlooked the potential effects of the actual clinical situation on this process.

Clearly, our understanding of student nurses’ clinical decision-making is fragmentary at best. During more than twenty-five years as a clinical nurse educator, I have often felt frustrated by my limited ability to help students who were struggling in this area, a feeling shared by many of my colleagues. It was from the desire to learn how to be more helpful, to shed light on some previously unexplored aspects of clinical decision-making that this research project developed. My research participants were seven college
and eight university nursing students in the final year of their respective programs. Using a focused ethnographic approach, I followed each subject twice, for a four-hour period at the beginning of a clinical shift. During the observational periods, I taped subjects’ ongoing thought processes using a verbal protocol and made observational field notes. At the end of each four-hour period, I taped a retrospective, semi-structured interview to clarify and enlarge on the earlier information.

The purpose of the research was to learn how student nurses make patient care decisions in the actual clinical setting, and whether there were identifiable differences among different groups of decision-makers. The research questions were:

1) What are the decision-making (DM) patterns (types, frequency, and sequencing) shown by student nurses when providing patient care in the clinical setting?
2) How appropriate are student nurses’ clinical decisions?
3) Are there identifiable differences in the DM patterns among participants based on program type or age and life experience, and if so, what are they?
4) What contextual factors influence student nurses’ clinical DM and how do they do so?
5) Does DM ability and appropriateness improve during a medical/surgical clinical rotation?

**Major Findings and Conclusions**

The most exciting finding of this research project was the powerful influence of context on participants’ decision-making. The answers to the remaining research questions, while useful, were of secondary importance. Participants made five types of
decisions in brief and irregular sequences, and most decisions were generically appropriate. Decision-making patterns did not distinguish clearly between participants in different programs or age groups, but decision-making did improve over the course of a clinical rotation. Each of these findings and its implications will be examined further below.

Effects of Context

Context was a major determinant of participants’ decisions. Six contextual factors were identified, of which five were external to the participants and one was internal. The external factors included abundance of data, scarcity of time, conflicting priorities, relationships, and the hospital culture. The internal factor comprised an amalgam of participants’ individual preoccupations, knowledge base, and experience. This mixture of individual characteristics was considered a part of the context within which decisions were made because it formed a substrate on which the decision-making was taking place and it affected many parts of the decision-making process. For example, personal factors which focused a participant’s attention in a particular direction (e.g. symptoms of cardiovascular disease) tended to bias the assessment process, while lack of knowledge in an area required the participant to commit extra time and cognitive processing resources to fill the gap, thus decreasing time and resources available for other aspects of care. Earlier experience with roles in the health care system had both positive and negative effects. It made some decision-making easier, but the stress of protecting a previously successful identity sometimes interfered with the cognitive flexibility needed for decision-making.
In terms of the external factors, abundance of data and scarcity of time interacted with each other. In the classroom, simulations are often used to teach application of theory, and extraneous data are limited or omitted in order to focus students’ attention on the important aspects of the situation. In contrast, data in the clinical situation cannot be artificially restricted and the sheer amount of data is quite overwhelming to novices. Participants had difficulty identifying the relative importance of data and tended to treat it all as equally meaningful. Thus, they had to commit large amounts of time and cognitive processing resources to the sorting and analysis of data, much of which was irrelevant. This demand cut into time resources already strained by the numbers of activities to be performed in the shift, and participants lacked the organization and priority-setting skills to cope with the workload.

Participants often encountered conflicting priorities when they sought advice from others in the same or different disciplines (e.g. teacher/preceptor, other staff nurses, physiotherapist), and the advice they received sometimes conflicted with the participant’s own priorities for the patient. How they determined whose advice to follow depended on the perceived authority of the source, the presence or absence of the advisor during implementation, and the participant’s comfort level with the advice.

Participants’ relationships with others (teacher/preceptor, staff, patient, etc.) also had a significant influence on their decision-making. Relationships that were perceived as positive and supportive promoted risk-taking and willingness to make decisions. Teacher/student relationships perceived as negative tended to cause anxiety which
interfered with participants' cognitive flexibility, while negative patient/student relationships promoted avoidance on the part of the participant.

Underlying all of the above factors was the powerful and pervasive influence of hospital culture. Students in the hospital environment are strangers in a foreign land. In a short period of time, they must learn not only a new language and the rules of the culture, but also the roles, relationships, and activities of group members and the schedules of the system. This requirement places enormous demands on students' cognitive processing capacities, demands which are largely invisible to teachers and staff. Most staff and teachers are so immersed in the culture that, by and large, they are unable to see what the students don't understand.

Cognitive processing occurs on several levels, only the topmost of which is at the level of conscious awareness. According to Newell & Simon (1972), short-term memory is the place where this conscious processing takes place, and it's capacity is extremely limited (they postulated a capacity of five to nine items or "chunks" of related data at a time). In short-term memory, new data are related to information retrieved from long-term memory in the process of learning and assigning meaning to data. Experts perform familiar activities at a subconscious level where the activities do not impinge on the limited processing resources of short-term memory. In fact, raising such activities to conscious awareness is usually accompanied by a degradation in the level of performance (Dreyfus & Dreyfus, 1986). It is very difficult for experts to make themselves aware of the things which they do automatically. For this reason, individuals who are closer to the learner in the novice-to-expert progression are often more helpful than experts.
For students, however, knowledge of hospital culture is not automatic. They have to consider the meaning of medical jargon and abbreviations; learn the hospital and unit routines and schedules; become familiar with the types of medical conditions, medications and treatments that are common on the unit; and come to recognize the staff hierarchy. Furthermore, unlike RNs who work on the same unit for years, students are usually moved from one specialty to another (e.g. medicine, surgery, obstetrics, paediatrics, psychiatry) at least every semester, and sometimes more often. Thus, students are continually coping with new situations which must be thought through at the level of conscious awareness. This lack of familiarity places considerable demand on students’ limited cognitive processing resources, a demand which is virtually unrecognizable to experienced staff and teachers.

As expected from Information Processing Theory (Newell & Simon, 1972), this research clearly demonstrated limits on participants’ conscious processing abilities. Whether the constraints were as severe as postulated (five to nine items/chunks) is not clear. What is clear from this project is that contextual demands on students’ cognitive processing resources are much greater than is usually recognized. This fact, together with the processing limitations noted, brings to light many sources of difficulty in student nurses’ clinical decision-making.

Decision-Making Patterns

The main types of decisions made by participants were: 1) assessment, 2) analysis/hypothesis, 3) intervention, 4) organization/priority-setting, and 5) administrative/communication. The majority fell into the first three categories. It was possible to further
subdivide these three categories into two subtypes: nursing and procedural. Nursing decisions were those which could be independently chosen by the nurse; procedural decisions could not be instituted without an order from another health professional. Organization/priority-setting decisions included both ongoing choices of organizational strategies and the setting of inter- and intra-patient priorities. Administrative/communication decisions included those which required direct interaction with other health professionals (e.g. physicians) or a broader level of communication within the nursing team (e.g. reporting to a covering RN about the condition of all assigned patients prior to going on break).

Assessment decisions were most numerous, followed closely by intervention and less frequently by analysis/hypothesis decisions. Organization/priority-setting and administrative/communication decisions represented a very small minority of the total. Interestingly, nursing decisions were much more common than procedural decisions in the assessment and analysis/hypothesis categories, but slightly less common in the intervention category. All decision types increased in frequency between the first and second observational periods except organization/priority-setting which decreased slightly. The increase in most decision types was probably related to participants’ greater familiarity with types of patients common to the unit which allowed frequently repeated decisions to become automatic, thus freeing more time and cognitive processing resources for additional decision-making. The decrease in organization/priority-setting decisions may suggest that, as organizational strategies improved, more data could be handled in each
priority-setting exercise, thus decreasing the frequency with which this process needed to be undertaken.

The relative frequencies of assessment, analysis/hypothesis, and intervention decisions superficially appear to support the nursing process model in which a set of related assessments leads to an appropriate nursing diagnosis (analysis/hypothesis) which in turn suggests a series of pertinent nursing interventions. This impression, however, is false. Most decision sequences were short, fragmented, and variable in point of origin and direction of flow. Analysis/hypothesis decisions were the least frequently articulated part of this process, and were generally based on quite limited data. Participants demonstrated a limited ability to chunk related data and had difficulty recognizing overarching hypotheses which could explain more than one data set. Participants frequently used heuristics (e.g. moving directly from assessment to intervention/reassessment) to cope with the limitations of short-term memory. Their decision-making patterns were consistent with the novice level in Dreyfus’ & Dreyfus’ (1986) Skill Acquisition Theory.

The standard for judging appropriateness of student nurses’ decisions should not be the same as that used for experienced RNs. Thus, I defined appropriate decisions as those which were “consistent with patient safety and reasonable for participants’ level of experience”. In this context, most of the participants’ decisions were generically appropriate if not optimum (e.g. encouraging a potentially dehydrated patient to drink more without assessing why the patient was not drinking). This generic appropriateness likely reflects several things. First, the nursing body of knowledge is largely transmitted in terms of generically appropriate assessments and interventions so that it is broadly
applicable. Secondly, the generic appropriateness also functions to restrict students’ decision-making latitude within boundaries which help to prevent or minimize potentially harmful errors. Thirdly, both time and cognitive processing constraints probably limited participants’ ability to see beyond the “hospitalized patient” to the individual. The majority of participants’ decision-making errors were those of omission rather than commission.

**Differences by Program Type and Age/Life Experience**

There was no clear differentiation between participants’ decision-making based on program type or age and life experience. University participants made more decisions in all categories except organization/priority-setting, where they made slightly less than their college counterparts, but the differences were small. Mature students with greater life experience made more assessment and analysis/hypothesis decisions and slightly less of the other types than their younger counterparts, but again, differences were slight.

Surprisingly, another factor which seemed to bear little relationship to decision-making frequency was the number of patients in the participants’ assignments. Participants with one, four, and five patients respectively each made very similar numbers of decisions during their second observational periods. Conceivably this phenomenon could relate in part to the complexity of the patients in the assignment, but since all participants had one or more patients requiring equivalent amounts of monitoring and care, this explanation seems unlikely. A more likely possibility is that there is a tendency for care to be spread out to fill the available time. That is, the fewer patients in the assignment, the more time spent and the greater the amount of care given to each.
Although this finding suggests that students can gain as much decision-making practice from one as from multiple patients, the quality of the experience depends on the individual student and patient(s). Single patient assignments also limit practice with organization/priority-setting decision-making.

The fact that there were no clear differences between groups on their decision-making suggests that something more powerful than program type and age/life experience was influencing participants' decision-making. The likelihood is that contextual factors which affected all participants in relatively similar ways were powerful enough to minimize or obliterate expected differences.

Decision-Making Improvement During a Clinical Rotation

All but one participant identified an improvement in decision-making over the course of the clinical rotation. They felt much more confident, they made decisions more easily, and their organization and priority-setting had improved. This subjective perception of a change in their decision-making was supported by the increased frequency and appropriateness of decisions, the staff's increased confidence in participants' judgement, and my own observations that they were coping better with their patient assignments on the second observational period. The one participant who did not appear to have improved during the second observation was one who was already at a high level of decision-making skill due to several years of related health care experience, and who felt significantly threatened by the teacher. She had already noted that her anxiety over the teacher was interfering with her work.
Limitations of the Research

Limitations of this research project relate to both content and methodology. One primary limitation was the difficulty encountered trying to elicit participants' rationales for their decisions. I had hoped that understanding rationales would help me track knowledge gaps and reasoning errors. However, participants assumed that I knew the reasons behind their decisions. Questions aimed at eliciting rationales tended to confuse participants and misled them into elaborating on marginally related issues. Consequently, I was frequently left to infer rationales. Sometimes knowledge gaps, problems with transfer of knowledge, and reasoning errors could be readily identified, but at other times the nature of the problem with an inappropriate/omitted decision was not clear.

Another limitation was imposed by the desire to interfere as little as possible with the normal course of participants' ongoing work and thought processes. Questions throughout the course of the observational period had, of necessity, to be fairly brief to avoid changing the focus of the participant's attention and impinging on strained time resources. Thus I had to rely on the retrospective interview to "fill in the gaps".

I tried to be as nondirective as possible so as not to bias participants' responses, but participants often needed slightly more guidance than planned in order to understand the data required. Thus, I may have inadvertently inflated the frequency of responses related to assessments and interventions because these were terms used when necessary to provide minimal guidance.

This research is also limited by program timing and location factors. It describes the development of participants' clinical decision-making during a particular semester in
their nursing program but says nothing about the course of development over earlier or later semesters. It also identifies several contextual factors which exerted a powerful influence on participants’ decision-making in a medical/surgical setting in an acute care general hospital. To what extent these same factors would be influential in a different setting (e.g. obstetric/psychiatric in-patient units, clinics, community health care) or what different factors might be operative there remain unknown.

Several other limitations relate to the methodology chosen. These include the nature of the sample and of the data collection methods. Qualitative research samples are small and nonrandom, which prohibits the generalizability of the findings and the identification of causation. One of the problems with participant observer research is not knowing how the presence of the researcher affects the process under observation. Also, since the researcher is the primary data collection instrument, it is difficult to eliminate the researcher’s own biases. Verbal protocols have limitations as not all participants are equally able to verbalize their thought processes.

**Recommendations**

This research project offers beginning insights into student nurses’ clinical decision-making in the real world of hospital nursing. There is much more that needs to be done to augment our understanding of this phenomenon, and of how to facilitate its development. The following includes recommendations to nursing as a profession and to nursing educators, as well as suggestions for further research.

**Recommendations to the Nursing Profession**

1. Facilitating student nurses’ clinical decision-making requires a joint effort between
educators and clinical practitioners. Nursing staff need to be aware of their crucial role as decision-making role models and mentors of students. Especially at this time when Ontario nurses are feeling overworked and devalued, they need to recognize and be recognized for the value of their contribution to future nurses.

2. Nursing administrators need to be aware of the importance of field research among staff and students in different health care settings, and supportive of it. One of the major problems involved in this research project was getting access to the clinical setting, and this would not have been possible without the active help and support of nursing administrators at many levels.

Recommendations to Nursing Educators

1. Nursing educators need to be much more aware of how complex the clinical setting is for students, and of how this affects their learning to make decisions about client care. We need to understand and accept the limitations this imposes on students' decision-making.

2. Nursing curricula should be structured to provide the maximum amount of clinical experience. Increased clinical experience would give teachers more time to initiate students into the organizational culture and would allow students more opportunity to practise clinical decision-making.

3. To facilitate the transfer of learning from classroom to clinical setting, knowledge must be structured in schemata that closely approximate what students will find in the clinical situation. Both verbal/linear and visual representations of knowledge are important. We now have a generation of students raised as much on visual
imagery (TV, computer graphics, etc.) as on linear material (e.g. books). We need to take advantage of both left- and right-brain methods of cognitive processing.

4. Nursing educators need to be primarily supportive rather than evaluative as they mentor students’ learning. The anxiety experienced by students who feel themselves to be continually evaluated interferes with their clinical decision-making. Evaluation needs to come toward the end of the rotation when the student has developed some degree of both skill and self-confidence.

5. Nursing educators need to build strong relationships with their staff colleagues in order to provide the most effective environment for students’ learning and practice of clinical decision-making.

6. Nursing educators need to be aware of student nurses as individuals in order to understand and use the strengths that each brings to the decision-making enterprise. Knowledge of specific weaknesses (e.g. with knowledge base, personal problems, etc.) can allow educators to tailor assistance appropriately.

Recommendations for Further Research

1. More field research studies need to be done into student nurses’ clinical decision-making at different points in the curriculum in order to understand the ongoing development of this process and how to intervene when it goes astray.

2. Field research also needs to be done into student nurses’ clinical decision-making in different settings in order to identify how the influence of contextual factors differs in other clinical situations (e.g. clinics, community health).
3. Research is required to bridge the gap between classroom theory and clinical practice in decision-making. For example, an experimental study to determine the effectiveness of teaching a particular decision-making method could be followed by a field study involving a subset of the experimental group to see how the method survived the transition into the clinical area.
Content References


**Methodology References**


APPENDIX A
INSTRUMENTS AND RATIONALE FOR VERBAL PROTOCOLS

VERBAL PROTOCOL QUESTIONS

Just after shift change report and before entering the client's room:

1) Based on your chart research and what you've just heard in report, what are your thoughts at this point about your client care?
1a) What is the purpose of this visit to your client? Why are you choosing to do this?

Throughout the day, after each time in a client's room:

2) What are your thoughts about what you've just seen/heard/done in the client's room? Why did you choose to...?
3) I noticed while you were in the client's room that you.... Can you tell me about that (e.g. why you did it, etc.)?
4) What are you going to do now? Why?

The above are attempts to elicit the student's ongoing thought processes without leading him/her in any particular direction (e.g. toward assessment, diagnostic, or treatment decisions).

STIMULATED RECALL QUESTIONS

I would start without prompting:

1) I'd like you to tell me about as many of the client care decisions that you made today as you can remember. What were they?
2) Why did you make those particular decisions (each one individually)?

If prompting were necessary:

1a) What did you assess about each client? What decisions did you make based on your assessment? What actions did you take based on the decisions you made about the assessment data?
2a) How did you decide what to assess? How did you arrive at the decisions which resulted from the assessment? Why did you choose the particular interventions that you implemented?

Questions about the quality of decisions:

3) In retrospect, would you have changed any of your decisions? If so, which ones and why?
4) Which decisions do you think were the most important? Why?
RESEARCHER'S OBSERVATIONS OF STUDENT PERFORMANCE

PATIENT A (age, gender, medical dxs. tests & txs. marital/family status, complexity/level of nursing care required)

Assessments:
Complete
Areas Omitted

Diagnoses:
Accurate
Inappropriate
Omitted

Treatments/Interventions:
Appropriate
Inappropriate
Omitted

PATIENT B (age, gender, medical dxs. tests & txs. marital/family status, complexity/level of nursing care required)

Assessments:
Complete
Areas Omitted

Diagnoses:
Accurate
Inappropriate
Omitted

Treatments/Interventions:
Appropriate
Inappropriate
Omitted

Rev. 25/9/95
## CLIENT CARE TIME RECORD

| TIME/ACTIVITY | 07  | 07  | 08  | 08  | 09  | 09  | 09  | 09  | 10  | 10  | 10  | 10  | 11  | 11  | 11  | 11  | CODES |
|---------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| Pt A Asmt     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |       |
| Hyg           |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |       |
| IV            |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |       |
| Meds          |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |       |
| Trmt          |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |       |
| Emot          |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |       |
| Tchg          |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |       |
| Othr          |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       | eg Spec. A/D |
| Pt B Asmt     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |       |
| Hyg           |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |       |
| IV            |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |       |
| Meds          |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |       |
| Trmt          |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |       |
| Emot          |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |       |
| Tchg          |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |       |
| Othr          |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |       |
| Tch LAss      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       | Learning Assign |
| Rsch          |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       | Pt Research   |
| Intn          |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       | Interactn c St |
| St Help       |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       | c Othr Pts    |
| Covr          |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       | for Breaks    |
| Oth Brk       |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       | Own Breaks    |
| Dist          |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       | eg Fire A/Code |
| Unas          |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       | Free Time     |
| R/T           |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       | Record/Transit |
APPENDIX B
ONTARIO INSTITUTE FOR STUDIES IN EDUCATION
DEPARTMENT OF ADULT EDUCATION

Informed Consent Form

PROJECT TITLE: Student Nurses' Clinical Decision-Making: Key to Professional Practice
RESEARCHER: Margaret E. Black R.N. M.Ed. Phone: 416-496-2302

The purpose of this research is to learn how student nurses make client care decisions in the actual clinical setting, and what, if any, are the differences between the decision-making patterns of students with good clinical decision-making skills and those who have problems in this area. If you volunteer to participate in this research, you will be followed twice by the researcher through the first four hours of a clinical day shift in a medical/surgical rotation, once near the beginning of the rotation and again near the end. Each time that you leave a client's room, the researcher will ask you for your thoughts about what you have just seen/heard/done in your interaction with the client, and your plans based on the interaction. Your brief (2-4 minute) answers will be tape-recorded for later transcription. The researcher will also record and evaluate the types of decisions you are making and will complete a checklist identifying the time constraints and environmental demands being placed on you. At the end of the four-hour period, the researcher will conduct a 30-minute, tape recorded interview with you in which you will be asked to recall and evaluate the client care decisions you have made throughout the observation period. At the completion of each of the two observation periods, you will be given an honorarium of $25.00. None of the tapes or forms will be shared with your educational institutions or the hospital staff. When the coded data has been analyzed, anonymous group data will be included in the final report which will be available to all. Upon request, participants will receive a summary of the report and the implications of the study.

Although you may not benefit directly from the study, your participation may help other student nurses through improved teaching of clinical decision-making.

THIS IS TO CERTIFY THAT I, ___________________________ HEREBY AGREE TO PARTICIPATE AS A VOLUNTEER IN THE ABOVE NAMED PROJECT. I understand that none of the information collected during my observation periods will be shared with my teachers, school, or unit staff. I hereby give permission to be observed and interviewed, and for tape recordings to be made as described above. I understand that, after transcription, the tapes will be erased, and that, although the group information will be published, my name will not be associated with the research. I understand that I am free to withdraw my consent and terminate my participation at any time without penalty. I am willing to give the researcher the following background data: my nursing program Grade Point Average ____ /permission to obtain it from my school____: the highest level of education I attained prior to entering nursing _________. I have been given the opportunity to ask any questions I wish, and feel that all questions have been answered to my satisfaction.

_________________________ (Participant) ___________________________ (Researcher)
_________________________ (Witness) ___________________________ (Date)
The purpose of this research is to learn how student nurses make client care decisions in the actual clinical setting. Twelve baccalaureate nursing students and twelve diploma nursing students will act as research subjects. Students who volunteer to participate in this research will be followed twice by the researcher through the first four hours of a clinical shift, once near the beginning of their clinical experience and again near the end. Each time the student leaves a client's room, the researcher will tape record the student's thoughts about his/her interaction with the client and the decisions arising from it. The researcher will also complete a written observation form of the student's actions and decisions. and a checklist identifying time constraints and environmental demands. At the end of the four-hour period, the researcher will conduct a 30-minute, tape recorded interview with the student in which he/she will be asked to recall and evaluate the client care decisions made throughout the observation period.

In order to judge the adequacy of the student's decision-making, the researcher will need to be able to follow the student into patients' rooms while patient care is being given. and will need access to the student's patient data base (including age, sex, marital/family status, medical diagnoses, tests, and treatments, level and complexity of nursing care required). Absolutely no recordings of interactions with patients will be done. No patient names will be used in the data collection. Since the collection of patient data is only for the purpose of judging the appropriateness of the student's decisions, patient data will not be used in the research report. The agency will not be identified.

I will introduce myself to patients as follows: "I am a nursing teacher/researcher who is following your student nurse today in order to learn the process that student nurses use when they make decisions about client care. Although I will be observing your student as he/she provides care. and will have access to the student's information about you, this is only for the purpose of understanding the basis for the student's decisions. No client information will be used in the research report. Your willingness to permit my observation is strictly voluntary, and you may withdraw it at any time. Are you willing to allow me to do this?"

If the client/patient indicates objection to my involvement. I will omit him/her totally from the study.

None of the tapes or forms will be shared with the student's educational institution or the agency staff. A brief summary of the final report will be available on request.

Although the agency may not benefit directly from the study, your participation may help future nurses through improved teaching of clinical decision-making.
THE STUDENT(S) INVOLVED IN CLINICAL ROTATION(S) AT THIS AGENCY WHO HAVE VOLUNTEERED TO ACT AS RESEARCH SUBJECT(S) IS/ARE:

<table>
<thead>
<tr>
<th>Name</th>
<th>Educational Institution</th>
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THIS IS TO CERTIFY THAT I. __________________________________________________________ (Name and position) HEREBY AGREE TO ALLOW MARGARET E. BLACK, R.N., ACCESS TO THE AGENCY UNIT(S) AND TO THE INFORMATION AS SPECIFIED ABOVE, STRICTLY FOR THE PURPOSE OF CONDUCTING THE RESEARCH AS DESCRIBED. I understand that none of the information collected during the observation periods will be shared with teachers, school, or agency staff. I understand that no tape recordings will be made of interactions with patients. Patients will remain strictly anonymous. No patient data will be included in the report, and the agency will not be identified. I have been given the opportunity to ask any questions I wish. and feel that all questions have been answered to my satisfaction.

_______________________ (Agency Rep.) ______________________ (Position)

_______________________ (Witness) ______________________ (Researcher)

_______________________ (Agency) ______________________ (Date)

MEB
Rev. 9/9/95
Appendix B3.1

ONTARIO INSTITUTE FOR STUDIES IN EDUCATION
DEPARTMENT OF ADULT EDUCATION

Patient Consent Form

PROJECT TITLE: Student Nurses’ Clinical Decision-Making: Key to Professional Practice

RESEARCHER: Margaret E. Black R.N. M.Ed. Phone: 416-496-2302

I am a nursing teacher and researcher who is conducting a study of student nurses to learn how they make clinical decisions when they are giving care to their patients. Your student nurse has volunteered to participate in the study, and I would like to be able to follow her (him) about as she (he) gives your care today. This would mean being in your room while the student is looking after you, and having access to her/his information about you. This is only for the purpose of understanding the basis for the student’s decisions. The observational records will be anonymous. No patient information will be used in the research report.

Your willingness to permit my observation is strictly voluntary, and you may withdraw it at any time. If you have any questions now or during the day about the project or what I’m doing, please feel free to ask them. If you are willing to allow me to observe your student as described above, I would appreciate your signing this consent.

I, ________________________, HEREBY AGREE TO ALLOW MARGARET E. BLACK, R.N., TO OBSERVE ______________________ (student nurse) WHILE SHE/HE IS CARING FOR ME, FOR THE PURPOSE OF THE STUDY AS DESCRIBED ABOVE. I understand that the observational records will be anonymous, and that no information about me will be used in the research report. I understand that I am free to withdraw my consent at any time without penalty. I have been given the opportunity to ask any questions I wish, and feel that all questions have been answered to my satisfaction.

________________________ (Patient) ______________________ (Researcher)

________________________ (Witness) ______________________ (Date)
ONTARIO INSTITUTE FOR STUDIES IN EDUCATION
DEPARTMENT OF ADULT EDUCATION

Parent/Guardian Consent Form

PROJECT TITLE: Student Nurses' Clinical Decision-Making: Key to Professional Practice

RESEARCHER: Margaret E. Black R.N. M.Ed. Phone: 416-496-2302

I am a nursing teacher and researcher who is conducting a study of student nurses to learn how they make clinical decisions when they are giving care to their patients. Your child's student nurse has volunteered to participate in the study, and I would like to be able to follow her (him) about as she (he) gives your child's care today. This would mean being in the room while the student is looking after your son/daughter, and having access to her/his information about your child. This is only for the purpose of understanding the basis for the student's decisions. The observational records will be anonymous. No patient information will be used in the research report.

Your willingness to permit my observation is strictly voluntary, and you may withdraw it at any time. If you have any questions now or during the day about the project or what I'm doing, please feel free to ask them. If you are willing to allow me to observe your child's student nurse as described above, I would appreciate your signing this consent.

I ________________________________ HEREBY AGREE TO ALLOW MARGARET E. BLACK, R.N., TO OBSERVE ____________________________ (student nurse) WHILE SHE/HE IS CARING FOR MY CHILD. ____________________________ FOR THE PURPOSE OF THE STUDY AS DESCRIBED ABOVE. I understand that the observational records will be anonymous, and that no information about my child will be used in the research report. I understand that I am free to withdraw my consent at any time without penalty. I have been given the opportunity to ask any questions I wish, and feel that all questions have been answered to my satisfaction.

__________________________ (Parent/Guardian) __________________________ (Researcher)

__________________________ (Relationship to Patient)

__________________________ (Witness) __________________________ (Date)
Appendix B3.3

ONTARIO INSTITUTE FOR STUDIES IN EDUCATION
DEPARTMENT OF ADULT EDUCATION

Assent Form

PROJECT TITLE: Student Nurses' Clinical Decision-Making (how student nurses decide what to do to help their patients)

RESEARCHER: Margaret E. Black R.N. M.Ed. Phone: 416-496-2302

Why am I doing this study? One of the hardest things about learning to be a nurse is learning how to choose what things will be most helpful to each person the nurse is looking after. For example, when the nurse is trying to find out how you've been feeling and what's been happening to you. some children want to tell her all about it themselves, but others would rather let mom or dad answer most of the questions. If the nurse asks you a lot of questions that you don't feel like answering and doesn't explain why they are important or if she doesn't listen when you have something important to tell her, this can make you feel angry or uncomfortable. It can also mean that some important information that the nurse or doctor needs to know about you doesn't get heard. So it is really important for student nurses to learn how to figure out what is right for you. instead of just what is usually right for children your age.

What will happen during the study? When your student nurse, Mary, weighs and measures you and then asks you and your mom or dad all about how things have been with you lately. I will be there. I will be writing little notes to myself about what Mary is doing and how I think it is working for you and your parents. It is important to remember that it is Mary I am studying, not you. Later I will be able to compare these notes with the notes from other students who are helping me with the study and see what things seemed to work best and which ones were not helpful.

Are there good things and bad things about the study? Since it is Mary (rather than you) that I am trying to learn about. the study will make no difference to you at this point. If I can learn how to help student nurses make better choices when they are helping their patients. this may help people who come to hospitals in the future.

Who will know what I did in the study? No information about you will be given to anyone.

Can I decide if I want to be in the study? If you decide that you don't want to let me be with Mary while she is talking to you, that's OK. No one will be upset or disappointed. If you say yes now and change your mind part way through, just tell me and I will leave. Your mom or dad is also reading about the study, and can help you if you have any questions about it. If there are any things you don't understand, please ask me and I'll be happy to explain it to you.

Assent

I was present when ___________________________read this form and gave his/her verbal assent.

____________________________ (Name of person who obtained assent)

____________________________ (Signature) _______________ (Date)
APPENDIX C
CODING GUIDELINES FOR TRANSCRIPTION ANALYSIS

ASSESSMENT DECISIONS

Data collection forms the basis of the assessment process (Carnevali & Thomas, 1993; Diagnostic Reasoning & Treatment Decision Making in Nursing, p 53). In hospital nursing, however, it is not an isolated, individual entity. It is a distributed, collective process: distributed across time, across space and representational media, and across people (e.g. data are collected from P's and others' previous experiences with the pt, from the chart/kardex/report, and from P's and others' current exposure to the pt). There are always more data available than one can attend to, so choices must be made about which data to focus on. Generally these choices are powerfully influenced by this collective process.

All the data to which P attends (however acquired) form part of her overall decision-making process. It is extraordinarily difficult to separate the individual student's assessment decisions for the observational period from the overall collective process without destroying its integrity and rationality. To focus only on P's individual assessment decisions without reference to the mass of other data with which she has been presented is to miss the basis for many of her analytical and intervention decisions. To include/count all the data used in P's ongoing decision-making (regardless of how acquired) is to lose the focus on P's individual assessment decision-making. This issue has been a source of ongoing frustration and more than a little confusion. However, in the interests of this analysis, I have decided to focus on P's assessment decisions while at the same time acknowledging that they are not the sole basis for the rest of her decision-making (i.e. I have noted other data which have figured in analysis and intervention decisions, but not counted them among the assessment decisions). Certain arbitrary decisions were made about what counts as an assessment decision for P and they are as follows:

1. Pre-encounter data (those given to P at report, by T/Pr, or by back-up staff before P begins her own data collection, or acquired by P during earlier exposure to the pt) are not counted.
2. Similarly, ongoing presentation of data to P by others (staff, pt, etc.) are not counted.
3. Assessment decisions are those which P indicates she will do or implements before they are mentioned by others (although they may be corroborated by others). Assessment decisions are of varying depth and complexity and P is given credit for the complexity of her assessment decisions according to the following coding guidelines.

Assessment decisions are to be coded and counted as follows:

1. Each major area of assessment mentioned per patient (e.g. pain, skin, respiratory) should be coded as As; if there are no sub-assessments, give the area one count.
2. If an area is reassessed during the observation period (e.g. pain at two different times), count it as two separate instances of assessment.
3. Where possible, identify/count sub-assessments (including parameters and indicators) mentioned per patient as SAs (e.g. major area - pain: sub-assessments: parameters - location, character, severity, duration, radiation, factors increasing/reducing: indicators - moaning, verbalization, facial grimacing, posture/guarding, pallor, diaphoresis, vital sign changes).

4. Routine vital signs assessment include temperature, pulse/apical rate, respiratory rate, and blood pressure and count as 1"As" per pt per time. If particular vital signs (e.g. temperature, blood pressure) are repeated during the observation period because the participant feels they are warranted, count these as separate sub-assessments (SAs).

ANALYSIS/HYPOTHESIS/DIAGNOSIS DECISIONS

The following definitions have been used as the basis for identifying decisions in these categories.

Analysis (Data Processing) - the process of assigning meaning to data: classification, interpretation, & validation (Iyer et al, 1995; Nsg Process & Nsg Dx, p 96)

Hypothesis - a supposition or conjecture put forth to account for known facts; a provisional supposition which accounts for known facts, and serves as a starting-point for further investigation by which it may be proved or disproved (shorter Oxford, 1973)

Diagnosis (Nsg) - a clinical judgement about an individual, family or community response to actual or potential health problems/life processes (Iyer et al, 1995, p 95)

In practice, it has proved very difficult to distinguish between hypothesis and diagnosis (the main difference seeming to be the degree of certainty involved); consequently I have collapsed these two categories into one (H/D or simply, H). Decisions in these related areas are counted as follows:

1. Count as (An) each instance in which the participant attempts to assign meaning to data (analysis - initially likely normal/abnormal; then, if abnormal - ?).
2. Count as (H/D or H) each instance in which P puts forth an hypothesis/dx as defined above.

INTERVENTION DECISIONS

Intervention decisions arise/evolve in several ways. They may be part of a basic body of nursing care (e.g. hygiene, skin care, nutrition), part of a standard protocol used for common situations (e.g. DB&C exercises, turning/repositioning, increasing fluid intake for preventing/treating respiratory and skin problems in pts with decreased mobility), modifications of a standard protocol to fit particular situations (e.g. DB but no C for pts with increased intracranial pressure), or specific interventions chosen to deal with a pt's individual problem/need. Although the first 3 ways are "basic" expectations of the nurse, they are counted here because there is a considerable amount of less obvious decision-making around them related to how and when they will be done (e.g. will the pt be bathed...
in bed/at the bathroom sink/in the shower/tub? how much help will he/she need? how much encouragement to participate/do independently? should it be done before/after other aspects of care? etc.). This is particularly the case with student nurses who have not yet internalized this knowledge to the point where it is automatic. Intervention decisions are counted as follows:

1. Each major area of intervention mentioned per pt (e.g. bathing, ambulation, comfort, encouraging fluid/food intake, skin care, emotional care, teaching) is coded as 1; if there are no sub-components, give the area 1 count.
2. If an intervention area is repeated during the observation period (e.g. skin care given twice), count it as two separate instances of "I".
3. Where possible, identify/count the sub-components mentioned per pt as SI (e.g. major area - skin care; sub-components - cleaning prn, massaging bony prominences with lotion, turning/repositioning patient, applying opsite to broken area).
4. Count narrative/explanatory charting per patient per time as separate "I"s.

PROCEDURAL DECISIONS

These decisions are included here because, although the activity and its frequency are usually prescribed by someone else, there is still considerable latitude for judgement in exactly when and how they will be implemented. This category includes most decisions related to the implementation of ordered procedures (e.g. giving medications, doing dressings). It does not include nursing routines (e.g. assessing VS, ambulating pts, doing peri care, etc.). For example, decisions related to catheterizing a pt would be procedural; those related to emptying a catheter drainage bag & assessing the output would be nursing decisions.

1. Procedural decisions may involve assessments, analysis/hypothesis decisions, and intervention decisions, and they are identified with an asterisk and the category to which they belong (*As, *An,*H/D,*I) and counted per pt per time, separately from nursing decisions. Decisions related to the implementation of ordered procedures but involving significant nursing judgement (e.g. when to give prn meds, dosage ranges) are counted as nursing decisions.

If no sub-components of procedural intervention decisions are identified:

1. Count the preparation of meds per patient per route per time as separate instances (e.g. if both Pt A and Pt B have PO meds at 0800hr, preparing these meds for both patients counts as two "*I"s regardless of number of PO meds per patient; if Pt A has PO meds plus IV meds at 0800hr, preparing these meds for Pt A counts as two "*I"s).
2. Count the administration of meds per patient per route per time as separate "*I"s (e.g. giving Pt A's and Pt B's PO meds at 0800hr counts as two "*I"s; giving Pt A's PO meds and Pt A's IV meds at 0800hr as two "*I"s).
3. Count the **preparation** for ordered procedures (e.g. assembling equipment for doing a dressing) as separate "*I"s.

4. Count the **implementation** of ordered procedures (e.g. actually doing the dressing) as separate "*I"s.

5. If **research** is necessary prior to giving medications or doing ordered procedures, count these periods as separate "*I"s.

**If sub-components of procedural decisions are identified:**

6. Count them individually as described under the appropriate section above and identify them as *SAs, *SAN, *SH/D, *SI.

**Charting:**

7. **Procedural charting** includes graphic or tick-off charting but not narrative notes. Count flow sheet/graphic/CBE parameter charting per patient per time as separate instances (e.g. recording on Pt A's VSR graph at 0800hr and 1200hr counts as two instances; recording on Pt A's VSR graph and fluid balance record at 0800hr counts as two instances; recording on Pt A's and Pt B's VSR graphs both at 0800hr counts as two instances). Code them as "*I."

**Organization/Priority-Setting Decisions**

1. Each time the participant identifies general or patient-specific priorities or organizational strategies (e.g. first, I'll pour all the meds, then I'll distribute them; the most important thing for Pt A is his trach care, followed by encouraging his fluid intake), code them as O/P. Generally there is an initial priority-setting process early in the shift, followed by one or more periods of reorganizing/repriorizing during the course of the shift.

**Administrative/Communication Decisions**

1. Count as separate instances each time the participant makes choices about the **nature/scope** of her patient assignment, the transcription of doctors' orders, direct communication with doctors when requesting order initiation or renewal (e.g. ordering a test, renewing a DNR).

2. Miscellaneous communication decisions (e.g. communicating to the back-up RN what parts of pt care the participant is responsible for) are also counted here.

3. Both above types of decisions should be coded as A/C.

**When Decision-Making Is Shared**

1. When both the participant and an RN (e.g. teacher, preceptor, back-up RN for patient care on the unit) are involved in making decisions which the participant may be implementing, count the individual instances of P's part in the decision-making process and code appropriately.
N.B. Include all additional information noted in transcript margins (included from observational records) in the analysis. Include also planned assessments, interventions, and procedures - they should be coded as if actually implemented (assuming that they would be prior to end of shift).

FINAL INTERVIEW DATA
1. Review assessment, hypothesis/diagnosis, intervention & treatment decisions as identified in the final interview. Where they merely repeat/confirm the same data identified throughout the observation period (e.g. if P states that pain management was a major concern, and you have already noted that she assessed pain twice and gave analgesic once during the observation), do not count them as additional instances. If they expand on earlier data (e.g. if you only have the major area of pain noted, and P explains that she noticed facial grimacing, verbal complaint/ moans), then add these as appropriate additional instances (sub-assessments).