The cognitive component of nursing assessment: an analysis

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INTRODUCTION

The nursing process is considered to be a problem solving activity (McCarthy 1981), with much of the research on nurses’ problem solving behaviour based on Elstein et al.’s (1978) model of diagnostic reasoning (Tanner et al. 1987, Baumann & Deber 1989). Implicitly, therefore, nursing assessment is associated with diagnosis. Yet the Saunder’s Encyclopaedia and Dictionary of Medicine, Nursing and Allied Health (Miller & Keane 1987) describes assessment as a ‘critical analysis and evaluation or judgement of the
status or quality of a particular condition and situation of
the object of appraisal'. This definition suggests that the
purpose of assessment is to form an evaluation or judg-
ment about a condition, not a diagnosis of a problem. It
raises the question of whether the cognitive component of
assessment might include different cognitive strategies
from those involved in diagnosis. The definition also
implies that the judgement formulated may be more com-
plex than the identification of problems and needs.

Purpose of the paper

This paper seeks to identify the possible cognitive stra-
tegies which nurses appear to be using when making an
assessment of the patient and to establish whether they
formulate a judgement or evaluation as a result. For the
purposes of the analysis, a judgement was defined as 'a
statement which expresses the nurse's estimate of some-
one's condition or situation' or as 'a statement which
expresses the condition or situation as an evaluation such
as a quantitative analogy (e.g. that the condition is better,
the same or worse than before') (Yates 1990). The paper
starts with a brief overview of medical diagnosis to illus-
trate the cognitive processes used in diagnostic reasoning.

Examples from the nursing literature which refer either
directly or indirectly to assessment are then analysed to
try and elucidate the types of cognitive strategies used and
the way in which judgements or evaluations are expressed.
The findings from the analysis are brought together in a
general discussion of the possible nature of the cognitive
component of nursing assessment and the types of judge-
ments made. The paper concludes with a comparison
between the processes of assessment and diagnosis to illus-
trate their possible similarities and differences.

MEDICAL DIAGNOSIS

Medical diagnosis, like the nursing process, is classed as
a problem-solving activity. Originally it was thought that
problem-solving was a generic process that could be taught
to students of various disciplines (Resnick 1985). An
example of this view in medicine is the generalized diag-
nostic model proposed by Barrows & Feltovich (1987). It
includes two phases. The first, a surveillance process,
involves both an 'hypothesis-driven' search for infor-
mation and a routine or 'menu-driven' inquiry. Hypotheses
are possible explanations of the patients' presenting symp-
toms which, during the early stage, may start as non-
specific ideas (e.g. heart problem) or, pathophysiological,
psychological and aetiological explanations. The routine
enquiry is a well-rehearsed scanning procedure bringing
to light unexpected information which the hypothesis-
driven search may not have considered.

In the second phase all the information that has been
obtained is synthesized with prior knowledge retrieved
from memory to form an internal representation of the
problem. The hypotheses become better defined and better
structured at this stage and, with further new information,
enable the enquiry to become more focused until a final
diagnosis is reached.

It is now recognized, however, that problem solving
requires domain-specific cognitive strategies for gathering
and organizing information (Norman et al. 1987); in
medicine domains represent areas of medical special-
ity. Referred to as context-specific knowledge structures
(Bordage & Zacks 1984, Groen & Patel 1985), these domain-
specific cognitive strategies organize problems into broad
groups or categories either by core principles or concepts
(Larkin et al. 1980), or by a set of procedural rules which
specify what actions must be taken to solve them (Braune
& Foshay, 1983). The context-specific knowledge struc-
tures are developed through experience and form the basis
of domain-specific expertise, and will, therefore, be
referred to as domain-specific knowledge structures
throughout the paper.

The presence of domain-specific expertise has not only
been established for doctors (Kassirer & Gorry 1978), but
also for physicists (Larkin et al. 1980), bridge players
(Charness 1979) and chess masters (Chase & Simon 1973).
It enables expert problem solvers to limit the amount of
information search which they need to undertake by fil-
tering out irrelevant material (Patel & Groen 1991).

Inductive and deductive methods

It is also now acknowledged that diagnosis involves both
inductive and deductive methods of reasoning (Parrino &
Mitchell 1989). During inductive reasoning a general con-
clusion is inferred from particular instances. The inductive
method predominates during the phases of data gather-
ing when activities involve selection and assemblage of
specific relevant individual cues to formulate a generalized
cause or condition (Patel et al. 1986). The accuracy of the
generalized cause or condition is determined by the qual-
ity of the information gathered and is dependent on the
domain-specific expertise of the clinician (McGuire 1985).
During deductive reasoning, inferences are drawn about
particular instances by working backwards from a general
principle or concept. The deductive method occurs when-
ever a generalized cause or condition is generated as a
proposed explanation for an individual set of facts (Parrino

THE COGNITIVE COMPONENT OF
NURSING ASSESSMENT: AN ANALYSIS
BASED ON EXAMPLES DRAWN FROM
THE LITERATURE

Literature on the cognitive strategies used in nursing
assessment has concentrated almost exclusively on
information gathering, much of which concerns the development of objective schedules or check lists (e.g. Bruera et al. 1991, Spiegel et al. 1991, Cholowski & Chan 1992, Soderhamn & Berthold 1993). These schedules or check lists can be likened to the menu driven enquiry of medical diagnosis. What appears not to have been considered is whether there is also a knowledge driven search and, if so, what types of domain-specific knowledge structures nurses develop.

There has also, as yet, been little attempt to evaluate the judgements nurses formulate in assessment. For example, nurses might need to determine (a) how much personal assistance patients need, or (b) how frequently the patient's condition needs to be monitored (e.g. Benner 1984). The former decision requires an assessment from which the nurse can predict the patient's capacity to perform their activities of daily living. The latter decision, on the other hand, requires an assessment from which the nurse can predict the stability of the patient's condition. Only by articulating the predictions can the judgements nurses formulate in assessment be evaluated and their accuracy established.

It was the lack of information about the place of domain-specific knowledge structures and knowledge about the predictions in assessment which prompted the analysis of the literature. Published studies were selected if they (a) referred to information gathering as part of the process of making an assessment of the patient's condition, or (b) referred to the process of assessment itself. Five studies met one or both criteria and examples of the cognitive strategies and/or judgements which they describe or imply form the basis of the analysis.

**Domain-specific knowledge structures**

Domain-specific knowledge structures refer to cognitive strategies which organize problems into broad groups or categories either by core principles or concepts or by a set of procedural rules. Core principles or concepts provide categories which can be used for recognizing problems, e.g. which criteria indicate the type of assessment needed. Procedural rules, on the other hand, provide strategies for gathering and combining data, e.g. how to weight and/or combine the cues available or synthesize them with prior information. The domain-specific knowledge structures thus specify what actions to take and can best be described as 'ways of thinking' about problems met in everyday practice. For example, nurses experienced in looking after patients with diabetes may judge whether the patient's condition is stable very differently from nurses experienced in looking after patients with a myocardial infarction. The domain-specific knowledge structures should not be confused with Benner's (1984) domains of nursing practice which are wider in scope.

In cognitive science, the superior problem-solving skill made possible by the development of domain-specific knowledge structures is called 'intuition' because it happens rapidly and without much conscious deliberation about how the problem should be tackled (Larkin et al. 1980). Benner (1984) was the first to acknowledge the importance of intuition in clinical nursing and has shown, in particular, that it includes perceptual knowledge and recognition capabilities. A further component of problem-solving expertise is the way in which information is represented in long-term memory (Larkin et al. 1980).

Studies of expert and novice nurses' problem-solving skills have demonstrated differences in the way in which judgements are reached, e.g. experts solve problems faster and more accurately than novices (Tanner 1984, Corcoran 1986). These findings suggest that, like doctors, physicists, bridge players and chess masters, expert nurses also develop domain-specific knowledge structures for dealing with problems. Since none of these published studies were specifically designed to examine the cognitive component of assessment, however, it cannot be assumed that the domain-specific knowledge structures transfer to assessment problems. Studies of assessment selected for the analysis were, therefore, examined to see whether the presence of domain-specific cognitive expertise could be identified from descriptions of the nurse's behaviour. Any suggestion that the nurse's prior knowledge of the clinical situation (i.e. information which was not available from patient notes, TPR charts, observations of the patient, etc.) had influenced the outcome of the assessment was taken as an indication of its presence.

**First example**

The first example is drawn from a study reported by Marks et al. (1991). The study compared subjective predictions made by a nurse (and a doctor) with predictive scores of the Apache II assessment schedule. Marks et al. found that nurses' subjective assessments were a more powerful predictor of outcome (either survival or death). In the discussion, one of the inherent weaknesses of the objective scale was considered to be its 'failure to take into account the previous health of individual patients'. Although this aspect of the study was not pursued, the authors make the comment that 'the subjective assessor may pay greater attention to these factors'.

**Second example**

The second example is drawn from a study reported by Jacovone & Dostal (1992). This study was designed to reveal the cognitive processes of assessment and management of cardiac pain and, therefore, specifically set out to describe the cognitive component of assessment. From the types of information which nurses were reported to have used in their assessments, there is an indication that experts appear to know what they are looking for. Jacovone & Dostal (1992) refer to this as 'the ability of the expert
restlessness and level of consciousness, based upon her 
ment that ‘The significance she [the nurse] attributes to his 
the information search, described by Jacovone & Dostal 
that some form of perceptually based construct (i.e. one 
that has been developed from the nurse’s previous experi-
ence with similar conditions) is being generated to direct 
the information available by making the com-
ment that ‘The significance she [the nurse] attributes to his 
restlessness and level of consciousness, based upon her 
qualitative distinctions, influences her judgement’.

Third example
The third example is drawn from a study by Prescott et al. 
(1989). The study was designed to test the reliability of a 
patient intensity for nursing index (PINI) for assessing the 
level of patient need for nursing services in hospital medi-
cal, surgical and intensive care settings. As a part of the 
study, two different nurses were asked to rate the same 
patient on dimensions which assessed the patient’s con-
dition, the complexity of the clinical judgements involved 
and the hours of nursing care needed. In establishing the 
reliability, Prescott et al. (1989) measured the influence of 
the nurses’ educational preparation, general experience 
and prior care of the patient on the scores given. Only 
prior care of the patient was found to distinguish signifi-
cantly between the scores of the raters, indicating the 
important influence of prior knowledge of the patient on 
the quality of the nurses’ assessments.

Together these studies suggest that nurses are using 
some internally driven information search when making 
assessments. The results from Marks et al.’s (1991) study 
imply the presence of a procedural rule for synthesizing 
prior knowledge of the patient’s previous health with new 
information about their current health status. Jacovone & 
Dostal’s (1992) study indicates the presence of a rule 
which enables the expert nurse to limit the amount of 
information needed using some perceptually based strat-
egy. The studies by Jacovone & Dostal (1992) and Prescott 
et al. (1989) also suggest that nurses develop core con-
structs from their clinical experience which they generate 
as ‘situations’ which they might expect to see. It would 
seem from Jacovone & Dostal’s study that nurses generate 
these constructs in the form of a perceptual pattern. Prescott et al.’s study, on the other hand, suggests that 
nurses generate constructs specific to individual patients 
which they develop whilst caring for them.

Nurses thus appear to be using (a) procedural rules 
which set conditions either for the weight to be given to 
the information available or for how the information 
should be combined, and (b) constructs for comparison 
with the patient’s observed state. The constructs may 
either be ‘norms’ developed from experience with similar 
patient conditions or constructs specific to individual 
patients which the nurse has developed in the course of 
looking after them.

Assessments as judgements
Newell & Simon’s (1972) classical definition of a problem 
solver depicts someone who wants something ‘but does 
not know immediately what series of actions he can per-
form to get it’. The ‘something that is wanted’ is the solu-
tion being sought and the series of actions represent the 
cognitive strategies. In medical diagnosis, the solution is 
a diagnostic judgement which enables the doctor to select 
the appropriate medical treatment for the management of 
the patient’s condition. It was hypothesized that in nursing 
assessment, the solution is a judgement which enables the 
nurse to select the appropriate interventions for managing 
the patient’s care.

In order to identify examples of judgements based on 
a nursing assessment, a judgement was defined as a ‘state-
ment which expresses the nurse’s estimate of someone’s 
condition or situation (e.g. the patient is dependent)’ or a 
‘statement which expresses the condition or situation as 
an evaluation such as a quantitative analogy (e.g. that the 
condition is better, the same or worse than before)’. Two 
studies reported statements which met either one or both 
definitions.

First example
The first example is drawn from a report by Corcoran-Perry 
& Graves (1990) which describes cardiovascular nurses’ 
supplemental-information-seeking behaviour. As part of 
the study, nurses were asked for the types of information 
they collect in the course of their everyday practice and 
the reasons why they were seeking it. In the analysis of 
the patient-specific data it was found that nurses collect 
general information about the status of the patient’s con-
dition, illustrated by a direct quote from one of the nurse’s 
responses — ‘health status of a patient who underwent 
cardiac catheterisation’. The reasons given for seeking 
such information were for the purposes of general nursing 
care, illustrated by the direct quote — ‘to get a general 
picture of the patient being transferred to our unit’.

Although Corcoran-Perry & Graves did not refer direct-
ly to assessments in their discussion, they interpret 
their findings to indicate that nurses use the general 
picture of the patient to plan the provision of care. The 
‘general picture’ implies that the nurse has formulated 
a judgement of the patient and, since it was used in 
planning, that it enables the nurse to predict the type 
of care needed.
Second example
The second example is drawn from a description of how a nurse managed a cardiac crisis. It was reported in Jacovone & Dostal's (1992) descriptive study of nursing judgement in the assessment and management of cardiac pain. The nurse faced the problem of whether to continue administering a nitroglycerine infusion despite the patient's low blood pressure. In the section which reports a detailed account of how the nurse solved the problem, it is apparent that her assessment of the patient's condition helped her to decide whether to continue giving the infusion. The type of patient information which she used included level of consciousness, demeanour, restlessness, dyspnoea, pallor, pulse and blood pressure, and the finding that the patient was warm.

Two direct quotes illustrate the assessments which she formulated. The first was a judgement expressed in the nurse's own words — 'you're not yet in frank shock but you are headed in that direction'. This judgement was then revised, expressed again in her own words as 'you're in cardiac shock. You are going to die before we can get to the hospital'. Jacovone & Dostal (1992) suggest that the internal representation of the information used to formulate the judgements can be likened to an 'holistic perception'.

Both examples thus give tentative support to the suggestion that nurses formulate a judgement about the patient when making assessments. Two characteristics of the judgements emerge from Jacovone & Dostal's (1992) study. The first indicates that nurses appear to convey their judgements in the form of verbal predictive statements, for example 'you are going to die'. A predictive statement makes explicit the degree of certainty with which an event will occur, in contrast with a predictive inference where the prediction is implied (Yates 1990).

The second characteristic to emerge illustrates that the judgement changes and sometimes very quickly when looking after people who are acutely ill. Furthermore, Jacovone & Dostal's (1992) study shows how information which has traditionally been referred to as a patient problem (e.g. dyspnoea) acts as input (i.e. new information) to the nurse's assessment. It illustrates that the output of one process (be it a nursing diagnosis) may act as an input to another process (be it an initial assessment or a re-assessment).

THE COGNITIVE COMPONENT OF NURSING ASSESSMENT: GENERAL DISCUSSION
The examples drawn from the literature begin to identify the types of cognitive strategies used in nursing assessment and the form in which assessments are articulated. They thus help to give a structure to the cognitive component of assessment.

Taking the cognitive strategies first, there is an indication that the gathering and organization of information is directed by some internally driven search process. Jacovone & Dostal's (1992) study suggests that nurses generate descriptions of physical states in the form of perceptual patterns to direct their search. Benner & Wrubel (1982) referred to perceptual judgements which discriminate between outward appearances as 'physiognomic appreciations' and, with others (e.g. Henneeman 1989), have recognized their importance in nursing. Polanyi (1958) calls this recognition ability of the expert clinician 'connoisseurship'. The need to distinguish accurately between relevant and irrelevant cues is well known in critical care nursing (Baumann & Bourbonnais 1982, 1984) with Jacovone & Dostal's (1992) report indicating that expert nurses generate possible outward perceptual appearances which they can expect to see very quickly. Both Marks et al.'s (1991) and Jacovone & Dostal's (1992) studies also suggest that nurses use some sort of procedural rule for synthesizing the information.

A feature of the cognitive strategies which emerged from Prescott et al.'s (1989) study is the importance of the nurse's knowledge of individual patients. It suggests that nurses also develop specific knowledge structures for gathering and organizing information about individual patients. Jenny & Logan (1992) suggest that 'knowing the patient' is an intrinsic part of the expert nurse's clinical reasoning, likening it to Pyles & Stern's (1983) notion of a 'nursing gestalt'. By referring to the gestalt as a way of categorizing the picture of the patient using logic and intuition, Pyles & Stern appear to be describing a context-specific knowledge structure.

The need to know the patient as an individual is a central theme in the nursing literature, underpinning such concepts as individualized care (e.g. van Servellan 1982) and the nurse's interpersonal competence (e.g. Kasch & Dine 1988). The nature of the assessment problems which this way of knowing solves and the way in which the information is gathered and then organized internally is only just being articulated. MacLeod (1990) and Tanner et al. (1993), for example, have both shown that nurses come to know both the patient's typical pattern of responses and the patient as a person. Once the patient-specific knowledge structures have been more fully articulated, they may hold one of the keys to understanding the nurses' cognitive expertise in assessment.

Turning now to the assessments themselves, the studies by Jacovone & Dostal's (1992) and Corcoran-Perry & Graves (1990) show that nurses use the patient's current status to enable them to decide what to do. In a multiple sorting task, Spicer (1993) found that when experienced acute general hospital and community nurses were asked to group medical diagnoses from a nursing perspective they used the severity of the condition. Severity was considered to be the important dimension because it was thought to have the greatest impact on the type and amount of nursing care.
the patient required. Benner (1984) recognized the skill of the expert nurse in thinking about the future course of the patient, implicitly linking it to assessment by proposing that 'future think' is based on what nurses 'observe to be occurring with a specific patient'.

It therefore looks as though nursing assessments fit what Yates (1990) terms likelihood judgements. Likelihood judgements are opinions about the chances of various events occurring (i.e. predictions) which form the premises upon which decisions are made. The example drawn from Jacovone & Dostal's (1992) study clearly indicates that accompanying the nurse's decision about what to do was a prediction of the likely direction of the patient's condition, conveyed as an explicit statement. It was also apparent from Jacovone & Dostal's study that the judgements change as the patient's condition changes.

It follows from this analysis of the assessments themselves, that any shortcomings in the judgements nurses formulate will lead to decision errors. It is important, therefore, that the predictions entering the decision making process are accurate. A first step would be to establish how nurses express predictions. This would allow their usefulness in decision making, communication clarity and their susceptibility to biases to be evaluated (Yates 1990).

A COMPARISON BETWEEN THE COGNITIVE COMPONENTS OF ASSESSMENT AND DIAGNOSIS

It emerges from the analysis of the cognitive component of nursing assessment that the cognitive strategies used in assessment and diagnosis both appear to involve a directed information search. Assessments, like diagnoses, also seem to be similar in that they both appear to be predictive judgements which are not final states since they both form the basis of decision making.

However, at least two differences emerged. The first originates from the apparent purpose of the search. In medical diagnosis it is to provide a causal explanation for the patient's presenting signs and symptoms. In nursing assessment, on the other hand, the purpose appears to be to provide an accurate picture of the patient's current condition. Medical diagnosis and nursing assessment thus seem to be distinct processes, probably leading to the development of distinctive cognitive expertise. A second difference appeared to be in the frequency with which assessments need to be reviewed, in contrast with medical diagnoses. This illustrates the dynamic nature of assessment.

What is now needed is research which looks specifically at the cognitive strategies used in assessment to establish how nurses structure assessment problems. The results will then allow the nursing judgements to be evaluated, together with factors which influence their coherence. A better understanding of the cognitive component of assessment can then compliment other important aspects of assessment, particularly in the way in which the nurse comes to know the patient. It may also help to clarify the meaning of nursing diagnosis. The findings will have significant implications for education and clinical practice.

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