

Comparative Theories in Clinical Decision Making and their Application to Practice: a Reflective Case Study

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ABSTRACT

Within this article the author critically reviews the theories surrounding clinical decision making and judgement while discussing a clinical incident, and his experiences of decision making within his own practice setting. Exploring the works of Elstein and Schwarz, Benner, Hammond and Hamm, the author discusses how aspects from each of their theories relate to his practice and clinical reasoning before concluding on the clinical decision-making process and factors that can influence their successful application.

Key words: reflection; decision making; intuition; reasoning; heuristics; judgement

INCIDENT

Although walking through the post-operative care ward, the author noticed a patient lying in bed who appeared unwell with shallow 'disorganised' breathing. On closer examination the gentleman appeared cold and clammy with a grey pallor and a blue cyanotic tinge to his lips. The author attempted to speak to the gentleman; however, he was confused and anxious and talking incoherently. The author immediately undertook an Airway, Breathing and Circulation (ABC) assessment, checked his airway, placed him on 15 L of oxygen via a Hudson non-rebreathe mask and checked his vital signs. The gentleman's pulse rate was 120 beats per minute and regular; he had unrecordable oxygen saturations and his systolic blood pressure was 89 mmHg. The author immediately tilted the base of the patient's bed and set up an IV infusion of plasma expander (colloid) to raise his blood pressure.

Working in post-operative rehabilitation it is often common to encounter patients who suffer with orthostatic hypotension and syncope secondary to hypovolaemic shock. However, the author was concerned that the patient was not responding to the usual treatment provided and contacted the duty doctor on call. He was informed that the gentleman had been reviewed some 10 min earlier and there was no cause for concern as the patient appeared comfortable and was sleeping. It was explained that the patient was acutely unwell and the doctor responded that he would re-review the patient shortly. As the author was convinced that the gentleman's condition was deteriorating, he undertook an electrocardiogram (ECG), which upon examination indicated a myocardial infarction.

Concerned that he was not getting the appropriate response from the duty doctor the author called the

INTRODUCTION

The author's experience of clinical decision making details the diagnosis of an acute myocardial infarction and the decision-making process taken to reach this. To maintain confidentiality, the identity of the patient, hospital and other healthcare professionals have been anonymised in accordance with the Nursing and Midwifery Council's (NMC) Guidelines on confidentiality [NMC, 2008].

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clinical lead down from the Post-Anaesthetic Care Unit to help assess the patient again. On examination of the ECG, a posterior myocardial infarction was identified and the gentleman was immediately transferred to a High Dependency Care bed in her unit. The gentleman was promptly started on the Acute Coronary Syndrome protocol of care and further diagnostic tests revealed an extensive myocardial infarction.

LITERATURE REVIEW

Decision making forms the foundation of all nursing care and associated interventions from the administration of medicines to assistance with activities of living and rehabilitation. Over the past 40 years considerable emphasis has been placed on the need for knowledge and evidence to support practice and guide the decisions healthcare professionals make. Policies and directives issued by the Government and Department of Health [Department of Health, 2010; House of Commons, 2011] stipulate a need for high quality care underpinned by research and clear evidence.

The phrase 'Clinical Decision Making' is used synonymously with terms such as 'Clinical Judgement', 'Problem Solving' and 'Critical Thinking' implying that it is a cognitive process concerned with problem recognition through the identification of cues and clinical features, data gathering, integration, analysis, evaluation and choice to produce an informed decision [Clack, 2009]. Standing [2010] suggests that decision making is a complex process that involves observation, information processing, critical thinking and clinical judgement to select the best course of action in promoting and maintaining a patient's health. While Elstein and Schwarz [2002] assert that clinical decision making involves a rational process of 'hypothetico-deductive reasoning' based on information processing.

Within clinical decision-making theory, 'hypothetico-deductive reasoning' is considered the most dominant approach in health care with practice based on rationality and empirical precision [Jefford *et al*, 2011]. A hermeneutic examination of figures, text, verbal and non-verbal cues forms the foundation from which a hypothesis is generated and subsequent treatment is based. This diagnostic 'paradigm' is formed of four stages that assist the assessor in identifying and interpreting cues and constructing and evaluating a hypothesis (primary diagnosis).

These four stages are:

1. *Cue acquisition* – primary data and sensory stimuli that steers the nurse towards a particular thought process through specific cues.

2. *Hypothesis generation* – development of a provisional and differential diagnosis based on cues and baseline data.
3. *Interpretation of Cues* – re-exploration and interpretation of cues to support or dismiss hypothesis with further data collection to aid interpretation.
4. *Evaluation of Hypothesis* – the cues are then evaluated and applied to an overall hypothesis that directs the decision made and subsequent intervention/action taken.

Relating the author's clinical experience to the hypothetico-deductive approach, cue acquisition involved the collation of information from previous baseline observations and past medical history with new data that included visual cues and vital signs. From this information an initial hypothesis was formed that suggested the patient was having a heart attack. Further interpretation of cues included the use of electrocardiography that revealed a posterior myocardial infarction leading the author to evaluate and determine his hypothesis as correct.

As detailed above, the hypothetico-deductive model of clinical problem solving relates to the way a nurse or healthcare professional processes patient-relevant information [Norman, 2005]. This scientific method to problem solving and analysis is considered beneficial due to the linear approach and prescriptive manner in which practitioners address a given situation; hypothesis generation is considered rational and structured, and related to the directionality of interpretation [Banning, 2007]. This assertion is supported by Botti and Reeve [2003] who define the generation of a hypothesis through data acquisition and interpretation as 'forward reasoning', and claim that clinical experts use such an approach in clinical decision making and diagnosis.

However, this mode of decision making is not infallible and a number of researchers have questioned whether such a simplistic approach to assessment can facilitate safe, accurate diagnosis and subsequent treatment [Patel and Groen, 1986; Kennedy, 2002; Priddy, 2004; Banning, 2007].

Hypothetico-deductive reasoning is dependent on the hypothesis generated. That is, application of an inaccurate hypothesis can lead to a misdiagnosis and an inaccurate result. An example of this is the hypothesis generated in the author's scenario in which he diagnosed a heart attack based on the symptoms presented and associated cues. Symptoms of extreme anxiety, cold clammy pallor, a positive 'Portsmouth Sign', unrecordable oxygen saturations and peripheral

shutdown are also associated with late signs of septic shock [Woodrow, 2000]. Thus, it can be suggested that the author could have erroneously interpreted the cues leading to misdiagnosis and ineffective treatment. This assertion is supported by Rozeboom [1990] who is particularly scathing in his criticism of this approach, claiming that the 'epistemic fecklessness' of hypothetico-deductive reasoning wrongly implies a simple rational process to decision making without acknowledging context, affect, emotions and intuition.

While hypothetico-deductivism provides a linear and scientific structure to the decision-making process, it fails to acknowledge intuition and experiential learning, both of which influence the approach taken. This notion is supported by Cioffi [1997] who claims that intuition is a legitimate and essential component of clinical judgement and decision making. Yet up until the past 25 years, and until the seminal work of Dreyfus and Dreyfus and Benner, the notion of experience and intuition in decision making was not considered legitimate due to ambiguity and a lack of 'hard-data' [Mallick, 1981].

In a study of decision-making behaviour among US Air Force pilots, brothers Stuart and Hubert Dreyfus developed a model of skill acquisition based on situated performance and experiential knowledge [Dreyfus and Dreyfus, 1980]. Developing previous research undertaken by Johnson-Laird and Wason (1977, cited in Dreyfus and Dreyfus, 1980, pp. 4–5), the authors determined a subject's task performance improved significantly if related to previous experience. Further research identified a direct correlation between the levels of skill acquisition in relation to concrete experience. As professionals gain experience in their specific line of work, they move through a developmental continuum progressing from a novice to an expert. Dreyfus and Dreyfus, [1980] assert that workers move through five stages of career development that they categorized as: novice, advanced beginner, competent, proficient and expert. With each stage of 'skill' acquisition comes an increase in knowledge and ability. At the beginning, the 'novice' acts according to rules that determine a specific action; in the later stages of this paradigm, the 'expert' is able to make intuitive decisions based on previous experience, operating outside guidelines and scientific principles [Blum, 2010].

In her book 'From Novice to Expert', Benner [2001] applies the principles of Dreyfus and Dreyfus' model to nursing practice and clinical decision making. Employing the five stages of novice to expert, Benner suggests that novices undertake clinical decision making guided by rules and policies. Novices have little

experience in clinical decision making and critical analysis and rely on guidelines and rules for direction. Decision making and associated actions are often based on rudimentary 'primary' concept formation influenced by fear, mistakes and the need for acceptance from one's peers [Daley, 1999]. As the nurse moves through the stages of skill acquisition and gains experience, 'secondary' concept formation occurs and new and pre-existing knowledge is assimilated in a process referred to as 'subsumption' [Vacek, 2009]. The expert is able to make decisions based on both abstract and concrete information, which has been obtained through individual experience and skill acquisition. This notion is supported by Benner, who states that 'at the heart of good clinical judgement and clinical wisdom lies experiential learning from particular cases', before going on to state that nursing practice requires both *techné* (craftsmanship) and *phronesis* (wisdom) [Benner *et al*, 2009, p. XV (introduction)].

What is clear from the work of both Dreyfus and Dreyfus and Benner is that practice is guided by experiential knowledge and that intuition can only take place in the presence of this. However, one significant criticism of the notion of novice to expert is the lack of any clear definition as to what an 'expert' actually is [Peña, 2010]. Lyneham *et al* [2008] asserted that Benner's theory fails to explicate the final stage of the expert practitioner and it therefore remains open to debate. The authors go on to provide their own definition based on Benner's principles suggesting that the expert practitioner uses 'embodied intuition; taking what action is appropriate at the time, doing so freely, without conscious thought and practising within both cognitive and embodied intuitive paradigms' [Lyneham *et al*, 2008, p. 384].

Referring to the author's scenario it is hard to consider his actions as that of an 'expert'. What occurred with the identified patient was not part of the author's usual working practice and was a predominantly medical (cardiac) problem. Yet despite this, the author instinctively undertook what he considered was the most appropriate action based on a pre-existing knowledge and experience of cardiac arrest and resuscitation. The use of 'heuristics' based on previous experience provided a 'cognitive shortcut' in the decision-making process and allowed the author to develop a rapid response to a difficult situation.

Based on Simon's theory of bounded rationality [1991], Tversky and Kahneman [1974] transformed academic research and theories on judgement with their ideas on 'heuristics' and rationality. The authors assert that when faced with complex decisions individuals

often make use of experience-based problem solving techniques using a three-tier process:

1. Availability – assessing probability of actions based on previous phenomena and recalling previous occurrences.
2. Representativeness – comparing representation of data with that from previous experiences. Estimating the probability that patient A is having the same problems as patient B through the comparison of cues and data.
3. Anchoring/adjustment – Developing an initial hypothesis (anchor) based on availability and representativeness, and then adjusting this based on additional information.

This heuristic framework was employed when the author undertook his decision making in the incident detailed above, with the recollection of previous incidents involving a cardiac arrest guiding the author's actions. The patient presented with symptoms commensurate with previous experience and the author was able to undertake a representative comparison of the cues presented in both. Having developed a hypothesis based on 'rough pattern recognition' the author then 'anchored' this with the use of additional diagnostics that confirmed this.

However, despite this cognitive approach being successful it can be suggested that the author's actions were based on 'trial and error' rather than structured assessment. Thompson and Dowding [2009] claim that the use of heuristics generates predictable systematic biases and errors due to the subjective nature of the decision-making process. Tversky and Kahneman suggest that when recalling previous experience, individuals will often only recall those incidents where interventions or decisions were positive and had 'favourable' outcomes; thus rendering the decision-making process biased and unrealistic. Reflecting on the two approaches detailed above, it is apparent that intuition and analysis are at separate ends of the decision-making spectrum. Yet, it can be asserted that decision making is seldom entirely intuitive or analytical but a combination of both.

Based on Brunswik's Lens Model [see Thompson *et al*, 2004], Hammond's Cognitive Continuum Theory (CCT) focuses not only on the decision maker, but also on the environmental factors that influence cognition and the decision-making process, taking into account both analytical and intuitive strategies [Hammond, 1996]. Hammond's theory rejects a dichotomous view of intuition and analysis, instead detailing six modes of cognitive inquiry that places intuition and analysis

at opposing ends of the continuum [Dunwoody *et al*, 2000]:

1. Physical science experiment
2. Control group experiment
3. Quasi-experiment
4. Computer modelling
5. Expert judgement
6. Unrestricted judgement.

In his theory, Hammond argues that different decision-making tasks require different approaches according to the situation and task complexity [Hammond, 1996]. The cognitive continuum places tasks along a vertical axis in accordance with the decision-making approach taken. Along the horizontal axis, is the cognitive approach taken with the decision-making process beginning with 'pure intuition' and moving across to 'pure analysis'. In addition to the two axis, Hammond subdivides the cognitive continuum into six modes that detail the divergent intuitive and analytical methods associated with different tasks and the structure of the decision-making process [Thompson *et al*, 2004]. The scientific/analytical modes of 1–3 enable the decision maker to apply explicit theoretical knowledge supported with evidence-based practice and associated research. The intuitive/experimental modes of 4–6 allows the decision maker to undertake tasks supported by tacit knowledge and trial and error [Standing, 2010]. Thus, the CCT focuses on the relationship between the concepts of tasks and modes of cognition with Hammond asserting that the more structured a task is, the more analytically induced the decision-making process will be. In contrast, an ill-structured decision-making task is likely to be intuition-induced with little analysis involved [Cader *et al*, 2004].

Hamm [1988] later revised Hammond's theory to explore doctors' understanding of decision making and clinical judgement; amending the terminology used in the six modes of inquiry to allow for better association of tasks:

1. Scientific experiment
2. Controlled trial
3. Quasi-experiment
4. System-aided judgement
5. Peer-aided judgement
6. Intuitive judgement.

Hamm also determined that the quality of the task structure was in direct proportion to the amount of time taken along with the potential for judgement bias and visibility of the task process.

In his study, Hamm identified that decision making among doctors fell between the 5th and 6th modes of

the cognitive continuum, whereby mainly intuitive and peer-aided judgement was used [Standing, 2010]. Thompson [1999] asserts that employing the cognitive continuum in nursing practice can help provide the 'middle ground' in decision making that allows for the use of both analytical and intuitive cognition. By sitting firmly between Elstein's hypothetico-deductive model [Elstein and Schwarz, 2002] and the notion of intuition and tacit knowledge derived from the work of Dreyfus and Dreyfus [1980] and Benner [2001], the cognitive continuum allows for the synthesis of both theories allowing for more comprehensive decision making. Reviewing Thompson's work, Harbison [2001] endorses his notion of the usefulness of the cognitive continuum in nursing asserting that Hammond's paradigm helps to instill quality in the decision-making process and subsequent care provision by supporting the need for evidence-based practice and a sound knowledge base. However, Harbison is keen to point out that there needs to be further investigation to determine what constitutes 'quality' in nursing judgement and decision making. It can be suggested that like Benner's theory of expertise, the notion of quality is enigmatic and subjective, which is open to mixed interpretation and a multitude of conflicting descriptions.

Like Hamm [1988], Standing [2008] further revised Hammond's Cognitive Continuum in an attempt to make it more applicable to the nursing profession. Standing asserts that the definitions used in both Hammond and Hamm's versions of the continuum are ambiguous with the typology used for task structure confusing. Moreover, Standing states that decision making in nursing not only involves peer-aided judgement, but involvement from the patient too. In revising Hammond's theory, Standing changes the terminology used and adds a further three 'modes of practice' within the cognitive continuum that she feels underpins decision making in nursing. Standing's 'revised cognitive continuum' [Standing, 2008] identifies the benefits of reflective practice and replaces the quasi-rational and experimental modes of cognition with more specific categories that include action, experiential, qualitative, survey and experimental research.

In removing quasi-rationality from the cognitive modes, Standing acknowledges that, unlike the medical model of care, decision making in nursing does not take a predominantly 'scientific' stance. The nursing profession prefers a 'holistic' approach that encompasses reflection on and in action, patient involvement and evidence-based practice. This notion is supported by Harbison [2001] who claims that nurses are reluctant to adopt medical frameworks and theories due to a

need for 'professional identity' coupled with the fact that decision making in nursing is fundamentally different from the technical/rational approach taken in medicine.

Furthermore, Standing's revised theory removes the numerical sequencing from 1–6 as she asserts that decision making should not be seen as a 'linear' activity, but a 'flexible continuum oscillating in either direction along the continuum in response to continually changing judgement tasks' [Standing, 2008, p. 130].

Standing's revised continuum provides a rational and structured approach that promotes the ethical and professional aspects of decision making in nursing. Recognising that the modes of practice are not sequential, by removing the didactic numerical scale to each mode signifies the personal nature of decision making and the need for an objective multi-modal approach.

Referring to the author's clinical incident, it can be suggested that his actions and the approach taken were positioned across a number of modes in Standing's revised continuum, encompassing elements of intuitive, reflective and peer-aided judgement. Furthermore, having made a clinical decision and undertaken the associated actions, the author returned to the continuum to review this with the use of reflective judgement and critical reflection to evaluate the patient outcome.

CONCLUSION

In conclusion, it can be suggested that the theoretical principles of the CCT and associated paradigms developed by Hammond [1996], Standing [2008], Dreyfus and Dreyfus [1980] and Benner [2001] all provide the conceptual framework and insight from which clinical decisions are formed. The ideas and methods identified are well supported by research that identifies the many different approaches the nurse can take in clinical judgement and decision making. However, it can be suggested that in reality, as patients' needs change and care provision constantly evolves, these theoretical models will soon become obsolete, forcing the nursing profession to reassess their approach to clinical decision-making theory and practice. Moreover, as demonstrated by Benner [2001] and Elstein *et al* [1978], no decision-making model is completely infallible; environmental factors associated with socio-economic instability and changes to the way in which care is provided have the potential to 'shift the goalposts' and make the decision-making process more difficult even for the 'experts'.

It is appreciated that the theories discussed within this article have not been explored as fully as the author would have liked due to the constraints of this assignment. However, it is hoped that the link between theory and practice is evident. Although the author takes a more pragmatic approach to the issues raised in this assignment, it is evident that the theories have applications.

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