Conceptualising decision making in nursing education

Dawn Dowding PHD RN

School of Healthcare, University of Leeds, UK

Dawn Dowding is Professor of Applied Health Research. Her research interests include the clinical decision making of health care professionals, the use of technology to support decision making and teaching decision making to health care professionals.

Russell Gurbutt PhD

School of Healthcare, University of Leeds, UK

Russell Gurbutt is the e-learning co-ordinator in the School of Healthcare with research and teaching expertise in clinical decision making.

Monica Murphy

School of Healthcare, University of Leeds, UK

Monica Murphy is a lecturer and has a special interest in law, ethics and medicines management.

Margaret Lascelles EdD, RN

School of Healthcare, University of Leeds, UK

Margaret Lascelles is a Senior Nursing Lecturer with learning and teaching and research interests nursing and decision making, mentorship and practice learning.

Alan Pearman PhD

Centre for Decision Research, Leeds University Business School, University of Leeds, UK

Alan Pearman is Professor of Management Decision Analysis, working with the Centre for Decision Research at the University of Leeds. His recent research has concentrated on understanding and supporting the decision making of multi-stakeholder groups.

Barbara Summers PhD

Centre for Decision Research, Leeds University Business School, University of Leeds, UK

Barbara Summers is a Senior Lecturer in Decision Making. Her research focuses on individual decision making, especially in financial and health related contexts.

Abstract

The ability to exhibit sound judgement and decision making skills is a fundamental requirement of undergraduate nursing curricula. In order to acquire such skills, students need to develop critical thinking ability as well as an understanding of how judgements and decisions are reached in complex healthcare environments. The use of techniques such as problem based learning; simulation and feedback have been hypothesised to help with the development of critical thinking skills. In addition a curriculum that incorporates teaching on different ways in which judgements and decisions are reached can potentially help students identify how to avoid errors and mistakes in their clinical practice. Feedback has been shown to be a powerful tool to help with developing decision making skills; evidence for other approaches to teaching critical thinking and decision making skills is currently limited. This paper reviews theoretical concepts that provide a framework for decision making in nursing as well as methods by which it can be taught.

Key words

Nursing education, critical thinking, clinical decision making, clinical judgement

Introduction

Nurse education in the United Kingdom is currently undergoing immense change with a move towards all graduate entry to the profession (NMC, 2010). There is a corresponding emphasis on requiring newly qualified nurses to be critical thinkers, to have the ability to critique evidence and apply it in clinical practice to inform their judgement and decision making (NMC, 2010). In nursing, as in other areas of professional activity, it is therefore important that practitioners exhibit sound judgement and decision making skills. This in turn has three requirements; firstly that students develop knowledge or domain expertise in their field of practice, secondly that they possess the thinking skills to use that knowledge effectively and thirdly that they have an understanding of what constitutes good decision making practice. Student nurses enter an educational program as 'novices' who depend on 'rules' to guide their action (Dowding and Thompson, 2009). The aim of educational programs is to ensure that by the time a nurse qualifies they are a 'competent' practitioner who has a 'feeling of mastery and the ability to cope with and manage many contingencies of clinical nursing' (Dowding and Thompson, 2009). However there are potential impediments to developing such competence. A strong and growing body of evidence, notably associated with the work of Kahneman and Tversky on heuristics and biases, points to potential weaknesses in human decision making (Thompson and Dowding, 2009b). Errors of decision making are more likely to occur when decisions are complex and/or unfamiliar, and there is some evidence to suggest that that in situations involving probabilistic outcomes or imperfect information more experienced (or expert) practitioners may not necessarily perform better than less experienced individuals (see (Camerer and Johnson, 1991) and (Ericson, 2006) for a review).

The science of decision making has arisen through different areas of investigation including psychology, economics and management science, with applications in a number of areas including management, law and health care. Despite this breadth of interest, what it seeks to teach is not always very clear. There is not a straightforward and broadly accepted view as to what constitutes a good decision; neither is there a clear understanding of what makes for a good decision process (Dowding and Thompson, 2003). Arguably the latter depends on a very subtle understanding and balancing of a range of perspectives which will typically be quite domain-specific. The truth is that the activities called judgement and decision-making, which we all do all the time, are a complex and multifaceted set of processes. Much of what we do is essentially intuitive and we tend not to reflect on how we do it or what makes for good decision-making outcomes (French et al., 2009). Our personal understanding of the evidence base is often quite limited and because we might think we do much of it readily and relatively effectively most of the time we're not much motivated to analyse the process.

The challenge for nurse educators is to ensure that nurses on the point of qualification are not only 'competent' to make decisions, but that they have developed the critical thinking skills, and understanding of the complexity of their environment to enable them to understand and demonstrate sound decision making in the future. In this paper we focus on how curricula may enable nursing students to develop critical thinking skills and an understanding of decision making in clinical practice. Firstly we define what we mean by these terms and concepts, before summarising the evidence on how to effectively teach such skills in practice. The paper considers *methods* of teaching critical thinking, judgement and decision making, as well as the *content* of what should be taught.

Critical Thinking, Judgement and Decision Making

Critical thinking skills refer to cognitive skills such as analysis, evaluation, inference, deductive reasoning, inductive reasoning, interpretation, explanation and self-regulation (Beckie et al., 2001, Hicks et al., 2003, Lyons, 2008). Critical thinking is often considered to be a prerequisite for making 'good' judgements and decisions and has variously been defined as;

- "purposeful, self-regulatory judgment: an interactive, reflective, reasoning process of making a judgment about what to believe or do" (Beckie et al., 2001);
- "a dynamic, purposeful, analytic process that results in reasoned decisions and judgments" (Lyons, 2008);
- "a set of dispositions and skills that enhance decision-making processes through such cognitive abilities as analysis, inference and evaluation."(Hicks et al., 2003).

Clinical reasoning is the process by which individuals make judgements and decisions, and incorporates the skills of critical thinking (Figure 1). The outputs of the reasoning process are judgements, defined as 'an assessment between alternatives 'and decisions, defined as 'a choice between alternatives' (Dowie, 1993). It is beyond the remit of this paper to provide an overview of the literature on critical thinking, judgement and decision making as concepts. However, what it is important to highlight is that they are interlinked, and that individuals may reach judgements and decisions through a variety of different types of reasoning process including intuition, hypothetico-deductive reasoning, or analytical reasoning using algorithms and decision support tools (such as decision analysis or Bayes' theorem) (Thompson and Dowding, 2009a). Judgement and decision making may also be explored through ethical decision making, such as teleological (principles based) versus deontological (anticipated outcomes based) reasoning.

Developing critical thinking skills and knowledge to underpin decision making

The context of nurses' decision making is a complex clinical landscape having several features that can be categorised into three domains;

(a) the organisational context (including political, economic, sociological, technological and legal / professional features);
(b) participants (the patient, nurse and others involved in care, support and treatment);
(c) the role of the individual nurse making a decision (Bucknall, 2003).

The dynamics of these domains shape how and where nurse decision making occurs and can be represented in a way similar to Adair's Action centred leadership model of task, team, individual as context, participants and the individual nurse (Adair, 2011). Curriculum design therefore has to facilitate students' comprehension of the different domains, providing signposts that aid decision making such as guidelines and protocols, rules and regulations. It also needs to recognise that students need to develop their knowledge and understanding to develop from a novice practitioner to a competent one (Dowding and Thompson, 2009). This involves a developmental process starting from gaining an understanding of the 'rules' that govern practice (novice), through to building up a number of patient events to begin to develop 'patterns' in clinical situations in order to make sense of those guidelines or rules (advanced beginner) and then on to the stage of having enough experience to gain 'mastery' of clinical situations (competent) (Benner, 1984).

Education also has to render visible how decisions are made so that, together, curriculum design and practice facilitation offer students a clinical decision making framework that can be understood and applied in any unique real world situation across the clinical landscape. Furthermore the purpose of this has to be person centred interventions around safe, effective and congruent outcomes. The latter term implies a locus of decision making that incorporates negotiation about the extent of partnership with the patient in making the decision, commensurate with their preferences and capacity, while also mediated by the practical limitations of the service and equitable support for all who are recipients of the service – a recurring tension in nursing and decision making. Within the mediating context of the clinical landscape the act of developing knowledge about a patient includes two linked aspects. First, the nurse's generation of a mental 'picture' of how the patient is known (a way of seeing) should be developed, so that needs can be identified (sometimes referred to as an assessment or nursing diagnosis) (Gurbutt, 2006). Secondly what should be done on the basis of that knowledge has to be established (i.e., which intervention fits or needs to be adapted to a particular diagnostic label) (Gurbutt, 2006).

What this highlights is the importance of generating knowledge about individual patient cases, as well as the skills of reasoning to ensure that nurses can react to and adapt to the situation to make decisions. (Moule et al., 2008) argue that learning and teaching strategies that promote a self directed independent approach to inquiry are increasingly been seen as more relevant to developing these skills. These approaches include problem based learning, simulation, and high fidelity simulators (Moule, 2011). More recently this has extended to the use of interactive web based learning approaches and the use of simulated patients which may facilitate the development of critical thinking skills (McCallum et al., 2010).

Problem based learning (PBL) is defined as “a student centred approach to learning which enables the students to work cooperatively in small groups for seeking solutions to situations/problems” (Yuan et al., 2008) p.658. Students work through real practice situations in a classroom situation, and through this process are hypothesised to have enhanced knowledge acquisition, clinical competency and professionalism, as well as developing critical thinking skills (Williams et al., 2011). It is clear that PBL is having an impact on professional healthcare education (Rowan et al., 2007), although much of the literature is focused upon medical education (Jones et al., 2002, Wood, 2008). One study with nurse graduates indicated that nursing students undertaking PBL demonstrated better problem solving skills and higher level communication and interpersonal skills than those who did not (Uys et al., 2004). However, evidence from recent systematic reviews examining the relationship between critical thinking skill development and PBL suggest that the evidence for its effectiveness is limited (Yuan et al., 2008, Thompson and Stapley, 2011).

Simulated practice learning has begun to take on an even more important role in pre-registration nursing programmes in the UK since the NMC included this as part of practice hours for learning (NMC, 2007). However, clinical based skills development has assisted nursing students to “learn” skills in a safe environment for a number of years. The increase in the development of clinical skills laboratories has expanded at a remarkable rate over the last few years with an increasing ability to replicate “real life” scenarios via high fidelity/low fidelity simulators (Moule et al., 2008) Examples of simulation range from handling and moving to scenarios involving medical emergencies and students working through increasingly complex, time focused activities which involve prioritising

care and decision making. Simulation is a learning approach which actively engages students in their learning. The key aspect of using simulation, whichever approach is utilised, is the importance of providing timely feedback and the opportunity for students to reflect on their practice (Benner et al., 2010).

Simulated patients provide a "real life" experience for students to develop communication and decision making skills, for example breaking bad news, handling conflict with actors/service users and facilitators. The use of simulation and scenarios can also be effectively used to teach wider reasoning skills associated with areas such as philosophy and ethics. Assisting students to firstly identify and then develop lines of argument in ethical decision making can contribute to helping them locate their own moral compass and articulate the grounds on which their decisions are formulated (Davis et al., 2006). Exercises can be used to challenge students own predilection to pre-judge and enables them to recognise and acknowledge an ability within themselves to *agree to disagree*. To be able to contribute with a reasoned and ethically defensible opinion in the context of a Multi-Disciplinary Team discussion is an essential pragmatic and intellectual skill.

What is inherent in the use of problem based learning simulation and simulated patients is the opportunity to provide students with experience of making decisions on a number of patient 'cases' together with feedback on their performance. This is important as good expert performance has been associated with the availability of immediate feedback on the outcomes of judgements and decisions (Shanteau, 1992, Thaler, 1987). The provision of timely feedback in an education setting has been shown to improve performance in a complex task more effectively that learning "on the job" in an environment with delayed or missing feedback (Summers et al., 2004). (Gaeth and Shanteau, 1984) suggest that people can find it difficult to distinguish relevant from irrelevant information in predicting outcomes. The ability to pick examples for use in educational texts, and to provide immediate feedback via an answers section, facilitates the identification of the relationships between inputs and outcome for those learning by this route.

The importance of choosing cases to illustrate points and providing feedback is also reflected in (Lesgold, 2001) work on "learning by doing", although this approach puts a greater emphasis on practical experience than starting from theory, as is suggested by the Summers et al. study. Lesgold makes the case that learning by doing can be more effective if the aim is "for a person to be able to use the acquired knowledge to attack complex, incompletely structured, and novel problems" (p.965). The approach has links to case based reasoning, with the idea that knowledge is built up by exposure to cases that cover the range of situations likely to arise in a domain. Participants learn how to assess a new situation, identify a relevant previous situation and adapt the solution used previously to the new circumstances.

Lesgold describes as an example an intelligent tutor system developed for the US Air Force that helped their technicians learn equipment maintenance by giving them the opportunity to work through maintenance problems with a system that provided the opportunity to compare their ideas with what an expert would do, and the information an expert would see as important at a particular point, and get suggestions to improve their performance. This approach demonstrates how the use of examples and feedback can develop expertise.

The ideas of situational assessment and adaptation of previously used solutions are also reflected in (Klein, 1993) work on naturalistic decision making and the Recognition Primed Decision (RPD) model

of decision making. Klein and colleagues looked at the behaviour of fire fighters, and found that the fire fighters did not feel that they were following a decision strategy based on choosing the optimal course of action from a range of alternatives. Rather they felt that they were drawing on their experience to classify a situation and identify a typical way to react to it. If time was available they might simulate how the action identified might play out and check its suitability, but this was not a comparative process.

Through the use of teaching methods such as PBL and simulation we are exposing learners to examples of scenarios they might face and outcomes in those situations that could help them build the sort of experience "database" that underlies Klein's RPD model. Theoretical knowledge is important too, allowing the learner to have a basis for putting forward courses of action in novel situations. (Ericsson, 2008) suggests that performance is best improved by cases just beyond the learner's current level of ability. Although situations where there is a correct course of action (even if this comes from retrospective analysis) are most helpful (Ericsson, 2008), these might not be the only cases which provide benefits, as all cases add to the database of knowledge the learner has for their domain. In nursing scenarios an outcome might only be known for one decision and set of actions, but the details can provide evidence for how other approaches might have fared, particularly where the diagnosis of the problem was initially incorrect. In some professions (e.g. tax practice) practitioners meet and discuss difficult cases in a similar fashion to draw on the expertise of others and build up their own expertise from examples. The ideas from the education process can therefore potentially support continuing professional development.

Teaching Judgement and Decision making

Having briefly discussed different approaches to teaching that are considered to help students develop critical thinking skills and the knowledge base to help inform their decision making and develop expertise, we now wish to consider what students should be taught about the *process* of decision making.

The teaching of decision-making varies both with the purpose and the field of application. However, a standard, if over-simplified, approach has been to separate normative from descriptive decision-making. Normative decision-making assumes adherence to a set of axioms for rational choice which in turn allows the development of a series of quantitative models to represent what a rational response to a given decision situation should be. Descriptive decision making, on the other hand, is about what people actually do in practice and in particular about the deviations observed between what is done and what would be modelled as rational, axiomatically based choice (French et al., 2009). Seen against this background the purpose of teaching decision-making is quite straightforward. It is to move people as far as possible away from their error-prone intuitive approaches to choice and closer to the rational ideal encapsulated in the normative model.

However, at least three important and practical issues prevent this from being the only option for teaching the principles of decision making in practice. First it would be necessary to develop techniques that capture all the key data relevant to the decision concerned and process it through some model or algorithm. This is often not practicable for reasons of data availability or cost of data acquisition. Secondly, there is often simply not enough time to do this in a real-world context, particularly if delay can cause a negative clinical outcome. Thirdly, specifying the structure and parameters of the decision model can be immensely complicated, especially with regard to attitudes

to risk and to the balancing of multiple decision criteria. Significant simplifying assumptions are usually necessary and the decision maker can even then be called upon to answer questions to parameterise the model which may be seen as complex and obscure.

To complicate the matter further in time-pressured situations expert decision-makers do not appear to attempt to process data rationally when reaching decisions, but rather use different techniques such as pattern recognition, so-called recognition-primed decision-making (Klein, 1993). Thus we are in a world where we have to recognise claims from normative, descriptive and other approaches to decision making to be legitimate and practicable. The challenge in teaching lies is in helping learners to understand where and how to set the balance between the various approaches that is appropriate to their particular domain of application.

Strategies to improve diagnostic reasoning, such as the use of the Outcome Present State Test (OPT) model of clinical reasoning (Bartlett et al., 2008, Kautz et al., 2005) and using a decision tree as the basis for assisting with decision making (Verdu, 2003) were shown to improve decision making skills in 3 out of 6 studies included in a recent systematic review (Thompson and Stapley, 2011). Thompson and Stapley (2011) sends a clear message that the case for the value of current teaching of judgement and decision making skills in a nursing context is as yet unproven. Nonetheless, the importance of the judgement and decision making task faced by nurses cannot be denied. Further, in other disciplines, notably management and psychology, the explicit teaching of such skills is quite well-established. Thus, to discuss the what and how of teaching clinical judgement and decision making on pre-registration nursing courses represents a continuing and important topic. The discussion recognises and reflects the experience arising from existing writing and teaching on this topic (e.g., Thompson and Dowding, 2009) but draws on other experience, notably teaching of similar material in other disciplines, plus continuing development in the 'core discipline' of decision research itself.

The overall approach is to seek to fuse insights about judgement and decision making that is developing in the broad decision research literature with those emerging through the growing experience of teaching these topics specifically as part of nurse training. From both perspectives, the volume of emerging understanding is too great to allow a comprehensive coverage, so the challenge is to distil and present the most important and practically useful insights. While it should not shy away from the underlying theory and methodology, it recognises that, especially with regard to quantitative underpinnings, not all students have the aptitude or interest for a detailed treatment of these topics and that the goal is primarily to help develop well-founded and effective nursing practitioners.

As figure 1 highlights, clinical judgement and decision making does not take place in isolation. We assume that some background in the importance and application of critical thinking is already in place and an appreciation of the importance of domain-specific knowledge. It is also assumed that students have, or obtain in parallel, an appreciation of the critical role of information in underpinning good decision making and that they perhaps understand something of the importance of information behaviour in terms of information seeking and sharing, and questions of information sharing within and between teams (e.g., Berryman, J. M. 2006; Thompson *et al*, 2004).

Within the above context, our proposals on the teaching of clinical judgement and decision making to nurses focuses on developing and facilitating sound decision process skills. An excellent starting

point can be to introduce key findings from the heuristics and biases literature as a way of bringing home to students the demonstrated weaknesses in their own (and others') decision making (e.g., (Bazerman and Moore, 2009), chapters 1 and 2). From this naturally follows the question as to what can be done to help address the demonstrated fallibility of unaided human decision making.

An initial response lies simply in training decision makers to be aware of potential errors and biases and to question their own judgements in the light of this knowledge. This in turn highlights the important distinction between what has now come to be termed System 1 (intuitive, reactive, quick and holistic) and System 2 (deliberative, reflective, computational and rule governed) thinking (Bazerman and Moore, 2009), chapter 1) and the increasing awareness that to present the two as mutually exclusive polar opposites is inappropriate. Recent research, some of it based on the field of neuroscience, is increasingly demonstrating that the two modes of processing information in decision making can co-exist and perhaps that it is beneficial if they do so (Kahneman and Frederick, 2002). This in turn lines up with some of the earlier findings of people such as Klein in relation to recognition primed decision making and its employment by experts, especially in time-pressured situations.

However, especially when judgement and decision problems are complex and/or unfamiliar, there is strong evidence to support the use of formal decision models to support decision making. In practice, this does not, of course, mean that most individual practitioners are developing formal models themselves. More likely they are implementing them through computer-based decision support systems or by application of protocols that are underpinned by the processing of quantitative evidence. Nonetheless, an understanding of key modelling concepts such as decision trees as ways simply of *structuring* decision problems is important and can provide strong support to a good decision process without necessitating any specific probability estimates or numerical calculations. Finally, it is important for nurses, who often have to work in teams, to understand the particular dynamics of team-based decision making and the errors and biases that can be inherent in this mode of working (such as the concept of 'group think'). We have outlined a summary of the key topics that could be covered in an undergraduate nursing curricular, to ensure that graduates have an understanding of the nature of judgement and decision making in practice (Box 2).

Conclusion

Nursing curricula need to reflect the drive towards students becoming self directed independent learners who are able to meet the challenges of healthcare practice in both hospital and community environments. In this paper we have considered educational approaches that can be taken to prepare nursing students for the future and particularly to provide them with the necessary theoretical underpinning to be able to consider how they make decisions before they can consider the complexity and uncertainty of the clinical environment. We have highlighted the necessity to consider both the development of critical thinking and clinical reasoning *skills* and educational preparation in an understanding of how we make judgements and decisions in practice, together with examining tools to assist with decision making. It is important that any curriculum is balanced and not uncoupled from the real world clinical landscape in which the student needs to 'see' patients and know their need(s). Furthermore it is the partnership between academic and clinical staff that is key to coaching students by drawing on a shared contextual understanding (political, social, technological, economic, legal, ethical).

Nursing educators face considerable challenges when developing curricula to encompass both the needs of a profession where roles and responsibilities are changing to focus on advanced practice and the role of individuals in decision making, within a service and systems that focus on standardised practice (the use of protocols and care pathways). However areas that could be focused on to promote discussion and debate with nursing students in the future could include:

- The importance of exploring pattern recognition as an approach to decision making, rather than relying on the explanation of 'intuition.'
- The need to consider how processes of collaboration, care negotiation and consultation help to shape decisions. A recognition that many decisions are not taken by the nurse alone, and how to take the preferences of patients and other s into account is importance.
- Discussion of the use of different models of decision making for different contexts and decision tasks. In particular the role of more structured approaches to decision making for certain decision tasks.
- That judgement and decision making skills develop and change with experience and expertise.

There is a need for more research into the effectiveness of the teaching methods and curricula content discussed in this paper, in terms of preparing nursing students for being competent decision makers in practice, who demonstrate critical thinking skills. There is scant evidence to support the assumption that PBL and simulation based approaches to teaching do develop critical thinking skills. This may be more to do with our methods of measuring critical thinking skills than defects in the educational approaches used (Profetto-McGrath et al., 2003). There is also little existing evidence to suggest that educating students on how we make judgements and decisions, how to identify when heuristics and biases may be being used as the basis for decision making, and the use of normative approaches improve decision performance. These are all assumptions that need to be tested in further research studies.

References

ADAIR, J. 2011. *Action centred leadership and its evolution with the Royal Navy* [Online]. Available: www.johnadair.co.uk/articles/royal_navy.pdf [Accessed 5th June 2011].

BARTLETT, R., BLAND, A., ROSSEN, E., KAUTZ, D., BENFIELD, S. & CARNEVALE, T. 2008. Evaluation of the Outcome-Present State Test Model as a Way to Teach Clinical Reasoning. *Journal of Nursing Education,* 47**,** 337-344.

BAZERMAN, M. H. & MOORE, D. 2009. *Judgment in Managerial Decision Making*, Wiley.

BECKIE, T., LOWRY, L. & BARNETT, S. 2001. Assessing Critical Thinking in Baccalaureate Nursing Students: A Longitudinal Study. *Holistic Nursing Practice,* 15**,** 18-26.

BENNER, P. 1984. *From novice to expert: excellence and power in clinical nursing practice,* Menlo Park, California, Addison-Wesley.

BENNER, P., SUTPHEN, M., LEONARD, V. & DAY, L. 2010. *Educating nurses: a call for radical transformation,* San Francisco, Jossey-Bass.

BERRYMAN, J.M. (2006). What defines 'enough' information? How policy workers make judgements and decisions during information seeking: preliminary results from an exploratory study *Information Research*, 11(4) paper 266. [Available at http://InformationR.net/ir/11-4/paper266.html]

BUCKNALL, T. 2003. The clinical landscape of critical care: nurses' decision making. *Journal of Advanced Nursing,* 43**,** 310-319.

CAMERER, C. F. & JOHNSON, E. J. 1991. The process-performance paradox in expert judgment: How can experts know so much and predict so badly? *In:* ERICSSON, K. A. & SMITH, J. (eds.) *Toward a General Theory of Expertise.* Cambridge Uk: Cambridge University Press.

DAVIS, A., TSCHUDIN, V. & DE RAEVE, L. 2006. *Essentials of teaching and learning in nursing ethics,* Edinburgh, Churchill Livingstone.

DOWDING, D. & THOMPSON, C. 2003. Measuring the quality of judgement and decision making in nursing. *Journal of Advanced Nursing,* 44**,** 49-57.

DOWDING, D. & THOMPSON, C. 2009. What is a 'good' judgement or decision? *In:* THOMPSON, C. & DOWDING, D. (eds.) *Essential decision making and clinical judgment for nurses.* Edinburgh: Churchill Livingstone.

DOWIE, J. 1993. Clinical decision analysis: background and introduction. *In:* LLEWELYN, H. & HOPKINS, A. (eds.) *Analysing how we reach clinical decisions.* London: Royal College of Physicians of London.

ERICSON, K. A. 2006. *The Cambridge handbook of expertise and expert performance,* Cambridge, UK, Cambridge University Press.

ERICSSON, K. A. 2008. Deliberate practice and acquisition of expert performance: A general overview. . *Academic Emergency Medicine,* 15**,** 988-994.

FRENCH, S., MAULE, J. & PAPAMICHAIL, N. 2009. *Decision Behaviour, Analysis and Support,* Cambridge UK, Cambridge University Press.

GAETH, G. J. & SHANTEAU, J. 1984. Reducing the Influence of Irrelevant Information on Experienced Decision Makers. . *Organizational Behavior and Human Performance,* 33**,** 263-282.

GURBUTT, R. 2006. *Nurses Clinical Decision Making,* Oxford, Radcliffe Publishing.

HICKS, F., MERRITT, S. & ELSTEIN, A. 2003. Critical Thinking and Clinical Decision Making In Critical Care Nursing: A Pilot Study. *Heart and Lung,* 32**,** 169-180.

JONES, A., MCARDLE, P. & O'NEILL, P. 2002. Perceptions of how well graduates are prepared for the role of pre-registration house officer: a comparison of outcomes from a traditional and an integrated PBL program. *Medical Education,* 36**,** 16-25.

KAHNEMAN, D. & FREDERICK, S. 2002. Representativeness revisited: Attribute substitution in intuitive judgment. *In:* GILOVICH, T., GRIFFIN, D. & KAHNEMAN, D. (eds.) *Heuristics and biases.* New York: Cambridge University Press.

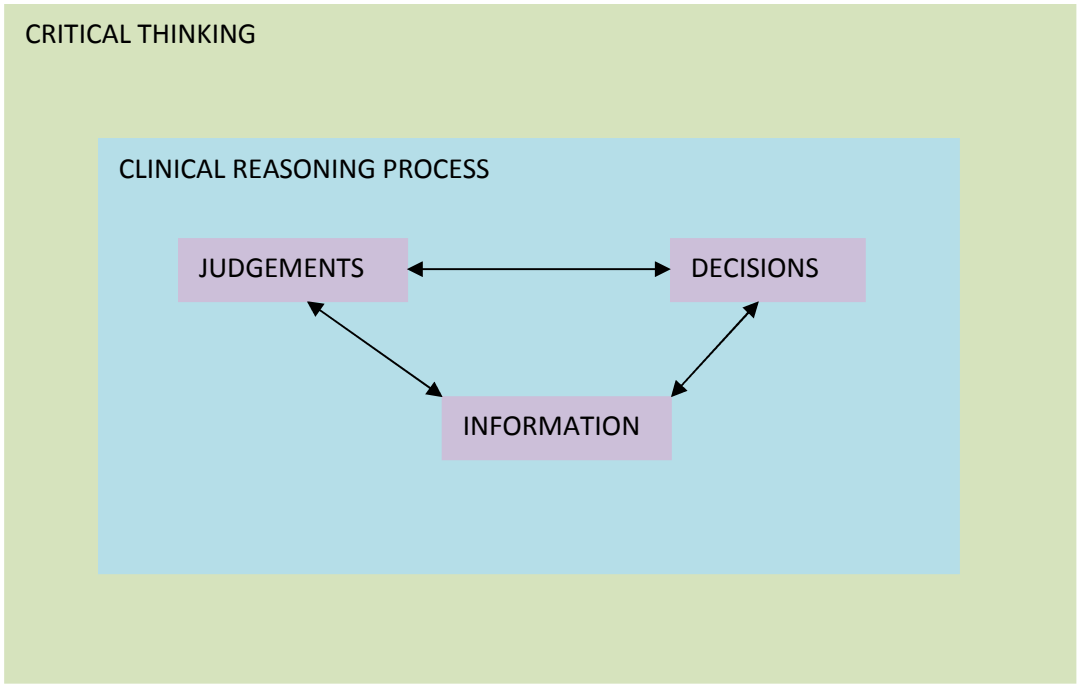
KAUTZ, D., KUIPER, R., PESUT, D., KNIGHT-BROWN, P. & DANEKER, D. 2005. Promoting Clinical Reasoning in Undergraduate Nursing Students: Application and Evaluation of the Outcome

Present State Test (OPT) Model of Clinical Reasoning. *International Journal of Nursing Education Scholarship,* 2**,** Article 1.
KLEIN, G. A. J. 1993. A recognition primed decision (RPD) model of rapid decision making. *In:* KLEIN, G. A. J., ORASANU, R., CALDERWOOD & ZSAMBOK, C. (eds.) *Decision Making in Action: Models and Methods.* New Jersey: Ablex Pubishing Corporation.
LESGOLD, A. M. 2001. The nature and methods of learning b y doing. *American Psychologist,* 56**,** 964-973.
LYONS, E. 2008. Examining the Effects of Problem-Based Learning and NCLEX-RN Scores on the Critical Thinking Skills of Associate Degree Nursing Students in a Southeastern Community College. *International Journal of Nursing Education Scholarship,* 5**,** Article 21.
MCCALLUM, J., NESS, V. & PRICE, T. 2010. Exploring nursing students' decision making skills whilst in a second life clinical simulation laboratory. *Nurse Education Today,* doi:10.1016/jnedt.2010.03.010.
MOULE, P. 2011. Simulation in Nurse education: past, present and future. *Nurse Education Today,* doi 10.1016/j.nedt.2011.04.005.
MOULE, P., WILFORD, A., SALES, R. & LOCKYER, L. 2008. Student experiences and mentor views of the use of simulation for learning. *Nurse Education Today,* 28**,** 790-797.
NMC 2007. Circular 36/2007 Supporting direct care through simulated practice learning in the pre-registration nursin g programme London: Nursing and Midwifery Council.
NMC 2010. New standards for pre-registration nursing. London: Nursing and Midwivery Council.
PROFETTO-MCGRATH, J., HESKETH, K., LANG, S. & ESTABROOKS, C. 2003. A study of critical thinking and research utilization among nurses. *Western Journal of Nursing Research,* 25**,** 322-337.
ROWAN, C. J., MCCOURT, C., BICK, D. & BEAKE, S. 2007. Problem based learning in midwifery - the teachers perspective. *Nurse Education Today,* 27**,** 131-138.
SHANTEAU, J. 1992. The psychology of experts: An alternative view. *In:* WRIGHT, G. & BOLGER, F. (eds.) *Expertise and Decision Support.* New York: Plenum Publishing.
SUMMERS, B., WILLIAMSON, T. & READ, D. 2004. Does method of acquisition affect the quality of expert judgement? *Journal of Occupational and Organizational Psychology,* 77**,** 237-258.
THALER, R. 1987. The psychology of choice and the assumptions of economics. *In:* ROTH, A. (ed.) *Laboratory experiments in economics: six points of view.* New York: Cambridge University Press.
THOMPSON, C. & DOWDING, D. 2009a. *Essential decision making and clinical judgment for nurses,* Edinburgh, Churchill Livingstone.
THOMPSON, C. & DOWDING, D. 2009b. When decision making goes wrong. *In:* THOMPSON, C. & DOWDING, D. (eds.) *Essential decision making and clinical judgement for nurses.* Edinburgh: Churchill Livingstone.
THOMPSON, C. & STAPLEY, S. 2011. Do educational interventions improve nurses' clinical decision making and judgement? A systematic review. *International Journal of Nursing Studies,* 48**,** 881-893.
THOMPSON, C., CULLUM, N., MCCAUGHAN, D., SHELDON T., & RAYNOR, P. (2004). Nurses, Information Use, and Clinical Decision Making—the Real World Potential for Evidence-Based Decisions in Nursing. *Evidence Based Nursing, 7*(3), 68-72.
UYS, L., RHYN, L., GWELE, N., MCLINERNAY, P. & TANGA, T. 2004. Problem solving competency of nursing graduates. *Journal of Advanced Nursing,* 48**,** 500-509.
VERDU, J. 2003. Can a decision tree help nurses to grade and treat pressure ulcers? *Journal of Wound Care,* 12**,** 45-50.
WILLIAMS, B., SPIERS, J., FISK, A., RICHARDS, L., GIBSON, B., KABOTOFF, W., MCILLWRAITH, D. & SCULLEY, A. 2011. The influence of an undergraduate problem/context based learning program on evolving professional nursing graduate practice. *Nurse Education Today,* doi 10.1016.

WOOD, D. 2008. Problem based learning: time to stop arguing about the process and examine the outcomes. *British Medical Journal,* 336**,** 971.

YUAN, H., WILLIAMS, B. A. & FAN, L. 2008. A systematic review of selected evidence on developing nursing students'critical thinking through problem-based learning. *Nurse Education Today,* 28**,** 657-663.

Figure 1: Critical Thinking and Clinical Reasoning



Box 1
EXAMPLES FROM ONE HIGHER EDUCATION INSTITUTION UNDERGRADUATE NURSING PROGRAMME

Nursing module: simulation and scenarios

Third year Adult nursing students are presented with case scenarios over a couple of sessions related to breaking bad news and handling conflict .This is facilitated by a lecturer and a service user/actor acts as a simulated patient drawing upon a pre- prepared script. The students in small groups identify the issues and direction of the interaction and solutions with a number of students role playing these interactions with the simulated patient. Immediate feedback is provided from the simulated patients, mainly focused upon communication skills and outcomes and students are encouraged to reflect on their interactions and problem solving skills. Discussion involves their rationale for choices made, possible alternatives and the complexity of the scenarios. Students evaluate these sessions positively.

Ethics and law module: scenarios

Second year undergraduate nursing and midwifery students participate in a classroom debate that asks them to bid for funding for specific healthcare related projects. Students receive a number of scenarios at least one week in advance of the session and are asked to prepare by identifying ethical issues, clinical based criteria for and against each scenario and finally to suggest a hierarchy of worthiness between the scenarios. The context of the debate is applying ethical theory, theories of Justice and especially Distributive Justice. All the scenarios are based on real life healthcare issues. Participants are randomly allocated a group and scenario that they are to champion, which for some challenges them to justify a cause they feel least attracted to. A deciding committee (not a jury) is also randomly selected who must first discuss the relative merits of all the scenarios then consider their allocation of resources on the quality of presentations each group submits. It is made clear to all participating that there are no right or wrong solutions; the important message is to embrace practical ethics in a fun-to-do non-threatening arena. The role of the teacher is to referee. Commonly the deciding committee express their difficulty in defining a hierarchy between the scenarios. The scenarios that divide opinion are often those that are identified as indirectly affecting patient care. When facilitators steer them to consider the role of ethical theory in their rationalisation students do reflect on the complexity of influences and come to acknowledge that good consequences for the majority might still be viewed as an injustice to certain individuals.

Box 2: Key topics in teaching decision making

What is a good decision? Are people appropriately confident in their own decision making abilities?
Man's limited mental capacity for processing decisions.
Normative and descriptive approaches to understanding decision making.
The influence of uncertainty on decision making
Heuristics and biases
System 1 and System 2 thinking
Assessing likelihoods
The nature and role of expertise
The importance of feedback
Recognition primed decision making
Structured decision aids – decision trees and balancing multiple objectives
Decision support systems and protocols
Scenario-based thinking
Working in teams – groupthink
Perception and communication of risk.