

Abstract—Clinical judgment and decision-making is a required component of professional nursing. Expert nurses are known for their efficient and intuitive decision-making processes, while novice nurses are known for more effortful and deliberate decision-making processes. Despite taking longer to make decisions, novices still have trouble with effective decision-making. The aim of this paper is to review the factors that contribute to clinical judgment and decision-making of novice nurses. This was achieved by reviewing over two hundred articles produced by searches through PsycINFO. These articles used various methods of data collection, ranging from observation to well-controlled experimentation, although the majority of the studies were exploratory in nature. Factors that influenced decision-making were categorized as either individual or environmental factors. Individual factors captured elements unique to the decision-maker and included factors such as experience, cue recognition, and hypothesis updating. By contrast, environmental factors captured elements surrounding the decision-task. Among these factors were task complexity, time pressure, and interruptions. The reliability and robustness of these factors are discussed.

Keywords: novice nurses, clinical decision-making, clinical judgment, accountability and responsibilities on nurses

et al., Sintsing, Olson, Pennington, Ebright, Eden, Patterson, Chalko, Casey, Fink, Kugman, & Propst, Key,

Nurses are at the forefront of patient care, usually the first link in the causal chain between identifying complications and eventual rescue (Thompson et al.,). This, coupled with the increasing responsibilities, underscores the importance of sound clinical reasoning and decisionmaking. Choosing appropriate interventions accurately and timely is crucial

Paper completed in August, 2012. This work was supported in part by the National Council of State Boards of Nursing (NCSBN). Nursing clinical decision-making: A literature review.

William J Muntean is with the Department of Psychology, University of Oklahoma

Correspondence concerning this paper should be addressed to William J Muntean, Department of Psychology, University of Oklahoma, Dale Hall Tower, 550 Lindsey Street, Norman, OK 73019. E-mail: williamjmuntea@gmail.com

II. LITERATURE REVIEW PROCESS

An evaluation of the peer-reviewed literature generated from PsycINFO with various combinations of the terms “decision-making”, “judgment”, “clinical”, “novice”, and “nursing” was carried out. The following limits were placed on the search: (1) articles must come from peer-reviewed journals; (2) only English language publications were reviewed; and (3) full text of the article must be available. Using these criteria, the search produced an overwhelming set of articles—over 1500 studies. Of these articles, roughly 800 were loosely related to nursing clinical decision-making and were reviewed. This subset of articles produced about 200 articles that had strong relevance to clinical decision-making and were subjected to a more detailed and thorough review.

The following paper summarizes research from the final subset of articles. In addition to a database search, citations to and from articles were also used. This led to the review of several book chapters, but to foreshadow a general theme found in the literature, most chapters are not reported because of the highly subjective nature of the content. Overall, this process revealed

(Dowding & Thompson, 2003; Aitken, Marshall, Elliott, & Mckinley 2011). Although experimentation has the benefit of controlling for nuisance variables (e.g., confounds) and showing causality, it runs the risk of oversimplification. And while reducing nursing environments to vignettes for the sake of experimentation might show the basic processes of decision-making, doing so can lose sight of the overall picture of applicability. It is the classic argument of *in vitro* versus *in vivo*—applied versus laboratory research. Therefore, regardless of the exploratory nature of nursing clinical decision-making research, these studies lay the groundwork for future experiments to confirm the critical factors that impact clinical judgment and decision-making.

Collectively, these three themes highlight two categories of variables that impact nursing clinical decision-making, individual factors (e.g., cue recognition, knowledge structure, ability to update working hypothesis, communication, current state of emotion, etc.) and environmental factors (e.g., task complexity, time pressure, interruptions, professional autonomy, etc.). Individual factors focus on the decision-maker and various properties of information processing. By contrast, environmental factors relate to the to-be-processed information. For example, a nurse's cue recognition ability will directly impact the efficiency and accuracy of their decisions—an individual factor. However, task complexity—an environmental factor—affects the presentation of cues and has an indirect impact on the decision-maker. The agreement on these factors in the literature is mixed. Some factors, such as task complexity, have repeatedly been shown to impact clinical decision-making (Corcoran, 1986a; Hicks, Merritt, & Elstein, 2003; Hughes & Young, 1990; Lewis, 1997). However, there has been less agreement on other factors, such as education level or experience (Sanford, Genrich, & Nowotny, 1992; del Bueno, 1983; Shin, 1998; Bechtel, Smith, Printz, Gronseth, 1993). Where appropriate, reasons for disparate results are discussed.

III. APPLIED DECISION-MAKING RESEARCH: METHODOLOGICAL DIFFICULTIES

As mentioned above, the majority of studies reviewed implement qualitative methods, varying primarily between either observational designs or think aloud protocols, although there are a substantial amount of studies that collect data through surveys. There are several issues with these methods that are worth mentioning. First, for qualitative research, regardless of the means of collection, data must be coded either descriptively or thematically. This requires multiple trained coders to ensure reliability in coding. Furthermore, statistics should be provided as to the amount of agreement between coders, also known as inter-rater reliability. Given that the majority of nursing research is qualitative (Cullum, 1997; Thompson, McCaughan, Cullum, Sheldon, & Raynor, 2004; Thompson, 1999a), reliable coding is imperative so results and conclusions are not contingent on researcher bias

or ambiguous constructs. However, nearly all articles reviewed either failed to include multiple raters or included multiple raters but provided no measure of inter-rater reliability. This issue is so prevalent in the nursing clinical decision-making literature that Thompson and colleagues published a paper calling on researchers to be more transparent in coding procedures (Thompson et al., 2004).

plans can be classified as binary. Decisions are often considered on gradient scales. Take for example two decisions or action plans that reach the same conclusion. Despite no differences in outcome, the two decisions could differ in efficiency, resources needed, complexity required, and therefore ultimately differ in quality. One solution offered by Buckna

Corcoran, 1986a, 1986b; Crandall & Getchell-Reiter, 1993; Pyles & Stern, 1983; Rew, 1988, 1990, 1991; Schraeder & Fisher, 1986, 1987; Young, 1987). Intuition is phenomenological in spirit and is often described as a feeling of knowing something without conscious use of reason (Banning, 2007) or an understanding without rationale (Benner & Tanner, 1987). For this reason, hypothesis testing is not necessarily used as a criterion for accurate or inaccurate propositions and reasoning, which raised much skepticism as to whether this approach is scientifically based (Banning, 2007; Cash, 1995; English, 1993).

Due to the phenomenological nature, researchers using this approach have a difficult time unifying the definition of intuition (Buckingham & Adams, 2000b). As a consequence, nursing decision-making literature is filled with this loose construct. For example, over 25% of the articles reviewed used the term 'gut feeling' as a proxy for intuition when surveying nurses on factors that led to their

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challenge of establishing a valid construct of intuition, but

analyzed as a function of experience, time since last professional training, and knowledge structure—which was determined by a content analysis from open-ended questions and classified as either abstract or concrete. Nurses with less than two years experience used a questioning approach to collect patient data and nurses with 3-5 years experience used an “unquestioning” approach. That is, they collected patient information more or less through observations. Nurses who had not received professional training or reorientation in ten or more years tended to be patient-oriented and were able to observe more patient related cues. Knowledge structure was significantly correlated with creative decision-making; nurses with more abstract knowledge structures had higher creative decision-making scores.

Sanford et al. (1992) reanalyzed data collected by a nursing education department during a hospital orientation of newly graduated nurses. Much like the previously

equal.

One explanation offered for the discrepant results is that past experience can actually lead to systematic biases (Thompson, 1999a; Tanner & Hughes, 1984). Nurses are better able to generate and consider more hypotheses as they gain experience. However, as a byproduct, nurses can oversample recent experiences and neglect older, but still useful, experiences. Furthermore, nurses assess probabilities of the associations between cues and likely outcomes when interpreting cues—which is biased by past experience (Kahneman & Tversky, 1996). Dramatic and profound events come to mind more easily and cause additional interference in assessing accurate probabilities. Inaccurate probabilities lead nurses to make inadequate decisions; hence, inaccurate probabilities are a counteracting force to experience.

Although that might explain one potential drawback of nursing experience, there are still many benefits (see Thompson, 1999a). Experience is associated with greater pattern recognition in

problem. Preventative cue collection seems to play a large role in decision-making, but more research is required on the topic (Hoffman et al., 2009).

In contrast to the previous studies, Greenwood and King (1995) found that novice nurses actually collected *more* cues than did expert nurses. However, they attributed this finding to an inability to discriminate between salient and non-salient cues. Novices simply collected more cues regardless of whether the cues would be helpful or not. Despite the importance of cue recognition in decision-making there is a lack of research using novice nurses; most studies rely on experts or students as participants.

In a study using senior baccalaureate nursing students, Thiele et al. (1986) demonstrated the impact of cue recognition on decision-making. The experiment used a pre-test/post-test design with each test presenting new clinical situations that required participants to identify and sort cues, as well as link them together to make decisions. In between tests, the students engaged in computer-assisted learning simulations. They were presented information on effective decision-making and cue recognition. Although the experiment was not conducted on registered nurses, several of the experiment's conclusions are relevant for novice nurses.

First, the pre-test showed that participants were identifying nearly as many irrelevant cues as relevant ones. It should be no surprise, then, that the students reached many inappropriate decisions. According to the study, students are not readily provided with decision-making training and are not taught the importance of cue recognition. Extrapolating this logic to novice nurses, if their ability to recognize cues is substandard—compared to nurses with more experience—then it will likely contribute to decision-making errors. Second, the post-test indicated that, after completing the computer simulations, senior students were significantly better able to differentiate between relevant and irrelevant cues. Moreover, their decision-making scores reflected this improvement; they made better and more appropriate decisions. And finally, the authors noted that once participants began improving their cue recognition they were able to chunk the cues together and link them in meaningful ways that assisted their decisions. Accordingly, chunking cues allows more information to be considered simultaneously, which facilitated the evaluation of decisions and hypotheses considered. These results show that novice nurses may require some training to promote successful decision-making through cue recognition.

corroborated by other studies (Corcoran, 1986a, 1986b; Ebright et al., 2004; Ramezani-Badr, Nasrabadi, Yekta, & Taleghani, 2009). When discussing factors that led to adverse events, Ebright et al. (2004) noted that novice nurses too often “loose the big picture” and ignore new aspects of a patient’s condition. Essentially, nurses were not able to update their hypothesis when presented with additional information.

In complex decision tasks, novice nurses were described as taking too narrow of an approach, placing a limit on their abilities to update their hypothesis (Corcoran, 1986a). By contrast, expert nurses took a broader initial approach and then refined their hypothesis accordingly. Furthermore, Corcoran (1986a) reported that a source of erroneous decision-making was the inability to combine patient information with an alternative hypothesis (e.g., hypothesis updating). This issue is exacerbated in complex tasks: Corcoran noted that fewer alternative hypotheses were being evaluated, despite more being generated. Although this was attributed to a limited short-

patient, the peer nursing staff, and the physicians. Much like what Radwin (1995) termed *knowing the patient*, Jenks (1993) concluded that decision-making was aided when nurses better communicated with patients and understood the idiosyncrasies of their conditions better. Furthermore, knowing the peer nursing staff provides an avenue for consultation and support system when nurses needed assistance on complex decisions. Jenks (1993) made it clear that communication plays an important role in clinical decision-making.

To study factors contributing to clinical decision-making, Ramezani-Badr et al. (2009) interviewed critical care nurses from Iran. The authors reported several findings that are

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random choice, with over selection of cues. On the surface, the conclusions of this study seem plausible, but the authors failed to regress CDMNS scores with decision-making scores on the simulation. Such a test would provide better support for the strong form of their argument.

In the survey study conducted by Casey et al. (2004), newly graduated nurses answered a battery of questions pertaining to their confidence in making clinical decisions. The results revealed a U-shaped function such that nurses between zero and three months of experience started out confident, which then declined until roughly a year of experience, and finally increased thereafter. This pattern is interesting because it could be interpreted as a learning curve of applied nursing. That is, newly entering nurses are naïve and overly confident but once they receive some experience they understand the complexity and dynamics of nursing—they realize the difficulties of clinical decision-making. However, following an acquisition period of a year, they come to understand their roles better and are more comfortable making decisions. This interpretation is consistent with Radwin (1998), which showed nurses gain confidence with experience.

To investigate facilitators and inhibitors of clinical decision-making, Hagbager et al. (2004) interviewed thirty-eight participants comprising Iranian nurses, nursing managers, and physicians. A nurse's self-confidence was a critical theme that emerged from the interviews. On the one hand, nurses described that being self-confident allowed them to take control of situations and increased the potential to make independent decisions. On the other hand, nurses reported that when they lacked self-confidence they felt self-doubt, powerless, and hopeless; they even went so far as avoiding participation in decision-making.

Self-confidence also inspired nurses to become proactive decision-makers. Much like the nurses in Hoffman et al. (2009), confident nurses in Hagbager et al. (2004) were initiators and made preventative decisions rather than merely responders of problems. Nurses felt more efficient and reported that confidence accelerated their timeliness in making and implementing decisions—which supports previous findings (Young, 1987).

Although confidence is reported to have influential effects on decision-making, no studies provide direct links to the accuracy of decisions. How does confidence relate to the efficacy of decisions? Do nurses make high-confidence errors in their decision? If so, what are the contributing factors? High-confidence decision errors are particularly problematic because the nursing environment does not allow for automatic corrective feedback, perpetuating erroneous decision-making.

Professional Orientation

Closely related to confidence is a nurse's perception on their value roles and occupational orientation. Rhodes (1985) investigated the effects orientation ideology on clinical decision-making and categorized nurses as belonging to one of three categories. First, a paramedical occupation orientation is a nurse who considers themselves as a subordinate to doctors and believes their job involves carrying out medical orders.

Second, a bureaucratic occupational orientation is a nurse who defers authority and responsibility for decision-making to those higher in the hospital hierarchy. And third, a professional occupational orientation is a nurse who believes in having control over his or her own work and decision-making.

Using British nurses, Rhodes concluded that a professional occupational orientation is linked with higher levels of clinical decision-making. Hoffman, Donoghue, and Duffield (2004) replicated this finding with Australian nurses. In their study, those who had a professional occupation had a greater propensity to make clinical decisions. In addition to these findings, Hagbager et al. (2004) indicated that nurses who lacked confidence in their decision-making had poor occupational orientations; nurses viewed themselves as agents to complete physician's orders.

Consequences

A nurse's perception of positive and negative consequences

increase arousal, and reduce the number irrelevant cues processed by the decision-maker. As a result, decisions are made quicker and with little or no loss of task-relevant cues; accuracy is not sacrificed.

By contrast, complex decision tasks place a much higher cognitive load on the decision-maker. They must attend to more cues and process them relationally to reach an appropriate decision. Narrowing attention—as a byproduct of disruption—will result in the loss of information processing, some of which will be relevant cues. There will be a greater deterioration in performance as the number of disruptions increase. Furthermore, to save cognitive resources a decision-maker will rely more on heuristic approaches, which have systematic shortcomings and produce less accurate decisions (Baron, 1986; Kahneman & Tversky, 1996).

Disruptions happen quite often in nursing environment. Hedberg & Larsson (2004) observed six Swedish nurses for thirty hours to discover environmental factors that affect decision-making. Two general themes emerged from their field notes, interruptions and work procedures. Because the researchers used observational methods they were not able to verify the efficacy of nursing decisions, but nurses were reported to be frustrated at times when disrupted or interrupted. Hedberg and Larsson took this as evidence that interruptions negatively impacted clinical decision-making. While this implicit argument might be weak, it does lay the groundwork for future experimentation and corroborates other decision-making findings (see, Speier et al., 1999).

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involves the nurse's freedom to act in the best interest of the patient, and therefore more emphasis is placed on the patient care. This assumption may be premature because autonomy could be viewed as a social phenomenon, which is influenced

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