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Early Examination of the Middle-range Theory of Flight Nursing Expertise

Andrew P. Reimer, PhD, RN,

Frances Payne Bolton School of Nursing, Case Western Reserve University, 10900 Euclid Ave, Cleveland, OH 44106, Critical Care Transport, Cleveland Clinic, Cleveland, OH, 216-368-7570

John M. Clochesy, PhD, RN, FAAN, and

University of South Florida, College of Nursing, 12901 Bruce B. Downs Blvd, MDC Box 22, Tampa, FL 33612, 813-974-7460

Shirley M. Moore, PhD, RN, FAAN

Frances Payne Bolton School of Nursing, Case Western Reserve University, 10900 Euclid Ave, Cleveland, OH 44106, 216-368-5978

Andrew P. Reimer: axr62@cwru.edu; John M. Clochesy: jcloches@health.usf.edu; Shirley M. Moore: shirley.moore@case.edu

Abstract

Reliance on expert flight nurses to move critically ill or injured patients generates considerable need for these nurses to obtain advanced education and maintain clinical expertise. The newly proposed Middle-range Theory of Flight Nursing Expertise provided an initial framework to guide education and training in this rapidly changing specialty, but the framework had yet to be compared to the actual experiences of flight nurses in research. A cooperative inquiry approach was used to guide an investigation into the validity of the theory. The study consisted of two cycles of inquiry. In the first cycle, post-flight questionnaires were administered after patient missions to assess the presence or absence of each concept described in the theory. In the second cycle, individual interviews were used to further explore the flight nurses' decision-making during patient transport missions. Data collected from flight nurses about their decision-making on patient transport missions supported the presence of all the concepts in the newly proposed theory. Another concept, *partner cuing*, emerged as a concept to be added to the theory, while the concept *decision-making*, was revised to *expanded decision-making*. The importance of *partner cuing* was confirmed by flight nurses as reflecting their expanded decision-making during patient missions.

Keywords

flight nursing cooperative inquiry; middle-range theory

Flight nursing is a uniquely dynamic context of practice. It requires a dynamic approach to knowledge development that links theory, research, and practice. Cooperative inquiry is one

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such approach. In this article, Reimer and his colleagues describe their application of cooperative inquiry in validating and refining their theory of *flight nursing expertise*. The authors describe two theory-research cycles of obtaining empirical data from expert practitioners to test their theory.

The findings from their research lead to insights that support adding a new concept and extending an existing concept in their theory, while retaining the basic propositions of their *flight nursing expertise* theory. Examples vividly show how theory, research, and practice are essential components in building knowledge about expert nursing practice. Next steps include testing their revised theory in research and translating the theory into curricular content for educating flight nurses of the future.

Pamela G. Reed, PhD, RN, FAAN

Professor

The University of Arizona College of Nursing, Tucson, AZ

Email address: preed@arizona.edu

Air transport of patients has progressively experienced new and continuing growth in the United States. Healthcare systems are more commonly implementing time-sensitive treatments and moving patients from community hospitals to tertiary care centers that offer consolidated, higher levels of care. Currently, in the United States a patient is transferred by rotary-wing (helicopter) at the rate of approximately one transport every 90 seconds (AAMS). Nurses are the primary care providers on approximately 90% of air medical teams that include nurse/nurse or nurse/paramedic crew configurations. This substantial growth and increased reliance on air medical transport has created a demand for advanced education and training programs that support flight nursing (FN) expertise. Therefore, a study was designed for the purpose of comparing the newly proposed Middle-range Theory of Flight Nursing Expertise to flight nurses' actual clinical experiences.

Theoretical Framework

In an effort to combine both quantitative literature from the cognitive sciences and qualitative research findings from nursing into one comprehensive framework, we developed the first Middle-range Theory of Flight Nursing Expertise (Reimer & Moore, 2010). The original theory, depicted in Figure 1 excluding the shaded concepts *partner cuing* and *expanded decision-making*, was developed both inductively and deductively through literature review, concept analysis, and personal clinical experience. The original theory consists of nine concepts: experience, training, psychomotor skill, cue recognition, pattern recognition, transport environment of care, flight nursing knowledge, decision-making, and action. The propositions for this theory, which describe the relationships among the concepts in Figure 1, are as follow:

- Psychomotor skills, cue recognition, and pattern recognition are expertise concepts (represented by the dashed line in Figure 1) that influence decision-making.
- The transport environment of care influences decision-making, the use and delivery of psychomotor skills, and cue and pattern recognition.
- Flight nursing knowledge influences the use and delivery of psychomotor skills, increases cue and pattern recognition, and influences decision-making.

- Experience and training contribute to factors associated with decision-making (transport environment of care, psychomotor skills, cue and pattern recognition, and flight nursing knowledge).
- Decision-making influences actions taken or not taken (Reimer & Moore, 2010).

This first version of the theory, however, had yet to be empirically compared to flight nurses experiences in clinical practice. In new theory development and early theory testing, a primary aim is to refine concepts for inclusion or exclusion.

The Study

The purpose of this study was to examine the validity of the newly proposed Middle-range Theory of Flight Nursing Expertise by comparing its concepts and relationships to the concepts included in the descriptions of flight nurses' actual clinical experiences (Reimer & Moore, 2010). The research question guiding this study was: Do the current concepts of the Middle-range Theory of Flight Nursing Expertise reflect the expertise used by flight nurses on patient missions? This study used a mixed method cooperative inquiry approach (Heron & Reason, 2005). The cooperative inquiry approach is an adaptable approach that involves identifying multiple research methods or techniques that can be useful throughout the investigation. The options are presented to the participants and cooperative group-based decisions are made regarding the technique(s) that both the participants and researcher prefer. This approach allowed for the opportunity to change techniques during the ongoing investigation if one particular technique did not work or failed to provide useful results. Similar to the learn and confirm drug development model (Gombar & Loh, 2007), this cycled approach was specifically developed to facilitate inquiry of the newly proposed theory and its evaluation and development using small-scale "proof-of-concept" cycles of inquiry to identify, test, and refine the theory as the investigation and the theory evolved simultaneously.

Method

Two rapid cycles of inquiry were conducted. The **first cycle** consisted of the cooperative decision to develop a post-flight questionnaire. The post-flight questionnaire was developed based on recommendations by Dillman et al. (2009), using the Middle-range Theory of Flight Nursing Expertise as a guiding framework. The validity of the first seven concepts was measured by the level of agreement on seven questions followed by an open-ended question. Each of the first seven questions addressed one specific concept each. The final two concepts, decision-making and action, are outcomes of the first seven concepts and were not assessed directly by the questionnaire. The last question, for a total of 8 questions, was open-ended to collect any additional information not obtained from the structured questions.

Results

Eight respondents completed the post-flight questionnaires. The responses to Questions 1 through 7 provided support of the presence of each concept from the theory as representing flight nurses' decision-making on a patient transport flight. For example, in response to the question assessing pattern recognition one nurse stated: "many patients with intracranial bleeds have similar symptoms, including dysphasia, hemiparesis, memory loss, etc," supporting the identification of individual cues and forming those cues into a recognizable pattern. The findings from the questionnaire responses provided beginning evidence for retaining each of the first seven concepts in the theory. Responses to the open-ended Question 8, however, provided data that did not relate to any of the concepts contained in the original Middle-range Theory of Flight Nursing Expertise. The statement "talked to partner who agreed with my decision," suggested the significance of the interpersonal

interaction between the flight nurse and their partner, possibly alluding to another concept to consider for inclusion in a newly revised theory.

Also, several responses to the questionnaire provided insight into possible relationships among the concepts. One example of this is exemplified by the relationship between the transport environment of care and the assessment limitations it imposes on flight nurses' ability to provide care: When the nurse cannot gain access to the patient's entire right side due to space restrictions, or when the nurses experiences limitations in assessing patients' breath sounds due to excessive noise from the aircraft engines and blades. The nurses' responses also confirmed that the proposed relationships among the concepts reflected their practice regarding how they identify assessment cues and form multiple cues into patterns. They then described how these patterns are compared to previous clinical experiences with similar patients and how it influenced their decision-making.

The **second cycle** of inquiry consisted of conducting structured Critical Decision Method (Crandall, Klein, & Hoffman, 2006) interviews with three of the flight nurses. Critical Decision Method is a structured in-depth interview technique that consists of four phases: (1) Identify a memorable flight, (2) construct a timeline of events, (3) gain insight into the nurse's thinking, and (4) ask "what-if" questions to probe hypothetical situations on how the flight nurse might have responded differently. Three themes emerged from the individual interviews: Partner cuing, anticipating future events, and expanded decision-making.

A primary theme, *partner cuing*, emerged related to the interactions between the flight nurse and his/her partner, and the strong influence that the interactions had on the flight nurse's decision-making. *Partner cuing* was present in all three in-depth interviews and directly influenced the flight nurses' decision-making. Two of the flight nurses provided examples of how their paramedic partner provided input that positively affected their decision-making related to providing care for the patient. In both cases the flight paramedic provided input to the flight nurse that resulted in the decision to have the flight paramedic, who was best able to provide the intervention, perform a particular procedure.

Another nurse provided an example of when the partner cuing slowed their decision-making and altered the approach of the flight nurse in providing patient care that constituted disagreeing views. In this interview, the flight nurse discussed a patient transport mission in which the flight nurse wanted to secure the airway of the patient prior to transport to the receiving hospital and her partner disagreed. The flight nurse recognized several other tasks that needed to be accomplished before they could attempt to establish a secure airway, so she focused on completing the individual tasks of attaching the vital sign monitor and establishing intravenous access. Accomplishing each task allowed the flight nurse to move closer to her goal of establishing the airway while providing additional time for her to work with her partner to agree to establish the airway. After all of the tasks were completed the flight nurse asserted a third time that they should establish an airway before transporting the patient. Again, the paramedic partner said he thought the patient would be stable to transport, so the flight nurse replied that she would consult with their medical control for a final decision. The paramedic partner then conceded that the airway needed to be secured prior to air transport.

The second theme, *anticipating future events*, was also present in all three interviews. For example, two of the nurses reported that they had to specifically "package the patient" prior to transportation in the aircraft (helicopter). Packaging a patient is the process of transferring the patient to the aircraft stretcher and securing the patient and equipment with safety belts. Packaging a patient was a skill that they learned while in training as new flight nurses, but also was a skill that they refined as they gained experience. Correctly packaging a patient so

that the monitor and IV lines and fluids were easily accessible allows the flight nurses to better care for the patient in flight due to limited patient access inside the aircraft. All of the nurses talked about flights that centered on intubating their patients prior to transporting them in the aircraft. Two of the flight nurses mentioned limitations that the aircraft environment had on the provision of care, which included having only one other care provider to work with, limited lighting, no room, noise that affects their ability to assess the patient, and difficulty communicating with their partner. All three nurses stated that they have previously performed intubation in an aircraft, but consider the limitations imposed by the aircraft environment and try to provide as much care as possible, which frequently includes intubating patients prior to moving them into the aircraft.

Flight nurses' frequent decision to intubate patients before loading them into the aircraft provides an example of the second theme, *anticipating future events*. Flight nurses apply the strategy of *anticipating future events* as they recognize cues and fit those cues into patterns to recognize, for example, that a patient may require intubation at some point during the transport. The nurses' *anticipating future events* also shows how "transport environment of care" and "flight nursing knowledge" influenced the flight nurses' decision-making and resulted in actions. Therefore, given that *anticipating future events* is a successful and necessary decision-making strategy, we propose that this theme is not a separate concept but rather a salient dimension of the theory concept *decision-making*.

The third theme, *expanded decision-making*, also emerged across the three interviews. Two of the nurses provided specific examples of decisions that they made that were beyond the scope of the standard protocol. One flight nurse described several reasons why she chose to deviate from the standard protocol and manually ventilate the patient that they just intubated instead of using the mechanical ventilator as the standard protocol directs. Several reasons were provided that focused on limitations imposed by the aircraft environment. This flight nurse prefers to manually ventilate intubated trauma patients during air transport because this provides her with more assessment information through tactile responses. Two nurses described how they are required to make many decisions without any input other than that of their partner. One nurse commented that even though there are standard protocols and a physician to talk to by phone or radio, flight nurses have to make decisions quickly and do not have time for outside consultation, thus they have "to know a lot about everything." This theme, *expanded decision-making*, provided support to re-name the theory concept *decision-making* to *expanded decision-making* (Figure 1), to accurately reflect the expanded decision-making processes that flight nurses engage in while caring for patients.

The emergence of the concept, *partner cuing*, has led to refinement of the theory to include the new concept and proposition (Figure 1). The new proposition is: flight nurse's training and experience, including experience of working with a partner, influences their interactions during a mission, which in turn affects their expanded decision-making and care provided. It is proposed that flight nurses incorporate partner cuing in their expanded decision-making, just as they consider and use their own psychomotor skills, cue recognition and pattern recognition.

Conclusion

The primary aim of this investigation was to explore the validity of the concepts in the newly proposed Middle-range Theory of Flight Nursing Expertise by examining the congruence between the theory's concepts and relationships, and flight nurses' descriptions of their clinical practice expertise and experiences. The cooperative inquiry approach allowed for the theory to guide the investigation while also providing a means to test the validity of the theory itself. The results were useful in validating and further refining the

theory using input from flight nurses' actual clinical practice experiences. This investigation provides initial empirical support for the new Middle-range Theory of Flight Nursing Expertise.

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Figure 1. Revised Middle Range Theory of Flight Nursing expertise

This figure is modified to include the new concept *partner cuing* and *expanded decision-making*. The original figure can be found in “Flight nursing expertise: towards a middle-range theory,” by Reimer, A.P., and Moore, S.M., 2010, *Journal of Advanced Nursing*, 66 (5), p1183-1192. Copyright 2010 by Blackwell Publishing. Reprinted with permission.