Management of Pain During Weaning from Mechanical Ventilation: The Nature of Nurse Decision-Making

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Malgré leurs connaissances poussées en matière de douleur et du soulagement de la douleur, les infirmières œuvrant en soins de phase aiguë interrompent la médication analgésique pendant des périodes prolongées, soit avant et au cours du processus de sevrage. Des infirmières affectées à ce service ont été interviewées (n = 10) dans le but de comprendre l'importance de la gestion de la douleur pendant le sevrage ainsi que le cheminement décisionnel dans le cadre des interventions de soulagement. Utilisant la théorie à base empirique comme méthode de recherche, l'auteure a constaté que le cheminement décisionnel relevait d'un processus dynamique et continu d'identification de données, de leur interprétation et d'action, le tout influencé par les croyances des infirmières concernant (1) l'existence de la douleur et l'importance de la gérer, et (2) le rôle du personnel infirmier. La théorie issue de cette étude possède le potentiel d'influencer l'élaboration d'interventions qui mèneront les infirmières à prendre des décisions efficaces, éclairées et fondées sur une approche holistique, pour soulager la douleur chez les patients en sevrage de ventilation artificielle.

Despite extensive knowledge of pain and pain management, critical-care nurses commonly withhold analgesia from patients for extended periods prior to and during weaning from mechanical ventilation. Nurses working in critical care were interviewed (*n* = 10) to gain insight into the importance of pain management during weaning and the nature of decision-making in pain management. Using the research method of grounded theory, the author found decision-making to be a dynamic and continuous process of knowledge gathering, knowledge interpretation, and action, influenced by nurses' beliefs concerning (1) the existence of and importance of managing pain, and (2) the role of the nurse. The emergent theory has the potential to guide the development of interventions in which nurses make effective, holistic, competent decisions about pain management during weaning from mechanical ventilation.

Mechanical ventilation and weaning from mechanical ventilation are associated with pain. It has been documented that patients endure pain from diseases, injuries, surgical incisions, prolonged immobility, endo-tracheal-tube positioning, suctioning, the insertion and maintenance of specialty lines, and other invasive procedures while also undergoing the process of weaning (Jenny & Logan, 1996; Puntillo, 1990). While health professionals are well versed in aspects of pain and consider the

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management of pain to be an ethical obligation and the patient's right, it is common and accepted practice for critical-care nurses to withhold pain medication prior to and during weaning from mechanical ventilation. Since nurses are the gatekeepers to analgesia and to the management of pain for the mechanically ventilated patient, exploring the nature of nurse decision-making related to pain management during weaning is important to the nursing profession.

Literature Review

A search of the literature using electronic databases revealed no studies pertaining to the management of pain during weaning from mechanical ventilation. Comments in related literature such as "withholding analgesia in preparation for weaning was a common finding" (Stannard et al., 1996) and "promoting comfort was only occasionally mentioned as a factor affecting weaning" (Clochesy et al., 1997) suggest a need for research into the nature of critical-care nurses' decision-making related to pain management during weaning.

Research indicates that pain is recalled by critically ill patients (Holland, Cason, & Prater, 1997; Puntillo, 1990). Studies of recollection indicate that patients recall having pain "almost always" and that the intensity of the pain recalled is moderate to severe (Carroll et al., 1999; Puntillo). Patients express frustration with their inability to communicate the pain experience during mechanical ventilation and state that nurses should "just assume that it hurts" (Puntillo).

Studies conducted on critical-care nurses' management of pain illustrate a clear pattern of findings suggestive of consistent undermedication. It has been reported that critical-care nurses administer 30% or less of the prescribed analgesia to their patients (Carroll et al., 1999; Kuberberg & Grubbs, 1997; Maxam-Moore, Wilkie, & Woods, 1994; Tittle & McMillan, 1994). Comparison studies indicate that critical-care nurses administer less analgesia than surgical nurses and less than patients in patient-controlled analgesia (Caroll et al.; Tittle & McMillan).

Decision-making concerning analgesia administration in critical care is a complex process. Decision-making research indicates that nursing decisions are influenced by factors such as "knowing the patient," "personal knowing," the ability to balance interventions, and nursing skill or experience. Tanner, Benner, Chelsea, and Gordon (1993) suggest that knowing the patient is a significant element in decision-making, affecting the manner in which critical-care nurses refine the selection of patient cues. Jenny and Logan (1994) concur, commenting

that nurses feel less sure of their judgement when they do not have specific knowledge of the patient. Jenks (1993) describes personal knowing as an influential factor in one's ability to communicate within complex health-professional hierarchies. The need to balance interventions, such as those for pain management, with interventions for weaning to effect optimal nursing care is commonly cited in the literature (Clement & Buck, 1996; Stannard et al., 1996). Benner (1984) found that decision-making improved with experience: experience provided a frame of reference for nurses, allowing them to rapidly identify a problem and analyze it in relation to past situations.

The fact that critical-care nurses commonly withhold analgesia during weaning and view this as acceptable practice suggested that an examination into the nature of nurse decision-making related to analgesia administration during weaning was warranted. The purpose of the present study was to address the following two questions: What is the nature of nurses' decision-making related to pain management during weaning from mechanical ventilation? What are nurses' perceptions of the importance of managing pain during weaning from mechanical ventilation?

Methods

Design

A qualitative design was selected based on the lack of published research on nurse decision-making related to pain management during weaning from mechanical ventilation. Grounded theory was selected because the focus of the study was understanding a human behaviour process. The theoretical basis of grounded theory is symbolic interactionism. Symbolic interactionism is individual development of behaviour, or construction of reality, from symbols realized through interaction with others. The purpose of grounded theory is to generate explanative theory of human behaviour. Methods of grounded theory as described by Chenitz and Swanson (1986), such as theoretical sampling, line-by-line coding, constant comparative analysis, memoing, categorizing, and attaining saturation, were used for this study.

Sample

Following ethical approval by the hospital, ventilator-certified critical-care nurses who worked full- or part-time in the intensive care unit (ICU) of a moderate-sized urban Canadian hospital were invited to participate in a semi-structured interview. All interviews were audiotaped. An initial convenience sample was attained by inviting staff to par-

ticipate in the study and scheduling interviews. Further participants were recruited through theoretical sampling related to level of skill acquisition. Theoretical sampling is a process whereby participants are selected in an effort to achieve a reasonably balanced sample relative to the needs of the study and participant knowledge of the topic. The final sample size was 10.

Data Collection

Prior to each interview, the participant signed a consent form, completed a demographic instrument, and rated personal nursing skills. Nursing skill was rated using a short document based on Benner's (1984) levels of acquisition (see Table 1). To verify personal skill ratings while maintaining confidentiality, the researcher asked the manager of the ICU to provide a skill rating of the entire ICU staff. The ratings were compared and were found to be similar.

Table 1 *Levels of Skill Acquisition*	
Novice	Has very limited experience with patients who are being weaned from mechanical ventilation. Goals and tools of patient care are unfamiliar.
Advanced beginner	Has limited experience with patients who are being weaned from mechanical ventilation. Overall characteristics, such as weaning success indicators, can be identified from previous experiences.
Competent	Has worked with mechanically ventilated patients 2 or 3 years. Is able to cope with and manage changes in the patient. Conscious, deliberate planning of the weaning process takes place.
Proficient	Has worked with mechanically ventilated patients more than 3 years and has the ability to recognize whole situations. Knows typical events that can be expected during weaning from mechanical ventilation and recognizes deterioration or patient problems and modifies plans prior to explicit changes (such as vital signs).
Expert	Has an intuitive understanding of weaning each patient from mechanical ventilation. Has a deep understanding of the whole situation and can zero in on a problem quickly and accurately.
Source: Adapted from Benner (1984).	

The interview began with the statement "Tell me about your nursing activities when caring for your patient during weaning." Participants were encouraged to tell their own story. Probing questions were used to clarify statements and expand on information. The topic of pain management was not probed until after it was raised by the participant.

Data Analysis

Analysis of data was conducted by the researcher. The interviews were transcribed verbatim using the computer program QSR NUD*IST 4.0, designed for qualitative analysis. Constant comparative analysis of the data included reading, rereading, and comparing the transcribed interviews in order to identify similarities and differences. Line-by-line analysis, or coding, of words, phrases, and sentences was carried out to establish emerging categories. Interviews were continually compared and coded. By the seventh interview it was obvious that the data were becoming repetitious, confirming data gathered in the earlier interviews. At this time, theoretical sampling was used to ensure a heterogeneous sample and to determine adequacy and appropriateness of the data. The remaining three interviews provided concurring and confirming data, indicating that the defined categories were substantial and mutually exclusive. At this point it was deemed that the data were saturated. Memos were kept in a log book of all the researcher's intuitive thoughts. The memos were used to build and link the categories and to link the findings to existing knowledge.

Validity and Reliability

Knowledge gleaned from the preliminary literature review and the personal experiences of the researcher as an ICU nurse were bracketed in an effort to reduce bias. Bracketing is a conscious effort to put aside the researcher's preconceived beliefs regarding the phenomenon under study. The categories were shared with the participants during the study as they emerged. Participant feedback established the validity of the coding and definitions and the reliability of the emerging interpretation. To ensure objectivity and valid coding, an expert qualitative researcher was asked to review the transcribed data. Agreement on the categories and the data saturation of each category was achieved. As the theory began to take shape, it was shared with critical-care nurses in other locations. Feedback from these nurses further supported the accuracy of the data analysis. In order to establish truthfulness, the researcher presented the final draft of the theory to the study partici-

pants after all the interviews had been completed. Their comments suggested a new appreciation of their decision-making concerns and established that a truthful interpretation had been achieved.

Results

A theory of nurse decision-making was developed around the core category of belief-based decision-making. Four major categories arose from the data, each with two distinct subcategories or nursing styles, as follows:

- Nurse beliefs about pain and sedation (the diagnostic nurse; the humanistic nurse)
- The weaning puzzle (the technical survey; contemplating the big picture)
- Nurse roles in weaning (the soldier nurse; the nurse advocate)
- Managing comfort and weaning (steps towards extubation; anything for success)

The Categories

***Nurse beliefs about pain and sedation: The* diagnostic nurse *versus the* humanistic nurse.** This category includes comments that describe a nurse's beliefs or values in relation to pain. The participants quite openly described their beliefs concerning the existence of pain during weaning. Their descriptions were emphatic and reflected well-established beliefs. The *diagnostic nurse* expressed a belief that pain is a function of the patient's medical diagnosis. This belief was established prior to the nurse's contact with the patient. In relation to weaning, the belief was that pain does not exist. One nurse stated:

> *Pain? I wouldn't think so. That would always depend on their diagnosis. If they've had a lobectomy or a pneumonectomy possibly, but I don't think that there's any actual pain.*

Diagnostic nurses represented all levels of skill acquisition.

The *humanistic nurse* expressed a basic belief that pain exists when the patient indicates that pain exists. These nurses did not have established beliefs about pain, based on diagnosis, but, rather, expressed an openness to patient cues. The a priori beliefs of the humanistic nurse included a belief that pain likely exists during weaning but that this is determined by the person who is being weaned. One nurse commented:

We do a lot of things to patients in here that cause pain. Just from lab work they have pain. They have pain from having a tube down their throat for weeks. It's got to hurt. When we suction them, we choke them. It's got to hurt. Sometimes you even get blood. I think they all have pain.

Level of skill acquisition did not denote a tendency to the humanistic style of nursing practice.

Two important facts emerged in this category: (1) beliefs about the existence of pain were well established a priori, and (2) level of skill acquisition had no bearing on a critical-care nurse's selection of nursing style.

***The weaning puzzle: The* technical survey *versus* contemplating the big picture.** In this category, the nurse's words or phrases suggested a search for the salient aspects of the patient, or the pieces of a puzzle:

We look at the big picture and see if the puzzle all fits together. If there are some things that aren't going to fit into that puzzle today, we don't [wean].

The participants described two distinct approaches to identifying the salient aspects of the patient.

The *technical survey* describes the approach of getting to know the patient by monitoring technological and behavioural indicators and the reports of health-care professionals:

Basically, just the patient's vital signs and how they physically look to you. Their gases obviously would reflect whether they are having problems.

The technical survey approach was used by nurses of all skill levels. However, those nurses who were less skilled and those who tended towards a technical approach in general placed more value on these cues than other nurses.

Contemplating the big picture describes the approach of getting to know the patient by stepping back to look at the whole picture, getting to know the patient personally, and using intuition. The nurses who took this approach viewed the patient as an individual and as a whole entity rather than in terms of separate functional entities. One nurse commented:

You have to remember that they are all individual people and they have a personality. I think we tend to forget and we read monitors and numbers.

The focus of this approach was the patient, and it allowed for a broad, holistic interpretation of cues. Another nurse described it this way:

Just standing at the bottom of the bed and taking a look at her…stepping back. Sometimes that's a little more important, I find.

Humanistic nurses tended to contemplate the big picture. However, the degree to which this approach was taken depended on skill level. The more-skilled nurses placed greater value on the whole patient.

***Nurse roles in weaning: The* soldier nurse *versus the* nurse advocate.** This category includes perceptions about the role of the nurse during weaning. The participants expressed clear perceptions about expected nurse behaviours and described two distinct role beliefs. The *soldier nurse* plays a submissive role, exhibiting behaviours such as reporting to a higher authority, following orders, and maintaining a position within a chain of command. One nurse commented:

If it's a physician's order, you have no decision to make when it comes to not giving analgesic or whatever.

The nurses who fit this description participated in decision-making in a passive manner. While one might expect to find less-confident nurses in this role, nurses at all skill levels were found to fit the description of soldier nurse.

The *nurse advocate* uses the team structure to troubleshoot patient needs, challenging team members' ideas and decisions and collaborating with them to produce a plan of care. One nurse stated:

Sometimes you have to go up to the doctor and say, "OK, things are going pretty good except for the guy is as anxious as hell and he's getting bronchospastic and the tube is driving him crazy, so could we just give him a little bit [of analgesia]?"

The participants who described their role as that of nurse advocate had the highest level of skill acquisition. Their descriptions suggest active participation in decision-making as a result of their perceived role as an equal member of the health-care team.

***Managing comfort and weaning:* Steps towards extubation *versus* anything for success.** This category describes nursing actions *done to* and *done with* the patient during weaning. *Steps towards extubation* describes routine nursing actions *done to* patients to make them comfortable during weaning, such as positioning, mobilizing, suctioning, sedating, and explaining. One nurse described her routine:

We suction every 2 hours. We make sure the airway is clean and clear. We make sure the head of the bed is at an adequate level so that they are not having problems.

This course of action was selected by those nurses who were less skilled and those whose role belief was that of soldier nurse.

The alternative approach, *anything for success*, comprised actions *done with* the patient during weaning. These included mutual goal-setting, ensuring comfort, and communicating with the patient. One nurse commented:

> *They need to know that we are here to help them, that we are not here to judge them and we want to help them get better. If they want to have family in to support them, that is really important, that they feel comfortable. I will try to get them through it.*

This course of action was described by experienced nurses and those who expressed a belief that the nurse's role is that of advocate.
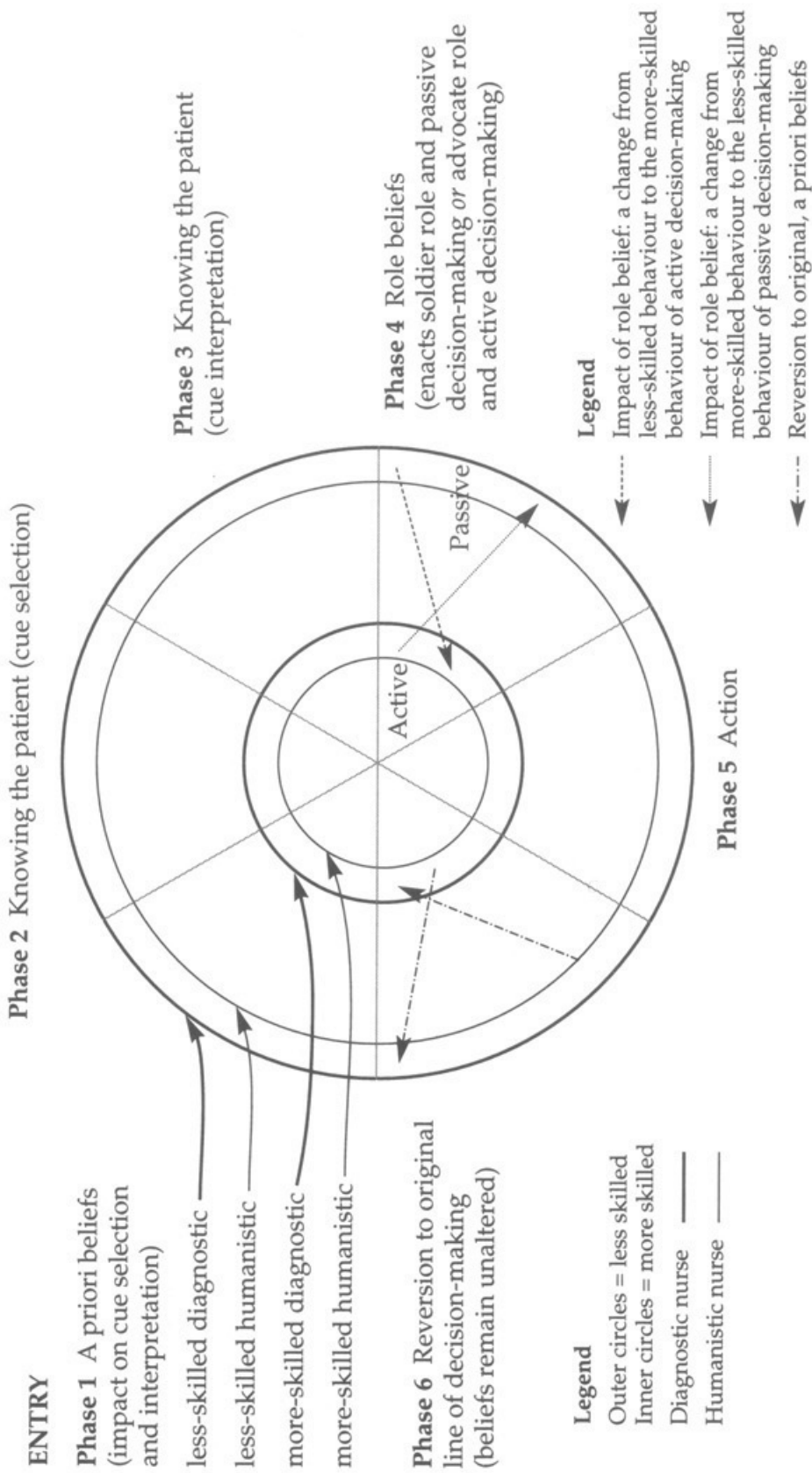
The Theory

The emerging theory may be described in terms of a circle, representing the continuous nature of the decision-making process (see Figure 1). Four concentric circles, or lines of decision-making, are divided into six wedges, or phases. The circles indicate skill level, with the inner circles representing the *more skilled* and the outer circles the *less skilled*. For the purposes of simplification, Benner's (1984) five skill levels have been collapsed into two broad levels. In view of Benner's postulation that a major change in thinking occurs between the competent and proficient levels, the two groups have been organized as the less skilled (novice, advanced beginner, and competent) and the more skilled (proficient and expert). Each skill level has two circles, representing the two styles of nursing, *diagnostic* and *humanistic*, that emerged from the data.

Phase 1 is the point at which the nurse enters into decision-making, possessing a level of skill, a style of nursing, and a priori beliefs (concerning, for example, pain during weaning), three factors that will set the nurse on a specific line of decision-making.

Phases 2 and 3 are when "knowing the patient" takes place. In phase 2 patient cues are selected according to skill level, style of nursing, and a priori beliefs. This selection varies from the purely technical (the technical survey) to the holistic view (the big picture). In phase 3 the identified cues are interpreted. The context within which the interpretation takes place depends upon the nurse's level of skill, style of nursing, and a priori beliefs. In this study, cues were interpreted in the context of the patient or the process of weaning.

Figure 1 *The Belief-Decision Continuum*

Phase 2 Knowing the patient (cue selection)

ENTRY

Phase 1 A priori beliefs (impact on cue selection and interpretation)

less-skilled diagnostic
less-skilled humanistic
more-skilled diagnostic
more-skilled humanistic

Phase 6 Reversion to original line of decision-making (beliefs remain unaltered)

Legend
Outer circles = less skilled
Inner circles = more skilled
Diagnostic nurse
Humanistic nurse

Phase 3 Knowing the patient (cue interpretation)

Phase 4 Role beliefs (enacts soldier role and passive decision-making *or* advocate role and active decision-making)

Legend
Impact of role belief: a change from less-skilled behaviour to the more-skilled behaviour of active decision-making

Impact of role belief: a change from more-skilled behaviour to the less-skilled behaviour of passive decision-making

Reversion to original, a priori beliefs

Passive

Active

Phase 5 Action

In phase 4 the nurse's role beliefs impact on decision-making, potentially generating a shift to an alternative line of decision-making. Belief in the nurse's role as soldier or advocate will determine whether the nurse will participate passively or actively in the decision-making process.

Phase 5 is the action phase. While level of skill, style of nursing, a priori beliefs, and "knowing the patient" influence the choice of action, the greatest influence is the belief about the role of the nurse.

In phase 6 the nurse returns to the original line of decision-making, as the power of the role belief diminishes once the action has been completed.

Discussion

The findings from this study suggest that nurse decision-making related to pain management during weaning is a continuous, dynamic process. The continuous cycle was described by the participants as knowledge generation, knowledge interpretation, and action selection. Knowledge in this instance is the information that a nurse gathers and interprets about the patient, while action is the intervention the nurse selects as the appropriate response to that knowledge. This cycle reflects problem-solving as part of the nursing process.

The findings suggest that driving forces move the process forward through varying levels in the circle. Both the nursing process and the skill level play a part in this dynamic process. Consistent with Benner's (1984) theory, experience was shown to influence the means by which the nurses gathered and interpreted knowledge about the patient. For example, those who used the broadest scope of knowledge gathering and interpretation were among the most experienced nurses. Two powerful forces outside of the nursing process and skill level were identified as major driving forces: a priori beliefs about the existence of pain and beliefs about the nurse's role during weaning.

The first force encountered in the decision-making process is the nurse's perceptions about the importance of managing pain during weaning. Despite published evidence that pain is experienced during weaning, more than half of the nurses in this study held a strong a priori belief that pain is not experienced during weaning and that analgesia is unnecessary. Beliefs about whether pain exists during weaning have a significant impact on patient care. A nurse who believes there is no pain will approach the patient for knowledge, and interpret that knowledge, differently from a nurse who believes there is

pain. This finding is congruent with that of Greipp (1992), whose study of ethical decision-making found nurse beliefs to be a potential inhibitor, enlightening or biasing the nurse and affecting his or her approach to the patient. The *diagnostic nurse* identified in the present study, for example, holds an a priori belief that pain does not exist during weaning and therefore does not perceive pain management in weaning as important. The diagnostic nurse approaches the patient for knowledge within the limited frame of weaning. Cues sought, and interpreted, are related to the patient's tolerance of the weaning process. Pain cues are not considered in the search for or interpretation of cues, even though they may be there. The result could be that weaning is stopped due to intolerance when, in fact, the patient was in pain, and the pain could have been managed.

A second force arises in the decision-making process after patient cues are interpreted and before an action is selected. This is the belief about the nurse's role in weaning a patient. The perception of the nurse as a *soldier* or as an *advocate* determines whether the nurse will be a passive or an active participant in decision-making. The nurses who perceived a soldier role deferred or delegated decision-making to other members of the health-care team, thereby participating passively. In the context of pain management during weaning, the soldier nurse who does not administer analgesia because of an "order" transforms the act of withholding analgesia from an ethical issue of managing pain into a legal issue of following orders. What is most interesting about this belief is its power. A humanistic nurse who believes that pain exists during weaning, and identifies and interprets the patient's pain cues, will not advocate for analgesia administration if his or her role belief is that of soldier. While Benner (1984) describes advocacy as a characteristic of the more skilled nurse, the findings of the present study suggest that perceived role exerts greater power than skill level in determining advocacy. Although the participants who described an advocacy role for nurses were among the most skilled, not all nurses at the highly skilled level perceived such an advocacy role. The impact of role beliefs on patient care is significant in that most of the nurses did not advocate for the best care for their patient. Role beliefs may be compared to Ajzen and Fishbein's (1980) normative beliefs. While their theory of reasoned action was developed to predict health behaviours, normative beliefs resemble role beliefs in that in both cases the opinions of individuals and groups determine whether a nurse will or will not perform an act. The motivation to comply, another aspect of normative beliefs, was discussed by the nurses in the present study: they described motivators for the soldier role as perceived lack of control over personal

practice and caregiver stress. Role belief can ultimately result in an intervention that is in contradiction to beliefs about the existence of pain and knowledge of the patient. As powerful as it may seem, role belief does not possess the ability to alter the nurse's belief concerning an issue. It is for this reason that, prior to continuing the process of decision-making, the nurse will return to the original belief set.

Implications for Practice and Future Research

The emerging theory of nurse decision-making provides a means for critical-care nurses to examine their practice specifically in relation to pain management during weaning and generally in relation to their personal beliefs and decision-making role. The theory provides a new perspective on forces that influence decision-making among critical-care nurses. The finding that critical-care nurses rely more heavily on established belief systems than on empirical evidence when making decisions about care has implications for personal practice, nursing education, and critical-care orientation programs. In their personal practice, critical-care nurses can use this theory to identify their personal belief on an issue and review the literature to determine whether evidence-based knowledge credits or discredits that belief. It may be that the method of knowledge-dissemination in nursing education does not impact on established beliefs. The emerging theory offers a method for determining whether education affects the decision-making process. The theory can be used in critical-care orientation programs to the benefit of both novice and mentor. The novice can be nurtured in the different styles of nursing as he or she gains experience, towards the goal of humanistic decision-making and advocacy nursing. The theory can help the mentor to appreciate the complexities that the novice nurse must negotiate in order to reach a level of technological-humanistic competence within a highly technical environment.

Concepts that form the basis of the emerging theory support those identified in the literature. These include: a continuous process of knowledge and action (Ford & Profetto-McGrath, 1994), effect of experience on decision-making (Benner, 1984), importance of knowing the patient (Jenny & Logan, 1994; Tanner et al., 1993), and impact of beliefs on actions (Ajzen & Fishbein, 1980; Greipp, 1992). Further research is needed to test the efficacy of the emerging theory for use in critical care. The truthfulness of the theory and its generalizability within nursing have yet to be tested. Concerning the influence of beliefs about a particular issue, the following areas could be examined: the impact of nursing and critical-care education on belief systems, the ability of edu-

cation to change beliefs, and the role of nursing experience in the formation of beliefs. Such research could lead to more effective knowledge acquisition by novice and expert critical-care nurses. Concerning the influence of beliefs about the nurse role, research into the role of social hierarchy in critical-care units in encouraging or discouraging advocacy could reveal ways of improving nurse self-efficacy; research into nurses' working environment could lead to a greater understanding of issues of power and control in their personal practice; and research into the effect on nurses of caring for the critically ill could provide insight into why decision-making is delegated to others and why nurses are compelled to leave critical care.

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