Executive Summary

As the health care industry refines quality assurance and quality improvement standards, the accountability of individual care providers is intensifying.

Care providers work within a system of interdependent roles and functions and collaborate to attain the common goal of quality care.

A conceptual model was developed which relates the achievement of specific outcomes to nurses' independent, dependent, and interdependent roles and functions.

Empirical literature was used to identify outcomes associated with nurses' role functions.

Outcomes associated with nurses' independent role functions included the prevention of complications, clinical outcomes, knowledge of diseases and treatments, satisfaction, and cost outcomes.

Outcomes associated with nurses' dependent role included adverse incidents which caused problems or prolonged hospital stays.

Outcomes associated with nurses' interdependent role included interdisciplinary team functioning.

Fiscal constraints and expectations among consumers, policymakers, and regulators for accountability in health care spending have resulted in an emphasis on costs and patient outcomes as measures of system effectiveness. Health care professionals are being asked to assume responsibility for managing system costs and outcomes. They are increasingly held accountable for their own practice through the development of professions' quality assurance and quality improvement activities (Bond & Thomas, 1991).

Identifying outcomes for which individual nurses can be held accountable is a challenge. The challenge stems from accumulated evidence suggesting outcomes are multifaceted and reflective of what preceded them. Outcomes are affected not only by the care provided, but also by the factors related to the patient, to the interpersonal aspects of care, and to the setting or environment in which care is provided (Brook & Naylor, 1995; Hegyvary, 1991; Tarlov et al., 1989). Therefore, identifying and investigating nursing-sensitive patient outcomes must be guided by a conceptual framework that establishes specific relationships between the factors in a nursing care situation and outcome achievement. Several scholars have argued against focusing on outcomes research alone (Higgins, McCaughan, Griffiths, & Carr-Hill, 1992; Sidani, 1996), because when the process is not also examined one cannot know what caused the favorable and unfavorable outcomes. Without an understanding of the relationship between the outcome variables and

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process variables, one cannot begin to improve the quality of nursing care.

In this article, a model is presented that identifies nurses' roles in health care and relates these roles to specific patient and cost outcomes (hereafter referred to as the nursing role effectiveness model). Examples from the empirical literature on nursing-sensitive patient outcomes are used to illustrate how outcomes can be linked to the roles nurses assume in health care.

**Figure 1. The Nursing Role Effectiveness Model**

<table>
<thead>
<tr>
<th>Structure</th>
<th>Patient/Health Outcomes</th>
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<tr>
<td>Nurse</td>
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<tr>
<td>Experience</td>
<td>Clinical/Symptom Control</td>
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<td>Knowledge</td>
<td>Freedom from Complications</td>
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<td>Skills</td>
<td>Functional Status/Self-Care</td>
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<td>Knowledge of Disease &amp;</td>
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<td>its Treatment Satisfaction Costs</td>
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<td>Staff Mix</td>
<td>Adverse Events</td>
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<td>Patient</td>
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<td>Health Status</td>
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<td>Morbidity</td>
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The conceptual model presented in Figure 1 is based on the structure-process-outcome model of quality care (Donabedian, 1980). Providing health care to patients involves a system of health care providers interacting and delivering care for the purpose of achieving desired outcomes. The contribution of health care providers to patient and cost outcomes is governed by the roles they assume in patient care. Roles are positions in organizations that have attached to them a set of expected behaviors (Johns, 1992). Professional roles are complex because they consist of components that are based on normative expectations concerning standards of practice that have been established by external regulatory bodies and secondly, of normative expectations that have evolved over time that are unique to the organization. For example, patient education is an example of a formal role function of nursing that is recognized by most if not all regulatory bodies as being within the domain of nursing practice. In contrast, transporting a patient to radiology is an example of an informal role function that may have evolved over time to meet the instrumental needs of a particular organization. In this article, we focus on formal or assigned nursing roles, and examine the influence of structural variables on the capacity of nurses to function within their assigned roles, and the relationships between role performance and patient and cost outcomes. The conceptual model depicted in Figure 1 proposes relationships between the different roles nurses assume in health care and outcomes expected of nursing care.

**Components**

The structure component consists of nurse, patient, and organizational variables that influence the processes and outcomes of care. Nurse variables such as experience level, knowledge, and skill level can affect the quality of nursing care (Fuqua & Stevens, 1988; Preuss, 1997). Patient variables, such as age, physical function at the time of admission, severity of presenting problem, and co-morbidities can affect health outcomes and should be accounted for when assessing the impact of nursing variables on patient outcomes. Organizational structure variables focus on measures of staffing patterns expected to affect the quality and quantity of care provided by nurses, including measures of the availability of nursing staff (for example, staff mix, daily staffing levels, nurse/patient ratios) and nursing assignment patterns (for
example, functional nursing, team nursing, primary or modular nursing) (Fugua & Stevens, 1988; Girotti, Carrick, Tierney, Chesnick, & Brown, 1987; Heinemann, Lengacher, VanCott, Mabe, & Swymer, 1996; Petryshen & Stevens, 1995; Roseman & Booker, 1995; Sandhu, Kérouac, & Duquette, 1992).

The process component consists of nursing's independent, dependent, and interdependent roles. Nursing's independent role concerns the role functions and responsibilities for which only nurses are held accountable. They refer to activities initiated by professional nurses which do not require the physician's order (Heater, Becker, & Olson, 1988). They include the activities of assessment, decision making, intervention, and followup that define the nursing process. They also include "nurse-initiated treatments" which were defined by the Nursing Intervention Classification (NIC) project team as interventions "initiated by the nurse in response to a nursing diagnosis; an autonomous action based on scientific rationale that is executed to benefit the client..." (McCloskey & Bulechek, 1996, p. xvii). In recent years there have been several attempts to classify nursing interventions in an effort to identify the substantive basis of nursing practice (Bulechek & McCloskey, 1994; Tripp-Reimer, Woodworth, McCloskey, & Bulechek, 1996).

Examples of classes of nursing interventions identified by the Iowa Intervention Project (McCloskey & Bulechek, 1996) include physiologic comfort promotion, coping assistance, self-care facilitation, activity and exercise enhancement, immobilization management, skin-wound management, and nutritional support. These independent nursing interventions create results for patients which can be measured as patient outcomes. Examples of outcomes that can be linked to nurses' independent role function include symptom control, functional health status, and knowledge of self-care strategies.

Nursing's dependent role concerns the functions and responsibilities associated with implementing medical orders and medical treatments. The NIC (McCloskey & Bulechek, 1996) defined a "physician-initiated treatment" as an intervention initiated by the physician in response to a medical diagnosis but carried out by a nurse in response to a "doctor's order" (McCloskey & Bulechek, 1996, p. xvii). Outcomes of nursing's dependent role function might include adverse events such as medication errors.

Nursing's interdependent role concerns the activities and functions in which nurses engage that are partially or totally dependent on the functions of other health care providers. It also includes those activities of the nurse on which other health care professionals depend for accomplishing their own activities. Examples of interdependent role functions for nurses include monitoring and reporting of changes in the patient's health condition and coordinating health services. The kinds of outcomes that could be affected by nursing's interdependent role in health care include the quality of intra-team and interprofessional communication and coordinating care. Timely communication of a change in the patient's condition could, in turn, lead to the prevention or effective management of potentially serious complications.

The outcome component includes nursing-sensitive patient outcomes which are defined as a "general patient state, behavior, or perception resulting from nursing interventions" (Johnson & Maas, 1997, p. 22). The literature on patient outcomes, nursing-sensitive outcome classification efforts, and studies investigating the effectiveness of nursing interventions, including meta-analytic studies, was reviewed to identify outcomes sensitive to nurses' three role functions. This literature illustrates how outcomes can be linked to nurses' three role functions.

When findings from the different outcome studies and classification efforts were reviewed for common themes, six major categories of outcomes emerged. Preventing complications is a major responsibility of nursing (Majesky, Brester, & Nishio, 1978). Complications that have been attributed to the quality of nursing care include safety or freedom from injury (Gillette & Jenko, 1991; Lang & Marek, 1990; Johnson & Maas, 1997), infection (American Nurses Association [ANA], 1997; Majesky et al., 1978), complications of immobility (Aydelotte, 1962; Majesky et al., 1978), and complications of fluid imbalance (Majesky et al., 1978). While nurses are not solely responsible for complications such as infection, "they are the only persons in the hospital close to the patient every hour of the day and night. only they can provide continuous, professional supervision with respect to infection [complication] control" (AHA, p. 40, as cited in Majesky et al., 1978).

Clinical outcomes is a second theme and includes symptom control (Gillette & Jenko, 1991; Johnson & Maas, 1997) and indicators of health status (Hover & Zimmer, as cited in Johnson & Maas, 1997; Lang & Clinton, 1984).

A third theme, knowledge of disease and its treatment, encompasses patient knowledge of the illness process (Hover & Zimmer, as cited in Johnson & Maas, 1997; Lang & Marek, 1990; Johnson & Maas, 1997), knowledge of medication (Hover & Zimmer, as cited in Johnson & Maas, 1997), health attitudes and knowledge (Lang & Clinton, 1984), and adherence behavior (Johnson & Maas, 1997).

Functional health outcomes includes physical and social functioning (Lang & Clinton, 1984), role functioning (Naylor, Munro, & Brooten, 1991), cognitive and mental functioning (Aydelotte, 1962; Naylor et al., 1991; Waltz & Strickland, 1988),continence and mobility (McCormich, 1991; Johnson & Maas, 1997), self-care...
include a lower proportion of RNs to other care providers (Heinemann et al., 1996), workload (Girotto et al., 1987; Roseman & Booker, 1995), and drug distribution systems (Fuqua & Stevens, 1988).

Nurses’ interdependent role function depends upon the nurse’s ability to communicate and articulate her/his opinion to other members of the health care team. Wilden and Casualy (1994) reported that part-time and casual nursing staff were more hesitant to speak up voluntarily and more likely to respond only when asked for information at interdisciplinary team conferences. Alt-White, Charns, and Strayer (1983) reported a weak inverse relationship between nurse’s length of employment and collaboration with physicians. A significant positive relationship was found between a unit’s use of primary nursing and nurse-physician collaboration (Alt-White et al., 1983).

Structure and Outcome

Nurse, patient, and system structural variables have a direct effect on clinical, functional, satisfaction, and cost outcomes. They also have an indirect effect, through the mediation of the process variables. For example, patient age, immune status, and the length of intraoperative procedures affect nosocomial infection rates (Larson, Oram, & Headrick, 1988; National Nosocomial Infection Surveillance [NNIS] System, 1991). Studies that have investigated the influence of organizational structure variables, such as nurse staffing, have found the percentage of registered nurses and the level of staffing are related to outcomes such as preventable complications and risk-adjusted mortality rates. For example, Lengacher et al. (1996) found staff mix changes, employing RNs and nurses extenders, resulted in higher patient satisfaction, lower adverse patient incidents, but also higher costs. Similar results were reported by Neidlinger, Bostrum, Stricker, Hild, and Zhang (1993). Behnor, Fogg, Fournier, Frankenbach, and Robertson (1990) found that staffing at 20% below the recommended level during the first 3 days of a patient’s stay resulted in a 30% increase in the probability that the patient would experience a complication while in the hospital, which in turn would lead to an additional 3.5 days of hospital stay. Hartz et al. (1989) found that the percentage of nurses who were registered explained a significant amount of the variation in adjusted mortality rates between hospitals. Shortell and Hughe (1988) found that the percentage of RNs among the hospital employees was associated with lower mortality rates, but the relationship was not statistically significant. Aiken, Smith, and Lake (1994) found hospitals known for good nursing care, defined as “magnet” hospitals, had 4.8% less excess mortality than comparative hospitals.

Process and Outcome

Nurses’ independent role function can have a direct effect on clinical, functional, satisfaction, and cost outcomes.

Clinical outcomes. In a meta-analysis of 84 studies published between 1977 and 1984, Heater et al. (1988) grouped clinical outcomes such as heart and respiratory rate under one outcome heading labelled “physiological” and reported a mean effect size of .58 for nursing interventions. Symptom control is another important clinical outcome for which nursing can have a major impact. For instance, nurses have sole responsibility for analgesic administration, particularly opioids in managing pain. Regular opioid dosing has resulted in patients having fewer complications such as infection following surgery, shorter hospital stay, and less disability after discharge (Tuman et al., 1991; Wasylak, Abbott, English, &Jeans, 1990; Yeager, Glass, Neff, &Brinck-Johnsen, 1987). A large body of empirical evidence now exists validating nursing’s impact on clinical
outcomes such as pain, comfort, fatigue, nausea, constipation, and diarrhea (Marek, 1989). A meta-analysis of studies investigating the effectiveness of symptom management in oncology nursing practice found a moderate effect size for nursing’s impact on symptoms of nausea and vomiting, moderately large effects for nursing impact on pain, anxiety, and infection, and a large effect for nursing’s impact on alopecia, although the latter involved only two studies (Smith, Halcombe, & Stullenbarger, 1994).

**Functional outcomes.** Several studies have documented the effect of nursing interventions on functional status health outcomes (Brown & Grimes, 1995; McCorkle et al., 1989). In a meta-analysis examining the effect of nursing interventions on patient outcomes, Heater et al. (1988) reported a mean effect size of .63 for behavioral outcomes. Behavioral outcomes were defined as “a change in the manner in which a client conducted self” (Heater et al., 1988, p. 303). Patient affect/emotional status has demonstrated sensitivity to nursing variables, including a nurse-provided cardiac rehabilitation program (Burgess et al., 1987), a nurse-provided intervention to prepare patients for total hip replacement surgery (Gammon & Mulholland, 1996), and a training program to improve nurses’ attitude and knowledge regarding the care of women with breast cancer (Alexander, 1990). Heater et al. (1988) reported a mean effect size of .54 for the impact of nursing interventions on psychosocial outcomes.

**Knowledge outcomes** are another class of outcome for which nurses have a major impact. For example, a program designed to improve nurses’ knowledge about caring for women with breast cancer resulted in an improvement in the knowledge of patients who were under the nurses’ care (Alexander, 1990). In a meta-analysis examining the effect of nursing interventions on patient outcomes, Heater et al. (1988) reported a mean effect size of .64 for knowledge outcomes.

**Patient satisfaction.** Nursing variables that have demonstrated a relationship with patient satisfaction include the use of nurse practitioners (Brown & Grimes, 1995), an early discharge and home follow-up program for caesarean section (Brooten et al., 1994), primary nursing (Koerner, Cohen, & Armstrong, 1985), and quality nursing care for MI patients (Proctor, Yarcheski, & Oriscello, 1996).

**Costs.** Hospital length of stay (LOS) is a cost variable that has been empirically linked with the quality of nursing care (Duffy, 1990) and nursing interventions (Brooten et al., 1994; Marchette & Holloman, 1986). A meta-analysis by Devine and Cook (1983) found that psycho-educational interventions reduced postsurgical hospital stay by an average of 1.07 days, and the effects for the nurse-conducted studies were similar to the effects for the total sample of studies.

**Nursing’s dependent role function.** Medication errors and other adverse events associated with nurses’ dependent role function can ultimately affect all categories of patient outcome. When nurses carry out physician-initiated treatments, they assume responsibility for the safe execution of the treatment and for the outcomes associated with their actions. Brennan et al. (1991) defined an adverse event “as an injury that was caused by medical management (rather than the underlying disease) and that prolonged the hospitalization, produced a disability at the time of discharge, or both” (p. 370). Therefore patient outcomes associated with nurses’ dependent role functioning might include adverse patient events leading to new physical, emotional, functional, or cognitive disability and/or prolonged hospitalization. Perhaps because of the reluctance to publicize adverse outcomes associated with patient incidents, this domain of nursing practice is largely unresearched. The only exception is the wealth of information on medication errors (Fuqua & Stevens, 1988).

**Nursing’s interdependent role function** can affect the quality of interprofessional communication and coordination. The nature of inter-professional communication and coordination can influence other important patient outcomes and costs such as risk-adjusted length of stay (Shortell et al., 1994), risk-adjusted mortality rates (Knaus, Draper, Wagner, & Zimmerman, 1986), excess home care costs following discharge (Brooten et al., 1994), unplanned visits to the physician or emergency department, and unplanned re-hospitalization (Naylor et al., 1994).

**Coordination of care.** Coordination of discharge planning is an area in which nurses have assumed a major interdependent role. Kennedy, Noéliger, and Scroggins (1987) demonstrated that a comprehensive discharge planning protocol implemented by a gerontologist clinical nurse specialist (CNS) decreased the LOS for subjects in the experimental group by 1.9 days, and resulted in significant in-hospital cost savings. Similar results were reported by Brooten et al. (1986) for low birth weight infants and by Naylor et al. (1994) for the medically ill elderly. Marchette and Holloman (1986) conducted a retrospective review of the medical records of 500 patients in one American hospital and found LOS was related to the extent and timing of discharge planning by nurses.

**Case management** is another area in which nurses have assumed a major interdependent role. Case management is a system of patient care delivery that focuses on the achievement of patient outcomes within effective and appropriate time frames and resources where care is coordinated across a continuum by a case manager (Huber, 1996). Patient outcomes associated with case management include fam-
ily confidence in being able to provide care in the home (Ethridge & Lamb, 1989), adherence to medication (Ethridge & Lamb, 1989), adjustment to chronic illness (Ethridge & Lamb, 1989), reduced length of acute hospital stay (Cohen, 1991; Ethridge & Lamb, 1989), and reduced utilization of laboratory and radiology services (McKenzie, Torkelson, & Holt, 1989).

Implications of the Model

The Nursing Role Effectiveness Model represents the multidimensional nature of a nursing care situation. The model can be used to guide an investigation of the mechanisms that underlie nursing care effects on patient outcomes. Success or failure of the care to produce the expected outcomes can be studied. The conditions strengthening or weakening the effects of the care on outcomes can be determined by examining the influence of the structure factors (Brooten & Naylor, 1995; Hegyvary, 1991; Sidani & Braden, 1997).

The model encourages researchers, administrators, and clinicians to conceptualize the outcomes of care in terms of the processes of care that have a direct impact on the outcomes, and the factors in the organizational structure that may influence the process of care and subsequently the outcomes of care. This conceptualization facilitates identifying appropriate outcome variables that reflect the specific process of care characterizing the nursing care situation of interest. The process component offers a way of categorizing inter-related nursing activities by grouping them under the three role functions of nurses. As such, the categorization schema provides a parsimonious way of conceptualizing nurses’ contribution to health care and relating this to different patient and cost outcomes.

Examining the relationships among specific structure, process, and outcome factors enhances the validity of conclusions in outcome evaluation endeavors, contributes to the development of a solid knowledge base, and assists in designing appropriate quality improvement strategies. The validity of conclusions regarding outcomes achievement is enhanced since (a) the particular process of care (nurses’ roles and/or activities) primarily responsible for producing the specific outcome(s) of interest, and (b) the structure factors that affect, either potentiate/strengthen or weaken, the effects of process on outcomes, are identified. Such knowledge consolidates our understanding of the nursing care situation, as it actually occurs. Finally, using the model to guide outcomes evaluation provides a link between theory and research. On the one hand, the model could be used to operationalize a theory that describes, organizes, and explains outcomes achievement in a defined nursing care situation. On the other hand, the relationships among structure, process, and outcomes that have been empirically supported could form the basis for developing such a theory (Sidani & Braden, 1997).

Conclusion

In summary, as the relative salaries and benefits for the professional staff have risen, management has responded by attempting to “rationalize” jobs and decentralize routines to less skilled workers (Preuss, 1997). Nursing services have come under scrutiny, as hospitals look for cost-effective ways to provide patient care. Changes in the structure and composition of the nursing workforce have prompted concern in the nursing community regarding the quality and benefit of care provided to patients (ANA, 1997). However, criterion measures of patient care and precise instrumentation to measure the effect of professional services other than physician care, are major gaps in the health care literature.

A conceptual model was presented that linked patient and cost outcomes to the roles nurses assume in health care. The empirical literature testing specific nursing interventions provided evidence of the relationship between specific patient outcomes and nurses’ independent role in health care. There is very little empirical evidence on patient outcomes associated with nurses’ dependent role function. Adverse outcomes resulting from medication errors and from the execution of other physician-initiated treatments are possible outcomes for evaluating nurses’ dependent role function. The immediate outcomes of nurses’ interdependent role function would include effective interdisciplinary communication and coordination of care. These immediate outcomes would in turn, affect patient and cost outcomes such as timely discharge, reduced LOS, reduced re-hospitalization, and reduced discharge costs.

The model proposed in Figure 1 was generated from a review of the literature on nursing-sensitive patient outcomes and from studies and meta-analyses investigating the effectiveness of nursing interventions. Future research needs to test the proposed relationships between the structure, process, and outcome variables.$

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one ACNM did not want to give up her position and found it difficult to return to the staff nurse role. As the 2nd year approached, on some units, some staff began taking sides among the aspiring candidates and some wrote letters to the CNE supporting their candidates. On one unit, the staff developed close loyalties to the ACNM and did not want her to "retire." However, she worked closely with the incoming ACNM and helped the staff make the transition. Though there were no complaints, there was some speculation that after several years, the CNM could tire of being in the position of constantly training a new ACNM. Perhaps this could be helped by planning a more structured continuing education program for the ACNMs.

Summary

This innovative program was an easily administered and cost-effective method to identify and develop new nurse leaders. Successful features of the program were (a) the tenure in the ACNM's traineeship position was limited to 1 year, (b) the salary expense was just over $1,000 per ACNM per year, (c) the ACNMs were protected from publicity and visibility while they learned, and (d) potential nurse leaders were identified. After selling the idea to the hospital and nursing management, the only major effort needed to begin the program was the development of the ACNM job description and the selection of candidates. The rewards far outweighed the initial effort.5

REFERENCES


Linking Outcomes

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