Nursing Practice Models: Research on Patient Outcomes[1]

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This paper examines the state of knowledge regarding the effects of nursing practice models on patient outcomes. Many hospitals, and to some extent other care facilities, are experimenting with innovative models of nursing practice, and some of these models are the subject of evaluation research. This paper will attempt to summarize what is known from studies in which the practice model is the independent variable, an element of the "structure" of health care settings (Donabedian, 1988), and patient outcomes are dependent variables.

The paper will present an overview of innovative nursing practice models; will summarize the types of patient outcome measures employed in studies of these models and present some examples of findings; will discuss some of the methodological issues that arise in this type of research; and will suggest future research needs in this area.

Since many models are still in the formative stages and evaluations are ongoing, much of the evaluation research on practice models has not yet been reported. Nevertheless, the studies represent a significant departure from earlier research on patient outcomes. Previous research on patient outcomes rarely had included variables representing the organization of nursing services. Hospital studies frequently considered attributes of medical staff but neglected attributes of nursing staff. Figure 1 provides some information on four studies that did consider aspects of nursing service organization as predictors of mortality among surgical patients, intensive care patients, and Medicare patients. In these studies, the measures of nursing organization were somewhat crude and did not reflect practice model issues.

Overview of Nursing Practice Models

For purposes of this paper, the term "nursing practice model" refers to operational models for redesigning nursing practice for the provision of patient care in organizational settings, primarily hospitals and longterm care facilities. Though the models may be implemented organization-wide, they typically redesign nursing practice at the point of patient care delivery, that is, at the nursing unit level. Thus the models are distinguished from organization-level management innovations (such as clinical advancement programs or innovative pay systems) that do not specifically address care delivery.

Nursing practice models are innovative practice arrangements that differ from traditional models on one or more of the following structural dimensions:

(1) The degree to which the practice of individual nurses is differentiated according to education level or performance competencies;

(2) The degree to which nursing practice at the unit level is self-managed, rather than managed by traditional supervisors;

(3) The degree to which case management is employed; and

(4) The degree to which "teams" (either nursing or multidisciplinary) are employed.

Many practice models contain more than one of these elements and also include elements of primary nursing.

A recent compendium of innovative nursing practice models (Mayer, Madden, and Lawrenz, 1990) includes the selected examples displayed in Figure 2. These models, which have been evaluated to varying degrees, represent a wide variety of structural approaches to reorganizing nursing practice. Some have been motivated primarily by the need to address nurse staffing shortages, whereas others have been motivated primarily by the need to contain costs. Cost savings might be achieved through better coordinated care, through use of non-RN providers, or through reductions in turnover and replacement costs. Most of these models have been developed for, and field tested on, a small number of nursing units in one hospital, rather than hospital-wide or in multiple hospitals.

In addition to the models already described in the published literature, there are some ongoing evaluations of innovative models. Two research demonstration projects funded by the National Center for Nursing Research (NCNR) and the Division of Nursing are underway in New York and Arizona. The University of Rochester School of Nursing is implementing and evaluating an Enhanced Professional Practice Model for Nursing, designed to increase nurses' control over practice at the unit level and to provide professional compensation. The evaluation design includes five hospitals, experimental and control units, and a pretest-posttest design. Patient outcomes being studied include patients' perceptions of the hospital experience, morbidity and mortality, and unplanned hospital readmission up to 30 days post-discharge. The University of Arizona College of Nursing is implementing and evaluating a unit-based Differentiated Group Professional Practice Model that includes three components: group governance (including participative management, staff bylaws, peer review, and professional salary structure); differentiated care delivery (including differentiated RN practice, use of nurse extenders, and primary case management); and shared values (including a culture-building process that values quality of care, intrapreneurship, and recognition for excellence in practice). The evaluation design includes three hospitals, demonstration and comparison units, and a 36-month followup. Quality of care outcomes include complications, medication errors, infections, and chart audits.

NCNR is also funding the evaluation of The Johns Hopkins Professional Practice Model. That model consists of a contract between a unit's registered nurses and the hospital in which the nurses agree to provide 24-hour patient care on the unit for one year in exchange for unit self-management (including peer review, self-scheduling, and quality assurance), salaried compensation, and shared savings if the unit contains its costs. The evaluation design is posttest only and includes 16 professional practice units and 8 comparison units matched for gross clinical area and unit size. The Professional Practice Model units include units in neurology, psychiatry, pediatrics, general surgery and several surgical specialties, two general operating rooms and labor and delivery. Process variables and patient outcomes studied include in-hospital mortality, medication errors, falls, length of stay, patient satisfaction with nursing care measured on the day of discharge, post-discharge perceived health status, unmet needs for care during the first two weeks after discharge, post-discharge unplanned health services utilization, and hospital readmission within 30 days. Post-discharge outcomes are included because the model was expected to improve discharge planning; the two-week post-discharge period was selected for study based on previous research on

the effects of discharge planning on patients' needs for care (Steinwachs et al., 1989). Our data are being analyzed now.

Twenty projects have been funded by The Robert Wood Johnson Foundation and The Pew Charitable Trusts in their program entitled "Strengthening Hospital Nursing: A Program to Improve Patient Care." The implementation phase of these projects began in the fall of 1990, so definitive descriptions of the practice models being tested are not yet available. According to the projects' proposals, the models range from system-wide interventions to unit-based practice models. Further, fourteen of the twenty proposals indicated that patient outcomes would be measured in order to assess the impact of the models.[2] These projects are likely to produce some interesting findings with regard to patient outcomes by 1994.

Another project with plans to collect patient outcome data is the New Jersey Nursing Incentive Reimbursement Awards (NIRA) Program (Knickman et al., 1991). This project is evaluating nursing innovations in 23 New Jersey hospitals. The innovations include redesigned work environments, including case management models; shared governance structures; computerized nursing process; and educational programs to address nurse satisfaction. The pretest-posttest evaluation (with comparison units, as possible) will include the Hinshaw and Atwood (1982) patient satisfaction instrument and three indicators of quality of care: nosocomial infections, medication errors, and falls. The final report on this project is planned for June, 1992.

Other current projects include studies of practice models in specialty units, such as dedicated AIDS units, special care units for chronically critically ill patients (Daly et al., 1991), pediatric critical care units (Murphy, Walts, and Cavouras, 1989), and intensive care units (Phillips et al., 1990).

Patient Outcome Measures and Illustrative Findings

The motivation for creating innovative nursing practice models has included the need to attract and retain nurses in hospital practice and the need to contain costs (Tonges, 1989). Many of the models were designed initially to increase nurses' job satisfaction and retention and to produce efficiencies in care delivery. Only more recently have researchers turned to the question of the models' effects on patient outcomes. Hypothesized effects on patient outcomes differ by study. In cases where the primary focus is on achieving cost savings, the hypothesis might be that the model maintains current quality of care (i.e. does not result in poorer patient outcomes). In cases where the primary focus is on retaining a more experienced nursing staff or on improving care coordination or case management, the hypothesis might be that the model will improve patient outcomes.

The types of patient outcomes being measured in these studies vary widely and reflect the general shift in patient outcomes research from traditional measures of morbidity and mortality to a broader set of measures including patient-perceived health status, post-discharge outcomes, and patient satisfaction (Tarlov et al., 1989; Moritz, 1991). Often, "process" indicators of quality of care — such as length of stay, number of medication errors, or nursing chart documentation — also are included in these studies.

The variations in practice models and in patient outcomes, as well as the preliminary nature of many of the studies, makes it difficult to summarize findings. Instead, illustrative examples of findings will be presented from six published studies. (See Figure 3.)

Dear et al. (1985) reported on results of a one-year pretest-posttest evaluation of the Professional Practice Model unit at Johns Hopkins Hospital, compared with a unit using traditional management. The only outcome studied that related to quality of patient care

was the nursing audit; audit scores were generally higher for the professional practice model unit than for the comparison unit, at both baseline and followup. As previously noted, the ongoing evaluation of this practice model includes a number of patient outcomes.

Burnes-Bolton et al. (1990) reported findings from a pretest-posttest evaluation conducted over 10 months for one medical-surgical unit using the Cost Containment Model at Cedars-Sinai Medical Center. Patient care planning, nursing documentation, and patient education improved over the 10-month period; patient satisfaction increased, primarily because patients perceived that nurses spent more time with them and their families.

Lamb and Huggins (1990) reported on some pilot studies of the St. Mary's Professional Nursing Network, a case management model; the data covered a three-year period and referred to several "tracer" diagnoses. The authors reported that client satisfaction increased over time and that length of stay decreased in two diagnostic categories (chronic obstructive pulmonary disease and total hip replacement).

Horvath (1990) reported some data from evaluations at Beth Israel Hospital in Boston, in which patients on primary nursing units had significantly lower stress scores than patients on team nursing units.

Brett and Tonges (1990) reported a number of findings from an 8-month pretest-posttest pilot evaluation of one surgical orthopedic unit using the ProACT model at Robert Wood Johnson University Hospital. Patient satisfaction and four indicators of the quality of nursing care were measured; the general hypothesis was that these outcomes would be maintained or improved as a result of the model. Patient satisfaction was measured using Risser's Patient Satisfaction with Nursing Care Instrument (Risser, 1975) as adapted by Hinshaw and Atwood (1982). Satisfaction scores remained stable over the 8-month study period. Percentage achievement of nursing process criteria and of nursing outcome criteria, measured using quality assurance indicators, improved over the study period. Neither the number of incidents attributable to nursing care nor the number of nosocomial infections attributable to nursing care changed during the study period.

Daly et al. (1991) compared patients randomized to either a special care unit for chronically critically ill patients or to traditional ICUs at University Hospitals of Cleveland. Qualitative data suggest an increase in patient and family satisfaction for the special unit patients. The project plans to collect data on length of stay, complications (respiratory and infections), mortality, readmission rate, and patient and family satisfaction with care.

In sum, there is some evidence of positive effects of some models on nursing process and on patient satisfaction. To date, there is little evidence of effects on post-discharge outcomes.

Methodological Issues

This review of studies of the effects of nursing practice models on patient outcomes suggests a number of methodological issues for evaluation research in this area. These issues pertain to the selection of appropriate patient outcomes for study; defining appropriate patient samples for study; selecting controls for patient severity or care needs; and the timing of studies using patient outcome measures. Each issue, with an example from the Johns Hopkins evaluation, will be discussed.

Selecting Patient Outcomes for Study

Donabedian (1988) states, "As a general rule, it is best to include in any system of assessment, elements of structure, process, and outcome." Most of the studies cited are following this rule in that they are including measures of nursing care process as well as measures of patient health status and satisfaction. (How-

ever, some studies neglect measures of structure by failing to include comparison units that are not employing the practice model or by neglecting measures of the degree to which the model has been implemented or the length of time the unit has been using the model.)

Interestingly, though, the studies do not always provide a rationale for the specific patient outcomes selected or for the instruments used to measure these outcomes. For example, although patient satisfaction is a frequently measured outcome, few studies provide a theoretical argument as to why a specific practice model would be expected to affect patient satisfaction. Further, although the Hinshaw and Atwood (1982) measure of patient satisfaction is the most frequently used, it is not clear that their scale taps the dimensions of nursing care that would be affected by practice models and that could be perceived by patients assessing the quality of their care. A concern is that some studies may be "fishing" for patient effects and may be reducing their chances of finding effects by using instruments that may not be sensitive to the dimensions of patient care affected by practice models.

In the Johns Hopkins evaluation, we decided that no existing patient satisfaction scales measured the patient's perception of nursing teamwork or coordination of care, two dimensions thought to be improved by the Professional Practice Model. Focus groups of nurses convened early in our study planning alerted us to these issues. We therefore developed and pretested some items assessing patients' perceptions of how well the nurses work together to coordinate their care. Also, since the nurses reported their perception that the Professional Practice Model improves discharge planning, our study includes several outcomes that should reflect the impact of discharge planning on the patient's post-hospitalization status.

Studies need to select patient outcomes carefully so as to reflect the dimensions of care affected by the practice model being evaluated. In some cases, instrument development may be necessary to assess outcomes of interest.

Selecting Patients for Study

Defining appropriate patient samples for study is another important methodological issue. Many reports do not provide power computations or specify how the patient samples were selected or how representative the samples are of patients treated within the practice models being evaluated. Since most studies are collecting data directly from patients (e.g. patient satisfaction measures), issues of response rates and response biases also need to be addressed. Most studies appear to collect data on a case series of patients in each of the nursing units studied. Some studies employ "tracer" conditions and examine outcomes only for patients with these conditions (Donabedian, 1988). (When tracer conditions are used, outcomes are disease-specific.)

In the Johns Hopkins study, we could not use tracer conditions due to the distribution of diagnoses in our Professional Practice and traditional units. Instead we conducted day-of-discharge and two-week post-discharge interviews with a case-series of approximately 40 consenting patients from each of the units. By obtaining case-mix records on all patients discharged from the units during the study period, we are able to report response rates by unit and to assess differences between responding and non-responding patients on sociodemographics, hospital LOS, principal diagnosis category, etc.

Controls for Patient Condition

In comparing patient outcomes for practice model units and comparison units, the comparability of patients needs to be addressed. Comparability might be addressed through randomization of patients to both

types of units, through matching of units or patients (e.g. on discharge diagnoses), or through statistical controls for patient diagnosis, severity of illness, or needs for care at the point of entry to the study unit. Randomization of patients is rare in the literature.

In the Johns Hopkins study, we required a means of controlling for the severity level of patients with a wide range of diagnoses across clinical departments. In addition, we required a measure of severity at the point of entry to the nursing unit, prior to substantial resource consumption on that unit, and that could be assessed, using retrospective chart review, by a rater other than a nurse providing care to that patient.

Our decision was to use APACHE II (Knaus et al., 1985) to measure adult patient severity of illness in the first 24 hours on the nursing unit, and the Pediatric Risk of Mortality (PRISM) instrument (Pollack et al, 1988) to measure pediatric patient severity. The two instruments are similar in that they are both physiology-based and can be scored objectively through retrospective review of the medical record. Both instruments were developed to predict risk of mortality in patients in intensive care, but APACHE II has been used in non-ICU settings as well (Larvin and McMahon, 1989; Daley et al., 1988). We reviewed the charts of patients discharged from each of our study units and grouped the scores on these two instruments (by risk of mortality) to develop categories of low, medium, and high severity. Using these groupings, we were able to show that the matched Professional Practice and traditional units are comparable with regard to patient severity. In addition, the patient's severity score can be used as a covariate in analyses of patient outcomes by type of practice model.

Timing of Posttest Measures

The timing of outcome measures is another key methodological issue. Most of the reported evaluations of practice models have assessed effects over a short period of time (e.g. eight months to one year following full implementation of the models). The length of time that a unit has been using a practice model, however, could affect patient outcomes. Two competing hypotheses are relevant here. The "honeymoon" hypothesis would predict that patient outcomes, if they are to be improved by a given model, will show greater improvement early in the model's history, rather than later, because the nurses will be more motivated during the honeymoon phase of the new model. The "settling in" hypothesis would predict that patient outcomes, if they are to be improved by a given model, will show greater improvement later in the model's history, after the model has settled in, been fine tuned, and the nurses have learned their new roles. (Conventional wisdom suggests that it takes one year for a model to settle in.) These issues can be addressed by measuring "time on the practice model" and examining patient outcomes in repeated followup surveys.

In the Johns Hopkins evaluation, Professional Practice Model units were classified as early or late adopters of the model: early adopters had been using the model for at least three years at the time of our study; late adopters had been using the model for less than three years. Our analysis will investigate whether length of time on the practice model affects patient outcomes.

Future Research Needs

Based on this discussion, several recommendations for future research on the effects of nursing practice models on patient outcomes are made:

1. Researchers should make explicit the theoretical links between practice model components and the patient outcomes studied. Many nursing practice models were designed primarily to affect nurses' work environment and retention; the possible impacts on patient outcomes need to be conceptualized and measured.

2. Patient samples need to be representative of all patients served on the nursing units studied or of specified subgroups of patients served (e.g. "tracer" diagnoses) for whom critical pathways or specific outcomes can be defined. Studies need to select an appropriate sampling frame and address the issue of representativeness.
3. To ascertain practice model effects, patients should either be randomized to model and non-model units, matched by diagnosis or DRG, or classified according to severity level at the point of entry to the unit.
4. Studies of patient outcomes need to address the "honeymoon" and "settling in" hypotheses in order to account for short-term versus longer-term impacts of practice models.

Endnotes

1. The assistance of Sandra Cassard in the preparation of this paper is gratefully acknowledged.
2. This information was provided by Sue Taft, Associate Professor of Nursing, Kent State University, in her role as evaluator of the Robert Wood Johnson/Pew Charitable Trusts' "Strengthening Hospital Nursing Program."

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