Contextual Factors Influencing Patient Outcomes Individual/Group/Environment: Interactions and Clinical Practice Interface

Joyce A. Verran PhD, RN, FAAN
Barbara Mark, PhD, RN

The context of an organization is made up of the external and internal environment in which it operates. If the nursing unit is considered to be the focal unit of interest, the external environment encompasses factors outside the boundaries of the unit, but within those of the total organization. The internal environment comprises factors within the boundaries of the unit such as work delivery patterns and characteristics of the work group.

In considering contextual effects on patient outcomes, the research emphasis is usually on aggregates of patients who are heterogenous with respect to illness. Research in this area, usually, but not always, focuses on global group level outcomes such as length of hospital stay, mortality, morbidity, satisfaction and cost. There are a number of limitations to the use of these outcome measures primarily due to their lack of sensitivity. In addition, analysis in this type of research is hindered by the quality of data sources and the need for group level analysis.

Selected research on three external environmental variables and four internal environmental variables was reviewed to examine the findings in terms of impact on patient outcomes. The external variables were Hospital Ownership, Hospital Teaching Status, and Volume of Procedures. The internal environmental variables were Hospital to Home Nursing Management, Multidisciplinary Coordination/Collaboration, Job Satisfaction and, Education.

Results of studies on both Hospital Ownership and Teaching Status are inconsistent. There does seem to be some indication that teaching hospital status or affiliation with medical schools could have a positive impact on mortality rates, but these findings tend to be diagnosis dependent. In terms of Volume of Procedures, mortality seems to be reduced when surgical patients are considered, but for medical patients, the effect of high volume is questionable. A major difficulty with studies of these three variables are the considerable interaction effects on outcomes.

The research on internal environmental effects on patient outcomes is limited by two factors: Inadequate replication and the study of organizational outcomes, rather than patient outcomes. The variables selected for examination have received a great deal of discriptive attention in the literature as ways to improve patient outcomes.

A number of investigators are examining models of nursing management that extends from the hospital to the home. Such specialized nursing care seems to have a significant impact on patient cost outcomes. There are also some indications that this care delivery method may have a positive influence on some indices of morbidity such as hospitalization or rehospitalization. For acutely ill patients, research has also provided beginning evidence that mortality is reduced in units evidencing greater collaboration between nurses and physicians. Although job satisfaction is frequently cited as

a desirable organizational outcome, little research has been done on its influence on patient outcomes. Based upon a limited data base, there exists a significant relationship of staff job satisfaction with client satisfaction. Finally, educational level of staff is often considered to be associated with improved patient care. Unfortunately, little research connecting education with patient outcomes has been conducted. Two studies that examine the effect of continuing education programs on outcomes present inconclusive results.

Introduction

Our purpose in this paper is to review the literature examining the effects of contextual factors on patient outcomes. First, we suggest a taxonomy of outcomes research approaches to assist in the delineation of our specific focus. Next, we define the independent variable, context, as it will be used in the paper. Third, the literature on selected contextual variables and their relationship to patient outcomes is reviewed. Finally, methodological issues involved in research examining the effect of contextual factors on outcomes are briefly addressed. A disclaimer is, however, warranted before beginning. Most of the research in the area of context deals with hospitals, clinics or group practice entities as organizations. Therefore, while we recognize the importance of nursing beyond bureaucracy, of necessity, most of our examples will refer to hospitals or other organizations providing health care services. The second part of the disclaimer has to do with age and boundaries of the research cited. In order to limit the review to some extent only research published within the last decade is included. Only those contextual variables are examined that have been either researched in some depth or which are popularly included as being significant to a change in outcomes.

A Taxonomy of Outcomes Research Approaches

Two axes form the basis of the proposed taxonomy shown in Figure 1. The horizontal axis refers to the level of analysis, i.e. whether one is interested in studying individual or group level relationships. The vertical axis relates to the level of variability in the client population in terms of the degree to which the population is homogenous or heterogeneous with respect to illness or diagnosis.

Quadrant 1 represents research with individuals who are homogeneous with respect to illness. Intervention would be directed toward individual treatment and individual response. Outcomes are then analyzed at an individual level, even though they are reported in grouped form, and are referred back to the individual.

Quadrant 2 also deals with homogeneous groups of clients but the intervention in is directed toward the group of clients as a group. Appropriate group level outcomes, related to the specific illness of the client group, should be reported and analyzed. Results from this type of research are referable only to the group not to the individuals who are members of that group.

Quadrant 3 is characterized by the study of individuals who are heterogeneous with respect to their diseases, but who exhibit similar symptoms, for example, individuals who suffer sleeplessness, pain or stress. Research in this quadrant would again have the individual as the focus and examine individual response to intervention.

In the fourth quadrant, the research emphasis is on aggregates of patients who are heterogenous with respect to illness. Research in this area usually focuses on global group level outcomes such as length of hospital stay, mortality, morbidity, satisfaction and cost. For example, health services research may investigate the relationship between certain organizational characteristics and length of stay, while nursing research may examine the comparative costs of differing nursing prac-

tice models. In research on global outcome indicators, however, the close correspondence between research problem or clinical condition and outcomes disappears, opening a virtual Pandora's box of conceptual and methodological controversies about the "appropriate" selection and measurement an analysis of outcomes. Much of the research that investigates the effect of context on patient outcomes would logically fall in this last quadrant of the taxonomy. Some studies however, analyze the dependent variable at the individual level even though it is a global indicator of outcome. In general, the research that we will be reviewing next is most logically referable to the fourth quadrant of the taxonomy.

Context Defined

The most important aspect of an organization's context is the environment in which it operates. According to Duncan (1972), the environment of an organization consists of the social and physical factors that are considered by individuals when making decisions. Much of the work on the effect of contextual factors on patient outcomes has been done with the nursing unit as the focal unit. When the focal unit is defined in this manner, the external environment encompasses factors outside the boundaries of that unit, but within the boundaries of the total organization. The external environment for the unit, then, includes the "macro" characteristics of the organization in which it operates, such as size, teaching status, ownership and volume of procedures. The internal environment comprises factors within the boundaries of the unit such as work delivery patterns, attributes of individuals as members of the work group and characteristics of the work group itself. This internal environment is made up of the "micro" characteristics of the organization. Taken together, the external and internal environments comprise the nursing unit's context. We will first review selected research that relates to the effects of the external environment on patient outcomes.

External Environmental Effects on Patient Outcomes

Nursing research has generally not taken into account organizational characteristics that may confound the relationships between selected independent variables and outcome measures. In health services research, three organizational characteristics and their impact on patient outcomes have been examined in some depth. They are: 1) the type of hospital ownership, 2) hospital teaching status, and, 3) volume of surgical procedures. Our discussion focuses on selected studies that exemplify both representative findings and typical methodological issues. For each of the comparison, all studies employ mortality rate as the outcome of interest, despite the rather obvious problems in using such a gross indicator of outcome (Chassin et al., 1989; Demlo, 1990; Fink, Yano & Brook, 1989). Tables 1, 2 and 3 present summaries of these studies.

Hospital Ownership

Hospital ownership has been studied from two, often combined, perspectives: whether the hospital is public or private, and whether it is investor-owned (IO) [proprietary] or not-for-profit (NFP). Federally owned and operated hospitals, such as Veterans Administration and Public Health Service hospitals are typically excluded from consideration. Gaumer (1986), for example, examined a large sample of short-term U.S. hospitals with regard to four different outcomes: 1) in-hospital mortality for Medicare patients undergoing any of eight elective surgical procedures[1]; 2) mortality for Medicare patients 180 days following hospital admission for the same procedures; 3) 90 day post-discharge readmission rates, again for the same procedures; and 4) JCAHO accreditation status. Using the ratio of actual to expected mortality rates, in order to standardize differences in

severity, Gaumer found that for all procedures, there were significantly lower in-hospital mortality rates in IOs compared with NFPs, but no consistent pattern emerged when procedures were examined separately. There were no significant differences between IOs and NFPs for either 180 day mortality rates or 90 day readmissions, but IOs were 11% less likely than NFPs to have full JCAH accreditation status. At a time when there was growing concern about the potential of investor-owned hospitals to provide poor quality care, Gaumer concluded that there was no evidence for "concluding that the profit motive, in the aggregate, has compromised patient care to the point of causing large and systematic differences in post-operative mortality or readmission" (p. 367).

Shortell and Hughes (1988) examined the relationships between regulation, competition and ownership and in-hospital mortality rates for over 214,000 patients in 981 U.S. hospitals. They concentrated on deaths of Medicare patients for 16 clinical conditions (10 operative, 5 non-operative, and an additional category called "complications and misadventures" that referred to preventable complications). Using the HCFA's Medical Provider Analysis and Review (MEDPAR) data base, the researchers found no significant differences in in-hospital mortality for any ownership category: independent investor-owned, multi-hospital investor-owned, independent not for profit, or not for profit multi-hospital system.

While Gaumer (1986) and Shortell and Hughes (1988) used HCFA data to study mortality rates among Medicare patients, Kelly and Hellinger (1986) used data from the Hospital Cost and Utilization project (HCUP) of the National Center for Health Services Research (NCHSR) to examine in-hospital post-surgical mortality for all patients between the ages of 18 and 99 with four surgically treated conditions: 1) stomach cancer with abdominal surgery, 2) peptic ulcer with surgery, 3) colon cancer with surgery and, 4) abdominal aneurysm with surgery. Using a sample of 373 short-term general hospitals, the authors found that for patients undergoing surgery for peptic ulcer or colon cancer, being in a public hospital significantly increased the probability of mortality. Patients experiencing surgery for cancer had slightly, but not significantly better outcomes in public hospitals, while patients with abdominal aneurysms had slightly, but again, not significantly, worse outcomes in public hospitals.

Hartz et al. (1989) however, discovered poorer outcomes in for profit hospitals. They used the HCFA Medicare Hospital Mortality Information to examine all in-hospital deaths of Medicare patients in a sample of 3100 hospitals. Using the HCFA's predicted mortality rate to adjust for severity, the researchers found investor-owned hospitals had higher mortality rates than not-for-profit hospitals, after adjustment for severity of illness. Private not for profit hospitals had lower adjusted mortality rates than did private for-profit hospitals. In addition, osteopathic and public hospitals had high mortality rates than other types of hospitals.

Results of these studies are inconsistent, and frequently are diagnosis or procedure dependent. Differences in findings can be explained partly by different researchers focusing on different types of conditions (medical vs. surgical), different patient populations (Medicare vs. non-Medicare), different hospital samples, and different methodologies for severity adjustments. Clearly, however, nursing research that examines differences in patient outcomes across hospitals must include hospital ownership as part of model specification.

Teaching Status

In many studies, a hospitals's teaching status is often simply coded as a control variable. Few studies investigate the impact of teaching status, or level of involvement in teaching on patient outcomes. Yet, more complex case mix, a higher proportion of board certi-

fied medical specialists and better qualified nurses may all be characteristics of teaching hospitals that will relate to outcomes.

Kelly and Hellinger (1986), using the HCUP data set described earlier, measured three degrees of hospital involvement in teaching. Members of the Council of Teaching Hospitals (COTH) were assumed to have the highest level of involvement in teaching, medical school affiliation without COTH membership (MSA, non-COTH) suggested a somewhat lower level of involvement, while non-medical school affiliated, non-COTH hospitals (non-MSA, non-COTH) would clearly have the lowest, if any, involvement in teaching. For seven of eight comparisons (i.e. four surgical treatments by two levels of teaching involvement, with the non-MSA, non-COTH group omitted), involvement in teaching decreased the likelihood of in-hospital mortality. For surgery for colon cancer, the difference was significant for both levels of teaching involvement, while for abdominal aneurysm, the difference was significant for MSA hospitals, but not for COTH hospitals. However, ulcer patients undergoing abdominal surgery in COTH hospitals had somewhat, but not significantly worse outcomes.

Kelly (1990) reporting on NCHSR HCUP data to study seven groups of patients (diabetes, hypertension, CABG, cardiac catheterization, cholecystectomy, atherosclerosis and cranial injury) using a five category classification of teaching status to study in-hospital mortality, found that teaching hospital status significantly improved the outcomes for atherosclerosis patients, and that the more involved the hospital was in teaching, the less likely the patient was to die. The results for cranial injury, however, were exactly the opposite: patients in teaching hospitals had significantly worse outcomes than those in non-teaching hospitals, and the more involved in teaching the hospital was, the more likely the patient was to die. For the five other conditions investigated, there were no differences between types of hospitals.

Hartz et al. (1989) also examined the relationship of teaching status and outcome. Hospitals were designated simply as teaching (members of COTH) or non-teaching. Mean mortality rate, adjusted for severity, for patients in teaching hospitals was significantly lower than for patients in non-teaching hospitals. Hospitals with lower mortality rates were also characterized by having a significantly higher proportion of board certified physicians, a significantly higher proportion of nurses who were RNS, higher occupancy rate, and a higher technology index. In a multivariate regression equation explaining 54.3% of the variance in patient mortality, the same characteristics described hospitals with lower adjusted mortality rates. The most important predictors of lower mortality rates were board certification of physicians and the proportion of nurses who were RNs.

Similar to studies on ownership, findings on the relationship between teaching status and patient outcome are inconclusive. Yet, the results do suggest fruitful areas for further research in nursing, particularly with regard to the impact on mortality of increasing the overall proportion of registered nurses in hospitals[2].

Volume of Procedures

A variety of studies have concluded that outcomes for surgical patients are likely to be significantly better if they undergo surgery in a hospital that performs a "greater than average" number of those procedures (Flood, Scott & Ewy, 1984a, 1984b; Luft, 1980; Luft, Bunker & Enthoven, 1979; Sloan, Perrin & Valvona, 1986).

In an early study, Shortell and LoGerfo (1981) examined the relationship of hospital structural characteristics including volume, medical staff characteristics and outcomes for patients with acute myocardial infarc-

tion (AMI) and appendicitis. Data on 50,000 AMI patients and 8200 appendectomy patients were included in the Commission on Professional Hospital Activities (CPHA) data base with the American Hospital Association Annual Survey being used for hospital and physician data. For AMI, the authors developed a standardized mortality ratio, and found that physician participation in decision-making, volume of AMI patients per physician and the presence of a coronary care unit were all significantly associated with lower mortality. For appendicitis, the outcome was the percent of normal appendices removed. Frequency of medical staff committee meetings was the most important predictor of better outcomes for appendicitis patients. Volume made no significant impact on outcomes.

In a landmark study, Flood, Scott and Ewy (1984a, 1984b), using 1972 CHPA and Professional Activities Survey (PAS) data files, investigated in-hospital mortality for 15 surgical and two medical conditions for 550,000 patients in 1200 U.S. acute care hospitals. Hospitals were considered high volume if they treated more than the average number of patients in the same diagnostic category. A standardized mortality ratio (SMR) was developed for each hospital, based on the ratio of actual deaths to deaths expected on the basis of differences in both individual patient characteristics and hospital patient mix.

The findings are complicated, but, in general, there was strong evidence across the aggregate (i.e. combined) data for six surgical categories exhibiting more than 1000 deaths per category (surgery for abdominal aortic aneurysm, gallbladder disease, ulcer disease, colon cancer, hip fracture and amputation of lower limb) that patients in high volume hospitals had significantly lower mortality rates (SMRs) than those in low volume hospitals. For medical categories, gallbladder patients did significantly better in low volume hospitals, while for ulcer patients, there were no differences depending on volume. When probability of dying, or risk level (low, medium, high) was taken into account, in general, in high volume hospitals, outcomes did not change substantially depending on patient risk level, while in low volume hospitals, there appeared to be interactions between volume and risk. In low volume hospitals, low risk surgical patients had poor outcomes which were significantly worse than low risk patients in high volume hospitals, while medium risk patients had better outcomes (but still poorer than medium risk patients in high volume hospitals). In comparison to low or medium risk surgical patients in low volume hospitals, high risk patients had the best outcomes, and these outcomes were not significantly different than for those high risk patients treated in high volume hospitals.

For medical patients, greater experience did not make a significant difference in explaining outcomes for ulcer patients, but was weakly related increased mortality for gallbladder patients. For gallbladder patients in high volume hospitals, there was no relationship between risk and outcome; for low volume hospitals, high risk patients did better than either low or medium risk patients. For ulcer patients there was no interaction between risk and volume.

The effects of hospital size, teaching status and expenditures were then introduced into the analysis. For surgical patients, high volume continued to reduce mortality even after size was considered, while size, after controlling for the effects of volume, increased the likelihood of death. When teaching status and expenditures were entered into regression equations, the results did not change: larger hospitals were associated with higher mortality rates, while high volume hospitals were associated with lower mortality rates.

For medical patients, it was only after controlling for the effects of size, teaching status, and expenditures that a highly significant relationship was revealed

between volume and outcome for both gallbladder and ulcer disease. Again, high volume was associated with better outcomes.

Understanding the volume-outcome relationship, however, is complicated by different interpretations. One, the "practice-makes-perfect" explanation, hypothesizes that because physicians and hospital personnel develop greater skills, better outcomes will result. The other, the "selective-referral pattern", suggests that physicians and hospitals with better outcomes attract more patients (Luft, Hunt & Maerki, 1987).

Kelly and Hellinger, in their 1986 study investigating ownership and teaching status, also examined volume of surgical procedures, with the purpose of investigating whether the inverse relationship between volume and outcome is due to the volume of services provided by individual physicians or to particular characteristics of high-volume hospitals. They found that across all diagnoses examined, in-hospital mortality was lower in high volume hospitals, and for patients undergoing surgery for peptic ulcer and abdominal aneurysm, the difference was significant. In no case, however, was the volume of procedures by an individual physician related to outcomes. These results did not change, even after re-specification of the regression equations to take into account potential collinearity between patient specific variables and volume variables. The authors concluded, therefore, that the volume-outcome relationship was explained by hospital characteristics rather than physician characteristics.

From the studies just reviewed, it is clear that for most surgical conditions, in-hospital mortality rates are lower in high volume hospitals. The results for medical conditions, however, are mixed.

Internal Environmental Effects on Patient Outcomes

While there has been a great deal written on internal environmental influences on outcomes, there are two limitations to this body of literature. First, research is seldom replicated and, second, the outcomes studied are usually related to the organization rather than to the patient. For the purpose of this paper, four contextual variables related to the internal environment have been selected for review for differing reasons. The first two variables to be addressed refer to characteristics of the work pattern in which nurses function. These variables involve the effect of hospital to home nursing management (Nursing Case Management, Nurse Specialist Care) and the effect of multidisciplinary collaboration/coordination of the patient's care. Both of these variables have received considerable recent attention in the literature. The second set of two variables were selected due to the fact that they are often cited either as ways to improve care or as desireable organizational outcomes. These variables are staff work satisfaction and education of staff. Research related to the four variables is summarized in Tables 4, 5, 6 and 7.

Hospital-Home Nursing Management

In 1986, Brooten and colleagues (Brooten, et al., 1986) published a landmark study on the effect of nurse specialist care for discharge and at home for the families of low birthweight infants. The experimental intervention included early discharge of low birthweight infants meeting specific criteria, to be followed by master's prepared nurse specialists for 18 months after hospitalization. Infants were randomly assigned to a control or experimental group resulting in 39 infants in the experimental group (36 mothers) and 40 infants in the control group (36 mothers). Groups were found to be equivalent on a number of demographic family variables and infant treatment variables. Findings indicated that the experimental group was discharged a mean of 11.2 days earlier than the controls. There were no dif-

ferences in rehospitalizations, acute care visits, failure to thrive, child abuse, foster placement or developmental quotient of infants. However, the mean hospital charges were $17,420 less for the experimental group and physician charges were a mean of $1,716 less. The nurse specialist care cost an average of $576.00 for patients receiving the intervention. Thus, the hospital-home nurse specialist care was credited with resulting in health outcomes equal to traditional care but with cost outcomes of approximately $18,560 less per family.[3]

A series of research projects at Carondolet St. Mary's hospital in Tucson is currently underway, with some data published, to evaluate the impact of the nursing case management system centered at this facility. This nursing delivery pattern involves a network of nursing care delivery including home care, hospice, community wellness centers and in-hospital nursing with the nurse case manager, prepared at least at the Bachelor's level, at the hub of these services. Ethridge and Lamb (1989) report on the effects of the nursing case management intervention with two groups of patients: those who received total hip replacements and who represent the effect on patients with acute illness and those with respiratory disease who represent the effect on patients with a chronic illness. The results of the analysis are limited in their generalizability due to a lack of random assignment to the intervention, however, the authors report that for patients with total hip replacement, length of stay, the outcome measure for this investigation, was reduced by 2.1 days due to case management. There was a 3.5 day reduction in length of stay for the case managed chronically ill patients. It is hypothesized that the reduction for the acute illness occurs at the end of hospitalization. In other words, case management allowed earlier discharge for these patients. For the chronically ill, a different mechanism is in operation. Length of stay appeared to be reduced at the beginning of the hospitalization. Patients who were case managed prior to hospitalization entered the hospital at lower acuity levels and shortened their length of stay by seeking care before illness severity reached a level than would require longer hospitalization.

An additional report by Ethridge (1991) provides data on more than 700 case managed patients enrolled in a Health Maintenance Organization Senior Plan. Outcomes examined include annualized hospital admissions and bed days per 1000 enrollees as well as average length of hospital stay. The data for the case managed patients is descriptively compared to national and state statistics for Medicare patients and health maintenance organization service use statistics. The annualized admissions for the case managed patients (after eleven months of operation) numbered 242 as compared to a range of 239 to 318 admissions as cited in comparison data bases. Annualized bed days were 1,311 as compared with a range of 1,677 to 2,798. Average length of hospital stay was 5.77 days compared with a low of 5.85 days and a high of 9.50 days from published data. A more specific comparison indicated that the case managed patients had 53 less annualized hospital admissions, 895 less bed days and an average length of stay 1.73 days lower than other Medicare patients in the State of Arizona. Again, these results are limited in generalizability due to methodological difficulties in applying the treatment and due to the retrospective nature of data analysis.

A recent study by Naylor (1990) reports on the effects of gerontological nurse specialist care primarily in planning discharge for hospitalized elders. While this intervention concentrates on the discharge component of the Brooten et al. (1988) model of nurse specialist care, it also includes some home care elements such as telephone follow-up at specified times. This pilot study included 40 hospitalized patients, age 70 and older, who were randomly assigned to the discharge planning or control group. Each group had twenty subjects who were

evaluated for average length of initial hospitalization, post-discharge morbidity (infections and rehospitalizations) and cost of initial hospitalization. Groups were found to be equivalent on age, sex, race, marital status, education, financial status, admission mental and functional status. No statistical differences were found in initial hospital length of stay, or costs for the hospitalization. There was also no difference in the post-hospital infection rate. However, there were significant differences in the number of rehospitalizations during the twelve weeks after discharge. For the control group, 64.7% of the subjects were rehospitalized while only 16.7% of the experimental group required additional hospital stays. Since data on costs was unavailable for a number of the rehospitalizations, health care cost information post discharge was not compared.

The results of these investigations indicate that specialized nursing care that bridges the hospital and home environment has a significant impact on patient cost outcomes. In addition it appears that there is some indication that this health care delivery method may have a positive effect on morbidity as indexed by rehospitalization.

Multidisciplinary Coordination/Collaboration

Koerner, Cohen & Armstrong (1985) designed a study to evaluate the effects of organizational implementation of a system of professional nursing practice through collaboration with physicians. The collaborative practice system included the five interrelated parts as specified by the National Joint Practice Commission in 1977.[4] In their study, Koerner et al. (1985) compared outcomes between adult patients discharged from a nursing unit utilizing team nursing (control) and one in which collaborative practice had been established. Patients were selected for survey during a six week period at four, eight and twelve months after the start of the project. Sample size was 280 patients which included 100 from the team nursing unit and 180 from the collaborative practice unit. Data on the outcome of patient satisfaction was analyzed at the individual level. Patient satisfaction and perception of quality of care was indexed by an instrument designed by the researchers to measure patient-provider interaction, quality of care, health education, knowledge of practitioners and environment of the unit. Findings indicated that there was no difference between units on patient age, gender, ethnicity, illness severity and hospital admissions. Patients who were hospitalized on the collaborative practice unit reported significantly greater patient-provider interaction, provider knowledge, health teaching and respectful treatment. There was no difference in patient satisfaction with the physical environment or in expectations of care. The authors indicate that the satisfaction questionnaire was designed with the emphasis on items thought to be pertinent to an evaluation of collaborative practice, thus the results may be biased towards the positive evaluation of the experimental treatment. In addition there appears to be some confusion as to exactly what is being measured as an outcome: patient satisfaction or patient perception of care.

As a further test of the delivery method, the investigators performed a retrospective record audit on a random selection of 234 patient records (116 from the team unit and 118 from collaborative practice unit) to investigate the outcomes of length of stay, number of laboratory days, IV therapy days, cardiac arrests, deaths, and transfers to ICU. In addition, the care process activities of referrals to nurse specialists, referrals to allied health workers, teaching plans and discharge plans were also examined. There were no differences in any of these measures except for the process variable of teaching plans which was higher on the team unit. The authors conclude that it is possible that several intervening variables influenced the outcomes so that no differences in the units were found. These variables include the system of medical education at the study hos-

pital which would influence the number of laboratory tests ordered; the availability of nursing home beds, which would influence the length of hospital stay, and inservice education on charting which would influence the number of teaching plans recorded.

The study discussed above examined the effect of collaborative practice on selected outcomes for patients hospitalized on intermediate care units. Other research has investigated outcomes for patients admitted to intensive care units in which there was a high degree of collaboration among disciplines.

Knaus, Draper, Wagner and Zimmerman (1986) conducted an extensive study with adult patients who had been hospitalized in intensive care units at 13 hospitals. Patients who had burns or coronary artery bypass grafts were eliminated from the study. The total individual patient sample was 5,030 patients with a range of 159 to 1,657 patients per hospital. The goal of the investigators was to determine if the differences in organization, staffing, commitment to teaching, research and education across hospitals influenced the outcomes of care as measured by the ratio in actual to expected mortality rates as determined by the APACHE 2 system of classifying severity of illness. Findings indicate that there were substantial differences in predicted and observed mortality rates across the hospitals and that "these differences appeared to relate to the interaction and communication between physicians and nurses" (pg. 416). The hospital with the lowest ratio of actual to expected deaths was organized with clinical protocols implemented by in-unit physicians, a comprehensive nursing educational support system, clinical specialists with Masters degrees and extensive experience in intensive care units, independent nursing responsibilities as designated within clinical protocols, and excellent communication between physicians and nursing staff. Use of advanced technology in care was important but was not a sufficient factor to differentiate hospitals with lower mortality. Reduced mortality was not limited to specific diagnostic categories or severity levels.

The American Association of Critical-Care Nurses (AACN) developed a Demonstration Project to further examine patient outcomes in a unit that has valued organizational attributes some of which were delineated in the Knaus et al. (1986) research just described. Mitchell, Armstrong, Simpson and Lentz (1989) provide a report of the AACN demonstration. Since the sample for the demonstration was one intensive care unit, the authors examined their data in comparison to data of previously published research and health care statistics. Specific clinical outcomes examined were in-hospital mortality ratio of observed to expected deaths; complications related to infections, immobility, and fluid balance; patient satisfaction with nursing care, length of stay; and, hospital accounting costs. Patients (N=192) included in the analysis represented 42% of the admissions to the unit during the data collection period. Findings indicated that the standardized mortality ratio of 51.2% was comparable to the findings of the Knaus et al. (1986) study for a hospital with low mortality rates; complications represented non-resolution of problems on admission rather than new problems; patient satisfaction ratings were higher that those reflected in two previously published sets of data; patient charges and length of stay were within the range of data selected for comparison. The authors conclude that the desirable clinical outcomes of low mortality, no new complications and high patient satisfaction existed in the ICU with valued organizational attributes. A strong dimension of this project is the validation of the existence of the organizational attributes of high perceived level of nurse-physician collaboration, highly rated objective nursing performance and significantly more positive organizational climate and indices of job satisfaction and morale than found in historical samples. While the pa-

tient subjects in this research were not selected randomly, they do reflect the same characteristics of other ICU patients at the same hospital and the specific unit is further representative of other units in the United States. Therefore, a statement could be made that the sample appears to be representative of ICU patients on those comparison variables that were examined.

The results of these studies indicate that, at least in settings with acutely ill patients, a high degree of nurse-physician collaboration and positive interaction is associated with lower mortality rates, high patient satisfaction with care and low nosocomial complications. In intermediate care units, findings are less clear. Patient seem to perceive better quality of care which may be reflective of increased satisfaction, but other positive outcomes were not supported in the one study examined.

Job Satisfaction

Job satisfaction is a variable frequently cited as an important organizational outcome related to a number of contextual factors such as degree of control over nursing practice, autonomy in practice, group cohesion, and commitment to the organization (Verran, Murdaugh, Gerber, and Milton, 1988). It is often theorized that increased job satisfaction will result in positive patient outcomes, however, this link has been seldom researched and supported with empirical data. Three studies are described that have examined the relationship of staff job satisfaction to patient outcomes.

Holland, et al. (1981) studied resident mental health patients and staff on 22 wards from three psychiatric institutions. They examined aggregated data for 98% of the eligible staff (N=297) and 68% (N=249) of the total potential patients who were selected with stratified random sampling. Staff subjects included all staff on each treatment unit although exact preparation and titles were not specified in the published report. The unit of analysis for this research was the unit which resulted in a sample of 22. The outcome examined in this study was potential posthospital adjustment of patients as measured at discharge by a standardized scale. Results indicated that improvement in resident functioning was moderately associated with staff satisfaction, that greater staff participation in resident treatment only affected the outcome through staff satisfaction and not directly. The total effects of job satisfaction on resident functioning as analyzed through path modeling were higher than any other variable at .55 which includes .38 direct effect and .17 indirect effect.

Linn, Brook, Clark, Davies, Fink and Kosecoff (1985) examined the relationship of patient satisfaction and physician satisfaction in 16 group practice sites. Although it is unclear which variable is meant to be the outcome in this research since it appears that temporally, physician satisfaction was measured after patient satisfaction, the findings were that there were statistically significant correlations among aggregated satisfactions scores for faculty, housestaff and patients. The samples for this research represented 94% of the physician faculty, 88% of the housestaff and 77% of the randomly selected patients from the 16 practice sites.

A study more directly related to nursing staff was conducted by Weissman and Nathanson (1985). These researchers examined a causal model to explain two client outcomes for teenage clients who attended one of 77 family planning clinics. The sample of 77 represented data from 344 nurses or 86% of the total possible and 2,900 (80%) clients. Outcomes examined were client satisfaction and rate of client compliance with contraceptive prescriptions. Results of causal modeling using path analysis were the existence of significant direct effects (.32) of job satisfaction on client satisfaction, but no direct effect of job satisfaction on compliance rates. However, there was a significant indirect effect (.08) of job satisfaction on compliance through client satisfaction.

Hays and White (1987) reanalyzed the Weissman and Nathanson (1985) data using the LISREL program for structural equation modeling. They supported the model proposed in the original study and also proposed an alternative model that also supported the hypothesis that job satisfaction of staff has a direct and indirect effect on selected patient outcomes.

The research studies cited indicate that, with a variety of work groups, increased job satisfaction will improve patient outcomes in terms of patient satisfaction and functional abilities. At least two of these studies provide some evidence of the simultaneous effect and interactions of many variables on outcome measures. This supports the need for multivariate models in describing patient outcomes and the need for the appropriate analysis of these models.

Education

Education of care providers has often been cited as a workgroup variable that will improve patient outcomes. In fields such as rehabilitation the link between level of education and outcome has been investigated (Szymanski & Parker, 1989). However, most research in the topic that relates to nursing, examines primarily the effect of education on the process of care rather than on patient outcomes[5]. A few studies have examined the effects of special educational programs on patient outcomes.

Alexander (1990) investigated the effects of providing a staff educational program on caring for patients with breast cancer on patient outcomes of satisfaction with care, patient knowledge and affective responses of anxiety, depression and hostility. The patient sample for the research included 18 patients. Nine patients were hospitalized prior to the educational intervention while 9 were hospitalized after staff received the continuing education offering. Findings were that the experimental group had significantly higher mean satisfaction and knowledge scores. There were no differences in depression or hostility, however the experimental patients evidenced significantly lower anxiety than did controls. As with previous research cited, the satisfaction instrument used in this research was designed specifically by the investigator for this project. Other measures however, were well developed and tested instruments. Although the sample size for this project is small and was not selected randomly, the research does provide an excellent example of how patient outcomes can be incorporated in evaluation studies of educational programs.

A second publication which examines the effect of education on outcomes reports on the impact of a diabetes educational and organizational development program on health centers in Sweden (Carlson & Rosenqvist, 1991). Thirty-four health centers were included in the study with 17 having received the treatment. A sample of a total of 566 patients (317 from intervention sites) were randomly selected for measurement of the outcomes of dietary knowledge, self-care practices, and metabolic control. The results indicated no significant differences in dietary knowledge or metabolic control. The only self-care practice that was affected by the educational program was self-testing for glucose levels.

Results of only two studies provide limited evidence for the effect of educational programs on patient outcomes. In addition, the results are inconclusive due to differing findings across the studies. However, this is an area of needed nursing research to support the impact of education on patient outcomes. Tangentially, the studies on delivery patterns tend to support the need for higher educational levels for practitioners. However, this relationship is not directly supported in the studies cited earlier.

Measurement and Methodological Issues

In examining the impact of contextual variables, either at the external or internal environmental level, on patient outcomes, several measurement and methodological issues are of concern. A few of these will be summarized in this section.

Mortality as an Outcome Measure

There are obvious limitations to the use of mortality data as an outcome measure. Kelly (1990) suggests three reasons why mortality rates are inadequate and perhaps inaccurate measures of hospital or workgroup performance. First, because the vast majority of patients, some 95-98% do not die in hospitals, mortality rates furnish no information on outcomes for patients who do NOT die in hospitals. Second, patients die in hospitals because they are severely ill and/or aged, perhaps unrelated to hospital performance. And third, patients die in hospitals because they may not have other places to die. In addition to the reasons provided by Kelly, in-hospital mortality rates ignore the fact that for some patients, complications that occur in hospitals (preventable or not) result in death after discharge. In addition, mortality rates provide no knowledge about other important outcomes, for example, morbidity, quality of life or other health status indicators of interest. There is perhaps no other outcome indicator that so clearly illustrates the dilemma of research in Quadrant 4 of the taxonomy shown in Figure 1. One is forced to accept use of an outcome that becomes, in essence, the "lowest common denominator" because of the heterogeneity of patient aggregates with which one is dealing.

Patient Satisfaction as an Outcome Measure

Satisfaction of patients with their care is another outcome frequently examined in the research related to Quadrant 4. The popularity of this measure is reflected by the number of patient satisfaction instruments that have been developed for evaluation and research purposes (McDaniel & Nash, 1990). There are a number of ways to measure patient satisfaction. Not all of those ways are accurate or reliable. In addition, the construct validity of many instruments designed for specific studies is questionable. Often it appears that patients are being asked to evaluate quality of care rather than their satisfaction with that care. A further limitation of patient satisfaction with nursing care as an outcome measure is that patients traditionally report high levels of satisfaction with the care nurses provide, thus decreasing the variability of responses that are needed for unbiased analysis (LaMonica, Oberst, Madea & Wolf, 1986). Measures of satisfaction, that are clinically feasible for use because of their parsimony, seem to lack the sensitivity required to tap fine differences in patient perceptions.

Adequacy of Data Sources

For every study reported in the section on external environmental contextual factors, and, for some of those reported in the internal environmental section, analysis was based on large data sets, gathered for different purposes than for the particular study. Frequent data sources are the CHPA, PAS, AHA, NCHST and HCFA data files (Fink, Yano & Brook, 1989). Yet, Demlo (1990) cites studies in which coding of diagnosis and even mortality was incorrect a substantial proportion of the time. For example, of 1003 cases reviewed for correctness of coding for acute myocardial infarction (AMI), 25.9% failed to meet clinical criteria (Iezzoni, Burnside & Sickles, 1988); while of 387 patients discharged with the diagnosis of AMI, 57%, in fact did not have the diagnosis (Schiff & Yaacoub, 1989). One would think that coding for in-hospital mortality would be less ambiguous. However, a study of Medicare discharges in California found a large percentage of patients reported as discharged alive when they had in fact died in the hospital (Blumberg, 1987; California Medical Review, Inc., 1986). Clearly, when policy de-

cisions are made based on the types of studies reported, it is incumbent on researchers to ensure the quality of their data, or at the very least, to attempt to ascertain (and report on) potential sources of error.

Group Level Analysis

Research utilizing contextual factors almost demands statistical analysis at the group level. However, appropriate use of the techniques for group analysis are limited. None of the studies cited that utilized aggregated data for the analysis examined this data for its reliability, validity and adequacy at the aggregated level (Mark, Lamb & Verran, 1991; Verran, Lamb & Mark, 1991). There also appears to be limited use of appropriate statistical techniques with contextual variables (Firebaugh, G., 1979; Holzemer, et al., 1989; Rousseau, 1985). Inappropriate use of analytic techniques, may result in fallacies of interpretation and generalization of results.

Conclusion

This paper has reviewed research on selected contextual variables from the external and internal environment of the nursing unit. Conclusions regarding the effect of context on patient outcomes are limited in a number of ways. First, the variables reviewed in this paper represent only a small number of those that may relate to patient outcomes. Unfortunately, research has not consistently addressed the same variables or has examined their relationship to organizational outcomes rather than patient responses. Second, the interrelation of contextual variables supports the need for multivariate procedures to examine their impact, and yet, few studies have used multivariate techniques to investigate these interrelationships. Finally, nurse researchers have not traditionally valued the examination of the effect of context on anything, much less patient outcomes. However, in the current world of health care, with the need to support the validity of new delivery patterns, treatment programs and environmental changes, the investigation of how and why context effects outcomes of practice is becoming vitally important. Perhaps it is time that nurse researchers consistently examine research for the need to include contextual variables. Perhaps it is also time that other health services researchers consistently consider the characteristics of nursing services as part of the hospital context and its subsequent effect on outcomes.

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