

# Outcomes of Nurse Practitioners in Acute Care: An Exploration

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## Abstract

The purpose of this study was to compare the outcomes achieved by adult patients who did ( $n = 78$ ) and did not ( $n = 45$ ) receive care by acute care nurse practitioners (ACNP), within one week following discharge. A comparative, cross-sectional design was used. Consenting patients completed the outcome measures within one week following discharge. The outcomes included satisfaction with care, functional status, symptom resolution, and sense of well-being, which were measured with established instruments. The two groups of patients were equivalent in terms of their demographic profile and severity of condition. The results indicated that patients who received ACNP care, as compared to those who did not, reported higher levels of satisfaction with care and of physical, psychological, and social functioning. These findings provide preliminary evidence supporting the contribution of ACNPs to high quality care. However, the small sample size limits the generalizability of the study findings.

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## INTRODUCTION

In the 1990's, acute care hospitals sought the services of nurse practitioners, with the expectation that their services would produce high quality, economically efficient care (1, 2, 3). The quality of the care provided by acute care nurse practitioners (ACNPs) was examined in ten studies that used the following outcomes: mortality, morbidity or complications, and cost of care, which was commonly operationalized as length of hospital stay. The design used to evaluate the impact of ACNP care on these outcomes varied across the studies. Bissinger and colleagues (4), and Kearnes (5) used a retrospective chart review, while Sarkissian and Wennberg (6) used a prospective descriptive design to compare the outcomes before and after the introduction of the ACNP role. Mitchell and colleagues (7) conducted a randomized controlled trial, while the remaining six studies (2, 8, 9, 10, 11, 12) used a prospective comparative design, where the outcomes of patients assigned to ACNPs were compared to those of patients assigned to physician residents (PRs). Despite the differences in design, the results related to mortality and morbidity were consistent, showing no differences in these outcomes for the two groups of patients. The findings on length of stay (LOS) and hospital charges

were inconsistent, indicating either a short LOS for ACNP, or no difference in this outcome between the ACNP and PR patients.

Overall, the results of these studies indicate that the care provided by ACNPs is comparable in quality to that given by PRs, and is potentially cost-efficient. The outcomes examined in these studies, however, may not be sensitive to all aspects of health care delivered by ACNPs. Several authors anticipated that the high quality of the ACNP care would be reflected in increased patient satisfaction with care; improved patients' functional status; enhanced symptom resolution; and increased sense of well-being (13,14,15,16,17,18,19). Of these outcomes, only satisfaction with care was examined in four studies. Mitchell and colleagues (7) and Bissinger and colleagues (4) found that parents of neonates admitted to intensive care units, were just as satisfied with care by ACNPs as by PRs. Similarly, Rudy and colleagues (9) reported no difference in the level of satisfaction for adult patients whose care was managed by ACNPs as compared to PRs. Sarkissian and Wennberg (6) stated that all patients were highly satisfied with care before and after the introduction of the ACNP role in an epilepsy monitoring unit.

The current study represents an initial step toward delineating the contribution of the ACNPs to the achievement of the additional outcomes posited to reflect the

quality of ACNP care. The specific purpose of this study was to compare the outcomes achieved by adult patients who did and did not receive care by ACNPs, within one week following discharge from the hospital. The outcomes assessed were patients' satisfaction with care; functional status reflected by level of physical, psychological, and social functioning; symptom resolution operationalized as the number and perceived severity of symptoms experienced by patients; and sense of well-being. The time frame selected for outcome assessment was appropriate for the expected outcomes to be achieved; it corresponded to the first follow-up point within the acute care episode. It also had the potential to reduce response bias associated with the patients' desire to please the health care providers.

### METHODS

#### DESIGN

A cross-sectional, comparative design was used. It was modeled after the design used in two studies comparing the outcomes for health care providers (9, 20). The design was appropriate to capture the effects of ACNP care, as naturally implemented in acute care settings.

Patients were recruited from units to which both an ACNP and a PR were assigned. Consenting patients were divided into two groups: those who received care by ACNPs and those who did not receive ACNP care. Patient assignment to the respective groups was based on information available on the patient assignment board on the unit. The assignment was also confirmed with the ACNP working on the unit. Assignment of patients to either the ACNP or PR was sequential, made on the basis of which provider was on duty. However, to control for any possible differences in the health status of patients who did and did not receive ACNP care, data on the severity of patients' condition were extracted from the patients' health record, and accounted for in the data analysis comparing the two groups of patients. Patients completed the instruments measuring the outcomes within one week following discharge.

#### SETTING AND SAMPLE

Acute care institutions located in two cities in Southern Ontario and in which ACNPs were employed comprised the setting for this study. Within each hospital, in-patient units were selected if both ACNPs and PRs were assigned to the same unit and provided care to adult patients. Six units met these selection criteria. Of these, three units admitted patients for cardiovascular surgery; one unit admitted patients for spinal surgery; one for orthopedic / trauma

surgery; and one unit provided acute care for patients with cancer.

Patients admitted to these units were eligible to participate in the study if they: 1) were 21 years of age or older; 2) could read English; and, 3) had any of these high volume medical conditions: cancer; admitted for coronary artery bypass surgery, cardiac catheterization, knee or hip replacement surgery; spinal laminectomy; or fracture repair.

Since previous studies did not investigate the outcomes of interest in this study (i.e., satisfaction with care, functional status, symptom resolution, and sense of well being), it was difficult to estimate an expected effect size and to do a power analysis a priori. A total of 123 patients participated in the study, which was adequate to detect medium-to-large effect size, with set at .80 and  $\alpha$  at .05 (21).

#### VARIABLES AND MEASURES

Data were collected on the patients' age, gender, marital status, and level of education using standard demographic questions. Data on patients' medical diagnosis and severity of condition were extracted from the patients' health record. Due to differences in the patients' medical diagnosis across the participating units, severity of patients' condition was operationalized as the number of comorbid conditions with which the patients presented.

Satisfaction with care was measured with the Satisfaction with the Hospital subscale of the Patient Judgment of Hospital Quality Questionnaire (PJHQ) (22). Higher scores reflect higher levels of satisfaction. This subscale demonstrated acceptable reliability and validity in previous studies (23, 24), and internal consistency reliability in this study (Cronbach's  $\alpha = .83$ ).

Functional status was measured with relevant subscales of the Medical Outcome Study-Short Form (SF-36), acute version. The subscales represented physical, psychological, and social functioning, and included physical function, role limitations due to physical health and to emotional problems, social functioning, and mental health. The transformed scores (i.e., standardized to a scale of 0-100) were computed, where higher scores indicated higher levels of functioning. The SF-36 has been extensively used with different patient populations and demonstrated reliability and construct validity (25). In this study, the Cronbach's  $\alpha$  coefficients were .91 for physical function, .87 and .93 for role limitations due to physical health and emotional problems respectively, and .75 for mental health.

Symptom resolution was measured with an adapted version of the Symptom Distress Scale (SDS) (26). The SDS consists of 10 items measuring nausea, mood, appetite, insomnia, pain, mobility, fatigue, bowel pattern, concentration, and appearance. It has been used extensively in cancer research and demonstrated internal consistency reliability, construct validity, and sensitivity to change (27, 28). The adaptation consisted of adding items measuring symptoms such as shortness of breath and fever, which are of relevance to the patient populations selected for the study. A six point numeric rating scale anchored with 'not at all' (0) and 'very much so' (5) was used to assess symptom severity. The total number of symptoms experienced was calculated as the sum of the symptoms rated greater than 0. The total scale score was computed as the mean of the items' scores, with higher scores indicating increased symptom severity. The adapted SDS showed high internal consistency reliability in this study (Cronbach's  $\alpha = .87$ ).

Sense of well being was measured with the general health perceptions subscale of the SF-36. Higher scores indicated an increased sense of well-being. This subscale has demonstrated acceptable psychometric properties (25). The Cronbach's  $\alpha$  coefficient was .71 in this study.

### PROCEDURE FOR DATA COLLECTION

The study protocol was approved by the Research Ethics Board at the University of Toronto, University of Western Ontario, and the participating institutions. A list of units meeting the study selection criteria was generated with the assistance of the institutions' nursing office. The research assistant (RA) introduced the study to the manager, the nursing staff, and the ACNPs and PRs assigned to each unit. The unit staff assisted in identifying eligible participants and in obtaining the patients' permission to release their name to the RA. The RA approached patients indicating willingness to learn about the study, described the study purpose and what was expected of them, and obtained their written consent. Within 24 hours prior to discharge, the RA contacted consenting patients to give them a package containing the questionnaire and self-addressed return envelope, and to inform them to complete the questionnaire within one week following discharge. The RA called the patients within one-to-two days of the pre-scheduled questionnaire completion date to remind them to complete and return it. No further follow-up reminders were needed. On the day of patients' discharge, the RA reviewed the patients' records to collect the data on medical diagnosis and comorbidities.

### DATA ANALYSIS

Descriptive statistics were performed to characterize the sample on demographic variables, medical diagnosis, and comorbidities. Prior to comparing the two groups of patients (i.e., those who did and those who did not receive ACNP care) on the outcomes, possible differences were examined in: 1) demographic and outcome variables across the six participating units, and 2) demographic variables and comorbidities between the two patient groups. In the first analysis, a chi-square test or one-way analysis of variance, depending on the variable's level of measurement, was used and no differences in demographic and outcome variables were found across the six units. In the second analysis, an independent sample t-test or chi-square test, depending on the variable's level of measurement, was used. No statistically significant differences were found. The findings of these preliminary analyses supported the equivalence of the two patient groups relative to their demographic profile and comorbidities. Accordingly, the analysis proceeded to compare the two groups of patients in terms of outcome achievement, using independent sample t-tests. The appropriate t-test formula was used when the within-group variance was unequal, which occurred with a few variables due to unbalanced group sizes.

### RESULTS

A total of 123 patients consented to take part in the study, yielding a 61.5% response rate. The main reasons for non-participation included feeling of 'too sick', and non-availability for completing the questionnaire on time due to travel. Of the 123 patients, 78 (63%) received care from ACNPs and 45 (37%) did not. The average patient age was 61 years ( $\pm 12.2$ ). Most patients were married (72.3%) men (64.5%), who had completed high school (47%). They were admitted for cardiovascular surgery (45%), orthopedic surgery (21%), cancer management (21%), and spinal surgery (13%).

The mean (SD) scores on the outcome variables for the two groups of patients are presented in Table 1. The mean scores on the PJHQ indicated that patients were moderately-to-highly satisfied with the care they received during their hospitalization. Patients who received ACNP care were more satisfied with their care than patients who did not receive ACNP care ( $t(116) = -4.23, p = .000$ ). The difference between the groups' means was of a large magnitude (Effect Size (ES) = -.75).

Figure 1

Table 1: Mean (SD) scores on outcomes for patients who did and did not receive ACNP care

Outcome	Patients not receiving ACNP care	Patients receiving ACNP care
Satisfaction with care*	3.2 (0.4)	3.5 (0.4)
Functional status		
Physical function*	24.4 (23.4)	37.4 (27.8)
Role limitation-physical health*	12.9 (15.6)	19.2 (31.6)
Role limitation-emotional problem*	13.9 (33.5)	54.9 (48.6)
Social functioning*	43.0 (31.5)	57.4 (29.6)
Vitality	77.9 (19.9)	71.7 (16.8)
Mental health*	57.2 (20.4)	71.5 (18.4)
Symptom Control		
Total number of symptoms	7.5 (5.2)	6.5 (4.1)
Total symptom severity	1.0 (0.9)	0.9 (0.7)
Sense of well being	62.2 (28.8)	58.5 (19.4)

\* p ≤ .05

Overall, patients reported some limitations in their physical, psychological, and social functioning, within one week following discharge from the hospital. Statistically significant differences between the two groups of patients were found on all domains of functioning. Patients who received ACNP care showed a higher level of physical functioning than those who did not receive ACNP care ( $t(119) = -2.60, p = .010$ ). The difference was of a moderate magnitude ( $ES = -.50$ ). Patients who received ACNP care experienced less role limitations due to physical health ( $t(118) = -3.75, p = .000$ ) and to mental health ( $t(118) = -5.44, p = .000$ ). The effect sizes were  $-.23$  and  $.94$ , respectively. Further, patients who received ACNP care had higher levels of social functioning ( $t(119) = -2.49, p = .014$ ) and mental health ( $t(120) = -3.98, p = .000$ ). The effect sizes were  $-.47$  and  $-.75$ , indicating a difference of moderate and high magnitude, respectively.

Within one week post discharge, patients experienced several symptoms, of low severity. Although there was no statistically significant difference between the two groups of patients on the total number of symptoms experienced, patients who received ACNP care tended to report about one symptom less ( $ES = .22$ ) than patients who did not receive ACNP care. The difference between the two groups of patients in level of symptom severity was not statistically significant and it was of a small magnitude ( $ES = .26$ ).

The patients' perceived sense of well-being did not differ between the two groups ( $ES = .20$ ). On average, patients expressed a moderate level of well-being.

**DISCUSSION**

The results of this study provide preliminary evidence supporting the contribution of ACNPs to the achievement of outcomes that are sensitive to health care, for adult patients admitted for cardiovascular, orthopedic, and neuro surgery,

and for the management of cancer. Patients who received ACNP care reported higher levels of satisfaction with care, and physical, psychological, and social functioning, than those who did not receive ACNP care. However, both groups of patients experienced several symptoms, of low severity, and expressed a moderate level of well-being. The differences between the two groups were larger for the outcomes reflecting the psychological well-being of patients (i.e., satisfaction with care, role limitations due to mental health, and level of mental health), than for physical health status of patients (i.e., physical function, symptom resolution, and sense of well-being). This pattern of findings suggest that ACNPs provide care to manage the physical domain of health that is similar in quality to the care offered by PRs, and that the 'value added' of ACNP care is in addressing the psychological domain of health.

The differences observed for the outcomes reflecting the psychological domain of health could be attributed to the nature of the ACNP role and functions. ACNPs are salaried employees, expected to manage the patients' condition, while PRs are medical students expected to engage in learning activities and intense training (29). As such, ACNPs spend most of their time on the unit; in contrast, PRs are off the unit attending lectures or conferences, seeing patients in out-patient clinics, or assisting with surgery. The results of two studies showed that ACNPs, more than PRs, spent time on the unit, reviewing chart notes, interacting with patients' family members, assessing patients (9), coordinating care, and interacting with other health care providers (30). It can be then speculated that the ACNPs' interactions with patients, family, and health care providers, enhance the ACNPs' ability to get to know the patients, identify their needs, and manage their conditions promptly. This, in turn, contributes to the patients' sense of being cared for and satisfaction with care, as was observed in this study. High levels of satisfaction have been reported in studies that investigated the contribution of nurse practitioners in primary care settings (31). Venning and colleagues (32) attributed the high satisfaction to the time the nurse practitioners spent with patients during the clinic visit.

The contribution of ACNPs to the patients' reported psychological well-being could also be attributed to their approach to care. As advanced practitioners, ACNPs are trained to conduct comprehensive assessment of the patients' condition, encompassing the physical, psychological, and social domains of health. ACNPs formulate a care plan and coordinate in- and out- patient services to assist patients in

managing problems in any of these domains (33). They also involve patients and their family members in care and care-related decisions, and they provide patients and their family members with the necessary education to help them manage their condition at home. This approach to care is used by nurse practitioners in primary care settings, where the nurse practitioners were found to spend slightly more time with their patients and to offer counseling and education to a greater extent than did PRs (32, 34). These role functions could have promoted the patients' psychological functioning.

### CONCLUSIONS

The findings of this study are encouraging as they begin to delineate the contribution of ACNP care to health sensitive outcomes. However, results should be interpreted with caution. The participants were sampled from selected in-patient units. The number of participating patients was rather small, and the group sizes were unbalanced. Therefore, the generalizability of the findings is limited. This study should be replicated with a larger sample to increase our confidence in the results. Additional research is needed to explore the aspects of the care provided by ACNPs that contribute to the achievement of the health sensitive outcomes.

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