Advanced Practice Nursing Outcomes: A Review of Selected Empirical Literature

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Purpose/Objectives: To review selected empirical literature examining outcomes of advanced practice nursing with a specific focus on the work of oncology advanced practice nurses (APNs).

Data Sources: Published articles (descriptive and data-based) and books.

Data Synthesis: Well-designed, methodologically sound investigations offer clear and compelling evidence that APNs are effective in improving outcomes in diverse populations and settings. Data on outcomes of oncology APNs are more limited but do demonstrate statistically significant improvements in clinical outcomes in the homecare and ambulatory settings. The increase in oncology APNs and the evolution of viable roles for oncology APNs across cancer practice settings offer opportunities to further assess the outcomes of advanced practice nursing.

Conclusions: Understanding the effects of oncology advanced practice nursing on clinical, cost, and satisfaction outcomes is critical. These data will help to explain how APNs can be used most effectively in the healthcare system to ensure the delivery of quality cancer care.

Implications for Nursing: Assessing the outcomes of advanced practice nursing care has been identified as a priority by the Oncology Nursing Society. Expansion of APN roles in oncology creates myriad opportunities to investigate this issue. APNs should be cognizant of the work that has been done in this area and use this knowledge as a foundation from which to launch further investigations.

The work of advanced practice nurses (APNs) is thought to enrich the healthcare system by adding value to the delivery of healthcare services (Spross & Heaney, 2000). Articulating how, why, and for whom they add value is critical to the future viability of the APN role and the delivery of quality healthcare services to the public. The need to understand the role that oncology APNs play in effecting outcomes was identified as a priority at the 1994 State of the Knowledge Conference on Advanced Practice in Oncology Nursing. The APN Survey Team reported that this issue remains unresolved and suggested an urgent need to undertake additional work in this area (Lynch, Cope, & Murphy-Ende, 2001). The purpose of this article is to explore selected empirical literature examining advanced practice nursing interventions and outcomes, with a \focus on outcomes related to oncology advanced practice nursing. Goals of the work include outlining conceptual and methodologic issues pertinent to the measurement of advanced practice nursing outcomes, providing a brief review of the historical literature about advanced practice nursing effectiveness, examining relationships between oncology advanced practice nursing interventions and outcomes, considering challenges

Key Points . . .

- The complex care needs of patients with cancer have created opportunities for growth in oncology advanced practice nurse (APN) roles in a number of practice settings.
- Strong evidence from well-designed investigations supports the effectiveness of oncology APNs in the home setting, and evidence is emerging in the ambulatory area.
- The knowledge base for APN outcomes needs to be expanded. Systematic evaluations of the process of care provided by APNs to patients with different types of cancer receiving care in diverse practice environments are needed to more fully inform the understanding of this issue.

Goal for CE Enrollees:

To enhance nurses' knowledge about the outcomes of advanced practice nursing with a specific focus on the work of oncology advanced practice nurses (APNs).

Objectives for CE Enrollees:

On completion of this CE, the participant will be able to

1. Define the term advanced practice nurse.
2. Discuss the impact of APN practice on clinical, cost, and satisfaction outcomes.
3. Identify aspects of advanced practice nursing that need to be studied further.

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Digital Object Identifier: 10.1188/04.ONF.219-232

and practical issues in this field of inquiry, and suggesting strategies for the expansion of this knowledge base.

Advanced Practice Nurses

APNs are RNs who are educationally prepared at the graduate or doctoral level, have expertise in an area of clinical specialization, and provide direct patient care. The American Nurses Association (ANA) recognizes four types of APNs: certified registered nurse anesthetists, certified nurse midwives (CNMs), clinical nurse specialists (CNSs), and nurse practitioners (NPs) (ANA, 1996). Historically, each of these roles has evolved in response to societal needs, with APNs providing services where gaps in the healthcare system existed. Since the 1980s, the expansion of scientific knowledge and technology, new ideas of social meliorism, and changes in methods of healthcare delivery have created myriad opportunities for APN role expansion. In concert, the number of APNs in the United States has increased substantially, with the most rapid growth occurring among NPs and CNMs (Cooper, Laud, & Dietrich, 1998). Collectively, APNs manage millions of patient encounters annually (Paine et al., 2000). Despite these statistics and more than a quarter century of research, data on the effects of APN practice and APN contributions are limited (Kleinpell, 2002).

Oncology Advanced Practice Nurses

The title oncology APN is used to designate nurses practicing in CNS or NP roles who are educationally prepared with a minimum of a master's degree in nursing and specialty training and experience in the management of patients with cancer (Oncology Nursing Society [ONS], 1995). The *Position on Quality Cancer Care* (ONS, 1997) affirmed that oncology APNs should be used in all cancer care delivery systems to ensure cost-effective expert care.

The complex care needs of the oncology population have created ample opportunities for growth in oncology advanced practice nursing. Historically, the dominant advanced practice role in cancer nursing was that of CNS. Since the 1990s, however, changing needs in a number of oncology settings, coupled with decreases in the number of house staff and the economic drive to reduce costs through more efficient use of resources, have led to an increased growth in the number of oncology NPs (see Figure 1). Several reports have described effective roles for oncology NPs in the acute care, ambulatory, high-risk, private office practice, homecare, and academic settings (Bush & Watters, 2001; Kinney, Hawkins, & Hudmon, 1997; Murphy-Ende, 2002; Ritz et al., 2000; Vogel, 2003). Many CNSs have returned to school to obtain additional NP training to allow them to practice in either capacity or in blended roles (Beddar, 1998; Jacobs & Kreamer, 1997; Much, Cunningham, & Zamek, 1998). The curriculum guide outlining the specialty of advanced practice oncology nursing was expanded in the late 1990s to support the development of both sets of skills (Galassi, 2000).

Conceptual Issues in Outcomes Assessment

A number of conceptual approaches to advanced practice nursing outcome evaluation has been suggested. Most of these relate in some way to the fundamental work of Donabedian

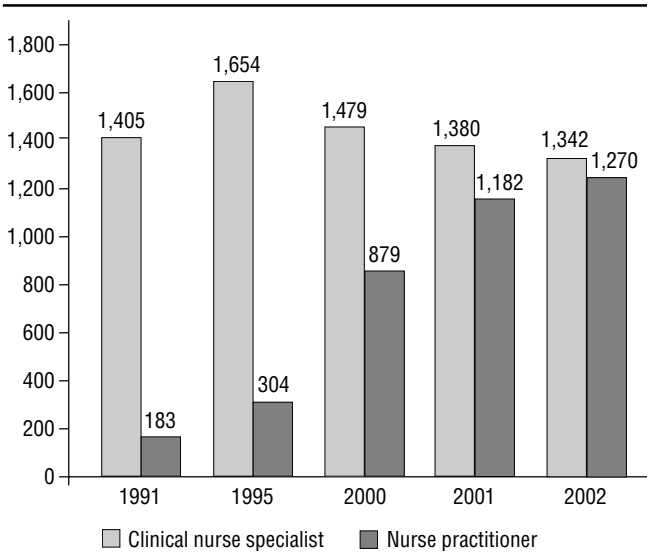

Figure 1. Number of Advanced Practice Oncology Nurses

(1980), who identified the structure, process, and outcome trilogy as essential components of the measurement of quality in health care. Structure refers to the tools and resources that providers have at their disposal to accomplish their work and the organizational settings in which they practice. Structural variables, as they relate specifically to APNs, can include their level of education, certification, or years of experience. Organizational issues, such as policies governing APN practice and institutional support for the APN role, also represent examples of structural elements that could influence the outcome of APN care. The effects of APN-specific structural variables on outcomes have not been studied systematically; however, over the years, more information about structural elements has been reported. In work by Naylor et al. (1999), for example, information about the APN's level of education and years of experience practicing as an APN within the specialty is provided. Researchers also have suggested that stronger structural variables increase the probability of APNs providing higher quality care that results in improved outcomes (Byers & Brunell, 1998), but this hypothesis needs to be validated empirically. The influence of various structural elements on outcomes requires systematic investigation.

The process of care refers to a set of activities that go on within, among, and between practitioners and patients; this includes technical and interpersonal components. The process of care, particularly in the setting of cancer, often is very complex and represents something of an enigma. Clearly explaining what happens during the process of care is critical to developing a comprehensive understanding of how APNs effect outcomes. This understanding will facilitate the ability to reproduce results. Many researchers investigating the effects of advanced practice nursing provide descriptions of what APNs do. This represents a component of the process of care, but additional work is needed to more fully describe the interactions and activities that occur between APNs and recipients of care.

Outcomes represent the consequences of the process of care on the health and welfare of recipients. Specifically, Donabedian (1980) used the word outcome to mean a "change in a patient's current and future health status that can be attributed to antecedent health care" (pp. 82–83). Donabedian

conceptualized outcomes to include physical, physiologic, social, and psychological functions. In addition, he considered patient attitudes, including satisfaction, health-related knowledge, and health-related behavioral change, to be important outcome variables. The effect of APN-delivered care on several of these outcomes has been studied; these will be presented in a subsequent section.

Methodologic Issues in Outcomes Assessment

Establishing relationships between APN interventions and outcomes relies on several fundamental assumptions. The two most salient of these are clearly defined concepts and the means by which to measure or observe these phenomena. Accurate measurement is essential to establishing the empirical adequacy of hypothesized relationships among APN interventions and outcomes. Some outcomes, such as survival, are unambiguous, making their measurement straightforward. Other outcomes, such as symptom distress, are more abstract in nature and cannot be measured directly (McDowell & Newell, 1987). Assessment of such outcomes relies on the use of empirical indicators or instruments that have established validity and reliability as well as adequate specificity and sensitivity to detect meaningful change in the population under study. Several resources are available to assist in the identification and selection of health measurement instruments. One example is the Health and Psychosocial Instruments database, produced by Behavioral Measurement Database Services (Pittsburgh, PA). This database is available online and via CD-ROM through Ovid Technologies, Inc. Outcomes measurement can be complicated further by the need to make risk adjustments for additional factors that may confound results, such as comorbidity, stage of disease, severity of illness, and demographic characteristics (Clochesy, 2002; Iezzoni, 1997; Whitman, 2002). Measurement strategies should be a focus when reviewing APN outcome studies. A lack of methodologic rigor can limit the ability to interpret study findings in a meaningful way.

Advanced Practice Nursing Effectiveness: Historical Perspectives

The drive to validate the quality and effectiveness of APNs has been important since the inception of these roles. Because APNs represent a heterogeneous group of providers, the literature assessing their effectiveness is ample and varied. Two distinct but interrelated issues create challenges in reviewing the body of historical work on advanced practice nursing outcomes. These include semantic inconsistency, or the use of multiple definitions for APNs, and a lack of conceptual clarity regarding the APN role.

Numerous terms and definitions have been used in the literature to refer to APNs. In work by Salkever, Skinner, Steinwachs, and Katz (1982), for example, the terms "physician extenders" and "new health practitioners" were used synonymously to represent APNs. Another study that compared NP outcomes to those of physicians referred to NPs as "clinical practitioners," "nonphysician providers," "advanced clinical practitioners," and "midlevel providers" (Judkins, Peterson, & Singletary, 1996). The use of various titles is compounded by a lack of clear definitions for the terms. In investigations where definitions are present, tremendous inconsistency exists in how APNs are described. In work by McArdle, George, and McArdle (1996), for example, the nurse "specialists" are described as being experienced in managing patients with cancer after surgery and having expertise in addressing psychosocial morbidity in patients with breast cancer. Gerrard et al. (1990) reported that NPs were nurses who were trained using a continuing education approach. The use of such varied nomenclature and the wide range of descriptions diminish the clarity of many of the reports, limit the external validity of the findings, and restrict the ability to draw comparisons across investigations.

Because the titling and conceptualization of the APN has evolved since the 1980s, some variation in the titles used in the literature is expected. Some of the labels and descriptions found might be apropos when considered in their appropriate temporal and historical contexts. The current consensus on the definition, scope of practice, and titling of APNs should be instrumental in minimizing the aforementioned issues and contributing to clarity in this area of research.

Advanced Practice Nursing Interventions and Outcomes

Many very well-designed, methodologically sound studies have focused on outcomes of advanced practice nursing. Although many investigate the work of APNs in nononcology settings, they provide an important foundation for readers interested in oncology advanced practice nursing outcomes. A thorough review of these data is beyond the scope of this article; however, a selection of these investigations is included in Table 1. The reports included in the table provide a specific definition for the APN, and the definitions presented are consistent with the current conceptualization of the APN role. In addition to defining the APN role, more recent studies provide information about specific characteristics, such as the amount of experience practicing in the clinical specialty (Naylor et al., 1999) and other qualifications that would indicate an APN's level of expertise (Burns & Earven, 2002). Interventions provided by the APNs also are clearly explicated. Precise descriptions of APN interventions are critical to understanding the process of advanced practice nursing care and its subsequent effect outcomes. In addition, the specific outcome variables studied are presented clearly. Each of the studies cited used instruments to measure outcomes that had established validity and reliability in the populations under study. Table 1 also includes several landmark APN studies.

In addition to the studies outlined in the table, several review papers summarizing the effect of advanced practitioners on outcomes have been published. The U.S. Congress Office of Technology Assessment (1986) reviewed outcomes of NPs, CNMs, and physician's assistants in primary care settings. Access to care, care quality, productivity, and cost outcomes were compared to physicians. Conclusions indicated that care provided was of equivalent quality between groups and that NPs and CNMs were more effective in providing preventive services or services that relied on communication with patients.

Brown and Grimes (1995) completed a meta-analysis of NP effectiveness studies in primary care. In this review, process of care, utilization, and cost outcomes of NP providers were found to be equivalent or superior to those obtained by physicians.

Table 1. Selected Empirical Studies Examining Advanced Practice Nursing Interventions and Outcomes

Author	Study Design, Sample, and Setting	Advanced Practice Nurse Description	Advanced Practice Nursing Intervention Provided	Outcome Variable(s) Measured	Selected Findings
Pozen et al. (1977)	Descriptive study designed to determine the effects of nurse rehabilitator supplementing routine physician and nursing coronary care; N = 102 sequential patients with acute myocardial infarction (MI) randomized to intervention or control; eastern city hospital	Coronary care unit-based "nurse rehabilitator." Master's degree; extensive experience in intensive care; ongoing mentorship from a senior psychiatric resident during the study	Met with patients daily while in cardiac care unit. Sessions devoted to reducing anxiety, providing reassurance, and explaining procedures. Followed subjects to step-down unit, provided information about cardiac disease, rehabilitation plans for return to function, diet, medication, risk factors, and warning signs. Reinforced teaching through weekly follow-up phone calls after discharge.	Anxiety Return to work Smoking cessation Symptoms	Patients in experimental group reported functioning at higher levels and had significantly greater knowledge in regard to disease process and medications. A greater number of these patients stopped smoking.
Linde & Janz (1979)	Descriptive study designed to examine effects of a comprehensive structured preoperative teaching program; patients preparing for coronary artery bypass surgery received teaching by master's prepared clinical nurse specialists (CNSs) (n = 25) or staff nurses (SNs) who had less than master's preparation (n = 23); allocation strategy not presented; large midwestern medical center	Master's-prepared CNS	Provided comprehensive pre- and postoperative teaching; included information on disease process and surgical procedure, activity progression, medication and dietary regimens, warning signs, special concerns, prevention of infection, and behavior modification; models, illustrations, and medication cards used to enhance understanding; provided written material as reinforcement.	Patient knowledge Patient adherence: • Risk-factors • Diet Clinic/laboratory follow-up	Patients taught by CNSs had significantly higher test scores at discharge than did patients taught by SNs; finding maintained through first two postoperative clinic visits.
Brooten et al. (1986)	Prospective randomized clinical trial (RCT); random assignment of infants with very low birth weights (less than 1,500 g) to control group (n = 40) discharged according to routine criteria (weight about 2,900 g) or early discharge group (n = 39) who went home before this weight if they met specified conditions; data collection during 18 months; large urban university-based medical center	One full-time and two-part time nurse specialists with master's degrees in perinatal nursing	Nurse contact weekly in hospital to promote parent-infant interaction, evaluate concerns, teach infant care and prevention of infection, provide information on sleeping patterns, teach reportable signs and symptoms, and discuss time frames for follow-up care; predischarge home visit to assess environment; home visits first week and 1, 9, 12, and 18 months after discharge; home visit activities were physical examination, developmental screening, confirmation of follow-up appointments, assessment of parental coping, infant care; telephone contact three times a week first two weeks and weekly thereafter; "on-call" for parental inquiries (heavily used by subjects); medical backup by perinatologists	Rehospitalization Infant development Acute care visits Cases of child abuse Costs • Initial hospital charges • Physician charges • Nurse specialist services • Readmission charges	Infants in the early discharge group were sent home a mean of 11 days earlier, weighed 200 g less, and were two weeks younger than controls; mean hospital charge was 27% less; mean physician charge was 22% less; no difference in rehospitalization rates, acute care visits, or measures of physical or mental growth. Conclusions: Early discharge with nurse specialist follow-up is safe and cost effective in dealing with this complex population.
Lipman (1986)	Descriptive; designed to compare length of stay (LOS) in newly diagnosed children with diabetes educated	An endocrinology CNS	CNS coordinated CNS/SN group instruction; formulated daily education plan; instructed child and family in principles of	LOS	LOS for the CNS/SN group was significantly shorter than SN

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Table 1. Selected Empirical Studies Examining Advanced Practice Nursing Interventions and Outcomes *(Continued)*

Author	Study Design, Sample, and Setting	Advanced Practice Nurse Description	Advanced Practice Nursing Intervention Provided	Outcome Variable(s) Measured	Selected Findings
	by SN versus CNS plus SN; n = 32 consecutively admitted patients; children's hospital; urban area; eastern city		diabetes, blood glucose monitoring, and injections; revised and expanded standardized diabetes care plan to include family and child assessment tool		group; differences not attributable to age, serum pH, or admission blood glucose levels. Conclusion: Use of CNS as a diabetic educator may decrease LOS in children with newly diagnosed diabetes.
Burgess et al. (1987)	RCT of cardiac rehabilitation to test whether psychosocial rehabilitation of patients with acute MI would improve return-to-work rates; assessed importance of psychological, social, occupational, sociodemographic, and medical factors in returning to work; experimental (n = 89) group received rehabilitation care from advanced practice nurses (APNs); control (n = 91) received usual care; 11 hospitals in eastern Massachusetts	Team of specially trained master's-prepared nurse clinicians, with each nurse clinician assigned to cover specific hospital sites	Provided interventions based on cognitive behavioral model; majority of visits occurred in patients' homes; education and counseling about beliefs, activities, and restrictions during the postinfarction period; monitoring and evaluation; mobilization of resources	Distress Anxiety Depression Family support Work connected to infarction Reemployment barriers	Significantly less distress and dependence on family in experimental group at three months; final follow-up at 13 months revealed marginal differences in deterrents to work; no differences in return-to-work rate between groups; further analysis showed that outcomes were most influenced by initial cardiac status, clinical course, and patterns of family support.
Neidlinger et al. (1987)	RCT; designed to determine cost effectiveness of comprehensive discharge (D/C) plan for hospitalized older adults; experimental group (n = 39), control group (n = 40) who received usual care; hospital setting (no further characteristics of setting described)	One master's-prepared gerontology CNS (GCNS); additional knowledge, skills, and abilities to care for geriatric patients; knowledge of resources	Comprehensive D/C protocol based on Orem's Self-Care Model; initiated by GCNS within 72 hours of admission; GCNS assessed, planned, and coordinated services; communicated with family members to explain and clarify plan; provided second bedside visit; initiated referrals.	Diagnosis-related group (DRG) payments Hospital costs	Average costs for control group were $4,380 and $3,069 for experimental; differences statistically significant. Conclusion: Findings demonstrate efficacy of GCNS, and further study is recommended.
Naylor (1990)	RCT; designed to examine effects of comprehensive D/C plans for hospitalized older adults by nurse specialists; N = 20 control and 20 experimental patients (age = 70 years); inpatient unit, urban medical center; data collected within 24 hours of admitting and 2, 4, and 12 weeks post D/C	Two part-time GCNSs	Provided comprehensive D/C protocol specific to older adults: assessment of subjects and caregivers within 24 hours of admitting, early projection of D/C needs, communication of plan, two visits by CNS in hospital, reevaluation of plan 24 hours prior to D/C; two-week follow-up via telephone.	Mental status Functional status Infection rate LOS Rehospitalizations Costs • Hospitalization • Rehospitalization	No statistically significant differences between groups on mental status, functional status, LOS for initial hospitalization, or rehospitalizations; significant differences in the number of subjects rehospitalized during study period. Conclusion: Further study is required to fully understand the impact of comprehensive D/C planning for older adults.
Niemes et al. (1992)	Descriptive survey designed to evaluate impact of pediatric nurse practitioners (PNPs) on pediatric service; N = 61; large teaching hospital with pediatric residency training program; northeastern city	Two seasoned PNPs; graduates of an approved program; master's prepared	PNPs collaboratively managed patients, provided admission and discharge evaluation, and performed a variety of procedures; no operating room, intensive care unit, or "on-call" responsibilities; guidelines for collaborative practice developed between PNPs and the department of surgery.	Patient, resident, and parent satisfaction	Benefits were improved continuity of care for long-term patients, better communication among surgeons and patients, accessible surgical liaison, decreased resident workloads, improved surgical and resident education and training, and overall patient, resident,

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Table 1. Selected Empirical Studies Examining Advanced Practice Nursing Interventions and Outcomes *(Continued)*

Author	Study Design, Sample, and Setting	Advanced Practice Nurse Description	Advanced Practice Nursing Intervention Provided	Outcome Variable(s) Measured	Selected Findings
					and parent satisfaction with program. Conclusion: PNP program was well received by physicians and families; PNPs provided safe and effective care.
Aiken et al. (1993)	Exploratory; designed to examine outcomes of care for patients with HIV; primary care provided by physicians or NPs; convenience sample (N = 87) of clinic attendees; data collected over four-week period; university teaching outpatient clinic	NPs were RNs with master's degrees in primary health care of adults; experienced in the care of patients with HIV-related illnesses	NPs conducted history and physical, diagnosed and treated HIV-related illnesses, prescribed and administered medications, provided health education and counseling, monitored adverse effects, ordered and assessed laboratory tests, and consulted with physicians as required.	Functional status Symptoms Self-management Health service use Patients' assessment of care	NP patients were three times more likely to report health status as fair to poor, reported significantly more symptoms, and, despite being in poorer health, reported equal function and utilization of health services as physician group. Conclusion: NPs could safely enhance access to care for people with HIV-related illnesses.
Goksel et al. (1993)	Descriptive case series; examined efficacy of nurse practitioner (NP) inpatient service; N = 248 patients; diagnoses included cerebrovascular accident, dementia, and pneumonia; data collected during a 15-month period; 450-bed public hospital; major teaching hospital	Two certified, master's-prepared NPs	Collaborated with doctor from general internal medicine service who rotated monthly; assumed care of inpatients referred by house staff; managed medically stable patients from jointly developed protocols.	LOS Readmission rates Costs House staff satisfaction	NP inpatient service was effective in managing stable medical patients with prolonged LOS; house staff ratings were favorable; professional costs were approximately equal. Conclusion: Study provides data that could be useful in planning services.
Hanneman et al. (1993)	Nonequivelant control group, separate samples, and pre- and posttest; designed to examine indirect effect of unit-based expert nurse on incidence of preventable pulmonary complications	Expert nurses defined as having a master's degree in critical care; prepared for role of CNS; completed more than three years in CNS role in critical care; assigned to the study unit for a period of at least six months	Conducted formal staff workshops to educate on pulmonary assessment, positioning of endotracheal tube to prevent complications, securing of artificial airways, and ventilator management; CNS made daily rounds with staff, rotated shifts, and worked with staff members to demonstrate and validate assessments and interventions.	Preventable pulmonary complications: Malpositioned endotracheal tubes Inadvertent extubation	Pulmonary complications on experimental unit were reduced after six months of CNS intervention. Conclusion: Indirect effect of a unit-based CNS on patient outcomes can be tested deductively, and indirect intervention by unit-based CNS can reduce incidence of preventable pulmonary complications in critically ill patients.
Brooten et al. (1994)	RCT; designed to evaluate early hospital discharge and home follow-up of women having unplanned Cesarean birth; subjects randomized to early D/C (N = 61) with CNS follow-up (experimental group) or standardized (control group) care (N = 61) with no follow-up; data collected from delivery to eight weeks post partum; urban university teaching hospital	CCNSs	Provided transitional homecare services such as comprehensive D/C planning, instruction, and counseling; daily "on-call" availability; home visit activities such as physical examination of mother and baby, assessment of wound healing, uterine involution, sleeping patterns, emotional status, coping, ability to perform child care, home environment, and confirmation of follow-up appointments; telephone contact	Maternal and infant LOS Infant immunization rates Satisfaction with care Rehospitalizations Acute care visits Anxiety or depression Overall function Costs • Rehospitalization • Acute care visits	Earlier D/C group sent home a mean of 30.3 hours sooner than control; significantly greater satisfaction with care; more timely infant immunizations; no statistically significant differences in maternal or neonatal rehospitalization or acute care visits; no differences between groups in maternal affect or functional status. Conclusion: Nurse specialist transitional care is safe, feasible, and cost effective.

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Table 1. Selected Empirical Studies Examining Advanced Practice Nursing Interventions and Outcomes *(Continued)*

Author	Study Design, Sample, and Setting	Advanced Practice Nurse Description	Advanced Practice Nursing Intervention Provided	Outcome Variable(s) Measured	Selected Findings
			twice per week for two weeks then weekly for six weeks; medical backup provided by physicians.	• Nurse specialist care	
Lombness (1994)	Descriptive; designed to compare CNS and physician assistant (PA) patient management; retrospective chart audit; N = 105 randomly selected charts of elective coronary artery bypass surgery patients; 900-bed private midwestern hospital	CNSs; master's prepared	CNSs and PAs comanaged care with cardiovascular surgeons: performed history and physicals, updated physician progress notes, prepared postoperative and transfer orders, participated in daily rounds, ordered and interpreted laboratory and diagnostic tests, consulted specialists, responded to abnormalities in vital signs, performed some aspects of technical care (e.g., removing chest tubes, pacing wires), and developed discharge plans.	LOS Total hospital LOS LOS from surgery date LOS in intensive care unit	CNS-managed group had statistically significantly shorter LOS for all categories of LOS. Conclusion: Results suggest that care managed by CNSs can decrease LOS when compared to care managed by PAs. A conservative estimate of the cost savings was $550,000.
Naylor et al. (1994)	RCT; designed to study the effects of comprehensive D/C planning for elderly (> 70 years); subjects from selected medical and surgical DRGs; N = 276 patients and 125 caregivers; data collected at baseline and 2, 6, and 12 weeks; inpatient unit; urban university teaching hospital	Two part-time nurse specialists; master's degrees in gerontologic nursing and one year practice as nurse specialist	Patient and caregiver contact within 24–48 hours of admission to complete assessment; visits every 48 hours for education, referral, consultation, counseling, and coordination; finalized preparation 24 hours pre-D/C; "on-call" throughout hospital stay and two weeks post; follow-up calls during first two weeks D/C	LOS Time to readmission Costs • Hospitalization • Rehospitalization • Specialist care • Health services utilization	Fewer readmissions in medical DRGs, fewer total days rehospitalization, lower readmission charges, lower charges for health services after D/C, and no changes in surgical DRG patients. Conclusion: Findings support need for comprehensive D/C planning implemented by nurse specialists, and the greatest effect in delaying or preventing rehospitalization occurs during first six weeks after D/C.
Evans et al. (1997)	RCT; investigated relative effects of two experimental interventions on physical restraint use; three nursing homes randomly assigned to restraint education (RE), restraint education with consultation (REC), or control; measures at baseline, immediately after the 6-month intervention, and at 9 and 12 months	Master's-prepared gerontology nurse specialist (GNS)	RE and REC nursing homes received intensive education by GNS designed to increase staff awareness of restraint hazards and knowledge about assessing and managing behaviors likely to lead to the use of restraints; staff were provided with 10 sessions focused on effects of restraint use, minimizing falls, preventing interference with medical treatment, and coping with behaviors such as wandering and agitation; REC home received 12 hours per week of unit-based nursing consultation to facilitate restraint reduction in residents with more complex conditions.	Restraint use (vest or chest, wrist or ankle, mitt, belt, pelvic, geriatric, recliner, or wheelchair with fixed tray table; siderails were excluded.)	REC home demonstrated statistically significant reduction in restraint prevalence; average reduction in use was 23% in the RE, 56% in the REC and 11% in the control home. Conclusion: Six-month educational intervention in combination with resident-centered consultation can reduce the use of restraints in nursing homes effectively and safely.

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Table 1. Selected Empirical Studies Examining Advanced Practice Nursing Interventions and Outcomes *(Continued)*

Author	Study Design, Sample, and Setting	Advanced Practice Nurse Description	Advanced Practice Nursing Intervention Provided	Outcome Variable(s) Measured	Selected Findings
Scarbrough & Landis (1997)	Descriptive; evaluated two methods of implementing hospital-based immunization program; six hospital units; implemented by a family nurse practitioner (FNP) (N = 3 units, 431 patients) or SN and physician (N = 3 units, 821 patients); 500-bed community hospital; data collected for three months	FNP; master's prepared	Assessed vaccine need, determined patient interest, obtained informed consent, ordered and administered vaccines, provided education, and documented care.	Documentation on patient medication administration record	Sixty-nine of 431 patients received vaccines in the FNP group; 10 of 821 patients received vaccines in the SN and physician group. Conclusion: FNPs were able to deliver vaccines at a higher rate.
Naylor et al. (1999)	RCT; examined effects of APN-centered D/C planning and home follow-up intervention for hospitalized older adults (≥ 65) at risk for readmission; admitting diagnoses among top 10 reasons for Medicare beneficiary hospitalizations; control group (n = 186) and intervention group (n = 177); data collected at 2, 6, 12, and 24 weeks after D/C; two urban academically affiliated hospitals in southeastern Pennsylvania	Five part-time master's-prepared gerontology APNs; mean = 6.5 years (range = 2–9 years) post-degree experience in hospital or home care of older adults	Administered standardized D/C planning and home follow-up protocol for older adults at high-risk for poor post-D/C outcomes; in collaboration with physician, APN provided individualized patient management within bounds of protocol; interventions included APN visit within 48 hours of admitting and every 48 hours during stay, two home visits within 48 hours of D/C, and additional visits based on need; "on-call" availability seven days per week and weekly APN-initiated calls to patients and caregivers.	Readmissions Time to readmission Acute care visits after D/C Functional status Depression Patient satisfaction Cost	Intervention group patients had fewer multiple readmissions; fewer hospital days per patient; time to first readmission was prolonged at 24 weeks; Medicare reimbursements for control group was $1.2 million versus $0.6 million for intervention group; no significant differences occurred in acute care visits, functional status, depression, or patient satisfaction. Conclusion: APN-centered D/C plan and homecare intervention for at-risk hospitalized older adults promotes positive outcomes and decreases cost.
Mundinger et al. (2000)	RCT; designed to compare outcomes of patients assigned to NP or physicians for primary follow up and ongoing care after emergency room or urgent care visit; N = 1,316 patients with no regular source of care who kept their initial primary care appointment; measurement at 6 and 12 months; four community-based primary care clinics and one primary care clinic at an urban-based medical center	Master's-prepared primary care nurse practitioners (PCNPs)	PCNPs provided all primary care services and had authority to prescribe, consult, refer, and admit patients.	Patient satisfaction Health status Service utilization Physiologic tests	No significant differences were reported in health status at six months; physiologic test results were not different in patients with diabetes or asthma; patients with hypertension had significantly lower diastolic blood pressure readings in the PCNP group; no differences in health services use or satisfaction after initial appointment; some differences in satisfaction at six months. Conclusion: Primary care outcomes are comparable when NPs and physicians have the same authority, responsibility, productivity, and administrative requirements.
Burns & Earven (2002)	Descriptive pre- and postanalysis of APN-managed care in medical intensive care unit (MICU) patients requiring long-term mechanical ventilation (N = 699) during a six-year period; large, university-based hospital in a mid-Atlantic city	Master's degree in critical care with specialty training in pulmonary care, specifically acute oxygenation and weaning; successful advancement to the clinician IV level in the institution; background in research and teaching; excellent communication skills	APNs provided interventions based on pathways derived from scientific evidence. Major APN work focused on monitoring patient progress, implementing pathways, preventing complications, and coordinating care.	Hospital, MICU LOS Duration of ventilation Extubation status Reintubations Complications Placement on D/C Cost	Decreases in the mean number of ventilator days, decreased mean LOS, decreased mean MICU LOS, and decreased costs of care. Researchers concluded that APNs were effective in improving a number of outcomes in this population of highly complex patients.

The authors identified several limitations of the advanced practice nursing outcomes literature. These included the use of variable measurement strategies, a lack of specific health-related outcomes, and the use of physicians as a comparator group. A more recent review by Horrocks, Anderson, and Salisbury (2002) reported similar findings. Although they concluded that NPs were able to provide equivalent or better care than physicians, the authors pointed out a lack of methodologic rigor (citing a large number of observational versus randomized studies), heterogeneous outcomes, and a lack of robust economic analyses in the studies reviewed.

Oncology Advanced Practice Nursing Interventions and Outcomes

Much of the understanding of APN outcomes in the oncology-specific setting comes from work by McCorkle and colleagues. Early work in this area investigated a model of care delivery where oncology APNs provided care to patients with cancer during their transition from the hospital to the home setting. The effectiveness of this delivery model was evaluated in a sample of 166 patients newly diagnosed with lung cancer who were randomized into one of three different post-hospitalization care conditions: oncology homecare services provided by master's-prepared oncology nurses (oncology transitional care), home care provided by homecare nurses, and office care (standard ambulatory care follow-up). The APNs in this study were trained to give personalized care to people with advanced cancer and their families. APN activities included pain and symptom management, physical and psychosocial assessment, and teaching about cancer treatment and self-care. McCorkle et al. (1989) asserted that if alternative forms of home nursing services for patients with lung cancer differ in their effectiveness and these differences are powerful enough to be of practical significance, they should be manifested in differential symptom distress, pain, current concerns, mood states, functional status, health perceptions, complications, hospitalizations, or length-of-stay outcomes. Measures of these outcomes were taken at baseline and on five subsequent occasions during a six-month period. Statistically significant improvements in symptom distress, functional status, and current concerns were found in both nursing groups. Although the numbers of hospital admissions for treatment of lung cancer were similar among the nursing groups, patients in the oncology homecare group had fewer hospital admissions for symptoms and complications of malignancy, suggesting that the APNs may have had the ability, through effective symptom management, to avert certain symptoms and complications. The authors concluded that the application of home nursing following discharge was effective in forestalling distress associated with symptoms and maintaining independence longer in newly diagnosed patients with lung cancer (McCorkle et al., 1989). A diagnosis of lung cancer is associated with a fairly progressive downhill clinical course and the development of a broad array of symptoms. When considered within this context, the findings of this investigation are especially meaningful.

In tandem with the previously referenced study, McCorkle, Robinson, Nuamah, Lev, and Benoliel (1998) investigated the influence of oncology transitional care services provided by APNs on psychological distress during bereavement. Patient-spousal dyads were randomized to receive care in one of the three experimental conditions described previously. They were entered into the study two months after patients were diagnosed with lung cancer and received care until 25 months after patients' deaths. Psychological distress was measured at four time periods after patients' deaths, and lower levels were sustained among spouses who received the APN care for a period of 13 months. At the 25-month measurement time point, differences among the groups were not appreciated. Researchers concluded that the bereaved's psychological distress could be influenced positively by the manner in which their loved one was cared for during the terminal phase of illness. These data are useful particularly in that the measurement strategy used provides insight into the duration of the interventions' effectiveness. All outcome measurement must be considered within the context of time. The effects of health-care interventions may not be discernable immediately or be sustained over time. Longitudinal measures provide information about the patterns and trajectories of outcomes. Understanding the duration of an intervention's effect allows for the planning and delivery of effective health care.

More recently, McCorkle et al. (2000) reported on the effect of a specialized nursing intervention protocol provided by APNs to elderly patients with cancer who received surgical intervention as the primary treatment for their disease. Following discharge from the hospital, the experimental group (n = 199) received advanced practice nursing care that was designed to provide patients and their family caregivers with comprehensive assessments, monitoring, and teaching aimed at assisting with their recovery from surgery and improving their quality of life (QOL), and the control group (n = 185) received standard postoperative care. The intervention included three home visits and five telephone calls made by oncology APNs to assess and monitor physical, emotional, and functional issues; provide direct care when needed; and make referrals to other agencies as required. If a patient developed complications, the APN consulted with the patient's physician immediately. To accomplish this, APNs were on call 24 hours per day.

The main outcome measure in this analysis was length of survival, which was measured for a 44-month period from the date of study enrollment to the date of death or final encounter. Additional outcomes included symptom distress, functional status, and depression. Results revealed that after adjustments for age, stage of disease at diagnosis, race, total length of rehospitalization, and depressive symptoms, patients in the experimental group had a longer length of survival, by an average of seven months, compared to the control group. The survival advantage observed in the experimental group was especially compelling given that this group had a higher proportion of late-stage disease. Symptom distress and social dependency scores were not predictive of length of survival in the subjects tested. Researchers concluded that the specialized homecare intervention provided by APNs following discharge was effective in enhancing survival among elder patients undergoing surgery for cancer. This was the first study to empirically link interventions provided by APNs to survival.

Robinson et al. (1999) analyzed the advanced practice nursing intervention logs from a subset of the sample of the study by McCorkle et al. (2000) (men with prostate cancer who underwent radical prostatectomy). Statements extracted from 32 homecare records indicated that although a broad range existed in the type and intensity of care provided, APN interventions

were focused primarily in two areas: patient teaching (45%) and psychologically based interventions (20%). Further analysis of the teaching interventions included the ranking of specific teaching categories based on frequency. Upon discharge from the hospital, the primary informational needs of this group of patients included symptom management (e.g., pain, bladder spasms, constipation, fatigue), bladder retraining, anticipated course of recovery, and recognition and reporting of complications. This investigation provides information regarding the need for a meaningful teaching plan following prostate cancer surgery.

Explicit descriptions of the work of APNs are essential to understanding the process of care and empirically linking this to outcomes. An in-depth look at oncology APN interventions is found in the work of Hughes et al. (2002), who performed chart audits on 148 postsurgical patients with cancer receiving care from APNs as part of a randomized clinical trial. Recorded interventions were analyzed according to Grobe's (1990) Nursing Intervention Lexicon and Taxonomy. The most frequent interventions were focused on teaching, followed by provision of psychological support and reassurance, determination of patient need and nursing care requirements, assessment of current status, and indirect care. The intensity of nursing interventions varied over time, indicating that the care provided was in response to individualized patient needs (Hughes et al.).

Work by Maliski, Heilemann, and McCorkle (2001) provided insight into patient and family perceptions of APN contributions. In this investigation, researchers interviewed 19 patient-spousal dyads receiving APN-delivered transitional care services following discharge after radical prostatectomy. Results revealed that patients found APN support provided to them in the home following surgery invaluable. APNs were identified as providing health education and reinforcement on symptom management, giving feedback on clinical progress, dispelling misperceptions, and providing psychosocial support. These interventions improved patients' perceptions of control and enhanced their ability to effectively care for themselves. Patients and spouses also reported decreased anxiety as a result of APNs' actions. Researchers concluded that APNs who provided transitional care services were able to assist patients with their adaptation to alterations they experience as a result of their illness.

Investigations of advanced practice nursing effectiveness in the ambulatory oncology setting also have been reported. Ritz et al. (2000) evaluated QOL and cost outcomes in a sample of women newly diagnosed with breast cancer. Subjects were randomized to receive standard medical care (n = 104) versus standard medical care plus APN care (n = 106). The interventions provided by the APNs focused on providing written and verbal information about breast cancer, outlining expectations, and providing decision-making support. QOL was assessed using the Functional Assessment of Cancer Therapy (Cella, 1996), Mishel Uncertainty in Illness Scales (Mishel & Epstein, 1990), and the Profile of Mood States (McNair, Lorr, & Droppleman, 1992). Each of these instruments has established validity and reliability in the cancer population. QOL measures were taken on seven occasions during a two-year period. Researchers reported that less uncertainty existed in the intervention group at the three- and six-month time points. APNs improved women's perceptions of the complexity, inconsistency, and unpredictability of information about their illness and outcome. With APNs providing continuity of care and information, subjects in the intervention group found their treatment and care process easier to understand, were less likely to receive conflicting information, and viewed their illness and treatment as more predictable than did their counterparts in the control group. Differences in cost outcomes were not appreciated. The authors concluded that the first six months after a breast cancer diagnosis is a critical time for women and that advanced practice nursing interventions rendered during this time frame were critical in improving outcomes. One of the limitations of this investigation is the difficulty of assessing the effect of any one provider in an interdisciplinary context. This limitation has been identified in a number of investigations where APNs worked as part of an interdisciplinary team (Urden, 1999).

Limitations, Challenges, and Suggestions for Expansion of Knowledge

The advanced practice nursing outcomes literature presented documents with consistent improvements in numerous health-related outcomes when APNs manage aspects of care. The oncology-specific literature also supported a consistent improvement in selected health outcomes. Interestingly, although some outcomes improved, others did not. Understanding which outcomes are most sensitive to APN interventions is critical to advancing knowledge in this area of inquiry. Moreover, being able to effect outcomes that are most meaningful to patients with cancer will affect the quality of cancer care delivered.

Several classification systems for nursing outcomes have been developed (Jennings, Staggers, & Brosch, 1999; Lang & Marek, 1992; Maas, Johnson, & Moorehead, 1996). Although these systems certainly are applicable, they are not directed specifically at advanced practice nursing. Ingersoll, McIntosh, and Williams (2000) developed a list of outcomes thought to be particularly sensitive to advanced practice nursing. Using a convenience sample of 66 APNs, a list of 27 relevant outcome indicators was generated. This inventory formed the basis of a survey that subsequently was completed by APNs. The 10 highest-rated outcomes listed included satisfaction with care delivery, symptom resolution or reduction, perception of being well cared for, compliance or adherence with treatment plan, knowledge of patients and families, trust of care provider, collaboration among care providers, frequency and type of procedures ordered, and QOL. Several of these outcomes have been tested in the studies listed in Table 1; others require empirical validation and offer an opportunity for future research.

Another important factor to consider is that, although many of the reports presented described the interventions rendered by APNs in great detail, no studies specified which of the interventions were responsible for the outcomes or how the outcomes were affected. What are the mechanisms by which APNs are able to consistently improve outcomes? Is it just that they provided the interventions described by the researchers? Was something key about those interventions within the populations studied? What about the interpersonal components of care? The exquisite skill in clinical judgment and decision making that comes from "knowledge embedded in practice" (Benner, 1984, p. 36) has been proposed as a possible reason for the improved results. Although plausible, this rationale excludes other factors that may influence outcomes.

In addition, the characteristics of APNs as a group are changing. A trend toward earlier entry into advanced practice has emerged. As such, APNs may have less practice experience than they did historically. The experience differential represents a structural variable that must be considered in future investigations. Hughes et al. (2002) indicated that linking advanced practice nursing interventions to outcomes depends on the ability to quantify an episode of nursing care using measures that adequately capture what nurses actually do. For these measures to be meaningful, they must provide information on the type and frequency, as well as the range, emphasis, and dose intensity of the interventions.

Expanding the body of knowledge on advanced practice nursing outcomes is complex work. Within the oncology-specific context, several additional issues need to be explored. The systematic evaluation of the structure and process variables, and the interaction between these variables, needs to occur in patients with different types of cancer receiving care in various settings. All outcomes are context-dependent and should be evaluated within specific populations and environments. Uncertainty about which conditions or settings are most likely to benefit from advanced practice nursing interventions has been a criticism of effectiveness research (Sox, 2000).

Although evidence supporting advanced practice nursing work in homecare and ambulatory settings exists, studies in other cancer practice areas have not been identified. As discussed earlier, viable roles for oncology APNs have been established and will continue to emerge. The systematic evaluation of APNs in these areas needs to be conducted for the full effect of APNs in cancer care to be known.

In addition, because cost factors drive decisions in health care, cost outcomes should be considered carefully. A pressing need exists to demonstrate the cost implications of APN providers in cancer care. Several excellent examples reporting about the cost-effectiveness of APNs (Brooten et al., 1986; Lombness, 1994; Naylor et al., 1999) are presented in Table 1.

Myriad opportunities to participate in research on APN outcomes exist. APNs are well positioned to lead or participate in research of this nature. Partnering with researchers interested in outcomes evaluation represents an excellent strategy for collaboration (Hravnak, 2002; Whitman, 2002). Future knowledge will build on what was learned in the past. Many of the studies presented provide a solid foundation from which to launch further investigations. Continuing to advance this knowledge will inform the understanding of the full impact of APNs and ensure their viability in the healthcare delivery systems of the 21st century.

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