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Patient Problems, Advanced Practice Nurse (APN) Interventions, Time and Contacts Among Five Patient Groups

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Abstract

Purpose—To describe patient problems and APN interventions in each of five clinical trials and to establish links among patient problems, APN interventions, APN time and number of contacts, patient outcomes, and health care costs.

Design and Methods—Analysis of 333 interaction logs created by APNs during five randomized controlled trials: (a) very low birthweight infants ($n=39$); (b) women with unplanned cesarean birth ($n=61$), (c) high-risk pregnancy ($n=44$), and (d) hysterectomy ($n=53$); and (e) elders with cardiac medical and surgical diagnoses ($n=139$). Logs containing recordings of all APN interactions with participants, APN time and type of patient contact were content analyzed with the smallest phrase or sentence representing a “unit.” These units were then classified using the Omaha Classification System to determine patient problems and APN interventions. Groups were compared concerning total amount of APN time, number of contacts per patient, and mean length of time per APN contact. All studies were conducted in the United States.

Findings—Groups with greater mean APN time and contacts per patient had greater improvements in patients' outcomes and greater health care cost savings. Of the 150,131 APN interventions, surveillance was the predominant APN function in all five patient groups. Health teaching, guidance, and counseling was the second most frequent category of APN intervention in four of the five groups. In all five groups, treatments and procedures accounted for <1% of total APN interventions. Distribution of patient problems ($N=150,131$) differed across groups reflecting the health care problems common to the group.

Conclusions—Dose of APN time and contacts makes a difference in improving patient outcomes and reducing health care costs. Skills needed by APNs in providing transitional care include well-developed skills in assessing, teaching, counseling, communicating, collaborating, knowing health behaviors, negotiating systems, and having condition-specific knowledge about different patient problems.

Keywords

Patient problems; APN interventions; nurse time; transitional care; patient outcomes; health costs

Efforts to provide high quality health care services while controlling health care costs have resulted in dramatic changes in health care systems, the delivery of health care services, and methods of reimbursement in the United States (American Medical Association, 2000; Baradell & Hanrahan, 2000; Goldfield, 2000; Lesser & Ginsburg, 2001; Oz et al., 2001). In these changed systems of care, providing high quality services while controlling costs remains an essential objective. Wellness programs and ambulatory care services including day surgery have shown cost savings while providing quality services (Drinkard et al., 2001). Care for people with major illnesses has raised more complex challenges for cost containment because of the need for costly procedures and drugs, adequate lengths of hospital stay, home care services, and continuity of care between health care settings and patients' homes. Maintaining continuity of care through the use of home care services has been linked to improved patient and family outcomes (Kearney, York, & Deatrck, 2000). However, recent reductions in reimbursement for home care services have the potential for loss of health gains and increased use of hospital and acute care services (Goldfield, 2000).

Achieving high quality health care services and reasonable health care costs requires testing and evaluating types and levels of services capable of maintaining health at reasonable cost. Such testing requires knowledge of the problems of specific patients' groups needing health care services, provider interventions, provider time and number of patient contacts associated with optimal patient outcomes, and whether provider interventions could be more efficient and cost effective (Daly, Maas, & Johnson, 1997; Delaney, Reed, & Clarke, 2000; O'Conner, Kershaw, & Hameister, 2001; Stange et al., 1998). These issues are critical when the contracted care involves high-risk, high-cost, high-volume groups. To achieve this end, data are needed to accurately and adequately document health care problems of specific patient groups, to examine the processes of care, and to establish links among process, desired health outcomes, and consumer satisfaction. This analysis was conducted to determine those linkages.

Background

For 2 decades the quality-cost model of advanced practice nurses (APN) transitional care (comprehensive discharge planning and home follow-up) has been developed, tested, and modified for use with high-risk, high-volume, high-cost patient groups using randomized clinical trials (Brooten et al., 2002). These groups have included: very low birthweight infants (Brooten et al., 1986); women with unplanned cesarean birth (Brooten et al., 1994), high-risk pregnancy (York et al., 1997), and hysterectomy (Hollingsworth & Cohen, 2000); and elders with cardiac medical and surgical diagnoses (Naylor et al., 1994).

In addition to comprehensive discharge planning specific to each patient group, intervention patients received APN follow-up consisting of a series of home visits and telephone contacts after discharge from the hospital. The very low birthweight (VLBW) infants received APN intervention for 18 months after hospital discharge. The cesarean birth group and the hysterectomy group were enrolled and received APN intervention from delivery or surgery through 8 weeks post-discharge. The high-risk pregnancy group received APN intervention antenatally from initial antenatal hospitalization through 8 weeks postpartum. The elderly group received APN intervention during hospitalization and telephone follow-up for 2 weeks after discharge. Each control group received care that was standard for their patient group at the study site during that time.

Results from the clinical trials consistently showed improvements in patient outcomes and reduced health care charges for the APN intervention groups (Brooten et al., 1986; Brooten et al., 1994; Hollingsworth & Cohen, 2000; Naylor et al., 1994; York et al., 1997). Findings included significantly earlier hospital discharge, greater numbers of infants immunized,

fewer low birth weight (LBW) infants born, fewer hospitalizations, and greater satisfaction with care in the intervention groups (Table 1). In the original clinical trials, reduction in health care charges for the APN intervention groups ranged from a high of 44% (York et al., 1997) to a low of 6% (Hollingsworth & Cohen, 2000) compared to the control groups. In addition to examining patient outcomes and health care charges, in each clinical trial APNs recorded, in logs, interactions with patients, the APN interventions during telephone contacts and home and clinic visits, and the type and length of contacts with patients, families and other health care providers.

The purpose of this study was to describe patients' problems and APNs' interventions in each of five clinical trials and to begin establishing links between patients' problems, APNs' interventions, APN time and number of contacts, patient outcomes, and health care costs.

Methods

Sample

The sample consisted of APN interaction logs with 333 subjects in the intervention groups of five randomized trials: $n=39$ from the very low birthweight infant study, $n=61$ from the unplanned cesarean birth study, $n=44$ from the high-risk pregnancy study, $n=53$ from the hysterectomy study, and $n=139$ from the study of elders with cardiac medical and surgical diagnoses. In each clinical trial, the APNs who provided the intervention recorded, in interaction logs, their discussions with patients during telephone, home, and clinic visits. These logs were produced to document the care provided by APNs during each contact. APNs also recorded type and length of each contact with patients, families, and other health care providers. In the clinical trials, these data were used both to document care provided and to calculate costs of APN services. All logs produced during each clinical trial were included in this study.

Measures

Patient problems—The Problem Classification Scheme of the Omaha Classification System (Martin & Scheet, 1992) was used to identify and classify patient problems identified by patients or APNs. This system, developed over the past 20 years, included approximately 1,000 patient records to inductively derive categories, to conduct reliability and validity testing, and revise the taxonomy. The Problem Classification Scheme is a taxonomy with four distinct hierarchical levels from broad to specific: domain, problem, modifier, sign or symptom. The system's four broad (level 1) classifications, or “domains” of patient problems are: (a) environmental, (b) psychosocial, (c) physiological, and (d) health-related behaviors. Each of these domains contains from 5 to 16 subcategories of problems for a total of 44 subcategories of patient problems. Definitions are provided for each subcategory of patient problem in the Omaha System. Validity of the Omaha system is supported by findings that the Omaha system explained variation in nursing resource consumption (Hays, 1995; Pasquale, 1987). Martin and Scheet (1992) reported a range of 73% to 98% agreement for intercoder reliability during the development of the Omaha system and agreement at or above 80% for the intervention categories and activities in 8 of 12 reliability testings in a subsequent study. Agreement in these studies increased as the scheme was revised and as the coders gained experience with the system. Interrater agreement in the current study was maintained at 80% or greater.

APN interventions—The Intervention Scheme of the Omaha Classification System (Martin & Scheet, 1992) was used to identify and classify APN interventions in response to each patient problem. The intervention scheme also contains four broad categories of interventions: (a) health teaching, guidance, and counseling; (b) treatments and procedures;

(c) case management; and (d) surveillance, and a total of 63 nursing practice activities (targets). Definitions are provided for each target. Validity and reliability of the Omaha system are addressed above.

APN time—APNs recorded the time each contact (telephone, home visit, clinic visit) started and the time it ended. Amount of APN time in minutes for each contact was calculated from these start and end times.

Type of APN contact—For each contact, APNs recorded whether the contact was by telephone or in-person, and where each in-person visit occurred: hospital, home, clinic, or physician's office.

Outcomes and cost—Each of the clinical trials was designed to examine the effect of the APN intervention on patient outcomes and health care cost. Measures common across study groups included morbidity (hospitalizations and acute care visits), affect, functional status, satisfaction with care (except for the VLBW infant group), and health care charges. Although we recognize that health care charges are not the same as costs, our objective in the clinical trials was not to examine true costs for any patient, but to determine whether patients in the APN intervention groups had lower charges than did patients in the control groups, and if so, how much lower. Costs for APN services were calculated based on actual APN time spent in direct and indirect (charting, consulting, referring, administrating) care and the mean salary for APNs in the geographic area at time the of the study. Full descriptions of these measures were contained in the articles about the results of each randomized clinical trial (Brooten et al., 1986; Brooten et al., 1994; Hollingsworth & Cohen, 2000; Naylor et al., 1994; York et al., 1997).

Procedure

Each of the clinical trials and the present study were approved by the appropriate institutional review boards before the studies began. As part of each study protocol and to document care provided by APNs, all interactions between the APNs and study subjects in the intervention group were recorded verbatim immediately following the contact in APN interaction logs kept for each participant. Data for each contact were recorded on standard data forms structured with five columns: reason for contact, issues identified during contact, response of APN, response of patient, outcome of contact, and start and end times.

Content analyses were performed on all logs from intervention group participants ($N=333$). Each participant's log was analyzed individually with the contact as the unit of analysis. The text of the interaction between the APN and participant at each contact was divided into the smallest word or phrase that contained a single idea, called a "unit." Each of these units was then classified using the Omaha Classification System (Martin & Scheet, 1992). Decision logs were maintained throughout the coding and were shared by all coders. Interrater reliability was monitored throughout the study on a randomly selected sample of contacts. Interrater agreement was maintained at 80% or greater throughout the study. Data describing each contact included date, duration in minutes, type of contact (hospital, home, clinic, or telephone), who initiated the contact (patient or APN), most recent hospitalization admission and discharge dates, and most recent acute care visit. Units within each contact were characterized by domain, problem, intervention category, and intervention target.

Results

Patient Problems

According to the Omaha Classification System, 150,131 patient problems were identified in the five patient groups and were classified (see Table 2). The cesarean birth group had the greatest number of identified patient problems and the elderly group had the least. The total number of problems was related, in part, to the size of each group and the type and length of APN interventions.

In the type of patient problem identified most frequently, the three women's groups (cesarean birth, high risk pregnancy, hysterectomy) had the greatest number of problems in the physiologic domain. For the cesarean birth group, however, psychosocial problems were almost as dominant. Given the surgical procedure for the hysterectomy and cesarean birth groups and the physiological changes associated with high-risk pregnancy, the physiologic priority would seem reasonable. For the VLBW infant group, a group with high physical morbidity and socioeconomic risk, psychosocial problems predominated. Elder problems were heavily concentrated on problems of health-related behaviors, indicating the frequent need for lifestyle changes after cardiac events.

In subcategories of problems within the broader domains, both common problems and problems specific to study groups were identified. For four of the five groups caretaking was a major focus of problems within the psychosocial area, and health care supervision was a prominent problem in all five groups in the area of health-related behaviors. Similarly, for all five groups, problems of residence and income were the focus of problems in the area of environment. Problems identified within the physiologic area indicated the problems common to that group. VLBW infants commonly have respiratory, skin, and feeding problems, problems consistent with the study findings. Similarly, the elderly had circulatory problems, the hysterectomy group had genitourinary problems, and the high-risk pregnancy and cesarean-birth groups had problems related to antepartum and postpartum physiologic issues.

APN Interventions

In the APN interventions (Table 3), a striking finding was that in all five groups the most frequent intervention was surveillance, and the least frequent were treatments and procedures—the latter accounting for .1% to .6%. In the elderly group, treatments and procedures accounted for four APN interventions of a total of 9,488. For four of the five groups, the most frequent target of APN surveillance was signs and symptoms of physical problems, and in the fifth group this was the second most frequent target. The most frequent target in the VLBW infant group was caretaking and parenting, important potential problems for this group of high-risk infants and families. Case management ranked second in importance, likely indicating the need to locate and coordinate postdischarge services, community resources, and numerous specialty medical follow-up visits.

The three women's groups had similar rankings of APN interventions with teaching, guidance, and counseling the next most frequent category of intervention, followed by case management. In the elder group, teaching, guidance, and counseling interventions and case management interventions were almost equal in frequency. Elders often have high needs for coordination after a cardiac event. Because most of their problems were in health-related behaviors, interventions focused in the teaching, guidance, and counseling category would seem most appropriate. Overall, results indicate good correspondence between the focus of the surveillance (e.g., caretaking, signs and symptoms-physical) and the focus of the health teaching, guidance counseling, treatments, and procedures.

APN Time and Patient Contacts, Outcomes, and Cost

Patient outcomes, health care charges, APN time, and patient contacts for each randomized trial are shown in Table 3. The groups differed significantly in total number of contacts, total contact time, and mean time per contact. The VLBW group received significantly more APN contacts than did the other groups. The elder group received significantly fewer APN contacts and less APN time than did the other groups. The three women's groups did not differ significantly in number of contacts, but the high-risk pregnancy group received significantly more APN time than did the cesarean birth, hysterectomy, and elder groups. Mean length of time per APN contact (all types of contacts combined) also differed by group, $F=15.73$, $df=4,6529$, $p<.001$. Mean length of time per APN contact was shortest for the hysterectomy group ($M=18.3$ minutes) and longest for the high-risk pregnancy group ($M=26.8$ minutes). Mean times for the other groups were about 22 minutes.

Patient groups with more APN time and contacts per patient had greater improvements in patient outcomes and savings in health care charges even after costs for APN services were included. In the elder group with the least APN time and contacts (all by telephone and for only 2 weeks after discharge) improved patient outcomes were documented for only 6 weeks after discharge and only for the medical cardiac group. No difference was found in patient outcomes with the APN intervention in the surgical cardiac elder group compared to the controls. The hysterectomy group with the next least APN time per patient had the least savings in health care charges of the intervention groups.

Discussion

These findings indicate that study groups with greater mean APN time and contacts per patient had greater improvements in patient outcomes and greater savings in health care costs. Elders who received APN in-hospital visits and telephone contact for 2 weeks after discharge and had the least APN time, and contacts indicated improvements only to 6 weeks post-discharge and only in the medical cardiac group. In contrast, the high-risk pregnancy group followed antenatally through 8 weeks postpartum had considerably higher APN time and contacts, and it had a much larger reduction in hospital charges and greater improvements in patient outcomes. The differing doses of APN time and contacts across studies explains much of the differential in patient outcomes and reduction in health care costs even accounting for the costs of the APN services.

This finding is especially important because, within the broad study protocols that indicated a minimum number of contacts, the APN time with each patient and family and number of contacts in each study was based on patient need and APN judgment rather than on reimbursable visits or contacts. Much of the previous research indicates of number of nurse visits and contact time were based on data from home health agencies (Adams, Usher, & Kramer, 1997; Hays, 1992, 1995; Trisolini, Thomas, Cashman, & Payne, 1994; Wheeler, 1998). In some instances in which reimbursement for services is essential to agency survival, data can be skewed to services that receive greatest reimbursement. Number of provider contacts and time are essential components of current and evolving health care reimbursement policies (American Medical Association, 2000; Goldfield, 2000; Madigan & Fortinsky, 1999)

Surveillance was consistently the predominant APN function across the five different patient groups, and health teaching, guidance, and counseling was the next most frequent APN function in four of the five groups. In all five groups, treatments and procedures accounted for less than 1% of total APN interventions. In the original findings from the randomized trials, the APN-followed participants in each of the five study groups had consistently fewer rehospitalizations compared to the controls. Although not statistically significant in several

of the studies, consistent differences in health care cost savings were documented. The APN-followed participants, if rehospitalized, were rehospitalized for fewer hospital days at less cost. Documentation of the amount of APN surveillance, and early detection of health problems, plus focused health teaching of patients regarding prevention and early detection of problems specific to these patient groups provides evidence to help explain the reduced rehospitalizations and reduced health care costs. These study findings provide strong support for the APNs' well-developed assessment skills and targeted, effective patient teaching in reducing morbidity and health care costs.

In four of the five patient groups case management was the third most frequent category of APN intervention. In the VLBW group, in which infants often received care in five or more specialty clinics, case management was the second most frequent category of intervention. The need for case management also shows the complexity of care needed by these high-risk vulnerable patient groups. These patients often find management of their complex regimens difficult and confusing, so the services of APNs help patients to make better use of the available resources. APN skills in collaboration and in negotiating systems were critical. In all groups, communication was the paramount intervention within the case management category. This finding combined with the recognition that communication is basic to assessment, surveillance, and health teaching underscores the critical nature of communication skills in nursing.

The distribution of patient problems differed among patient groups, but it also indicated issues common to these groups. In the three women's groups (cesarean birth, high risk pregnancy, and hysterectomy), the largest percentage of patient problems (49% to 87.9%) were in the physiologic domain with physiologic antepartum and postpartum problems most common for the two childbearing groups (40.2% to 43.2%). In two of the three groups with newborns, the psychosocial problems of caretaking and parenting and issues in growth and development were paramount, accounting for 57.4% of the total problems in the VLBW group and 39.6% of the total problems in the cesarean-birth group. In contrast, for the high-risk pregnancy group consisting largely of women with diabetes, many of whom were newly diagnosed, the second largest percentage of patient problems were in health-related behaviors. Although these women had concerns about caretaking, parenting, and growth and development (combined 10.2%), these problems appeared to be overshadowed by problems in nutrition (28.8%) and health care supervision (11.8%). In the elder group, health-related behavior problems predominated, indicating the focus of treatment after a cardiac event. Many of these patients also had comorbid conditions requiring lifestyle modifications. The APN follow up for this group consisted of a 2-week follow up by telephone. The predominance of problems in health-related behaviors during this 2-week postdischarge period may indicate patients' immediate difficulty in adapting to prescribed lifestyle modifications.

Conclusions

The dose of APN time and contacts was significantly related to patient outcomes and health care costs. In this model of transitional care for vulnerable groups, surveillance was the predominant APN function across groups, and treatments and procedures comprised less than 1% of APN total functions. The predominant category of patient problems differed across patient groups, reflecting the characteristics of the health care problem. To provide care to high-risk, high-cost, vulnerable patient groups, APNs needed a battery of skills for all groups. Common patient problems were identified across these vulnerable groups. However, the differing profile of patients' problems underscores the importance of matching APN clinical specialization with the group they care for wherever possible to have optimal outcomes. APNs' in-depth knowledge in a specialty area likely allows them to make the

most reasoned, effective, and appropriate decisions that result in improved patient outcomes and reduced health care costs.

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Table 1

Results in 5 Randomized Controlled Trials of APN Transitional Care

Study group	Patient outcomes after intervention	Health care costs after intervention	APN time per patient (minutes) <i>M (SD)^a</i>	Contacts per patient <i>M (SD)^b</i>
Cesarean birth (<i>N</i> =122; 61 intervention, 61 control)	<ul style="list-style-type: none"> Discharged mean of 30.3 hours earlier postpartum Significantly greater patient satisfaction and number of infants immunized No maternal re hosp. vs. 3 in control group 	Mean 29% reduction in health care charges	528.34 (228.11)	23.85 (9.01)
High-risk pregnancy (<i>N</i> =97; 44 intervention, 52 control)	<ul style="list-style-type: none"> Significantly fewer antenatal re hosp. (women with diabetes) LBW three times more prevalent in controls with diabetes 	Mean 44% reduction in total hospital charges	919.63 (801.32)	34.34 (29.63)
Hysterectomy (<i>N</i> =109; 53 intervention, 56 control)	<ul style="list-style-type: none"> Significantly greater satisfaction with care Mean re hosp. costs \$1500 less 	Mean 6% reduction in total hospital charges	459.67 (153.79)	28.78 (10.15)
VLBW infants (<i>N</i> =79; 39 intervention, 40 control)	<ul style="list-style-type: none"> Discharged mean of 11 days earlier, 200 gms. less in weight, 2 weeks younger age No differences in number of re hosp. and acute care visits, physical or mental growth 	<ul style="list-style-type: none"> Mean 27% reduction in hospital charges Mean reduction of 22% in physician charges Mean charge savings of \$18,000 per infant 	982.13 (571.59)	62.66 (37.48)
Elderly (<i>N</i> =276; 139 intervention, 137 control)	<p>From initial hosp. to 6 weeks after discharge:</p> <ul style="list-style-type: none"> Fewer hosp readmissions, fewer total re hosp. days in medical cardiac group No differences in surgical cardiac group 	<ul style="list-style-type: none"> Medical intervention group charges \$170,248 lower at 2 weeks after discharge and \$137,508 lower from 2-6 weeks after discharge Charges similar for medical intervention and control groups from 6-12 weeks Charges similar for surgical intervention and control groups 	158.88 (80.79)	7.14 (3.41)

^a*F*=65.52, *df*=4,316, *p*<.001^b*F*=89.52, *df*=316, *p*<.001

Table 2

Patient Problems for Each RCT Group^a

	Total problems	Environment	Psychosocial	Physiologic	Human-related behavior
Cesarean birth	57,541	1916 (3%) Residence (1.8%) Income (1.5%)	23,247 (40.5%) Caretaking/parenting (20.5%) Growth & development (19.1%)	28,220 (49.0%) Antepartum/postpartum (40.2%) Integumentary (2.6%) Respiratory (1.2%)	4158 (7.2%) Health care supervision (4.6%)
High-risk pregnancy	12,761	145 (1.1%) Income (.6%) Residence (.4%)	1456 (11.4%) Growth & development (5.3%) Caretaking/parenting (4.9%)	5,974 (46.8%) Antepartum/postpartum (40.2%) Circulation (1.3%) Integumentary (1.1%) Respiratory (1.1%)	5186 (40.6%) Nutrition (28.8%) Health care supervision (11.8%)
Hysterectomy	41,985	416 (1.0%) Residence (.7%) Income (.2%)	713 (1.7%) Human sexuality (.8%) Emotional stability (.3%) Interpersonal relationships (.2%)	36,897 (87.9%) Genitourinary (75.9%) Integumentary (3.6%) Pain (3.2%)	3959 (9.4%) Health care supervision (6.9%)
VLBW infants	28,358	2264 (8%) Income (4.0%) Residence (3.1%)	17,241 (60.7%) Caretaking/parenting (40.1%) Growth & development (17.3%)	4,504 (15.9%) Respiratory (4.9%) Antepartum/postpartum (2.7%) Integumentary (1.7%) Digestion/hydration (1.3%) Bowel function (1.3%)	4349 (15.3%) Health care supervision (12.1%)
Elderly	9,486	9486 76 (.8%) Residence (.5%) Income (.3%)	910 (9.6%) Caretaking/parenting (7.9%) Emotional stability (1.5%)	1,125 (11.9%) Circulation (2.4%) Neuromuscular (1.8%) Integumentary (1.6%)	7378 (77.8%) Other health related behaviors (67.9%) Health care supervision (6.4%)

^a All percentages are percentages of total problems for that study group.

Table 3

APN Interventions by Category With Most Frequent Targets for Each Category^a

	Total Interventions	Health teaching, guidance, counseling	Treatments & procedures	Case management	Surveillance
Cesarean birth	57,531	15,342 (26.7%) Caretaking/parenting (3.2%) Stimulation/nurturance (3.3%) Sickness/injury care (2.5%) Signs & symptoms (2.0%)	356 (.6%) Dressing/wound care (.2%) Sickness/injury care (.1%) Caretaking/parenting (.1%)	7,449 (12.9%) Communication (6.5%) Medical/dental care (4.4%)	34,364 (59.7%) Signs & symptoms (16.8%) Dressing/wound care (4.1%) Caretaking/parenting (3.5%) Rest & sleep (3.2%) Nutrition (3.1%)
High-risk pregnancy	12,765	4,578 (35.8%) Signs & symptoms (6.8%) Sickness/injury care (6.1%) Nutrition (4.2%) Med administration (3.1%) Stimulation/nurturance (2.1%)	59 (.5%) Dressing/wound care (.1%) Growth & development (.1%) Caretaking/parenting (.1%) Med administration (.1%)	1,987 (15.6%) Communication (11.2%) Medical/dental Care (3.3%)	6,141 (48.1%) Signs & symptoms (20.9%) Lab findings (7.0%) Nutrition (3.2%) Med administration (2.5%)
Hysterectomy	41,984	8,464 (20.2%) Sickness/injury care (2.7%) Signs & symptoms (2.2%) Mobility (2.0%) Dressing/wound care (2.0%) 107(0.3%) Dressing/wound care (0.2%)	107 (.3%) Dressing/wound care (.2%)	5,970 (14.2%) Communication (9.0%) Medical/dental care (4.1%)	27,443 (65.4%) Signs & symptoms (physical) (18.2%) Dressing/wound care (8.1%) Bowel care (5.7%) Bladder care (4.5%) Mobility (4.4%) Nutrition (4.1%)
VLBW infants	28,350	3,544 (12.5%) Caretaking/parenting (2.0%) Nutrition (2.0%) Sickness/injury care (1.1%) Signs & symptoms (0.8%)	46 (.2%) Caretaking/parenting (.03%)	7,077 (24.9%) Communication (13.2%) Medical/dental care (7.4%)	17,683 (62.3%) Caretaking/parenting (11.3%) Signs & symptoms (8.8%) Environment (4.5%) Nutrition (4.5%)
Elderly	9,488	1,699 (17.9%) Med administration (3.5%) Sickness/injury care (3.0%) Signs & symptoms (2.7%) Mobility (2.0%) Nutrition (1.8%)	7 (.1%)	1,637 (17.3%) Communication (9.3%) Medical/dental care (6.0%)	6,145 (64.8%) Signs & symptoms (physical) (14.8%) Med administration (8.6%) Signs & symptoms (mental/emotional) (5.2%) Sickness/injury care (5.0%) Mobility/transfer (5.0%) Nutrition (4.6%)

^a All percentages are percentages of total interventions for that study group.