Value-Added Outcomes: The Use of Advanced Practice Nurses in Long-Term Care Facilities

Muriel B. Ryden, PhD, RN, FAAN,[1] Mariah Snyder, PhD, RN, FAAN,[1] Cynthia R. Gross, PhD,[1] Kay Savik, MS,[1] Valinda Pearson, MS, RN,[1] Kathleen Krichbaum, PhD, RN,[1] and Christine Mueller, PhD, RN[1]

The purpose of this study was to determine the effect on clinical outcomes for newly admitted nursing home residents when advanced practice gerontological nurses (APNs) worked with staff to implement scientifically based protocols for incontinence, pressure ulcers, depression, and aggressive behavior. Use of APNs in this manner differs from the usual way APNs have been used in nursing homes, in which their primary focus has been to augment the physician's role. The APN treatment was randomly assigned to two nursing homes and usual care was assigned to a third. Trajectories from admission to 6 months revealed that residents with APN input into their care ($n = 86$) experienced significantly greater improvement or less decline in incontinence, pressure ulcers, and aggressive behavior, and they had higher mean composite trajectory scores compared with residents receiving usual care ($n = 111$). Significantly less deterioration in affect was noted in cognitively impaired residents in the treatment group. Findings suggest that APNs can be effective links between current scientific knowledge about clinical problems and nursing home staff.

Key Words: Nursing home, Advanced practice nurses

Most of the care in nursing homes is provided by unlicensed nursing staff (National Center for Health Statistics, 1989). Many of the licensed nurses who manage care in nursing homes are practical nurses prepared in 1-year technical programs; 74% of registered nurses in long-term care are graduates of diploma or associate degree programs; 22% have baccalaureate degrees, and only 3% have master's degrees (Moses, 1996).

A promising means for improving the quality of care in nursing homes is the use of gerontological advanced practice nurses (APNs) in the delivery of care to elders. APNs have additional education and expertise in providing holistic care to elders with complex health care problems that is beyond that of traditional nursing home staff. APNs with expertise in gerontological nursing include gerontological nurse practitioners (GNPs) and gerontological clinical nurse specialists (GCNSs). GNPs comprise the largest number of APNs working in long-term care, with most focusing on the medical treatment of residents. GCNSs focus on educating staff; working with residents, families, and staff to plan care; serving as a resource for staff regarding complex or new care problems; and providing direct care. APNs in this study functioned as GCNSs. (Please see Appendix, Note 1.)

Few studies have been conducted to document the effectiveness of GNPs and GCNSs in nursing homes. The majority of these studies have focused on GNPs (Buchanan et al., 1992; Garrard et al., 1990; Kane et al., 1988; Wieland, Rubenstein, Ouslander, & Martin, 1986). Research on the effectiveness of GCNSs has been focused on their use in acute care settings rather than in nursing homes (Naylor et al., 1994; Neidlinger, Scroggins, & Kennedy, 1987).

The scientific base for care in nursing homes is increasing. For example, the guidelines for clinical practice related to specific client problems that have been developed under the aegis of the Agency for Health Care Policy and Research (AHCPR) focus on a number of key care problems in nursing homes. However, because of the limited educational preparation of the majority of the staff in nursing homes, there is a challenge to integrating this scientific knowledge into practice. The use of GCNSs in long-term care facilities has been advocated as a way to improve care by helping nursing home staff to provide health care services consistent with current research-based professional knowledge, but further documentation of clinical and cost outcomes is needed (Lokos, 1995; McDougall & Roberts, 1993; Melillo, 1992).

A conceptual framework that is relevant for the integration of research findings into practice is provided by Havelock's (1974) model of effective research utilization. This model depicts knowledgeable resource persons as links between relevant sources of scientific knowledge and the user. GNPs and GCNSs are appropriate resource persons to serve as links be-

tween the most current scientific knowledge about commonly occurring clinical problems and nursing home staff. For convenience, we use the generic term of APN in this article. The role we describe, however, is that of the GCNS.

This article is a report of the findings from a study designed to test the effectiveness of gerontological APNs using scientifically based clinical protocols when working with newly admitted residents and staff to improve resident outcomes related to four clinical problems: incontinence, pressure ulcers, depression, and aggressive behavior. These problems were selected as the focus of the study because of their prevalence in the population of nursing home residents and because of the availability of recently published practice guidelines for three of the problems: urinary incontinence, pressure ulcers, and depression (Agency for Health Care Policy and Research [AHCPR], 1992a, 1992b, 1993). A protocol for the fourth problem, aggressive behavior, was developed by two of the investigators, Muriel Ryden and Mariah Snyder, whose prior research focused on aggressive behavior (Ryden, 1988; Ryden, Bossenmaier, & McLachlan, 1991; Snyder, Egan, & Burns, 1995a, 1995b). The overall study examined clinical outcomes for residents, fiscal outcomes, staff outcomes, and the results of organizational interventions to integrate the research-based protocols into institutional practices. This article is the first report of resident outcomes. Previous publications have described other aspects of the study (Krichbaum, Pearson, & Hanscom, 2000; Krichbaum et al., 1999; Ryden, Pearson, et al., 1998; Ryden et al., 1999; Ryden et al., 2000; Snyder, Pearson, et al., 1998; Snyder, Ryden, et al., 1998).

The purpose of this article is to report resident outcomes for the four clinical problems, comparing the group who received the APN treatment with the group receiving usual care (the routine care provided within the facility). This aspect of the study tested the hypothesis that resident outcomes would be improved when scientifically derived protocols for urinary incontinence, pressure ulcers, depression, and aggressive behaviors were implemented by gerontological APNs working with nursing home staff as compared with outcomes for residents who received usual care. (Because the trajectory of nursing home residents is commonly one of decline, we conceptualized improvement as either maintenance of the current status or betterment in the status or condition relative to what would be expected without the intervention. According to Kane [1995], altering the trajectory to prevent or slow the speed of decline is a reasonable achievement with residents who are long-term stayers in nursing homes.)

Setting

This quasi-experimental study was conducted in three licensed proprietary nursing homes certified for Medicare, located in the suburban Minneapolis-St. Paul area. Through random assignment, two facilities

were designated as APN treatment sites and one facility as a comparison site where residents receive usual care. Because of the likelihood of shared staff across units within a facility, which would contaminate the treatments, random assignment of treatments to individual residents or to different units within a single nursing home was not feasible. At initiation of the study the three facilities were comparable with respect to occupancy rates, staff-to-resident ratios, staff turnover, resident acuity, and percentage of residents whose medical care was monitored by external nurse practitioners employed by physician group practices or managed care groups. The number of beds ranged from 201 (usual care facility) to 212 and 262 (treatment facilities).

Design and Sample

The study design is depicted in Table 1. Three consecutive cohorts of newly admitted residents were recruited over a 6-month period, and each resident recruited was followed for 6 months. Recruitment of a new cohort began after follow-up on the previous cohort ended; recruitment and data collection extended over 3 years. The first cohort, receiving usual care, served as a comparison group in all three facilities. For Cohorts 2 and 3, the APN treatment was provided to residents in two facilities; residents in the third facility continued to receive usual care. The only criterion for admission to the study was an expected minimum stay of 6 months. Written consent was obtained from each resident or from a family member or guardian of cognitively impaired residents.

Of 428 residents/families from the three cohorts who agreed to talk with a research assistant about the study, 319 agreed to participate, a response rate of 74.5%; 166 received the APN treatment and 153 received usual care (all residents from the comparison site plus the first cohort from the two intervention

Table 1. Design Overview: Admission of Each Cohort Over a 6-Month Period; Usual Care or APN Treatment for Each Subject for 6 Months After Admission

Facility	Cohort		
	I	II	III
A			
Caretype	Usual	APN treatment	APN treatment
Admission *n*	23	27	52
6-month *n*	17	18	22
B			
Caretype	Usual	APN treatment	APN treatment
Admission *n*	46	58	29
6-month *n*	28	31	15
C			
Caretype	Usual	Usual	Usual
Admission *n*	25	31	28
6-month *n*	19	26	21
Total	All facilities	Treatment	Usual care
Admission *n*	319	166	153
6-month *n*	197	86	111

Note: APN = advanced practice gerontological nurse.

sites). By 6 months, attrition had reduced the sample to 86 treatment residents (2.4% withdrew, 18.0% were discharged, and 27.5% died) and 111 comparison group residents (2.0% withdrew, 9.2% were discharged, and 16.3% died).

Measures and Procedure

A description of the instruments used to measure outcomes of the four clinical problems that were the focus of the study is provided in Table 2. In addition, demographic data and information about diagnoses and use of medications related to the four clinical problems were obtained from medical records. All data except the demographics were collected both on admission and at 6 months postadmission. Data were collected by research assistants; the nature of the study prevented blinding them to the experimental or control facilities. The two study APNs worked at both treatment sites; both spent an average of 10 hr a week at each facility.

Urinary incontinence data were recorded by nursing home staff in all three facilities who had attended an instructional session on the use of the Incontinence Monitoring Schedule. Every 2 hr, for 24 hr a day over a 3-day period, they recorded wetness and/or if the resident was toileted. For residents in the treatment group, an assessment protocol that used the incontinence data collected by nursing home staff was carried out by the APNs. The protocol also provided information used to determine factors related to incontinence and to identify residents at risk for incontinence.

In all three facilities, research assistants inspected the skin and recorded the stage and location of each pressure ulcer using the four stages for pressure ulcers recommended by the National Pressure Ulcer Advisory Panel (NPUAP 1989 Consensus Conference). Each resident's risk of developing pressure ulcers was assessed by using the Braden Scale for Predicting Pressure Sore Risk (Bergstrom, Braden, Laguzza, & Holman, 1987) on the basis of data from the resident's record and from staff.

The Geriatric Depression Scale (GDS; Yesavage, Brink, Rose, & Lum, 1983) and the Philadelphia Geriatric Center Morale Scale (PGCMS; Lawton, 1975) were administered by research assistants to residents in all three facilities. Residents with a GDS score greater than or equal to 11 or a PGCMS score less than or equal to 8 were considered to be possibly depressed. If data from individual items on these scales

Table 2. Description of Instruments

Instrument	Description	Reliability in This Study: Cronbach's α at Admission
Mini-Mental Status Exam (Folstein, Folstein, & McHugh, 1975)	A 10-item measure of cognitive status. High scores indicate better mental functions (range = 0–30).	.83
Modification of Incontinence Monitoring Schedule (Ouslander, Urman, & Uman, 1986)	Observations every 2 hr for 24 hr a day for 3 days; percentage of wetness = average number of times wet per day for the 3-day period.	
Braden Scale for Pressure Sore Risk (Bergstrom, Braden, Laguzza, & Holman, 1987)	Six subscales for assessing risk of pressure sores: sensory perception, skin moisture, physical activity, nutritional intake, friction and shear, ability to change body position; high scores indicate greater risk (range = 1–23).	
Staging of pressure ulcers (AHCPR Guidelines, 1992a)	Four stages (I, II, III, IV)	
Geriatric Depression Scale (Yesavage, Brink, Rose, & Lum, 1983)	30 items to assess symptoms of depression; yes/no response format; higher scores represent more symptoms; cutpoint for clinically important symptoms is a score of 10	.87
Philadelphia Geriatric Center Morale Scale (Lawton, 1975)	Seventeen dichotomous items to assess morale. High scores indicate high morale.	.81
Apparent Emotion Scale (AER; Snyder, Ryden, et al., 1998)[a]	Observation of the presence or absence of six emotions: pleasure, interest, tranquility, anger, anxiety, and depression. High scores indicate more positive affect (range = 0–90).	.55
Ryden Aggression Scale (RAS; Ryden, Bossenmaier, & McLachlan, 1991)	A 26-item scale with three subscales: physical, verbal, and sexual aggressive behaviors. Documentation of frequency of occurrence of each behavior over 3-day period. Score is average number of aggressive behaviors per day.	

Notes: Instruments were administered at admission and 6 months postadmission. AHCPR = Agency for Health Care Policy and Research.

[a]Based on work by Lawton, Van Haitsma, and Klapper (1996).

supported five or more criteria for depression from the *Diagnostic and Statistical Manual of Mental Disorders*, (4th ed., or *DSM–IV*; American Psychiatric Association, 1994), the status "depressed" was deemed to be validated (Ryden, Feldt, et al., 1998). This designation of validated depression represents persons with significant depressive symptoms rather than those with clinical depression. Information was not available to determine if residents met *DSM–IV* criteria regarding duration of symptoms and effect on occupational and social performance. All residents with no validated diagnosis of depression were considered to be at risk of depression because of the multiple losses associated with nursing home admission. The affect of cognitively impaired persons who were unable to respond verbally to administration of the GDS and the PGCMS was assessed using the Apparent Emotion Rating (AER; Snyder, Ryden, et al., 1998).

Aggressive behavior in residents at all three facilities was documented by nursing home staff who had attended an instructional session on the use of the Ryden Aggression Scale 2 (RAS2; Ryden, Bossenmaier, & McLachlan, 1991). They tallied the type and number of aggressive behaviors observed over a 3-day period at both data collection time points. Residents who showed no aggression but were cognitively impaired were considered to be at risk for aggressive behavior.

The assessment by the APNs included the interpretation of research data collected by the research assistants regarding the four clinical problems. In addition, APNs made their own assessments related to the presence or absence of each of the four clinical problems (urinary incontinence, pressure ulcers, depression, and aggression), the level of severity of the problem, and the residents who were at risk for each problem. The APNs interviewed the resident and/or family to elicit information about prior patterns of daily activity, values, interests, strengths, and preferences for care. If concerns about a resident's condition arose, the APN discussed these with the head or charge nurse, who then brought these to the attention of the physician or GNP. Using the treatment protocols for each problem,[2] the APNs developed individualized plans of care in conjunction with the resident, family, and staff (Ryden, Pearson, et al., 1998; Ryden et al., 2000; Snyder, Pearson, et al., 1998). The APN conveyed concerns about a resident's status to the head or charge nurse, who then contacted the physician or GNP.

Two primary approaches were used by the APNs to implement the protocol interventions. The first approach was working with the nursing home staff to implement the protocols. Through in-service staff education, one-to-one work with the nursing assistants who were responsible for the care of residents, and participation in unit care conferences and wound care rounds, the APNs assisted staff to implement the care plans related to the prevention or reduction of these four problems (Krichbaum et al., 2000). The second approach was direct care by the APN. The APN met with each resident for 15–30 min each week to provide emotional support to assist the resi-

dent to manage the transition to the nursing home and to deal with feelings underlying depression and aggressive behaviors. They also provided problem-specific education such as discussing strategies the resident could use to deal with urinary incontinence or depression (Krichbaum et al., 1999).

Analysis

Residents were aggregated across sites and cohorts to form two groups: the treatment group and the usual-care group. The usual-care group consisted of all residents in Cohort 1, before the implementation of any intervention, plus residents in Cohorts 2 and 3 at the usual-care comparison site. The treatment group included residents from Cohorts 2 and 3 at the intervention sites. Comparisons of baseline data between treatment and usual-care groups were made using chi-square, Mann-Whitney *U*, and *t* tests, depending on the level of measurement of the variable of interest.

Initial analyses of institutional variables were done using chi-square or analysis of variance to evaluate the comparability of the three sites. Institutional variables were occupancy rates, staff-to-resident ratios, staff turnover, and percentage of residents whose medical care was monitored by external nurse practitioners employed by physician group practices or managed-care groups. These comparisons and the statistical tests to compare baseline data between treatment and usual-care groups were conducted with .05 as the level of significance, two-tailed, to determine nonchance findings.

For each clinical problem, data were analyzed in two forms. First, changes from baseline to follow-up for each outcome scale or measure were compared between treatment and usual-care groups, using *t* tests or Mann-Whitney *U* tests. Second, an ordinal trajectory variable was created for each clinical problem. This trajectory variable classified each problem as improved/no problem, stable, or worse by comparing the resident's 6-month assessment to his or her admission assessment. The resulting trajectories were first assessed for independence from treatment (APN vs usual care), using a chi-square for the original 2 × 3 table. Follow-up chi-square tests were conducted to identify particular categories where treatment groups differed (Agresti, 1990).

The outcome comparisons for each clinical problem were conducted at the .05 significance level, one-tailed, assuming that rejecting the null hypothesis would be appropriate only if the APN intervention resulted in better outcomes. Findings in the opposite direction (suggesting usual care was superior) would not be of interest as, significant or not, such findings would not support further use of the intervention. A composite outcome measure was created to evaluate overall group differences. No other method was used to adjust significance for multiple comparisons.

Results

On admission, the mean age of all residents was 81.6 years (*SD* = 11.1); 71% were women. The

Table 3. Percentage of Subjects Admitted With Each Clinical Problem (*n* = 319)

	Treatment (*n* = 166)	Usual Care (*n* = 153)
Incontinence	63.2	67.3
Pressure ulcers	20.0	21.8
Depression		
Able to respond to		
self-report measures[a]	72.3	68.5
Unable to respond to		
self-report measures[b]	45.8	71.4
Aggression	20.4	13.7

[a]Treatment *n* = 137, usual care *n* = 127.
[b]Assessed with Apparent Emotion Rating as possibly or probably depressed; treatment *n* = 24, usual care *n* = 21.

mean case mix (an indicator of dependency in activities of daily living and need for special nursing care) was 6.2 (*SD* = 3.0), where the range was from 1 (*low dependency/acuity*) to 11 (*high dependency/acuity*). The mean score on the Mini Mental State Exam (MMSE; Folstein, Folstein & McHugh, 1975) was 18.6 (*SD* = 8.6). Residents at the three facilities did not differ significantly in gender, age, race, case mix, or mental status. When all residents in the usual-care group were compared with all treatment residents, there was no significant difference with respect to gender, race, case mix, or mental status. However, the treatment group on admission was statistically significantly younger than the usual-care group (*M* = 81.03 years, *SD* = 9.54, vs *M* = 83.45, *SD* = 8.27, *p* < .02). This difference persisted in those remaining in the study after six months.

The treatment group had a significantly higher overall attrition than the usual-care group, χ^2 (3, *N* = 319) = 14.5, *p* = .002. The facility that remained the usual-care facility for all three cohorts, and which contributed 59% of the residents to the usual-care group, had a significantly lower mortality rate than the combined treatment facilities for Cohort 3, χ^2 (1,

N = 109) = 7.31, *p* = .007, but not for Cohorts 1 and 2. Mental status scores declined significantly in both groups for residents remaining in the study for 6 months. The treatment mean declined from 16.74 to 14.47, *t*(84) = −3.43, *p* = .001, and the usual-care group mean declined from 18.97 to 15.72, *t*(97) = −5.03, *p* = .001.

The percentage of residents admitted with each clinical problem is depicted in Table 3. For those who remained in the study throughout the 6 months, the percentage with each problem at admission and at 6 months is shown in Table 4.

Incontinence

On admission, almost two thirds of the residents had some degree of incontinence (Table 1). There was no significant difference in the percentage incontinent when the usual-care and treatment groups were compared. The percentage of times wet, an indicator of the severity of incontinence, averaged 19% for the usual-care group and 16% for the treatment group (*ns*). For those remaining in the study, the treatment group averaged 15% times wet on admission and 21% times wet at 6 months compared with the usual-care group, who averaged 18% times wet on admission and 26% times wet at 6 months. Change scores of percentage of times wet between baseline and follow-up were not significantly different between groups, *t*(191) = −0.86, *p* = .2, one-tailed. A trajectory score for incontinence was determined in the following manner. Severity of incontinence was divided into five levels: 0 = no incontinence, 1 = incontinent 1%–24% of the time, 2 = 25%–49%, 3 = 50%–74%, 4 = 75%–100%. Residents who had no incontinence at both time points and residents whose incontinence improved by at least one level were combined and termed *no problem/improved.* Individuals whose incontinence remained the same were termed *stable.* Individuals whose incontinence level increased were termed *worsened.* The trajectory for residents remaining at 6 months showed a significant

Table 4. For Participants Remaining at 6 Months, Comparison of the Percentage of Participants With Each Clinical Problem at Admission and at 6 Months (*n* = 197)

Clinical Problem	Treatment (*n* = 86)			Usual Care (*n* = 111)		
	n	Admission	6 Months	*n*	Admission	6 Months
Incontinence	84	67.9	63.9	110	62.7	70.6
Pressure ulcers	86	19.8	3.5*	110	17.3	10.0
Depression						
Able to respond to						
self-report measures[a]	65	71.6	55.4	84	64.5	53.6
Unable to respond to						
self-report measures[b]	12	33.3	25.0**	16	68.8	62.5**
Aggression	86	20.9	19.8	111	14.4	20.7

*χ^2 = 3.01(1), *p* = .04, one-tailed.
**Fisher's exact test, *p* = .04, one-tailed.
[a]At both time points.
[b]At both time points; assessed with Apparent Emotion Rating as possibly or probably depressed.

positive effect for the treatment residents compared with the usual-care group: Fewer treatment residents became more incontinent, more remained stable, and more improved or maintained their continent status (Figure 1); overall χ^2 (2, $N = 193$) = 6.10, $p = .023$, one-tailed; worsened versus not worsened partitioned χ^2 (1, $N = .193$) = 4.63, $p = .015$, one-sided; stable versus no problem/improved partitioned χ^2 (1, $N = 119$) = 1.49, $p = .89$).

Pressure Ulcers

The prevalence of pressure ulcers on admission was 20.1% overall, with no significant between-group differences (Table 3). The majority of pressure ulcers were Stage 1 or 2; half of the residents with pressure ulcers had been admitted from acute care, and 31.1% had been admitted from another nursing home. At 6 months, the percentage with pressure ulcers in the treatment group was significantly less than in the usual-care group (Table 4). A trajectory score was based on the stages proposed by Bergstrom and colleagues (1987). Residents who had no pressure ulcers at either time point and those who improved by at least one stage were combined into no problem/improved category. Remaining residents were characterized as either stable or worsened. This trajectory also showed positive effects: More treatment residents were more likely to be ulcer free or have improvement and were less likely to have ulcers that remained at the same stage as compared with usual-care residents (Figure 1), overall χ^2 (2, $N = 196$) = 4.45, $p = .054$, one-tailed; worsened versus not worsened partitioned χ^2 (1, $N = 196$) = 1.2, $p = .24$, one-sided; stable versus no problem/improved partitioned χ^2 (1, $N = 187$) = 3.3, $p = .035$, one-tailed.

Depression

Of the 319 residents, 264 were able to respond to the GDS and the PGCMS; 186 met the research criteria for validated depression. This represented 70.5% of those who could be assessed. A total of 27.7% who could be assessed were identified as severely depressed at bas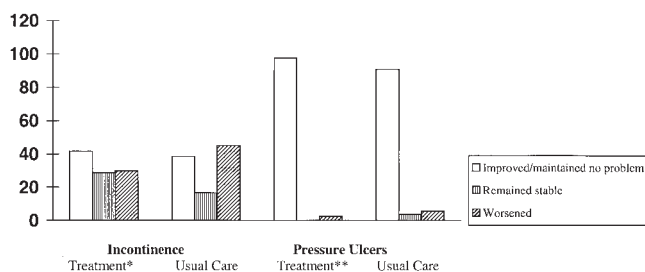eline (GDS = 21–30 or GDS = 11–20 plus PGCMS = 0–7). The treatment and usual-care groups did not differ significantly in the percentage identified as depressed (Table 3); however, an analysis of levels of depression revealed that a significantly greater proportion of treatment residents were severely depressed (38.0% vs 16.5%), χ^2 (3, $N = 264$) = 16.4, $p = .001$. The proportion of residents who were started on antidepressants during the six-month postadmission was greater for the treatment group than for the usual-care group (54.4% vs 41.2%, ns).

Examination of the congruence between having a medical diagnosis and a research diagnosis of depression revealed that of the 33 residents with a medical diagnosis of depression, 28 (84.8%) also had a research diagnosis of depression. However, of the 186 diagnosed as depressed through the research criteria, only 28 (15.2%) had a medical diagnosis of depression. Other evidence of convergent validity of the research diagnosis of depression was found in the relationship between diagnosis of depression and receiving antidepressants. Of the 43 residents on antidepressants on admission, 37 were capable of responding to the GDS and PGCMS; 36 of the 37 (93.3%) on antidepressants had a validated research diagnosis of depression.

Change scores for the GDS and PGCMS between baseline and follow-up were not significantly different between groups, GDS $t(1) = 1.0$, $p = .3$; PGCMS $t(43) = -0.18$, $p = .86$. A trajectory score for depression was determined in the following manner. Severity of depression was characterized into four groups: none, mild, moderate, and severe. Residents who had no depression at both time points and residents who improved by at least one category were combined and termed *no problem/improved*. Residents whose depression remained in the same category were termed *stable*, and those whose depression increased were termed *worsened*. Analyses of the trajectory for depression did not detect any statistically significant differences between treatment and usual-care groups, overall χ^2 (2) = 1.2, $p = .28$; worsened versus not worsened partitioned χ^2 (1, $N = 160$) = .04, $p = .27$; stable versus none/improved partitioned χ^2 (1, $N = 132$) = .78, $p = .19$.

On admission, negative affect was observed using the AER in 55% of the 45 cognitively impaired residents who were unable to respond to the GDS and PGCMS; 29% demonstrated one negative emotion ("possibly depressed"), and 26% showed two or three negative emotions ("probably depressed"). Change scores for the AER between baseline and follow-up were significantly different between groups, $t(28) = 1.9$, $p = .034$, one-sided. The treatment group improved an average of 18.8 points ($SD = 28$), and the usual-care group improved an average of 9 points ($SD = 21.5$). A trajectory score for the AER in cognitively impaired residents was determined on the basis of the number of negative emotions (0–3) observed. Residents who had no negative emotions or whose number decreased were classified as none/improved. Remaining residents were classified as stable or

Figure 1. Trajectory of incontinence (treatment $n = 84$; usual-care $n = 110$) and pressure ulcers from admission to 6 months (treatment $n = 86$; usual care $n = 110$). *Overall χ^2 (2) = 6.10, $p = .023$; one-tailed partitioned χ^2 (1) [worsened vs. not worsened] = 4.63, $p = .015$, one-tailed. **Overall χ^2 (2) = 4.45, $p = .074$; one-tailed partitioned χ^2 (1) [stable vs. no problem/improved] = 3.3, $p = .035$, one-tailed.

worsened. The trajectory for the 28 who remained at 6 months revealed that the percentage of residents in the treatment group who deteriorated at follow-up (8.3%) was significantly less than in the usual-care group (37.5%), overall χ^2 (2, N = 28) = 4.6, p = .05, one-sided; worse versus not partitioned χ^2 (1, N = 28) = 3.1, p = .039, one-sided; stabel versus improved/no problem partitioned χ^2 (1, N = 21) = 1.5, p = .11, one-sided).

Aggression

There was no significant difference in the proportion of residents demonstrating aggressive behavior between groups on admission (Table 3). However, for those who were aggressive, the level of verbal aggression was significantly higher in the treatment residents than in the usual-care group (M = 5.4 aggressive behaviors daily, SD = 6.3, vs M = 1.98, SD = 3.7, p = .007). Residents who were aggressive were significantly more cognitively impaired than those who were not aggressive (MMSE M = 13.02, SD = 9.2, vs M = 19.32, SD = 8.29, $p < .001$). Change scores of number of verbal (VAB), physical (PAB), or sexual (SAB) aggressive behaviors and total aggressive events between baseline and follow-up were not significantly different between groups (PAB, p = .4; VAB, p = .31; SAB, p = .95; RAS2, p = .64; Ryden, Bossenmaier, & McLachlan, 1991; Mann-Whitney U). A trajectory score for aggression was determined by classifying severity of aggression as none, mild, or moderate/severe. Residents who had no aggression at both time points and residents who improved by at least one category were combined and termed *no problem/improved*. Residents whose aggression remained in the same category were termed *stable*. The remaining residents were categorized as *worsened*. Analysis of the trajectory showed significantly improved outcomes for the treatment group over the usual-care group: Fewer became more aggressive and more remained stable (Figure 2), overall χ^2 (2, N = 198) = 9.97, p = .003, one-sided; worsened versus not worsened partitioned χ^2 (1, N = 198) = 3.40, p = .023, one-sided; stable versus none/improved partitioned χ^2 (1, N = 171) = 5.9, p = .008, one-sided.

Composite Trajectory Score for the Four Clinical Problems

To make an overall conclusion about the impact of the intervention by APNs on resident outcomes for the four clinical problems, a composite trajectory score was computed. For each problem, a resident received a score of -1 if his or her condition worsened over the 6 months, a score of 0 if the condition remained stable, and a score of 1 if the status of the problem improved or if the resident continued to have no problem. These scores were summed across the four problems, providing a possible range of -4 to 4. The mean for the treatment residents was significantly higher than for the usual-care group (M = 2.22, SD = 1.4, vs M = 1.79, SD = 1.6; Mann Whit-
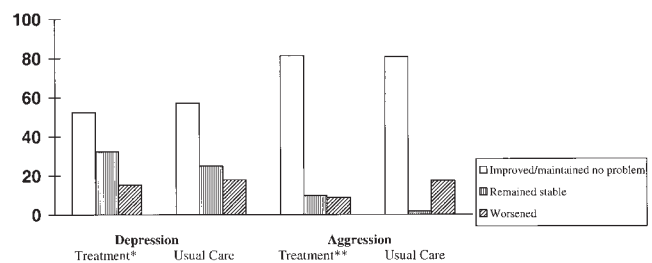

Figure 2. Trajectory of depression (treatment n = 65; traditional care n = 84) and aggression from admission to 6 months (treatment n = 84; usual care n = 110). *ns. **Overall χ^2 (2), = 9.97, p = .0003, one-tailed; worsened versus not worsened partitioned $\chi^2(1)$ = 4.2, p = .023, one-tailed; stable versus not/improved partitioned $\chi^2(1)$ = 5.9, p = .008 (results counter to hypothesis), *ns*.

ney U = 4135.5, p = .033, one-tailed), indicating more positive outcomes.

Discussion

Residents receiving the APN treatment over 6 months demonstrated significantly improved outcomes in status for three of the clinical problems that were the focus of this study when contrasted with residents receiving usual-care. Although cognitively intact residents in the treatment group did not significantly improve with respect to depression when compared with those receiving usual-care, AER scores demonstrated significantly less deterioration in affect in cognitively impaired residents receiving the APN treatment. Although pressure ulcers were the only problem for which the proportion of residents with the problem decreased significantly in the treatment group compared with the usual-care group, the APN treatment appears to have been effective in stabilizing the level of severity or preventing worsening of incontinence, aggression, and, in cognitively impaired residents, depression.

The findings confirm urinary incontinence as a major clinical problem in the nursing home population. Despite the myth that incontinence is to be expected in elderly residents (Snyder, Pearson, et al., 1998), consistent educational efforts with staff and residents demonstrated that interventions can improve or stabilize the level of incontinence in many persons. Even small, incremental improvements in the level of incontinence can contribute to the self-esteem and comfort of an individual.

The decline in the frequency of occurrence of pressure ulcers seen in both treatment and usual-care groups is congruent with our observation that nursing home staff at all facilities had a strong commitment to prevent pressure ulcers, viewing them as a stigmatizing indicator of poor care. Nevertheless, outcomes in the treatment residents were significantly improved over those of the usual-care group. This may be due in part to sharing of information from the Braden Scale with the staff in the treatment facilities so they were more aware of persons at risk who needed to

have preventive strategies instituted. A wound care committee, of which one of the APNs was a member, was also established at one of the treatment facilities. This group increased awareness about pressure ulcer prevention and care throughout the facility (Krichbaum et al., 2000).

It is not clear why outcomes related to depression for the residents receiving the APN treatment were not significantly better than for residents receiving usual care. However, the data suggest that many newly admitted nursing home residents have depressive symptoms that need to be recognized. The prevalence of validated depression in this sample (70.5% of those who could be assessed) was higher than the prevalence of clinical depression in nursing home residents reported in the literature (12% to 15%, with another 18% to 30% reported with depressive symptoms; Burrows, Satlin, Salzman, Nobel, & Lipsitz, 1995; Gerety et al., 1994; Parmelee, Katz, & Lawton, 1992). The proportion of study residents with a research diagnosis of *severe* depression (27.7%) was a closer approximation to prevalence data in the literature. The sensitivity of the research diagnosis of validated depression is supported by the identification of depression in 84.8% of those with a medical diagnosis of depression and 83.7% of those receiving antidepressants on admission. Depression in this population is underdiagnosed and undertreated (Board of Directors of the American Association for Geriatric Psychiatry, Clinical Practice Committee of the American Geriatrics Society, & Committee on Long-Term Care and Treatment for the Elderly, American Psychiatric Association, 1992). Our findings suggest that systematic screening for depression by nursing home staff on admission and when indicated may lead to greater recognition and improved treatment of this significant problem.

A low percentage of residents displayed aggressive behavior, despite the fact that the majority of residents had some degree of cognitive impairment. However, none of the high prevalence data reported in the literature were derived from samples of newly admitted residents. The treatment group was significantly more verbally aggressive on admission than the usual-care group, but not more physically aggressive. This may have contributed to the improved trajectory for the treatment group; verbal aggression has been found to be more responsive to interpersonal interventions designed to prevent or reduce aggression than has physical aggression (Ryden, Feldt, et al., 1998).

The 2-year difference in mean age between the treatment and comparison group residents is not likely to have had clinical importance because case-mix levels were not significantly different between the groups, either on admission or at 6 months. Case mix indicates functional ability, which is a better indicator of health status than is chronological age.

A higher than expected attrition from death and discharge decreased the sample size at 6 months and decreased our ability to detect significant differences between groups. Comparison of those who died with those who survived to 6 months revealed no significant differences in any of the following variables: age, case mix, mental status, or GDS scores. Changing community practices over the years of the study, with increased admission of patients from hospitals for subacute and hospice-type care in nursing homes may have influenced attrition. Another factor may have been the lack of precision in predicting length of stay by the person in admissions who determined which newly admitted residents were eligible for participation in the study. However, the reasons for the lower attrition in the usual-care group is not clear; facility differences with respect to factors we did not measure may have been responsible.

Although the use of both APNs at both facilities prevented a bias related to a person effect rather than an APN effect, the relatively short time (10 hr per week in each nursing home) and the high turnover rates of unlicensed staff (range of 11%–45%) reduced opportunities for each APN to establish relationships with staff and be recognized for the expertise the APN possessed. Thus, the less than optimal amount of time each APN spent in a facility may be accountable in part to the overall modest effects found in this study. Naylor and colleagues (1994) noted that an adequate dose of the APN needs to be used to obtain positive results. The adequacy of dose needs to be applied to both residents and staff, particularly since many of the interventions required the active participation of staff to be successful. Because the APNs consistently relied on unlicensed staff to carry out the interventions related to preventing or reducing the occurrence of urinary incontinence and aggressive behaviors, the high turnover among this group of staff meant that much of the APN's time was devoted to developing working relationships, explaining protocols to new staff, and modeling behaviors to be used by staff in interacting with aggressive or depressed residents.

Despite obstacles faced in incorporating scientifically based protocols into everyday care practices, the study findings were encouraging, with trajectories over 6 months that indicated significantly greater improvement or less decline in residents with APN input into their care compared with usual-care residents for three of the four problems. Additional studies are needed, however, to validate this study's findings about the use of APNs as consultants and educators in nursing homes. More information is needed about the amount of time that is needed (dose of intervention) for the APN to be available to staff. We report the fiscals outcomes of the study in a manuscript in progress. However, additional studies are needed regarding this key facet of APN use in nursing homes.

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Appendix

Notes

[1]The generic term *advanced practice nurse* includes clinical nurse specialists as well as primary care providers: nurse practitioners and certified nurse midwives. At present, APNs are prepared at the master's level; in the past, some nurse practitioners were prepared in shorter certificate programs.

[2]The assessment and treatment protocols for depression have been published (Ryden, Feldt, et al., 1998; Ryden, Pearson, et al., 1998). Protocols for the other three problems are available from Mariah Snyder, University of Minnesota, 6101 Weaver-Densford Hall, 308 Harvard Street, Minneapolis, MN 55455.