Do Gerontology Nurse Specialists Make a Difference in Hospitalization of Long-Term Care Residents? Results of a Randomized Comparison Trial

Michal Boyd, RN, NP, ND,[*†‡] Delwyn Armstrong, MPH,[‡] Janet Parker, RN, MN, NP,[‡] Carole Pilcher, RN, MN,[‡] Lifeng Zhou, PhD,[‡] Barbara McKenzie-Green, RN, PhD,[§] and Martin J. Connolly, MD*[‡]*

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Residents of long-term care facilities have highly complex care needs and quality of care is of international concern. Maintaining resident wellness through proactive assessment and early intervention is key to decreasing the need for acute hospitalization. The Residential Aged Care Integration Program (RACIP) is a quality improvement intervention to support residential aged care staff and includes onsite support, education, clinical coaching, and care coordination provided by gerontology nurse specialists (GNSs) employed by a large district health board. The effect of the outreach program was evaluated through a randomized comparison of hospitalization 1 year before and after program implementation. The sample included 29 intervention facilities (1,425 residents) and 25 comparison facilities (1,128 residents) receiving usual care. Acute hospitalization rate unexpectedly increased for both groups after program implementation, although the rate of increase was significantly less for the intervention facilities. The hospitalization rate after the intervention increased 59% for the comparison group and 16% for the intervention group (rate ratio (RR) = 0.73, 95% confidence interval (CI) = 0.61–0.86, $P < .001$). Subgroup analysis showed a significantly lower rate change for those admitted for medical reasons for the intervention group (13% increase) than the comparison group (69% increase) (RR = 0.67, 95% CI = 0.56–0.82, $P < .001$). Conversely, there was no significant difference in the RR for surgical admissions between the intervention and comparison groups (RR = 1.0, 95% CI = 0.68–1.46, $P = .99$). The integration of GNS expertise through the RACIP intervention may be one approach to support staff to provide optimal care and potentially improve resident health. **J Am Geriatr Soc 62:1962–1967, 2014.**

Key words: homes for the aged; clinical nurse specialist; frail older adults; community outreach

In the last 2 decades, the proportion of individuals aged 65 and older living in residential aged care (RAC) facilities has decreased in many countries.[1,2] This is due to numerous factors, including increased community care,[3] eligibility requirement changes,[4] and alternatives such as supported housing.[3,5] These trends have resulted in a resident population with steadily increasing dependency and healthcare complexity,[6] but the model of care in many RAC facilities has remained relatively unchanged,[7] and the overall quality of care is of concern internationally.[8–10]

Hospitalization for those in RAC is reportedly over twice the rate of that of community-dwelling older people.[11] Frail older people may have adverse hospitalization outcomes including poor functional ability, long hospital stays, delirium, and mortality.[12] Evidence indicates that many hospitalizations of RAC residents could be avoided,[13–16] but it is not clear exactly what specific interventions or combination of interventions effectively decrease potentially avoidable admissions from RAC facilities.[17] Nurses and caregivers working with RAC residents are crucial to the early identification of residents' failing health, yet there is often little support to improve their knowledge and clinical assessment skills.[18]

Several studies have used advanced practice nurses (nurse practitioners and clinical nurse specialists) to improve RAC resident wellness and consequently reduce potentially avoidable hospitalizations. In a nonrandomized

From the *Freemasons' Department of Geriatric Medicine, University of Auckland, Auckland; †School of Nursing, University of Auckland, Auckland; ‡Waitemata District Health Board, Auckland; and §School of Nursing, Auckland University of Technology, Auckland, New Zealand.

Address correspondence to Dr. Michal Boyd, Freemasons' Department of Geriatric Medicine, The University of Auckland, P.O. Box 93 503, Takapuna 7170, New Zealand.
E-mail: michal.boyd@waitematadhb.govt.nz

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study, nurse practitioner care was associated with half the hospitalization rate than comparison facilities without nurse practitioners.[19] In a randomized controlled trial, a complex intervention increased overall quality of care with gerontology nurse specialist (GNS) outreach for facilities deemed in need of improvement.[20] Another intervention showed fewer hospitalizations with a clinical nurse specialist providing advanced care planning outreach.[21] The Interact II program used strategies designed to assist RAC staff in identifying and communicating changes in resident status earlier. They found 24% fewer hospitalizations in facilities that were fully engaged in the program.[22] However, there are few randomized controlled trials of this type of intervention, and most studies have not been repeated.[17]

In New Zealand, specialist geriatric services are provided through secondary care services (acute hospital and specialist services). The Residential Aged Care Integration Program (RACIP) was developed to improve integration across healthcare services and to provide clinical outreach to RAC by secondary care GNS. The program adopted a population approach within a large district health board that provides health care for more than 500,000 people and approximately 2,500 residents of 57 long-term care facilities in Auckland, New Zealand. The overall goal was to improve the quality of care in aged care facilities through proactive GNS outreach, which includes on-site clinical support, education, clinical coaching, and care coordination. This article describes the RACIP intervention and results of a pre- and postintervention comparison of facility acute hospitalization rates randomly assigned to the RACIP intervention group or comparison group.

METHODS

Facility participation was voluntary in the RACIP quality improvement initiative. The regional ethics committee was consulted, and because the intervention was delivered at facility level and current district health board employees conducted the evaluation, the evaluation was classified as an audit of healthcare services, and an informed consent waiver was granted. All participating facilities signed a memorandum of understanding with the district health board before enrollment. Three facilities were excluded because, during the intervention period, one ceased operating, and two were under formal investigation and reparation of statutory quality audit violations. Fifty-four facilities were included in the evaluation.

This study follows the Meyers quality implementation framework, including assessment of need, creating the structure for implementation, providing ongoing support for implementation, and improving future applications through evaluation.[23] Researchers conducted extensive consultation (including nurses, managers, and facility owners) with all facilities to discuss program development and implementation. All facilities agreed to a two-stage RACIP implementation process and that random assignment was the most equitable means of facility stage allocation. In stage one, facilities were randomly assigned to intervention or comparison groups (a district health board administrator independent of the researchers completed randomization). All facilities in the district health board agreed to participate by the end of the 7-month development phase. The staged approach and the fact the facilities received additional services that were not usually available enhanced recruitment. Stage one intervention facilities

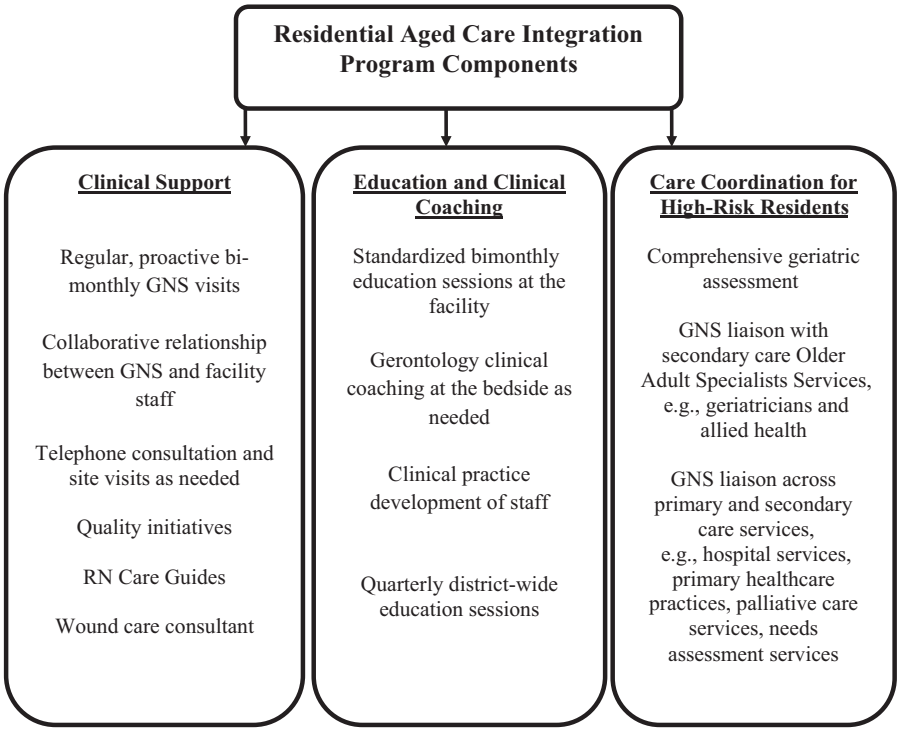

Figure 1. Summary of the components of the Residential Aged Care Integration Program. GNS = gerontology nurse specialists; RN = registered nurse.

(n = 29) participated in the RACIP outreach package for 1 full year. Comparison facilities (n = 25) did not receive GNS on-site intervention. Each full-time equivalent GNS was responsible for 14 or 15 facilities (average 49 beds per facility) within a specified geographic region. In stage two, the comparison facilities also received the GNS intervention. Because of the quality improvement nature of the intervention, it was impossible to blind the facilities, RACIP personnel, or researchers to facility intervention or comparison group assignment.

The district health board employed the GNSs, who had at least 1 year of postgraduate education or a Master's degree in nursing. All had more than 10 years of gerontology experience. The GNS intervention provided clinical support, education, and clinical coaching through on-site visits every other month and delivery of standardized gerontology education sessions for RAC nurses and care assistants (mean 5.5 sessions per facility in 12 months) (Figure 1). Ad hoc on-site clinical coaching to discuss residents of concern (mean 2.3 sessions per facility in 12 months) occurred at the request of facility staff. The GNS was on site at each facility for a mean of 1.9 hours per month. GNSs provided care coordination and comprehensive geriatric assessments for residents of concern as needed (mean 2.6 assessments per facility in 12 months). The GNS also provided care coordination for residents transitioning across healthcare settings, although much of this work was not well captured in GNS records, and therefore it is difficult to quantify how many residents or how much time was spent on this activity.

During the trial, there were interventions that all facilities in the district received (intervention and comparison facilities). The RN Care Guides[24] were developed as a quick evidence-based reference for common geriatric problems and to provide guidance about when to seek medical or advanced nursing consultation. These guides were developed through a collective workgroup of RAC facility nurses and managers and the GNS team. Education sessions specifically targeted at aged care facility staff were held every 3 months at a central location. These sessions facilitated staff peer support across aged care facilities. Intervention and comparison facilities had access to a wound care clinical nurse specialist who performed wound assessments as requested by facilities.

Program Evaluation

Bed numbers and types of all licensed facilities were identified through the district health board certification database. All residents receiving government-funded RAC (but not private pay residents) were included in the evaluation (~70% of all residents[25]). The resident National Health Index (NHI) was used to track healthcare use for government-funded residents. (NHI was not available for private pay residents.) All facilities were matched according to size (number of beds) and care level as risk adjustment before randomization to ensure that characteristics were relatively the same, and then facilities from each matched pair were randomly assigned to the comparison or intervention group. Because this was a facility-level intervention, hospitalization rates were reported according to facility, similar to other reports.[21] Care level include low-level rest home care (24-hour care but not 24-hour registered nurse coverage), higher dependency private hospital care (24-hour registered nurse coverage and includes a small number of psychogeriatric beds), and secure units classified as dementia rest homes. RAC in New Zealand is equivalent to nursing home care in the United States. New Zealand does not currently have subacute or rehabilitation facilities as part of the RAC sector. (These services are provided in the acute hospital system.) Sample characteristics for both groups are listed in Table 1.

Outcome measures included all resident hospitalizations and subgroups classified as medical or surgical admissions. The evaluation did not include an analysis of potentially avoidable admissions, although the subanalysis attempted to describe medical admissions, which were more likely due to exacerbation of chronic illness and therefore potentially avoidable, and surgical admissions, which would have been less likely to be potentially avoidable. Outcomes were analyzed in the intervention and comparison groups 12 months before the program's start (September 1, 2006 to August 31, 2007) and 12 months after the intervention commenced (April 1, 2008 to March 31, 2009) after the initial 7-month program setup phase (September 1, 2007 to March 31, 2008). Table 1 provides descriptive statistics of participating institutional characteristics. Facilities were matched according to care level and facility size before randomization to account for differences in staffing levels of low- and high-level facilities, although reports indicate no difference in hospitalization rates for rest home or private hospital facilities.[25]

Table 1. Characteristics of Facilities Participating in the Residential Aged Care Integration Program (Type, Size, Mean Resident Age, Hospitalizations, Acute Hospital Bed Days)

Characteristic	Intervention Facilities, n = 29	Comparison Facilities, n = 25 n (%)
Beds, n	1,425	1,128
Facility type, n (%)		
Combined low- and high-level care	8 (27)	5 (20.0)
Low-level care only (rest home[a])	15 (51)	16 (64)
High-level care only (private hospital[b])	5 (17)	3 (12)
Dementia care only	1 (3)	1 (4)
Care level, n (%)		
Rest home	760 (53)	650 (58)
Private hospital	562 (39)	420 (37)
Dementia care	103 (7)	58 (5)
Resident age, mean ± standard deviation (range)		
Before intervention	85.0 ± 6.8 (65–101)	85.5 ± 6.9 (65–102)
After intervention	84.3 ± 7.7 (65–105)	84.7 ± 6.5 (65–99)
Hospitalizations, n		
Before intervention	615	364
After intervention	710	578
Total bed days, n	520,125	411,720

[a]Twenty-four-hour residential care but not 24-hour registered nurse care.
[b]Twenty-four-hour residential care and 24-hour registered nurse care.

Because of the quality improvement nature of the intervention and the need to provide equitable access to all facilities within the district, no power analysis was performed. The rate of hospital admissions is expressed as the number of admissions per 1,000 RAC bed days to allow for comparable rates across facilities. A subgroup analysis was also conducted for medical versus surgical admissions. The rate ratios (RR) between time periods (before or after intervention) were calculated using Poisson regression and linear regression analyses. Statistical analysis was performed using R (version 2.15.2; R Project for Statistical Computing, Vienna, Austria).

RESULTS

There was no statistically significant difference in the hospital admission rate between intervention and comparison groups during the preintervention period ($P = .07$). For the comparison group, the admission rate for the postintervention period was greater than that for the preintervention period ($P < .001$). In contrast, for the intervention group, the admission rate for the postintervention period was not statistically different from that of the preintervention period ($P = .17$).

In the postintervention evaluation period, there was increased hospitalization rate for intervention and comparison facilities. There was no difference in the rate of hospitalization before or after the intervention between the two groups, but the comparison group admission rate for the postintervention period was 59% greater than for the preintervention period. The intervention group rate increased just 16% in the postintervention period over the preintervention period. After adjusting for number of beds, the change in admission rate (post–pre) was significantly less for the intervention group than for the comparison group (RR-0.73, 95% confidence interval (CI) =0.61–0.86, $P < .001$) (Table 2). The mean difference in admissions (post–pre) was less for the intervention group than the control group ($P = .04$). The mean admission increase per facility (controlled for the mean total beds) was 8.76 for the comparison group and 3.10 for the intervention group was. Thus, the mean difference was 5.66 admissions less per facility for the intervention group than for the comparison group (95% CI = 0.38–10.94).

Subgroup analysis of medical admissions showed a significantly lower RR for the intervention group than the comparison group (RR = 0.67, 95% CI = 0.56–0.81, $P < .001$). No difference was found in the rate in surgical admissions (RR = 1.0, 95% CI = 0.68–1.46).

DISCUSSION

The RACIP quality improvement intervention used GNSs to provide clinical support, education, clinical coaching, and care coordination to registered nurses and care assistants in RAC facilities. During the study period, the hospitalization rate increased for the intervention and comparison groups, although the intervention group hospital admission rate change was significantly less than that of the comparison group. This study took a quality improvement approach developed in collaboration with the RAC facility staff to foster an intervention that was relevant and readily applicable. The strength of this evaluation study is that the intervention and comparison groups were randomized, which is rare in evaluations of these types of programs.[17] The ability to use the NHI to investigate hospitalization rates, rather than relying on facility self-report, increased reliability of the data. Although generalizability of the results is limited because of methodological and international healthcare system variation, this study adds to the growing body of evidence regarding the effectiveness of long-term care outreach to improve quality and decrease potentially avoidable hospitalization.[17,20–22]

The finding of increased postintervention hospitalization for the intervention and comparison groups is unusual, although the results are consistent with a reported 24% increase in hospitalization for RAC residents between 2005 to 2008 in New Zealand.[25] The reason for this increase in hospitalization rates is unclear, but it may be related to the increasing dependency of aged care residents.[6] The RACIP intervention outcome supports the assertion that outreach and support for staff working in long-term care may be a way to slow the increase in hospitalization rates for frail older people living in aged care facilities. Although these positive results appear modest, in this large population, they can result in significant cost savings. If the intervention group had experienced the same 59% increased rate as the comparison group, there would have been 268 more hospitalizations annually. The

Table 2. Acute Hospital Admission Rate 1 Year Before and After Residential Aged Care Intervention Program (per 1,000 bed days)

Admissions	Preintervention Rate	Postintervention Rate	Pre/Post Admissions Ratio[a] (Increase, %)	Rate Ratio (95% Confidence Interval)	*P*-Value
Total					
Intervention facilities	1.18	1.37	1.16 (16)	0.73 (0.61–0.86)	<.001
Comparison facilities	0.88	1.40	1.59 (59)		
Medical					
Intervention facilities	0.95	1.07	1.13 (13)	0.67 (0.56–0.81)	<.001
Comparison facilities	0.70	1.17	1.69 (69)		
Surgical					
Intervention facilities	0.24	0.29	1.24 (24)	1.00 (0.68–1.46)	.99
Comparison facilities	0.19	0.24	1.24 (24)		

[a]Ratio of admissions before and after intervention.

average length of stay for aged care residents is approximately 5 days (a total of 1,340 hospital days annually), and each hospital day is estimated to cost NZ$800, so this reduced rate would result in approximately NZ$1,072,000 hospital cost savings annually, covering the cost of the program by more than three times. These cost estimates are conservative because they do not include the non-government-funded residents (~30% of residents). These results demonstrate that an outreach program facilitated by a GNS may significantly affect hospitalization rates and potentially lower healthcare costs.

The RACIP program had components similar to those of other RAC outreach interventions. The RACIP program was used as the basis for clinical coaching and used a work group of facility nurses and managers to develop the Registered Nurse Care Guides[24] to assist registered nurses in early assessment and management of typical gerontology issues. The Interventions to Reduce Acute Care Transfers (Interact II)[22] intervention used a similar consultative method to develop tools to help nurses identify, document, and communicate changing health status of residents. Unlike the Interact II program, the RACIP program did not include interventions targeted to primary care providers. Interact II used a facility champion who teleconferenced with an experienced nurse practitioner every 2 weeks, rather than RACIP's GNS scheduled on-site visits every other month and ad hoc visits as needed. The Interact II study used a same-group pre/postdesign and found a 17% decrease in hospitalization after the intervention. The RACIP evaluation used a more-robust randomized comparison group design than the Interact II study and government-held hospital utilization databases. In comparison, a potential weakness of the Interact II trial is that hospitalization data were gathered through facility self-report, which may have affected the reliability of the reported rates, particularly because the comparison facilities reported lower hospitalization rates than the intervention group.[22] In a replication study, the Interact NY trial also used a pre/postintervention design and found a nonsignificant 27% fewer hospitalizations for those with the highest hospitalization rates before the start of the intervention.[26]

A previous study reported that a randomized controlled trial of proactive monthly interventions by a GNS increased overall quality of care for facilities deemed in need of improvement, although staff retention was not affected. Effect on hospitalization was not included in the evaluation.[20] This intervention was similar to RACIP because it focused on specific quality concerns common to older residents such as weight loss and pressure ulcers, although the GNS provided monthly on-site supervision, in comparison to RACIP's bimonthly visits and ad hoc visits as requested. The RACIP model is complementary to the approaches described above, although a more-comprehensive, multifaceted intervention may be more effective.

An evaluation of the Evercare program found that nurse practitioners providing on-site primary health care resulted in approximately half as many hospitalizations as in comparison facilities.[19] This intervention was much more intensive than the RACIP intervention. Registered nurse practitioners in New Zealand are new (since 2001); few specialize in the care of older people, and even fewer currently work in RAC full time. A strength of the RACIP program is that it integrates secondary care gerontology specialists employed by the district health board across healthcare boundaries into RAC facilities. A higher-intensity intervention such as Evercare may have a greater effect on hospitalization, but the RACIP program provided a means of implementing specialist gerontology nursing outreach across a large district health board within the constraints of available advanced nursing expertise and healthcare budgets.

There are study design limitations because of the quality improvement nature of the study. This study did not use a clustered randomized approach, nor were the researchers, clinicians, or facilities blinded. There are factors, such as the cluster effect of the facilities and individual resident factors (age, sex, care level, comorbidities, mortality), that cannot be accounted for with the data available and the analysis methods used. Using the NHI database meant that only residents receiving government funding were included in the analysis. This evaluation did not include an analysis of potentially avoidable acute admissions. The RACIP program was delivered in a universal access healthcare environment, and therefore the generalizability of the program outcomes to a fee-for-service environment may be limited.

CONCLUSION

Individuals working with the frailest older people in RAC settings are often isolated and have difficulty implementing evidenced-based quality improvements.[27] The RACIP intervention provided an efficient means of integrating advanced gerontology nursing expertise to support registered nursing and care assistant staff across several facilities throughout a large geographic region. The improved staff skill and knowledge may have translated into a significant difference in hospitalization rates for intervention facility residents. The evaluation results may also indicate that the RACIP program had more of an effect on hospital admissions that were potentially avoidable (medical admissions), such as congestive heart failure, than for surgical admissions such as fractures, upon which staff may not have any preventive effect. Overall, the RACIP program has received a positive response from facility staff and was helpful in integrating services for frail older people across the secondary and primary healthcare divide, as well as potentially promoting wellness of residents. More research and refinement is needed regarding outreach programs to support RAC staff in the future.

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Author Contributions: Michal Boyd, Janet Parker, Carole Pilcher, Martin Connolly, and Barbara McKenzie-Green initially conceived the intervention. Michal Boyd developed and led the evaluation study in consultation with Martin Connolly. Michal Boyd conceived and drafted the paper. Delwyn Armstrong managed study data, and Lifeng Zhou undertook the initial data analyses and reviewed the final study statistical results. All authors assisted in writing and critically reviewing the paper and contributed academic content. All authors had full access to all of the data and results of analyses and vouch for the study's integrity and accuracy of the data analysis.

Sponsor's Role: Waitemata District Health Board approved the design of the intervention and evaluation.

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