Advanced Practice Nurse Strategies to Improve Outcomes and Reduce Cost in Elders with Heart Failure

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ABSTRACT

The aim of this study was to investigate whether, in a randomized controlled trial (RCT) of vulnerable elders with heart failure (HF), advanced practice nurses (APNs) who were coordinating care in the transition from hospital to home could improve outcomes, prevent re-hospitalizations, and reduce costs when compared with usual care. The APN strategies focused on improving patient and family or caregiver effectiveness in managing their illnesses, strengthening the patient–provider relationship, and managing comorbid conditions while improving overall health. The results were positive. By capitalizing on the patient’s desire to achieve their identified goals, APNs successfully educated patients about the meaning of their symptoms and appropriate self-management strategies; improved patient-provider communication patterns; and marshaled caregiver and community resources to maximize patient adherence to the treatment plan and overall quality of life. While HF was the primary reason for enrollment in the study, optimal health outcomes demanded a strong focus on integrating management of comorbid conditions and other long-standing health problems. Specific strategies used by the APN to achieve these positive outcomes are addressed in this report. These strategies are compared with nursing interventions used in other RCTs of HF home management. Directions for future research are explored. (Disease Management 2006;9:302–310)

INTRODUCTION

Research examining the problems elders face in the transition from hospital to home has demonstrated that these patients are at increased risk for poor outcomes (including preventable rehospitalizations) because of ineffective self-management, and poor inter-provider and provider-patient communication.¹ Elders at highest risk for post-discharge problems include those with multiple chronic and comorbid conditions, disabling symptoms, highly complicated management protocols, and inadequate self-management skills.² A growing body of research has provided clear evidence that an advanced practice nurse (APN), who coordinates care collaboratively with the patient’s healthcare team while the patient is hospitalized and during the immediate period post-discharge to home, will prevent complications and errors, and improve outcomes while reducing the cost of care.³–⁶

A recently completed randomized controlled trial (RCT) from our team’s program of transitional care research⁴ demonstrated that, for elders with heart failure (HF), the APN intervention was effective in increasing the length of time between hospital discharge and readmission or death, re-

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ducing readmissions, and decreasing overall healthcare costs. Intervention patients also experienced some improvement in quality of life, physical function, and patient satisfaction. Similar reductions in rehospitalization rates were seen in our team’s prior studies of patients with a variety of medical and surgical conditions with shorter interventions. The most recent RCT was conducted because, for elders with HF, the positive effects of delayed or prevented rehospitalizations were not sustained beyond the 1-month intervention period. By extending the length of time of the home care intervention to 3 months and recruiting APNs with significant HF expertise, we demonstrated that this comprehensive nurse-directed, collaborative, home-based management program improved outcomes for up to 52 weeks of follow-up after an acute episode of HF.

Our original analysis of this research did not include detailed identification of the strategies that the APNs used with the 118 intervention patients to achieve these outcomes. The purpose of this report is to examine interventions used by APNs to improve patient or caregiver self-management skills, provider understanding of patient needs, and overall management of HF and comorbid conditions.

METHODS

During the RCT, APNs followed a protocol that directed them to visit the patient daily while hospitalized, collaborate with the patient’s healthcare team and family to ensure optimum discharge planning, and visit the patient in the home within 24 h of discharge, at least weekly for the first month, and at least bimonthly for the next 2 months. Patients and caregivers had telephone access to APNs between visits. APNs had complete flexibility to visit or phone the patient as often as needed to achieve care goals. Guided by national evidence-based practice guidelines available at the time, such as the Agency for Health Care Policy and Research’s 1994 Heart Failure guideline, APNs focused on identifying and managing patients’ unique needs related to HF and comorbid conditions. They wrote detailed progress notes describing patient assessment findings, problems and needs, provider interactions, and APN interventions. Summary case studies also were completed. APNs had access to experts in HF, pharmacology, and nutrition. They discussed challenging cases in bi-monthly conferences attended by the domain expert of the issue to be discussed. Therefore, subject case summaries, notes from case conferences, APN summaries of major issues, and APN interviews comprised the data sources for this report. The authors were actively engaged in all aspects of this project, serving as the study’s principal investigator (M.D.N.); intervention APN (M.B.B.); and co-investigator in charge of clinical protocol development, APN training, and case conference leader (K.M.M.).

Statistical analysis

In the original RCT group-specific Kaplan-Meier survival curves and proportional hazards regression were used to assess group differences in rehospitalization rates and factors such as co-morbid conditions that affected rehospitalization.

RESULTS

The analysis revealed that APN interventions focused on three domains: patient and family or caregiver effectiveness; the patient-provider relationship; and management of co-morbid conditions and improving overall health. While the primary focus of the study was management of HF, the vast majority of patients had multiple, active comorbid conditions that complicated their HF and put them at risk for poor outcomes. APNs were particularly effective in reducing rehospitalizations related to these comorbid conditions (p < 0.013). APN activities focused predominantly on individualized patient assessment, enhanced patient-provider communication, targeted interventions to improve self-management, and improved access to resources. Comprehensive assessment included identification of the patient’s specific constellation of HF signs and symptoms and the contribution of any comorbid conditions to the patient’s symptom pro-
Sources and strength of social support were assessed including the patients’ caregiver network, current access to and use of services available for the aged in the community, and their access to transportation, supermarkets, pharmacies, and other services. Environmental safety assessment included risk for falls and neighborhood safety.

Patient education began with an assessment of knowledge base, learning capabilities, and learning styles. With up to 3 months to influence learning and behaviors, the APN was able to plan knowledge and skill development over time. APNs had the option of audiotaping patient education sessions and leaving the tape with the patient for later review. If patients did not have access to a tape recorder, one was provided as was a digital scale to support monitoring of daily weights. Videotapes and pamphlets from recognized sources such as the American Heart Association were given to patients. The focus of education was on learning comprehension and behavioral change. To this end, all patients participated in the development of two management plans: their overall plan for managing their HF and comorbid conditions, and a “911 plan,” which covered actions to take should symptoms worsen. The goal was to educate patients to detect subtle worsening of their specific symptoms and intervene before emergent care was needed. Patients were taught how to access their physician, which physician to contact for which symptoms, and when and how to move quickly to emergent care.

Significant barriers to adherence and behavioral change were encountered. While overt cognitive impairment made a patient ineligible for the study, more subtle cognitive changes interfered with some patients’ learning. Other barriers included inadequate reading skills, poor visual acuity, lack of ability or interest in cooking and subsequent restaurant eating and/or poor nutrition, and lack of access to medications. Medication nonadherence was related to the cost of medications, patient inability to leave home to go to a pharmacy, lack of pharmacy delivery systems, and lack of a system to organize medications with reminders to take them. An overarching barrier that affected self-management was some patients’ lack of acceptance that they had chronic conditions. It was common that once patients felt better, their adherence to the management plan deteriorated. APNs were instrumental in helping patients see connections between behavior and symptoms, such as taking diuretics as prescribed and improved exercise tolerance or increased sodium intake and worsening ankle edema.

Therefore APNs used multiple strategies to improve patient self-management including education about the chronic nature of their illnesses, practical solutions such as pill organizers and patient-specific prompts to remember to take them, and detailed nutrition counseling sessions with the patient or whoever does the cooking. The APNs took patients to grocery stores to teach them to read food labels and make healthier choices within their budget constraints, collected menus from local restaurants to teach patients to choose foods more wisely, and focused on helping patients see the relationship between worsening HF symptoms and recent food choices or medication nonadherence. Community resources such as Meals on Wheels and medication financing systems that the patient was eligible for were used. Pharmacies that delivered were identified and a relationship between the patient and a particular pharmacist was established. Patients were taught to identify signs and symptoms of improving versus worsening HF and other illnesses. Based on their specific situation their management plan included symptoms that could be managed with behavioral change, such as further salt and water restriction, versus those that required physician notification or even accessing emergency care.

Because APNs worked out of home care agencies affiliated with the RCT, they had access to social workers, physical therapists, and psychiatric clinical nurse specialists for consultation about planning patient care and for patient referral as needed.

**Patient goals as key motivator**

The connection between symptoms and recent patient behaviors were made whenever possible with the goal of enabling patients to gain control over their illness. This desire for
control was strengthened by identification of the patient’s goals. These goals became the primary motivator for behavioral change. The APNs determined what the patients wanted, what would bring them happiness, and used these goals to improve patient self-management. For example, one patient with HF, diabetes, and sleep apnea had not been off of the second floor of her home in months, yet she had a strong desire to go to church. The APN used this goal to enhance patient participation in diet management, medication adherence, and a gradual increase in walking endurance. Other patients wanted to avoid nursing home placement and become more functional within their own homes. Taking the focus off of the APN and physician goals for the patient and helping the patient to see the connection between behavioral change and achieving their own goals proved to be the most powerful strategy used by the APNs.

Family and community resources

Subjects in this study came from poor inner-city communities, wealthier suburbs, and isolated rural areas. Family and caregiver supports ranged from highly involved and sometimes overprotective relatives to weak family support but a few caring neighbors. One patient required a weekly injection but nearby family members refused to learn how to administer the injection. The patient’s insurance company denied coverage for home care nurses because the patient was not homebound and could theoretically travel to her physician’s office for the injection. This plan, however, required the patient to take two buses and proved exhausting. The APN was able to identify a neighbor who was willing to learn to administer the injection and the problem was resolved. Another patient whose wife had dementia had difficulty focusing on learning to manage his own problems because he was overwhelmed with his wife’s care. The APN arranged for the wife to attend a community agency providing day care for elders with dementia for several hours per week, providing the patient with needed respite care. The APN timed his visits to coincide with times when the patient was relieved of caregiver responsibilities.

Strategies to strengthen the patient-provider relationship

The RCT described here recruited patients from six hospital sites and five home care agencies. Hence, APNs needed to establish relationships with multiple physicians, most of whom had little experience with this particular APN role. We identified physician consultants in each hospital and used them to learn about the physician structures in place, for advice on establishing relationships with physicians, and to communicate the overall goals of the study. However, the APNs were ultimately responsible for educating individual physicians about the goals and benefits of the study and for establishing the relationships needed to enhance patient care. This was most effectively accomplished by accompanying patients to their first post-discharge physician office visit. During this visit, the APNs learned about the physician’s plan for managing the patient, demonstrated their ability to influence the patient to participate more effectively as a partner in management, and coached the patient to communicate more effectively with the physician. APN communication during this visit was generally effective in establishing the partnership between the patient, the physician, and the APN.

Several challenges emerged. APNs worked with patients who made conscious decisions not to take medications as prescribed (eg, reducing diuretic doses or skipping doses on days when an activity was planned) and refused to share this information with the physician. APNs guided patients in understanding how they would benefit from a management plan based on best practice and open communication that considered their individual needs. They coached patients to communicate their needs and actions to the physician and they worked with physicians to develop greater insights into patients’ broader needs and become more flexible and creative in management strategies. Sometimes the treatment regimen caused worsening of symptoms (eg, initiation of carvedilol) and increased risk of rehospitalization. APNs and physicians collaborated by increasing the frequency of APN home visits to monitor and support patients, and identifying
a plan for managing worsening symptoms. We discussed these challenges during case conferences and sought the opinion of relevant experts. Ultimately, we found that this experienced group of APNs possessed the knowledge and skill to work effectively and enhance patient and provider communication. With rare exceptions, APNs found physicians to be superb partners in care. The physicians quickly realized that, with APN support, difficult patient management problems had potential for resolution.

Management of comorbid conditions and improving overall health

The challenges presented by the patients' comorbid conditions and the need to improve overall health outcomes emerged as the third domain of this analysis because, while we began this study to improve outcomes in HF, we quickly learned that elders must manage HF within the context of other illnesses and health problems. Many patients with HF also suffered from diabetes, chronic lung disease, atrial fibrillation, and/or arthritis. APNs worked closely with patients and their caregivers to identify the meaning of symptoms, and they became close partners with physicians in identifying optimum treatment strategies. For example, APNs helped patients who had HF and chronic lung disease become more adherent in their use of prescribed inhalers, and used physical assessment skills to sort out the contribution of HF versus lung disease in interpreting worsening shortness of breath. Diabetes patients faced enormous challenges in managing the complexities of a diet that addressed both health problems. APNs helped patients use diet diaries to track food intake, taught them to make better choices within their food preferences, and enabled them to see the connections between what they ate and drank and their symptoms and blood glucose levels. By accompanying the patient to selected physician office visits, they coached the patient in communicating progress, needs, and preferences, and partnered with the physician in enabling the treatment plan to become part of the patient's lifestyle.

Problems with substance abuse emerged as a significant health concern. Excessive alcohol intake, continued smoking, and long-standing use of prescribed antianxiety and narcotic pain agents contributed to patients' symptoms and interfered with achieving optimal function. Many times, neither the patient nor the physician understood why the patient was taking antianxiety or narcotic agents. Evaluating the cause and impact of symptoms of depression was complicated by use of these agents. APNs were effective at working with physicians and patients to reduce dosages gradually or to discontinue the drug and initiate antidepressant agents if necessary.

We also learned that many patients' functional status was hampered by long-standing effects of deconditioning due to poor exercise habits that now were exacerbated by HF symptoms and the effects of aging. Improving functional status and exercise performance became a goal for most patients. APNs were able to help patients see that enhanced function was related to achieving many of their goals. In collaboration with the patients' physicians, we were able to refer some patients to outpatient cardiac rehabilitation programs but for most patients, gradually increasing walking and other muscle strengthening exercises in the home became the primary focus.

DISCUSSION

This analysis revealed that APN effectiveness may be related to knowing their patients as individuals, developing an understanding of how patients' goals will motivate them to learn to care for themselves more effectively and to persist in effective self-management over time, and improving patient-provider communication. It became clear to us that the strength of the intervention lay in the APN's attention to all of the physical, psychosocial, and financial problems these frail patients face. Their holistic approach considered the interconnectedness of problems and the need for a collaborative, individualized management approach that capitalized on and strengthened patients' capabilities and support systems.
A growing body of research has demonstrated the positive impact of nursing interventions on patient and resource use outcomes during the transition from hospital to home. The outcomes and nursing interventions of several of these RCTs in HF are described in Table 1. Common themes include a strong focus on patient education, symptom identification, and promotion of adherence to the treatment plan.

In earlier publications our research team has described APN interventions using content analysis of APN documentation of subjects with a wide range of medical and surgical conditions,8 an overview of medical and nursing care of patients with HF,9 case study reports of patients with HF,10 and an overview of the transitional care model as applied across our entire program of research.11 Davidson and colleagues recently published a narrative analysis of clinical notes of nurses caring for patients with HF in the home.12 They identified seven strategies including symptom monitoring, enhancing patient self-management, collaborating with health professionals to manage clinical deterioration, helping patients avoid institutionalization, dealing with psychological problems, and helping patients and families cope with dying. There is congruence between the interventions described in these reports and the interventions noted in the RCTs described in Table 1.

In the analysis described here, however, we identified other strategies that may account for our successful outcomes and bear examination in future research. First, we found that identification of the patients’ unique goals and connecting achievement of these goals to health-related behaviors proved to be a powerful force in gaining patient and caregiver partnership in sustained behavioral change. Second, our APNs worked actively to gain the support of the patients’ physicians as partners in designing the optimum treatment plan and as partners with patients in sustained behavioral change. Research that demonstrates effective strategies in establishing ongoing physician-patient partnerships is needed. Some of our educational strategies (eg, supermarket visits to teach label reading and healthy food choices, giving patients audio-tapes of the teaching session) warrant further investigation and may influence future educational programs. The three domains of APN influence described here (ie, patient and family or caregiver effectiveness; the patient-provider relationship; management of co-morbid conditions and improving overall health) may provide a useful framework for future research designed to improve patient outcomes and identify the specific nursing interventions responsible for those outcomes.

Our team is extending this research in two important directions. We have been funded by the National Institute of Aging and the Ware Family Foundation to test the transitional care model among elders with cognitive impairment. This funding builds on previous funding from the Alzheimer’s Association that enabled us to design and pilot test a cognitive impairment management protocol. Secondly, we are collaborating with some national insurance companies to translate this model into the real world of managed health care. The combined effect of these efforts will be to test strategies for effective, collaborative management of our most vulnerable elders in a real-world practice setting.

This report summarizes the interventions of APNs in optimizing health outcomes of high-risk elders in a cost-effective manner. The problems these patients face test the creativity and knowledge base of highly experienced APNs. It remains to be demonstrated if appropriately prepared nurses without graduate nursing education could achieve similar outcomes. Our current program of research promises to provide insight into this question.

ACKNOWLEDGMENTS

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<th>Reference, design, and subjects</th>
<th>Intervention</th>
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<td>Rich et al, 1995(^{13})</td>
<td>Experienced cardiovascular research nurse implemented program of intensive HF education, use of a teaching booklet, patient consultation with dietician and social worker, medication analysis by gerontology cardiologist to eliminate unnecessary medications/simplify regimen, routine home care plus visits by study specialists.</td>
<td>For subjects who survived initial hospitalization, improved survival was seen in the intervention group (66.9% vs. 54.3%, (p = 0.04)), fewer single ((p = 0.03)) and multiple ((p = 0.01)) readmissions, total readmissions ((p = 0.02)) and readmissions for HF ((p = 0.04)). Quality of life improved for both but significantly more for intervention ((p = 0.001)). Cost of readmission significantly higher in control group ((p = 0.03)).</td>
<td>Focus of intervention: to reinforce patient education, ensure compliance with medications and diet; identify recurrent symptoms that should be treated during outpatient care. Strong focus on simplifying regimen and ensuring compliance.</td>
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<td>Stewart et al, 1998(^{14})</td>
<td>Inpatient visit by study nurse for education about treatment regimen, importance of compliance, and reporting symptoms. One-week post-discharge visit by study nurse and pharmacist for knowledge and compliance assessment and targeted education. Communication with patient’s primary physician regarding patient progress, needs, and ongoing plan.</td>
<td>Both groups’ self-care behaviors improved at 1 month over baseline ((p &lt; 0.001)) but greater improvement seen in intervention patients ((p = 0.001)). Both groups decreased self-care behaviors over time but greater compliance at 3 months ((p = 0.005)) and between baseline and 9 months ((p &lt; 0.001)) seen in intervention group.</td>
<td>Educational focus: remedial counseling, reminder systems to ensure medication compliance, use of weekly medication dosage systems, improved caregiver monitoring, medication information and reminder cards, referral to community pharmacist for ongoing education/support, referral to physician if clinical deterioration.</td>
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<td>Study</td>
<td>Design and Intervention</td>
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<td>Harrison et al, 2002</td>
<td>RCT testing a 12-week nurse-led intervention using a structured protocol compared with usual home care. Intervention n = 92, usual care n = 100. Outcomes measured at baseline, 2, 6, and 12 weeks.</td>
<td>The same hospital and home care nurses delivered care to both groups. Intervention patients received care via structured protocol emphasizing transitional care and self-management. Usual care patients received assessment, monitoring, health teaching, and direct care from home care nurses. Improved MLHFQ total scores for transitional care intervention group at 6 weeks (p = 0.002) and 12 weeks (p &lt; 0.001), physical dimension at 6 weeks (p = 0.01) and 12 weeks (p &lt; 0.001), emotional dimension at 6 weeks (p = 0.006). Intervention patients had fewer emergency department visits (p = 0.003).</td>
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<td>Riegel et al, 2002</td>
<td>RCT testing the effect of a 6-month telephonic case management intervention on hospital readmissions and cost. Intervention n = 130, usual care n = 228. Outcomes measured at 3 and 6 months.</td>
<td>Registered nurse telephonic case management using a decision support software program (Pfizer, Inc) that emphasized management of factors predicting rehospitalization and guided education, data collection, and documentation; organized clinical information and included evidence-based guidelines. Mean number of phone calls = 17. HF hospitalization rates were 45.7% lower in intervention group at 3 months (p = 0.03) and 47.8% at 6 months (p = 0.01). All cause hospitalization rates were 25.6% lower at 3 months and 28.2% lower at 6 months (p = 0.03). Improved patient satisfaction at 6 months (p = 0.01).</td>
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<td>Stewart and Horowitz, 2002</td>
<td>RCT of multidisciplinary home-based intervention (HBI). Intervention n = 149, usual care n = 148, followed for median of 42 years.</td>
<td>Following an acute admission for HF, subjects in HBI group received structured home visit by pharmacist and/or nurse within 7–14 days post-discharge. Some patients received repeat home visits and some patients received additional education about their condition. Intervention subjects: 30% reduction in readmission or death (p &lt; 0.01); increased probability of remaining event-free (p &lt; 0.05) compared with usual care. Greatest effect on preventing readmission occurred in first 6 months (p &lt; 0.001), no difference in 6–24 months but significant (p &lt; 0.05) effects thereafter. Reduced cost of readmissions (p &lt; 0.01) compared with usual care.</td>
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*MLHFQ, Minnesota Living with Heart Failure Questionnaire.*
REFERENCES


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