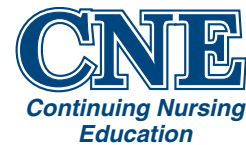


Management of Patients On Hemodialysis Before, During, And After Hospitalization: Challenges And Suggestions for Improvements



Debra Castner

Patients on hemodialysis are hospitalized on average twice per year for a total of 14 days annually (Brophy, Daniel, Gitlin, & Mayne, 2010). As renal function progresses toward CKD Stage 5, the rate of hospitalizations tends to increase (U.S. Renal Data System [USRDS], 2010). End stage renal disease (ESRD) is a predictor of re-hospitalization within 30 days of hospital discharge (Jencks, Williams, & Coleman, 2009).

Patients on dialysis are commonly affected by a multitude of clinical problems that require assessment and continuous monitoring, including anemia, mineral and bone disorder (MBD), malnutrition, inflammation, vascular access-related infection, and volume management. Many of these conditions tend to be overlooked or given a low priority during hospitalization and require intense efforts to restabilize following a hospitalization (Chan, Lazarus, Wingard, & Hakim, 2009; Plantinga & Jaar, 2009). Medication errors (such as omissions, duplications) are highly likely to occur during the transition period between outpatient dialysis centers and hospitals (Cornish et al., 2005; Lewis et al., 2009).

Care coordination, planning, communication, and education are at the core of basic nursing standards of care

Debra Castner, MSN, RN, APNc, CNN, is a Nurse Practitioner, Jersey Coast Nephrology and Hypertension Associates, Brick, NJ, and is a member of ANNA's Jersey South Chapter. She may be contacted via e-mail at renalnlp@hotmail.com

Acknowledgments/Sources of Support: Medical writing and editorial assistance provided by Norma Padilla, PhD, and Sophia Shumyatsky, PharmD, of ApotheCom Associates, and were supported by Affymax and Takeda Pharmaceuticals North America, Inc.

Statement of Disclosure: Debra Castner disclosed that she is a member of the Affymax nephrology nursing advisory board.

Copyright 2011 American Nephrology Nurses' Association

Castner, D. (2011). Management of patients on hemodialysis before, during, and after hospitalization: Challenges and suggestions for improvements. *Nephrology Nursing Journal, 38*(4), 319-330.

Patients on hemodialysis are hospitalized often and are vulnerable to deterioration of health during and after hospitalization. Lack of care coordination between hospital and outpatient dialysis facilities is a contributing factor. Proactive interventions to improve care coordination and the critical role nurses can play before, during, and after hospitalization are discussed.

Goal

To provide an overview of the management of patients on hemodialysis before, during, and after hospitalization.

Objectives

1. List proactive interventions by dialysis staff to improve care coordination of a patient on hemodialysis before, during, and after hospitalization.
2. Explain how poor care coordination and lack of effective communication can hinder a patient's recovery time during and after hospitalization.
3. Describe key programs currently being implemented that have shown success in providing optimal care for the patient on hemodialysis before, during, and after hospitalization.

(American Nurses Association [ANA], 2010). They are also described as competencies in the American Nephrology Nurses' Association (ANNA) *Nephrology Nursing Scope and Standards of Practice*, 7th edition (Gomez, 2011). Standard 5a – Coordination of Care explains the nurse “communicates the plan with other healthcare providers, the healthcare consumer, family, and system through written documentation

and verbal communication, as necessary, during transitions in care;” “advocates for the delivery of dignified and humane care by the interdisciplinary team;” and “documents the coordination of care” (Gomez, 2011, p. 22). Nephrology nurses have the skills, experience, and opportunity to lead successful transitions between sites of care. Successful nursing strategies are discussed in this article.

This offering for 1.4 contact hours is provided by the American Nephrology Nurses' Association (ANNA).

ANNA is accredited as a provider of continuing nursing education (CNE) by the American Nurses Credentialing Center's Commission on Accreditation.

ANNA is a provider approved by the California Board of Registered Nursing, provider number CEP 00910.

Accreditation status does not imply endorsement by ANNA or ANCC of any commercial product.

This CNE article meets the Nephrology Nursing Certification Commission's (NNCC's) continuing nursing education requirements for certification and recertification.

Transitions in Care Between Hospitals and Dialysis Facilities: Medications

Case Study: Mr. C, a 75-year-old male patient on dialysis, suffers a myocardial infarction (MI) and is hospitalized. The dialysis facility is called by the family and informed that the patient is in the hospital. While in the hospital, Mr. C remembers today is his dialysis day and expresses concern to the hospital staff. He has not been seen by a nephrologist, and is concerned about whether the hospital staff will know his dialysis routine. He has also noticed he has been receiving some new medications that he was not taking at home and does not recall receiving his erythropoietin stimulating agent (ESA) or phosphate binder.

Sound familiar? How often have you heard patients tell you upon their return from a hospital stay that they have a new medicine but do not know what it is called or why a medication change was made? Medication omissions and duplications can occur during hospitalizations. In a prospective study of patients admitted to a general internal medicine unit, 54% (81 patients out of 151 admissions) had at least one unintended medication discrepancy, of which 39% were deemed potentially harmful. The most common discrepancy (46%) was the omission of a routinely used drug (Cornish et al., 2005). Communication gaps contribute to the high rate of medication errors during hospitalization. Considering the large number of medications taken by patients on hemodialysis (11 per day in one study [Chiu et al., 2009]), these communication gaps may particularly affect them. While medication reconciliation is a difficult task, it requires proactive collaboration between the patient, caregiver, and healthcare team.

Case Study (cont.): Mr. C's discharge summary includes several new medications the patient was not taking before the hospital admission and contains no mention of a few medications he was taking before the hospitalization. The dialysis facility has not received any communication from the hospital discharge planner. Upon

arriving home from the hospital, Mr. C is confused about what medications he should or should not be taking.

Poor care coordination and lack of effective communication regarding hospital discharge may contribute to medication errors following a patient's return to the dialysis facility. Delayed and incorrect discharge summaries are a common occurrence. In a review of 73 studies, it was found that 66% to 88% of patients visited their primary care physician before the physician had received the detailed discharge summary, forcing the physician to make clinical decisions based on limited documentation and to rely on the patient for additional information. Medications at discharge have been shown to be missing from up to 40% of discharge summaries (Kripalani, LeFevre et al., 2007). Changes to the medication regimen, the rationale for the changes, and whether the changes are intended to be temporary or permanent are often not documented in the discharge summaries (Cua & Kripalani, 2008).

Just prior to discharge, patients are often presented with large amounts of information. Patients' comprehension may be over-estimated due to transient or persistent cognitive impairment (Chen, Chiu, Chen, Cheng, & Huang, 2010; Ehlenbach et al., 2010), as well as anxiety related to their condition. There may not be adequate opportunities for patients or caregivers to ask questions; thus, patients may return home from the hospital without an accurate and comprehensive understanding of their condition and treatment regimen, which can also contribute to medication errors (Cua & Kripalani, 2008).

Interventions to Improve Coordination of Care and Patient Transitions Before, During, And After Hospitalization

Case Study (cont.): Upon Mr. C's return from the hospital to the dialysis facility, he was greeted by the nursing team assigned to his care. He discussed his con-

dition in detail with the nurse practitioner and his primary care nurse. Blood studies were ordered to assess the status of his anemia and mineral bone disorder. The nurse practitioner contacted the hospital case manager to obtain a more detailed account of the patient's clinical course and initiated a medication reconciliation process. The patient and his caregiver (his grandson) participated in "coaching sessions" in which they were encouraged to be actively engaged in disease self-management.

Timely and proactive planning to optimize patient care and minimize risk of oversights can improve patient outcomes after hospitalization (see Table 1). A simple acronym, SEVEN, can be utilized that highlights the timing and important nursing actions: **S**even-day target, **E**valuate data, **V**alidate orders, **E**ducate patients, and **N**ursing assessment and interventions (see Figure 1).

Reconciliation of Medication Lists

Reconciliation of medication lists is key to reducing the risk of adverse drug effects, inadvertent therapy duplications, and harmful drug interactions. Transitions from the dialysis unit, to the hospital, and back to the dialysis unit require interventions to improve reconciliation processes. Select suggestions are listed below (Agrawal & Wu, 2009; Boockvar et al., 2004; Cua & Kripalani, 2008; Plantinga & Jaar, 2009).

- Prior to hospitalization, patients carry a complete medication list at all times in which the purpose and dosing of each medication is noted. This list helps create a complete and accurate prior medication history. The list can be printed out from the dialysis documentation system, prepared as a handwritten list, or written in the patient's notebook/journal. The list can also be placed on a flash drive that the patient or staff can update.
- During hospitalization, discrepancies between new orders and prior medications are identified and explained to the patient and

Table 1
Assessment and Interventions by Dialysis Staff for Before, During, and After Hospitalization

Factor	Before Hospitalization	During Hospitalization	After Hospitalization
Malnutrition Inflammation Dry Weight Volume Status	<p>Assessment:</p> <ul style="list-style-type: none"> Blood pressure (BP), weight and volume status, albumin, normalized protein catabolic rate (nPCR), appetite <p>Intervention:</p> <ul style="list-style-type: none"> Adjust and challenge dry weight as indicated Educate patient: <ul style="list-style-type: none"> Self-assess volume status Diet – Limit salt and fluid Obtain dietary consult Administer nutritional supplements 	<p>Assessment:</p> <ul style="list-style-type: none"> Assess patient's weight and volume status <p>Intervention:</p> <ul style="list-style-type: none"> Adjust and challenge dry weight as indicated Initiate nutritional consult 	<p>Assessment:</p> <ul style="list-style-type: none"> Review discharge summary BP, weight, and volume status, albumin, appetite <p>Intervention:</p> <ul style="list-style-type: none"> Adjust and challenge dry weight as indicated Re-educate patient: <ul style="list-style-type: none"> Self-assess volume status Diet – Limit salt and fluids Review and update Comprehensive Care Plan during interdisciplinary care conference
Care Coordination	<ul style="list-style-type: none"> Communicate patient's current dry weight and nutritional plan Communicate with patient and family during hospitalization 		
Infection	<p>Assessment:</p> <ul style="list-style-type: none"> Signs and symptoms of infection: skin, feet, access, oral cavity, vital signs, complete blood count (CBC), blood cultures Presence of permanent access <p>Intervention:</p> <ul style="list-style-type: none"> Develop plan for permanent access Begin treatment of infection and monitor response 	<p>Assessment:</p> <ul style="list-style-type: none"> Evaluate infection and monitor response to treatment <p>Intervention:</p> <ul style="list-style-type: none"> Continue or begin therapy Initiate access plan 	<p>Assessment:</p> <ul style="list-style-type: none"> Review discharge summary Monitor response to therapy and resolution of infection <p>Intervention:</p> <ul style="list-style-type: none"> Complete antibiotic therapy and obtain surveillance cultures as indicated Assist patient access plan follow up Review and update comprehensive care plan during interdisciplinary care conference
Care Coordination	<ul style="list-style-type: none"> Communicate patient's history, current antibiotic and treatment plan, and access plan Communicate with patient and family during hospitalization 		
Anemia	<p>Assessment:</p> <ul style="list-style-type: none"> Signs and symptoms of anemia: vital signs, fatigue, weakness, CBC, iron profile Causes: blood loss, inflammation, infection, co-morbid conditions <p>Intervention:</p> <ul style="list-style-type: none"> Monitor patient's response to and need to adjust anemia management therapy 	<p>Assessment:</p> <ul style="list-style-type: none"> Identify outpatient anemia management therapy <p>Intervention:</p> <ul style="list-style-type: none"> Continue therapy with ESA and monitor response 	<p>Assessment:</p> <ul style="list-style-type: none"> Review discharge summary Obtain result of last Hb pre-discharge Check Hb/iron status post-hospitalization <p>Intervention:</p> <ul style="list-style-type: none"> Adjust therapy with ESA and Iron Consider use of longer acting ESAs or change in method of administration (IV to SQ) Review and update comprehensive care plan during interdisciplinary care conference
Care Coordination	<ul style="list-style-type: none"> Reconcile current orders for ESA and iron supplementation with (outpatient or inpatient) order and with current Hb level and iron profile 		

Table 1 (continued)
Assessment and Interventions by Dialysis Staff for Before, During, and After Hospitalization

Factor	Before Hospitalization	During Hospitalization	After Hospitalization
Medications	<p>Assessment:</p> <ul style="list-style-type: none"> • Check patient's medication bottles monthly • Patient's understanding of medication and purpose <p>Intervention:</p> <ul style="list-style-type: none"> • Supply patient with updated list of medications and purpose • Educate and empower patient to take charge of medications 	<p>Assessment:</p> <ul style="list-style-type: none"> • Compare outpatient medications to current medication, noting discrepancies <p>Intervention:</p> <ul style="list-style-type: none"> • Reconcile medication list throughout hospitalization • Communicate with patient/family additions or deletions to current medications and reason 	<p>Assessment:</p> <ul style="list-style-type: none"> • Reconcile medication list from discharge with dialysis medication list • Review discharge summary • Assess patient's understanding of medication changes <p>Intervention:</p> <ul style="list-style-type: none"> • Give patient updated list of medications, educate and highlight additions and deletions • Review and update comprehensive care plan during interdisciplinary care conference
Care Coordination	<ul style="list-style-type: none"> • Communicate current medication list • Reconcile differences, highlight changes, and educate patient • Communicate with patient and family during hospitalization 		
Mineral and Bone Disorder (MBD)	<p>Assessment:</p> <ul style="list-style-type: none"> • Calcium, phosphorous, iPTH, evidence of hyperphosphatemia, and diet <p>Intervention:</p> <ul style="list-style-type: none"> • Educate and empower patients to take charge of phosphate binders • Educate patient: <ul style="list-style-type: none"> • Diet • Consequences of MBD 	<p>Assessment:</p> <ul style="list-style-type: none"> • Compare outpatient medications to current medication <p>Intervention:</p> <ul style="list-style-type: none"> • Communicate medication changes to patient/family 	<p>Assessment:</p> <ul style="list-style-type: none"> • Review discharge summary • Assess changes in calcium, phosphorus, iPTH, appetite • Assess patient's understanding of medication changes <p>Intervention:</p> <ul style="list-style-type: none"> • Give patient updated list of medications, educate, and highlight additions and deletions • Review and update comprehensive care plan during interdisciplinary care conference
Care Coordination	<ul style="list-style-type: none"> • Communicate current medications • Reconcile differences, highlight changes, and educate patient 		

caregiver. An explanation of why a medication was changed or replaced with another is done both orally and in writing to avoid patient/caregiver confusion.

- Reconciliation of medication lists occurs throughout hospitalization (especially during transitions in care, such as transfer to another department) and as close to discharge as possible.
- Upon the patient's return to the dialysis facility after a hospitalization, medication lists from the discharge summary are reconciled with the dialysis facility list to confirm there are no duplicate thera-

pies and to address any discrepancies between medications or doses administered during the hospital stay.

Improvement of Communication Practices

Improvements in care coordination are as easy as using a fax alert system to facilitate communication between the hospital and dialysis unit. Other tactics include obtaining access to hospital-based computer systems for read-only information, e-mail communication, daily or weekly conference calls with the hospital case manager, and coordinated discharge

rounds with specific staff caring for the patient. Developing a relationship with acute care nurses for discussion of patient cases allows the nurse in the dialysis unit to keep abreast of how a patient is progressing and to prepare for issues on which to follow up when the patient returns. Calls to the patient or his or her family by the dialysis staff during the hospitalization also helps keep the dialysis team more informed. Additionally, it offers the dialysis staff an opportunity to coach the family or patient in obtaining updated information.

On the day of discharge, the outpatient provider should be informed

Figure 1
Nurses represent the core of care coordination of patients on hemodialysis before, during, and after hospitalization.



that the patient will be discharged and a reconciled medication list provided (via e-mail, fax, telephone, or linked electronic medical records), followed by a detailed discharge summary sent to the outpatient provider no later than one week post-discharge (Cua & Kripalani, 2008; Kripalani, Jackson, Schnipper, & Coleman, 2007; Tjia et al., 2009). Optimally, the discharge summary will communicate relevant elements of the hospitalization, including final diagnosis, short- and long-term medication needs, and future medical appointments.

Another strategy is to identify one person responsible for initiating communication with the transferring facili-

ty, perhaps the primary care nurse assigned to the patient or other member of the team. Further, a dialysis unit policy outlining the review and revision of dialysis orders and medications with the nephrologist or advanced practice nurse on return of the patient to the outpatient dialysis facility can be used to manage the process. Use of a simple checklist can expedite that review (see Table 2), as will assessment of orders and laboratory tests obtained just prior to patient discharge.

In-Person Communication With Patients

Reviewing discharge instructions provides an opportunity to educate

patients about future management plans and can serve as a reinforcement of treatment goals. While keeping explanations simple and avoiding medical jargon, it is important to repeat key points to confirm the patient's and caregiver's understanding. Changes in the patient's medication regimen (such as dosing, introduction or discontinuation of select medications), as well as potential side effects and what to do if they occur are especially important to review. Adequate opportunity for questions and easy-to-understand take-home instructions, which may include audiovisual materials and simple drawings, should be provided as needed (Cua & Kripalani, 2008).

Table 2
Sample Coordination of Care Checklist

Complete within 7 Days of Hospital Discharge	
Check all that apply:	
	ESA agent, dose, or method of administration changed
	Vitamin D analog dose or agent changed
	Phosphate binder placed on hold or dose adjusted
	Heparin dose placed on hold or adjusted
	Dialysis treatment changes: Dialyzer, dialysate, hours, frequency, access in use
	Estimated dry weight/volume assessment changed
	Protein supplement added or other diet changes
	Follow-up labs or tests needed
	Medications: Discontinued, dose changes, new
Patient discharged to home with home care services, or to a rehab or skilled nursing facility. If so, where, duration, treatment provided?	

Following a hospital stay, continued communication with patients is critical. Studies in patients with heart failure demonstrated in-person communication as part of a chronic care management program was more effective than telephone communication in reducing hospital readmission rates (Sochalski et al., 2009). A study of programs aimed at reducing hospitalizations of Medicare beneficiaries with chronic illnesses indicated that the successful programs involved more in-person contact (Brown, 2009). Nurses at dialysis facilities are uniquely positioned for in-person communication at the patient's regularly scheduled dialysis treatments.

Clinical Issues and Strategies

Additional nursing responsibilities include anticipating challenges likely to occur during hospitalization. These challenges include anemia, nutrition, volume control, and infection management.

Anemia

Anemia, manifested as low hemoglobin (Hb) levels, affects nearly 90% of patients receiving dialysis (Di Iorio,

Cirillo, Bellizzi, Stellato, & De Santo, 2007) and is a major risk factor for hospitalization (Vaiciuniene, Kuzminskis, Ziginiskiene, & Petruliene, 2010). Impaired cardiac function and reductions in physical function and exercise capacity are among the many complications of poor anemia control (Eckardt, 2005; Odden, 2004).

Anemia tends to worsen during and after hospitalization (Solid, Foley, Gilbertson, & Collins, 2007; Yaqub, Leiser, & Molitoris, 2001). The greater the length of the hospital stay, the more severe the anemia upon discharge. The drop in the Hb level during hospitalization may be related to numerous factors, including the common presence of co-morbid conditions and procedure-related blood loss (Turenne et al., 2010). Inconsistent anemia management during hospitalization is another contributing factor because doses of erythropoiesis-stimulating agents (ESAs) are often missed (Brophy et al., 2010). Upon patients' return to the dialysis facility post-hospitalization, a prolonged time is needed to reestablish target Hb levels (Solid, Foley, Gilbertson, & Collins, 2004), often requiring large ESA dose increases

(Heung, Mueller, & Segal, 2009; Solid et al., 2007).

Treatment of anemia with ESAs while replenishing iron levels as needed is the current standard of care for raising Hb levels (National Kidney Foundation, 2006a, b). Timely efforts made to ensure adequate Hb levels after discharge include review of the discharge summary (to check date of last administration of anemia medication and Hb level prior to discharge) and adjustment of ESA or iron doses as needed. In a study of patients on hemodialysis, hospital readmission risk was reduced 16% if the ESA dose was adjusted in tandem with a recent Hb level and if done within seven days of discharge (compared with no Hb level check and no adjustment of ESA dose) (Chan et al., 2009).

Use of large ESA doses should be approached with caution. Observational analyses have demonstrated an association between increased ESA doses and adverse outcomes in patients on hemodialysis, although results were likely complicated by confounding factors (Bradbury et al., 2008; Zhang, Thamer, Stefanik, Kaufman, & Cotter, 2004). FDA-approved dosing schedules of ESAs (three times weekly for epoetin [Amgen, Inc., 2010] and weekly [QW] or every two weeks [Q2W] for darbepoetin alfa [Amgen, Inc., 2008]) are often burdensome and pose barriers to continuous management during a hospitalization. Extending the ESA dosing interval is one strategy by which continuity in care between outpatient dialysis centers and hospitals may be improved. For instance, less frequent dosing can lessen the likelihood that the ESA dose will be missed if the patient is hospitalized. In turn, the extent of Hb drop during hospitalization can be expected to be less, thereby shortening time to recovery to prehospitalization Hb levels.

Over the last decade, a few small studies have evaluated the use of shorter-acting ESAs at less frequent dosing intervals in patients on hemodialysis, including epoetin alfa QW (Lee et al., 2008; Locatelli et al., 2008), epoetin beta Q2W (Mircescu

et al., 2006), and darbepoetin every three weeks (Q3W) and every 4 weeks (Q4W) (Jadoul et al., 2004; Trachsler et al., 2009). Results have been mixed, and larger individual ESA doses were required than would typically be used with FDA-approved dosage intervals, thus posing a potential safety risk, as mentioned above.

ESAs intended for once-monthly use in patients on hemodialysis are emerging. Large-scale studies have been conducted with continuous erythropoietin receptor activator (Mircera) administered every 2 to 4 weeks (Carrera et al., 2010; Fliser et al., 2010; Klinger et al., 2007), which is approved but not currently available in the United States (Renal Business Today, 2009), and peginesatide administered Q4W (Schiller et al., 2010), an investigational peptide-based ESA for which phase 3 trials have recently been completed (Schiller et al., 2010; Affymax, Inc., 2010). It will be important to better understand these longer acting agents.

Mineral and Bone Disorder

The dysregulation of vitamin D, calcium, phosphorus, and parathyroid hormone (PTH) levels commonly affecting patients with chronic kidney disease results in mineral and bone disorder (MBD) (causing bone pain, fractures, and tendon rupture) (Achingner & Ayus, 2006; Lam, Shah, & Paparello, 2010) and may contribute to cardiovascular disease-related mortality in patients on hemodialysis (Cuzzolino & Malindretos, 2010; Moe & Chen, 2004). Hyperparathyroidism and hyperphosphatemia have been shown to be associated with all-cause hospitalization, as well as hospitalization for cardiovascular disease and fractures (Block et al., 2004).

During and after hospitalization, MBD-related parameters are monitored, and therapies (such as phosphate binders, vitamin D) are reassessed and adjusted as needed (Plantinga & Jaar, 2009). In a retrospective cohort study of over 80,000 patients on hemodialysis, patients

who received vitamin D therapy within 7 days post-hospitalization had a significantly reduced risk (by 6% after covariate adjustment) for repeat hospitalization compared to patients who did not receive vitamin D therapy. Similarly, patients who were receiving vitamin D therapy prior to hospitalization and discontinued it upon hospital discharge significantly increased (by 9%) their risk of repeat hospitalization compared to patients who continued their vitamin D therapy post-hospitalization (Chan et al., 2009).

Malnutrition, Inflammation, Estimated Dry Weight, And Volume Status

Protein-energy malnutrition, characterized by reduced body stores of protein or inadequate intake relative to nutrient demand, affects 18% to 75% of patients on dialysis. Insufficient nutrient intake, nutrient losses during dialysis, co-morbid illness-induced hypercatabolism (such as cardiovascular disease, infection), and/or dialysis treatments are among the implicated underlying factors. Several of these factors are also linked to inflammation, including infection. Therefore, inflammation exacerbates severity of protein-energy malnutrition (Kalantar-Zadeh, Ikizler, Block, Avram, & Kopple, 2003). Not surprisingly, malnutrition and inflammation, independent predictors of hospitalization (Ikizler, Wingard, Harvell, Shyr, & Hakim, 1999), often co-exist in patients on dialysis, contributing to poor clinical outcomes (Kalantar-Zadeh et al., 2003). C-reactive protein (CRP), ferritin, and albumin are all acute-phase reactants, which are markers of inflammation. Elevations in CRP and ferritin, as well as low levels of albumin, are associated with poor outcomes (Kalantar-Zadeh et al., 2003).

The hospitalization period is often characterized by decreases in albumin and weight (Chan et al., 2009). Low levels of pre-albumin and albumin are markers for protein-calorie malnutrition and linked to poor clinical outcomes in patients on hemodial-

ysis, including all-cause hospitalization, infection-related hospitalization, morbidity, and mortality (Chertow, Goldstein-Fuchs, Lazarus, & Kaysen, 2005).

Increasing the level of albumin through nutritional intervention is associated with lower risk of hospitalization and death in patients on HD (Lacson, Ikizler, Lazarus, Teng, & Hakim, 2007). Proactive interventions, including nutritional counseling, intradialytic parenteral nutrition, encouragement of oral intake, or use of appetite stimulants or dietary supplements can be implemented during routine dialysis care to prevent, alleviate, or treat protein-calorie malnutrition (Kalantar-Zadeh et al., 2003; Plantinga & Jaar, 2009). Identifying the causes of inflammation (such as poor dentition, urinary tract infection, nonsterile dialysate) and treatment with resolution are the ultimate goals (Kaysen & Kumar, 2003). When the patient is hospitalized, nutritional approaches implemented during the pre-hospitalization period can be communicated. This will prompt the request for a nutritional consult during hospitalization, thus helping maintain continuity of care. Following a hospitalization, the renal dietitian can reassess the patient's nutritional status by reviewing the discharge summary and laboratory parameters, and adjusting the nutritional support as needed. Markers of inflammation (such as elevation of CRP or ferritin levels, decline of albumin levels) (Kalantar-Zadeh et al., 2003) should continue to be monitored and underlying causes identified when no improvement is noted (Kaysen & Kumar, 2003).

Potential weight loss during a hospital stay makes volume management an important aspect of care. Both hypervolemia and hypovolemia are associated with negative short- and long-term consequences (Penne, Levin, & Kotanko, 2010; Rout, Sandhu, Khattak, & Goladfarb-Rumyantzev, 2010). The nurse reassesses a patient's dry weight at frequent intervals before, during, and after a hospital stay. Reassessment

and adjustment of target weight within seven days of hospitalization of patients on hemodialysis has been shown to reduce the risk of re-hospitalization (Chan et al., 2009).

Patient education and support are integral aspects of fluid management. Interventions linked to increased likelihood of patient adherence to fluid restriction include patient knowledge, facilitation of self-assessment of fluid status, as well as encouragement and social support (Smith et al., 2010). During routine dialysis visits, focus of patient education by nurses, including the consequences of excess fluid gain, thirst control strategies (such as control of blood sugar), and oral care to prevent dry mouth, increases the likelihood of adherence. Medication review and adjustments of those that may have the side effect of dry mouth (such as clonidine) are helpful fluid management strategies. Patient education also includes an explanation of the symptoms of excess fluid, complications associated with the removal of excess fluid, and the importance of following a prescribed diet (DaVita Dialysis, 2011). Well-informed patients will take control of their fluid management, thereby reducing the likelihood of volume management-related hospitalizations.

Infection/Vascular Access

Infection is a common cause of hospitalization and morbidity in patients on hemodialysis (Allon et al., 2003; Chavers, Solid, Gilbertson, & Collins, 2007). Since 1994, the rate of infection-related hospitalizations has increased by 45.8% (USRDS, 2010). Vascular access is a key contributing factor (Allon et al., 2003; Mix et al., 2003). Patients enrolled in the HEMO study (a randomized, prospective study of 1846 patients on hemodialysis) experienced infection-related hospitalizations at a 35% annual rate; access-related infection represented 23% of these cases. Occurrence of access-related infection was higher in patients using catheters compared with fistulas or grafts, as was the likelihood of infection-related death (Allon et al., 2003).

Recent studies show an increase in fistula-related infections related to buttonhole site preparation (Ball, 2010; Deaver, 2010).

Routine monitoring of vascular access sites in the dialysis center and continued monitoring during and after hospitalization can improve patient outcomes (Plantinga, Jaar, & Astor, 2006). Avoidance of dialysis catheters, and surveillance for and aggressive treatment of all infections in this population is critical in reducing the likelihood of morbidity. Clear communication of infection-related treatment received during hospitalization (such as antibiotic use) is important upon the patient's return from the hospital. Optimally, this information would appear in the patient's discharge summary. Communication of continued therapy after hospitalization is critical. Patients with buttonholes should be educated on appropriate skin preparation and cannulation approaches. Care of patient's access should be coordinated with the acute care dialysis nurses, with particular focus on how to use a patient's buttonhole or how to cannulate to not disrupt the established sites. Admissions can be seen as an opportunity for nurses to coordinate venous mapping, planning, and placing an AV access.

Nurse-Led Initiatives Improve Coordination of Care

The maximum hospitalization rate of patients with CKD Stage 5 occurs in the three months immediately after initiation of dialysis (Mix et al., 2003). RightStart™, a nurse-led initiative, provides patients in their first 90 days of dialysis with education and targets strategies to ensure implementation of best practices. A pilot program implemented by Fresenius Medical Care North America demonstrated positive results over a three-year period (May 2002 through November 2005) for 918 incident patients on hemodialysis compared with 1020 controls (Wingard, 2009). Hospital days "per patient year at risk" were lower in the patients

enrolled in the RightStart program versus controls (2.1 vs. 3.1 days at three months [$p < 0.001$]). This positive effect on morbidity continued for one year: 4.5 versus 6.3 days at six months, and 7.2 versus 10.5 days at 12 months ($p < 0.001$) for RightStart participants versus controls, respectively. Additionally, mortality incidence was lower in RightStart participants versus controls (at three months, 20 deaths per 100 patient-years vs. 39 deaths per 100 patient-years, respectively) (Wingard, 2009).

Based on these positive results, in 2005, the RightStart program was officially opened to the general patient population in more than 200 Fresenius clinics. Over a three-year period (December 2005 through May 2008), 4308 incident patients on hemodialysis were matched to a non-RightStart case control within the same facility who started dialysis within one year of implementation of the RightStart program. Results showed significantly lower first-year hospitalization rates in RightStart participants (15.5 hospital days per patient-year) versus controls (16.9 hospital days per patient-year) ($p < 0.0001$) (Wingard, Chan, Lazarus, & Hakim, 2009). A 22% one-year survival benefit ($p < 0.001$) was noted in RightStart participants versus matched controls, with a survival advantage evident within the first 120 days of dialysis (HR 0.66, $p < 0.0001$) (Wingard et al., 2009).

A similar pilot program, IMPACT™ (Incident Management of Patients, Actions Centered on Treatment), has been implemented in DaVita dialysis facilities (Robertson et al., 2009). The goal of the IMPACT program is to reduce mortality during the first 90 days after initiating dialysis. Program attributes consist of structured processes related to focused patient education, care, and ongoing management. The effect of this program was recently evaluated in an unblinded study of incident patients on hemodialysis in 44 DaVita dialysis clinics. Over a one-year observation period, when compared with patients not in the program ($n = 12,855$), a

Table 3
The Speak Up™ Initiative Urges Patients to Take a Role in Preventing Health Care Errors

S	Speak up if you have questions or concerns. If you still don't understand, ask again. It's your body and you have a right to know.
P	Pay attention to the care you get. Always make sure you are getting the right treatments and medicines by the right healthcare professionals. Don't assume anything.
E	Educate yourself about your illness. Learn about the medical tests you get and your treatment plan.
A	Ask a trusted family member or friend to be your advocate (advisor or supporter).
K	Know what medicines you take and why you take them. Medicine errors are the most common healthcare mistakes.
U	Use a hospital, clinic, surgery center, or other type of healthcare organization that has been carefully reviewed. For example, The Joint Commission visits hospitals to see if they are meeting The Joint Commission's quality standards.
P	Participate in all decisions about your treatment. You are the center of the healthcare team.

Note: The Speak Up Program includes brochures, posters, and buttons with safety topics, including "Help Avoid Mistakes With Your Medicines." See <http://www.jointcommission.org/assets/1/6/speakup.pdf> for more information.

Source: The Joint Commission, n.d.

trend for lower mortality was shown in patients enrolled in the IMPACT program ($n = 417$) ($0.10 \leq p \leq 0.05$ as early as quarter 1; $p \leq 0.05$ in quarter 4) (Robertson et al., 2009).

Another dialysis care provider, Renal Ventures (RV), has recently completed a small, one-year pilot of their face-to-face, 120-day education program, RV Care, for patients who are new to dialysis. The preliminary findings demonstrate a decrease in hospital admissions and mortality rates (T. Parker, personal communication, September 13, 2010).

At the University of North Carolina Kidney Center, a nursing model was initiated to address coordinated care within the clinic, as well as improve care for patients on dialysis when hospitalized and throughout the transitional care process. The model included six nephrology nurses (such as nurse practitioner, vascular access nurse, adult and pediatric transplant nurse), each of whom had a distinct role in a structure that facilitated communication. For example, when a patient is admitted to the hospital, the nurse practitioner serves as a liaison by communicating and coordinating patient information between the

admitting service, the inpatient dialysis unit, and the outpatient dialysis unit to streamline admissions, discharges, and post-discharge dialysis orders (Neyhart et al., 2010).

In addition, many disease management programs have shown positive patient outcomes and decreased readmission rates using RN-based programs. The first report about the Medicare Dialysis Disease Management Demonstration Project revealed a reduction in physician visits and use of skilled nursing facilities, improvement in select processes of care measures, and reduced mortality. Select areas of focus included hypertension, diabetes care, anemia, mineral metabolism, vaccination administration, and home-weight monitoring (Ramirez et al., 2010).

Empowering Patients and Their Caregivers

Case Study (cont.): Six months after returning to the dialysis unit, Mr. C suffered a second MI and was readmitted to the hospital. The primary care nurse and the nurse practitioner in the dialysis facility served as liaisons between the dialysis facility and the hospital (including the

inpatient dialysis facility), fostering two-way timely and accurate communication, and coaching the patient and his caregiver. Mr. C was incapable of engaging in disease self-management on his own; however, his grandson took this role upon himself (for example, providing accurate medication lists, asking questions, ensuring all instructions to the patient were understood). Upon the patient's discharge from the hospital one month later, the primary care nurse at the dialysis facility and the nurse practitioner were responsible for ensuring a smooth transition back to the dialysis facility.

Patients and caregivers are often the only common thread between sites of care. Empowerment of patients and their caregivers contributes to quality care before and during hospitalization, and the transition back to the dialysis facility. Patient empowerment can be achieved through a "coaching" approach, a strategy proven to significantly reduce readmission rates in a randomized controlled trial in adults aged 65 years or older with a variety of medical conditions (Coleman, Parry, Chalmers, & Min, 2006). In this study, a nurse "transition coach" facilitated the self-care roles of both the patient and the caregiver, met with the

patient in the hospital, and followed up (in person or by telephone) at least weekly post-discharge. Rates of re-hospitalization were lower for patients who received the coaching approach compared with patients in the control group (at 30 days: 8.3 vs. 11.9, $p = 0.048$; at 90 days: 16.7 vs. 22.5, $p = 0.04$) (Coleman et al., 2006).

Nephrology nurses can take an active role in coaching and educating patients about their medications, thus empowering them to provide their own "safety net." In 2002, an initiative called Speak Up™ was launched jointly by The Joint Commission and the Centers for Medicare and Medicaid Services urging patients to take a role in preventing healthcare errors by becoming active, involved, and informed participants on the healthcare team (The Joint Commission, n.d.). Free national programs, such as Speak Up (see Table 3), offer ready-made guidance on the steps patients can take to avoid medication (and other medical) errors.

Conclusions

Nephrology nurses can lead the way to implementing numerous proactive interventions before, during, and after hospitalization of patients on hemodialysis to decrease the likelihood of medication-related issues (including missed doses, dosing errors, duplication of medications) and worsening co-morbid conditions during the transition period between hospitals and dialysis facilities. Nurses often have more contact with patients than other clinical personnel and are in an ideal position to optimize assessment, management, and monitoring of clinical issues likely to affect patients on dialysis, including anemia, MBD, malnutrition/inflammation, vascular access-related infection, and volume status. They also serve integral roles in minimizing risk for medication-related issues by reconciling medication lists and improving discharge documentation and practices. Nurse-led initiatives such as the RightStart and IMPACT programs, have demonstrated the positive influ-

ence proactive interventions can have in improving clinical outcomes for patients on dialysis.

Nephrology nurses are encouraged to apply the principles of successful nursing models currently in place to develop site-specific practices and processes to improve quality of care before, during, and after hospitalization of patients on dialysis. Future topics for nursing research include medication continuity, medication errors specific to patients with kidney disease, communication techniques to transition between dialysis centers and acute facilities, and patient empowerment. By ensuring that patients and their caregivers are empowered to contribute to their own health management, timely, effective management of clinical issues is provided, and robust, efficient communication practices are in place to minimize risk of medical/medication errors, nurses can ensure the best possible outcome for their patients transitioning between inpatient hospitalization and dialysis services.

References

Achinger, S.G., & Ayus, J.C. (2006). Left ventricular hypertrophy: Is hyperphosphatemia among dialysis patients a risk factor? *Journal of the American Society of Nephrology*, 17(12, Suppl. 3), S255-S261.

Affymax, Inc. (2010). *Affymax and Takeda announce phase 3 trials meet primary endpoints for investigational drug, Hematide™/Peginesatide, to treat anemia in chronic renal failure with some differences noted in secondary analyses*. Palo Alto, CA: Author.

Agrawal, A., & Wu, W.Y. (2009). Reducing medication errors and improving systems reliability using an electronic medication reconciliation system. *Joint Commission Journal on Quality Improvement*, 35(2), 106-114.

Allon, M., Depner, T.A., Radeva, M., Bailey, J., Beddhu, S., Butterly, D., ... Schwab, S.J. (2003). Impact of dialysis dose and membrane on infection-related hospitalization and death: Results of the HEMO Study. *Journal of the American Society of Nephrology*, 14(7), 1863-1870.

American Nurses Association (ANA). (2010). *Nursing: Scope and standards of practice* (2nd ed.). Silver Spring, MD: Author.

Amgen, Inc. (2008). *Aranesp® (darbepoetin alfa) for injection*. Thousand Oaks, CA: Author.

Amgen, Inc. (2010). *Epogen® (Epoetin alfa) for injection*. Thousand Oaks, CA: Author.

Ball, L.K. (2010). The buttonhole technique: Strategies to reduce infections. *Nephrology Nursing Journal*, 37(5), 473-477.

Block, G.A., Klassen, P.S., Lazarus, J.M., Ofsthun, N., Lowrie, E.G., & Chertow, G.M. (2004). Mineral metabolism, mortality, and morbidity in maintenance hemodialysis. *Journal of the American Society of Nephrology*, 15(8), 2208-2218.

Boockvar, K., Fishman, E., Kyriacou, C.K., Monias, A., Gavi, S., & Cortes, T. (2004). Adverse events due to discontinuations in drug use and dose changes in patients transferred between acute and long-term care facilities. *Archives of Internal Medicine*, 164(5), 545-550.

Bradbury, B.D., Wang, O., Critchlow, C.W., Rothman, K.J., Heagerty, P., Keen, M., & Acquavella, J.F. (2008). Exploring relative mortality and epoetin alfa dose among hemodialysis patients. *American Journal of Kidney Diseases*, 51(1), 62-70.

Brophy, D.F., Daniel, G., Gitlin, M., & Mayne, T.J. (2010). Characterizing hospitalizations of end-stage renal disease patients on dialysis and inpatient utilization of erythropoiesis-stimulating agent therapy. *Annals of Pharmacotherapy*, 44(1), 43-49.

Brown, R. (2009). *The promise of care coordination. Models that decrease hospitalizations and improve outcomes for medicare beneficiaries with chronic illnesses*. New York: The National Coalition on Care Coordination (N3C).

Carrera, F., Lok, C.E., De, F.A., Locatelli, F., Mann, J.F., Canaud, B., ... Dougherty, F.C. (2010). Maintenance treatment of renal anaemia in haemodialysis patients with methoxy polyethylene glycol-epoetin beta versus darbepoetin alfa administered monthly: A randomized comparative trial. *Nephrology, Dialysis, Transplantation*, 25(12), 4009-4017.

Chan, K.E., Lazarus, J.M., Wingard, R.L., & Hakim, R.M. (2009). Association between repeat hospitalization and early intervention in dialysis patients following hospital discharge. *Kidney International*, 76(3), 331-341.

Chavers, B.M., Solid, C.A., Gilbertson, D.T., & Collins, A.J. (2007). Infection-related hospitalization rates in pediatric versus adult patients with end-stage renal disease in the United States.

- Journal of the American Society of Nephrology*, 18(3), 952-959.
- Chen, C.C., Chiu, M.J., Chen, S.P., Cheng, C.M., & Huang, G.H. (2011). Patterns of cognitive change in elderly patients during and 6 months after hospitalisation: A prospective cohort study. *International Journal of Nursing Studies*, 48(3), 338-346.
- Chertow, G.M., Goldstein-Fuchs, D.J., Lazarus, J.M., & Kaysen, G.A. (2005). Prealbumin, mortality, and cause-specific hospitalization in hemodialysis patients. *Kidney International*, 68(6), 2794-2800.
- Chiu, Y.W., Teitelbaum, I., Misra, M., de Leon, E. M., Adzize, T., & Mehrotra, R. (2009). Pill burden, adherence, hyperphosphatemia, and quality of life in maintenance dialysis patients. *Clinical Journal of the American Society of Nephrology*, 4(6), 1089-1096.
- Coleman, E.A., Parry, C., Chalmers, S., & Min, S.J. (2006). The care transitions intervention: results of a randomized controlled trial. *Archives of Internal Medicine*, 166(17), 1822-1828.
- Cornish, P.L., Knowles, S.R., Marchesano, R., Tam, V., Shadowitz, S., Juurlink, D.N., & Etchells, E.E. (2005). Unintended medication discrepancies at the time of hospital admission. *Archives of Internal Medicine*, 165(4), 424-429.
- Cozzolino, M., & Malindretos, P. (2010). The role of vitamin D receptor activation in chronic kidney disease. *Hippokratia*, 14(1), 7-9.
- Cua, Y.M., & Kripalani, S. (2008). Medication use in the transition from hospital to home. *Annals of the Academy of Medicine, Singapore*, 37(2), 136.
- Davita Dialysis. (2011). *How dry weight and fluid gain affect dialysis patients*. Davita Dialysis Web Site [On-line]. Retrieved from <http://www.davita.com/dialysis/treatment/how-dry-weight-and-fluid-gain-affect-dialysis-patients/a/1930>
- Deaver, K. (2010). Preventing infections in hemodialysis fistula and graft vascular accesses. *Nephrology Nursing Journal*, 37(5), 503-505.
- Di Iorio, A., Cirillo, M., Bellizzi, V., Stellato, D., & De Santo, N.G. (2007). Prevalence and correlates of anemia and uncontrolled anemia in chronic hemodialysis patients - The Campania Dialysis Registry. *International Journal of Artificial Organs*, 30(4), 325-333.
- Eckardt, K.U. (2005). Managing a fateful alliance: Anaemia and cardiovascular outcomes. *Nephrology, Dialysis, Transplantation*, 20(Suppl. 6), vi16-vi20.
- Ehlenbach, W.J., Hough, C.L., Crane, P.K., Haneuse, S.J., Carson, S.S., Curtis, J.R., & Larson, E.B. (2010). Association between acute care and critical illness hospitalization and cognitive function in older adults. *Journal of the American Medical Association*, 303(8), 763-770.
- Fliser, D., Kleophas, W., Dellanna, F., Winkler, R.E., Backs, W., Kraatz, U., ... Strack, G. (2010). Evaluation of maintenance of stable haemoglobin levels in haemodialysis patients converting from epoetin or darbepoetin to monthly intravenous C.E.R.A.: The MIRACEL study. *Current Medical Research and Opinion*, 26(5), 1083-1089.
- Gomez, N.J. (2011). *Nephrology nursing: Scope and standards of practice* (7th ed.). Pitman, NJ: American Nephrology Nurses' Association.
- Heung, M., Mueller, B.A., & Segal, J.H. (2009). Optimizing anemia management in hospitalized patients with end-stage renal disease. *Annals of Pharmacotherapy*, 43(2), 276-282.
- Ikizler, T.A., Wingard, R.L., Harvell, J., Shyr, Y., & Hakim, R.M. (1999). Association of morbidity with markers of nutrition and inflammation in chronic hemodialysis patients: A prospective study. *Kidney International*, 55(5), 1945-1951.
- Jadoul, M., Vanrenterghem, Y., Foret, M., Walker, R., Gray, S.J., on behalf of the Darbepoetin Alfa 20000144 Study Group (2004). Darbepoetin alfa administered once monthly maintains haemoglobin levels in stable dialysis patients. *Nephrology Dialysis Transplantation*, 19(4), 898-903.
- Jencks, S.F., Williams, M.V., & Coleman, E.A. (2009). Rehospitalizations among patients in the Medicare fee-for-service program. *New England Journal of Medicine*, 360(14), 1418-1428.
- Kalantar-Zadeh, K., Ikizler, T.A., Block, G., Avram, M.M., & Kopple, J.D. (2003). Malnutrition-inflammation complex syndrome in dialysis patients: Causes and consequences. *American Journal of Kidney Diseases*, 42(5), 864-881.
- Kaysen, G.A., & Kumar, V. (2003). Inflammation in ESRD: Causes and potential consequences. *Journal of Renal Nutrition*, 13(2), 158-160.
- Klinger, M., Arias, M., Vargemezis, V., Besarab, A., Sulowicz, W., Ciechanowski, K., ... Beyer, U. (2007). Efficacy of intravenous methoxy polyethylene glycol-epoetin beta administered every 2 weeks compared with epoetin administered 3 times weekly in patients treated by hemodialysis or peritoneal dialysis: a randomized trial. *American Journal of Kidney Diseases*, 50(6), 989-1000.
- Kripalani, S., Jackson, A.T., Schnipper, J.L., & Coleman, E.A. (2007). Promoting effective transitions of care at hospital discharge: A review of key issues for hospitalists. *Journal of Hospital Medicine*, 2(5), 314-323.
- Kripalani, S., LeFevre, F., Phillips, C.O., Williams, M.V., Basaviah, P., & Baker, D.W. (2007). Deficits in communication and information transfer between hospital-based and primary care physicians: Implications for patient safety and continuity of care. *Journal of the American Medical Association*, 297(8), 831-841.
- Lacson, E., Jr., Ikizler, T.A., Lazarus, J.M., Teng, M., & Hakim, R.M. (2007). Potential impact of nutritional intervention on end-stage renal disease hospitalization, death, and treatment costs. *Journal of Renal Nutrition*, 17(6), 363-371.
- Lam, A., Shah, S., & Paparello, J. (2010). Outpatient management of chronic kidney disease: Proteinuria, anemia and bone disease as therapeutic targets. *Disease-a-Month*, 56(4), 215-232.
- Lee, Y.K., Kim, S.G., Seo, J.W., Oh, J.E., Yoon, J.W., Koo, J.R., ... Noh, J.W. (2008). A comparison between once-weekly and twice- or thrice-weekly subcutaneous injection of epoetin alfa: Results from a randomized controlled multicentre study. *Nephrology Dialysis Transplantation*, 23(10), 3240-3246.
- Lewis, P.J., Dornan, T., Taylor, D., Tully, M.P., Wass, V., & Ashcroft, D.M. (2009). Prevalence, incidence and nature of prescribing errors in hospital inpatients: A systematic review. *Drug Safety*, 32(5), 379-389.
- Locatelli, F., Villa, G., Messa, P., Filippini, A., Cannella, G., De Ferrari, G., ... Conte, F. (2008). Efficacy and safety of once-weekly intravenous epoetin alfa in maintaining hemoglobin levels in hemodialysis patients. *Journal of Nephrology*, 21(3), 412-420.
- Mircescu, G., Garneata, L., Ciocalteu, A., Golea, O., Gherman-Caprioara, M., Capsa, D., ... Covic, A.C. (2006). Once-every-2-weeks and once-weekly epoetin beta regimens: Equivalency in hemodialyzed patients. *American Journal of Kidney Disease*, 48(3), 445-455.
- Mix, T.C., St Peter, W.L., Ebben, J., Xue, J., Pereira, B.J., Kausz, A.T., & Collins, A.J. (2003). Hospitalization during advancing chronic kidney disease. *American Journal of Kidney Diseases*, 42(5), 972-981.
- Moe, S.M., & Chen, N.X. (2004). Pathophysiology of vascular calcifica-

- tion in chronic kidney disease. *Circulation Research*, 95(6), 560-567.
- National Kidney Foundation (NKF). (2006a). *Clinical practice guidelines and clinical practice recommendations for anemia in chronic kidney disease in adults. CPG and CPR 3.2 using iron agents*. Retrieved from http://www.kidney.org/professionals/kdoqi/guidelines_anemia/cpr32.htm
- National Kidney Foundation (NKF). (2006b). *Clinical practice guidelines and clinical practice recommendations for anemia in chronic kidney disease in adults. CPR 3.1 using ESA's*. Retrieved from http://www.kidney.org/professionals/kdoqi/guidelines_anemia/cpr31.htm
- Neyhart, C.D., McCoy, L., Rodegast, B., Gilet, C.A., Roberts, C., & Downes, K. (2010). A new nursing model for the care of patients with chronic kidney disease: The UNC Kidney Center Nephrology Nursing Initiative. *Nephrology Nursing Journal*, 37(2), 121-130.
- Odden, M.C. (2004). Association of chronic kidney disease and anemia with physical capacity: The Heart and Soul Study. *Journal of the American Society of Nephrology*, 15(11), 2908-2915.
- Penne, E.L., Levin, N.W., & Kotanko, P. (2010). Improving volume status by comprehensive dietary and dialytic sodium management in chronic hemodialysis patients. *Blood Purification*, 30(1), 71-78.
- Plantinga, L.C. & Jaar, B.G. (2009). Preventing repeat hospitalizations in dialysis patients: A call for action. *Kidney International*, 76(3), 249-251.
- Plantinga, L.C., Jaar, B.G., & Astor, B. (2006). Association of clinic vascular access monitoring practices with clinical outcomes in HD patients. *Nephron Clinical Practice*, 104(4), c151-c159.
- Ramirez, S., Pearson, J., Dahlerus, C., Cheu, C., Port, F.K., Robinson, B., ... Gomes, S. (2010). *End stage renal disease (ESRD) disease management demonstration evaluation report: Findings from 2006- 2008, the first three years of a five-year demonstration*. Washington, DC: The Centers for Medicare & Medicaid Services.
- Renal Business Today. (2009). *Roche could start selling Mircera in the U.S. in mid-2014*. Retrieved from <http://www.renalbusiness.com/news/2009/12/roche-could-start-selling-mircera-in-u-s-in-mid-2.aspx>
- Robertson, J.A., Goel, P., Chen, G., Levine, R., Benner, D.A., & Burden, A. (2009). *Effect of IMPACT Program on mortality among incident hemodialysis patients*. Abstract presented at the 42nd Annual Meeting and Scientific Exposition of the American Society of Nephrology, San Diego, CA.
- Rout, P., Sandhu, G.S., Khattak, M., & Goladfarb-Rumyantzev, A. (2010). Advances in volume monitoring in dialysis patients. *Miverva Urologica E Nefrologica*, 62(1), 13-27.
- Schiller, B., Locatelli, F., Covic, A.C., Martin, E.R., Clark, R.V., Zeig, S., ... Besarab, A. (2010). Primary results from two phase 3 randomized, active-controlled, open-label studies (EMERALD 1 and EMERALD 2) of the safety and efficacy of Hematide™/Peginesatide for the maintenance treatment of anemia in patients with chronic renal failure who were receiving hemodialysis and were previously treated with epoetin alfa or epoetin beta. *Journal of the American Society of Nephrology*, 21, 2b.
- Smith, K., Coston, M., Glock, K., Elasy, T.A., Wallston, K.A., Ikizler, T.A., & Cavanaugh, K. L. (2010). Patient perspectives on fluid management in chronic hemodialysis. *Journal of Renal Nutrition*, 20(5), 334-341.
- Sochalski, J., Jaarsma, T., Krumholz, H.M., Laramee, A., McMurray, J.J., Naylor, M.D., ... Stewart, S. (2009). What works in chronic care management: The case of heart failure. *Health Affairs*, 28(1), 179-189.
- Solid, C.A., Foley, R.N., Gilbertson, D.T., & Collins, A. (2004). Reaching target hemoglobin after hospitalization for incident hemodialysis patients. *Hemodialysis International*, 8(1), 92.
- Solid, C.A., Foley, R.N., Gilbertson, D.T., & Collins, A.J. (2007). Perihospitalization hemoglobin-epoetin associations in U.S. hemodialysis patients, 1998 to 2003. *Hemodialysis International*, 11(4), 442-447.
- The Joint Commission. (n.d.). *Speak Up Program*. Retrieved from http://www.jointcommission.org/assets/1/6/speak_up.pdf
- Tjia, J., Bonner, A., Briesacher, B.A., McGee, S., Terrill, E., & Miller, K. (2009). Medication discrepancies upon hospital to skilled nursing facility transitions. *Journal of General Internal Medicine*, 24(5), 630-635.
- Trachsler, J., Gluck, Z., Dickenmann, M., Gauthier, T., Brunisholz, M., Martin, P.Y., ... Wuthrich, R.P. (2009). Parameters for successful monthly extended dosing of darbepoetin-alfa in patients undergoing hemodialysis. *Clinical Nephrology*, 71(6), 697-702.
- Turenne, M.N., Hirth, R.A., Messina, J.M., Turner, J.S., Sleeman, K.K., & Wheeler, J.R. (2010). When payment systems collide: The effect of hospitalization on anemia in renal dialysis patients. *Medical Care*, 48(4), 296-305.
- U.S. Renal Data System (USRDS). (2010). *United States Renal Data System 2010 annual data report. Atlas of end-stage renal disease in the United States*. Bethesda, MD: National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, Division of Kidney, Urologic, and Hematologic Diseases.
- Vaicuniene, R., Kuzminskis, V., Ziginiskiene, E., & Petruoliene, K. (2010). Risk factors for cardiovascular hospitalization in hemodialysis patients. *Medicina (Kaunas)*, 46(8), 544-549.
- Wingard, R. (2009). Reducing early mortality in patients on dialysis: Lessons from the RightStart Program. *Nephrology Nursing Journal*, 36(2), 215-220.
- Wingard, R.L., Chan, K.E., Lazarus, J.M., & Hakim, R.M. (2009). The "right" of passage: Surviving the first year of dialysis. *Clinical Journal of the American Society of Nephrology*, 4(Suppl. 1), S114-S120.
- Yaqub, M.S., Leiser, J., & Molitoris, B.A. (2001). Erythropoietin requirements increase following hospitalization in end-stage renal disease patients. *American Journal of Nephrology*, 21(5), 390-396.
- Zhang, Y., Thamer, M., Stefanik, K., Kaufman, J., & Cotter, D.J. (2004). Epoetin requirements predict mortality in hemodialysis patients. *American Journal of Kidney Diseases*, 44(5), 866-876.

Nephrology Nursing Journal Editorial Board Statements of Disclosure

In accordance with ANCC-COA governing rules *Nephrology Nursing Journal* Editorial Board statements of disclosure are published with each CNE offering. The statements of disclosure for this offering are published below.

Paula Dutka, MSN, RN, CNN, disclosed that she is a consultant and research coordinator, is on the speaker's bureau, and has sat on the advisory board for Genentech.

Patricia B. McCarley, MSN, RN, NP, disclosed that she is on the Consultant Presenter Bureau for Amgen, Genzyme, and OrthoBiotech. She is also on the Advisory Board for Amgen, Genzyme, and Roche and is the recipient of unrestricted educational grants from OrthoBiotech and Roche.

ANSWER/EVALUATION FORM

Management of Patients on Hemodialysis Before, During, and After Hospitalization: Challenges and Suggestions for Improvements

Debra Castner, MSN, RN, APNc, CNN

1.4 Contact Hours
Expires: August 31, 2013
ANNA Member Price: \$15
Regular Price: \$25

Complete the Following:

Name: _____

Address: _____

Telephone: _____ Email: _____

CNN: ___ Yes ___ No **CDN:** ___ Yes ___ No **CCHT:** ___ Yes ___ No

Payment:

ANNA Member: ___ Yes ___ No Member # _____

Check Enclosed American Express Visa MasterCard

Total Amount Submitted: _____

Credit Card Number: _____ Exp. Date: _____

Name as it Appears on the Card: _____

Posttest Instructions

- Complete the evaluation.
- Send this page to the ANNA National Office; East Holly Avenue Box 56; Pitman, NJ 08071-0056; or fax this form to (856) 589-7463.
- Enclose a check or money order payable to ANNA. Fees listed in payment section.
- A certificate for the contact hours will be awarded by ANNA.
- Please allow 2-3 weeks for processing. You may submit multiple answer forms in one mailing; however, because of various processing procedures for each answer form, you may not receive all of your certificates returned in one mailing.

Submit
Online!

Online submissions through a partnership with HDCN.com are accepted on this posttest at \$20 for ANNA members and \$30 regular price. CNE certificates will be available immediately upon successful completion of the posttest.

Note: If you wish to keep the journal intact, you may photocopy the answer sheet or access this posttest at www.annanurse.org/journal

1. What would be different in your practice if you applied what you have learned from this activity? (Response Required)

GOAL

To provide an overview of the management of patients on hemodialysis before, during, and after hospitalization.

Please note that this continuing nursing education activity does not contain multiple-choice questions. This posttest substitutes the multiple-choice questions with an open-ended question. Simply answer the open-ended question(s) directly above the evaluation portion of the Answer/Evaluation Form and return the form, with payment, to the National Office as usual.

Evaluation	Strongly disagree	2	3	4	Strongly agree
2. By completing this offering, I was able to meet the stated objectives					
a. List proactive interventions by dialysis staff to improve care coordination of a patient on hemodialysis before, during, and after hospitalization.	1	2	3	4	5
b. Explain how poor care coordination and lack of effective communication can hinder a patient's recovery time during and after hospitalization.	1	2	3	4	5
c. Describe key programs currently being implemented that have shown success in providing optimal care for the patient on hemodialysis before, during, and after hospitalization.	1	2	3	4	5
3. The content was current and relevant.	1	2	3	4	5
4. This was an effective method to learn this content.	1	2	3	4	5
5. Time required to complete reading assignment: _____ minutes.	1	2	3	4	5
6. I am more confident in my abilities since completing this material.	1	2	3	4	5

I verify that I have completed this activity _____
(Signature)

