

Patient-Centered Foot Care for Veterans Receiving Dialysis

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A quality improvement project at this VA dialysis unit produced a startling reduction in the incidence of infection and nontraumatic amputation.

Among patients undergoing dialysis for end-stage renal disease (ESRD), the risk of nontraumatic amputation is roughly 10 times that of patients without ESRD.¹⁻⁶ Veterans receiving dialysis who have an additional diagnosis of diabetes or hypertension are at particularly high risk for foot complications and amputations. According to A. O'Hare, MD (written communication, July 2005), among the 8,911 veterans receiving long-term dialysis in fiscal year 2002, the incidence of first amputation was 2.3% among those without diabetes, 3.5% overall, and 6.8% among those with diabetes. These amputation rates are 20 to 30 times higher than for veterans with a glomerular filtration rate of 60 mL/min or greater.

Amputations are known to have a tremendous, negative impact on quality of life. In addition to the burden they place on the patients, the

cost to the VA is sizable. According to former VA Under Secretary for Health Kenneth Kizer, the VA spent \$286,350,276 million on amputations in 1996.⁷ If appropriate foot screening and self-management education can reduce amputations, however, both the personal and financial costs could be diminished substantially.

With this in mind, clinicians at the VA Nebraska-Western Iowa Healthcare System (VA NWIHCS) in Omaha, Nebraska, implemented a quality improvement project that sought to promote both patient-centered care and self-management instruction, 2 central components of the primary care medical home model. When introduced early in the course of diabetes and renal failure of other etiologies, self-management education and the motivational interviewing that is characteristic of patient-centered care serve to mitigate the cardiovascular and neurologic risks that contribute to such devastating outcomes as foot amputation. From the earliest stages of diabetes and renal failure, it is essential that patients understand the importance of smoking-cessation; controlling blood pressure, lipids, and glycosylated hemoglobin; and performing appropriate foot care. Through our project, therefore, we strived to maxi-

mize self-management skills within the context of a patient-centered, foot care program for veterans to use while undergoing dialysis.

A primary goal of our project was to ensure that the VA NWIHCS dialysis unit was meeting the foot care needs of this high-risk patient population. To fill in some of the knowledge gaps, we initiated a retrospective study in 2003. Based on our initial findings, we developed an interactive, computerized, patient education program, focused on foot care self-management and designed a foot care reminder template that would dovetail with the VA's computerized patient record system (CPRS). By using the international classification of disease (ICD) 9 codes for ESRD, as well as for diabetes, the foot care reminder template helped clinical staff identify patients at high risk for foot complications, while enabling them to track and document patients' progress in the CPRS. We introduced the foot care reminder template and the foot care self-management program in October 2004. Prior to this project's inception, although patients undergoing dialysis received foot screens, they were not given education focused on foot care and self-management; clinical staff received no reminders to perform foot screens on patients at high risk for complica-

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Patient Satisfaction Survey						
Thinking about the new computerized foot care educational learning method, how would you rate the following:						
	Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree	
1. The timing of the education, during your dialysis treatment.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Was the foot care staff helpful?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. Information given to me about my foot care was clear and adequate.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. I would recommend the foot care education to my family or friends and other veterans.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5. The staff gave me opportunities to ask questions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6. This provided me with the knowledge I need to care for my feet.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7. I am satisfied with the education I received.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Excellent	Very Good	Good	Fair	Poor	N/A
8. Was the amount of time spent on the computer adequate for the foot care education?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. My evaluation of my ability to manage my foot care is:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Figure 1. The VA's Survey of Healthcare Experience of Patients (SHEP).

tions; and the screening process that was in place failed to align with the CPRS because the CPRS clinical reminders were not turned on and the nurses in dialysis had no access to them.

OBJECTIVES

The objectives of the VA NWHCS foot study were to prevent infection and amputation among veterans who were undergoing dialysis and at high risk for foot comorbidities by: (1) increasing their foot screening and edu-

cation, (2) teaching them foot care self-management using an interactive, computerized, self-study that could be viewed during dialysis, and (3) evaluating their satisfaction with the foot care education they received, as well as its effectiveness in preventing infection and amputation.

Both the VA and DoD Clinical Practice Guidelines on the Management of Diabetes Mellitus in Primary Care⁴ and the 2000 Guidelines for Hemodialysis Adequacy developed by the National Kidney Foundation's

Kidney Disease Outcomes Quality Initiative (KDOQI)⁸ had noted greater survival among patients with ESRD whose hemodialysis enabled them to achieve a urea reduction ratio (URR) of 65% or higher. In addition, Speckman and colleagues⁵ demonstrated that inadequate hemodialysis resulting in a URR of less than 65% is a risk factor for lower extremity amputation among patients with diabetes. In keeping with these findings and guidelines, our foot care self-management program encouraged

VA Foot Care Patient Education Survey Interactive CD-Dialysis Unit

Please, circle answer to the questions and provide written response.

Did you like the new education method of teaching by use of the computer?

1 Completely agree
2 Somewhat agree
3 Not sure
4 Somewhat disagree
5 Completely disagree

Why? _____

Was learning by this computerized method of education more effective for you than reading a booklet or verbal instruction?

1 Completely agree
2 Somewhat agree
3 Not sure
4 Somewhat disagree
5 Completely disagree

If yes, why? _____

If no, why? _____

Would you like to have more teaching by computer with the questions and answers as in this foot care education session today?

1 Completely agree
2 Somewhat agree
3 Not sure
4 Somewhat disagree
5 Completely disagree

Comments:

Figure 2. Patient education survey designed to assess patient satisfaction with the interactive, computerized, patient education program.

patients to complete a hemodialysis dose sufficient to achieve a URR of 65% or higher.

METHODS

The design team, which consisted of a registered nurse (RN), certified diabetes educator (CDE), program assistant with a master's degree in health administration (MHA), 4 consulting medical doctors (MDs), and a doctor of nursing practice (DNP), formulated a plan to provide staff education and demonstrate foot inspection and assessment techniques. Each team member had a different and complementary role in relation to the others. The RN and CDE completed foot screens, tracked data, presented the

foot care self-management program, obtained informed consent, and provided clinical consults. The MHA identified new patients in dialysis, obtained informed consent, and assisted with compiling data. The DNP developed the initial computerized slide show and gave the investigative team permission to modify the program for the study with the addition of information on the relationship between URR and infection and amputation. The consulting MDs provided guidance and direction in formatting the clinical tools and developing a short patient survey, designed specifically to assess patient satisfaction with the new foot care self-management program.

The design team provided clinic and dialysis staff access to the computerized foot care reminder template for charting purposes. The team modified the foot risk clinical reminder to include as risks peripheral vascular disease (PVD) and dialysis, in addition to diabetes, for ease in charting and obtaining such consult services as prosthetics, podiatry, and vascular laboratory services. They developed an in-service for the dialysis staff to demonstrate foot care screening; provided patient education books, pamphlets, posters, and videos from the VA and DoD Diabetes Toolkit to support educational efforts; and educated staff on the use of the interactive foot care self-man-

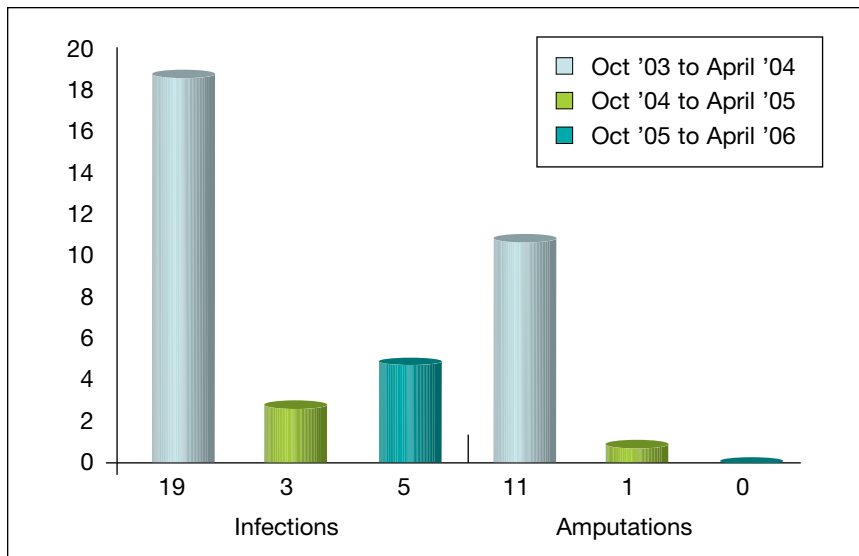


Figure 3. Number of infections and amputations during study periods.

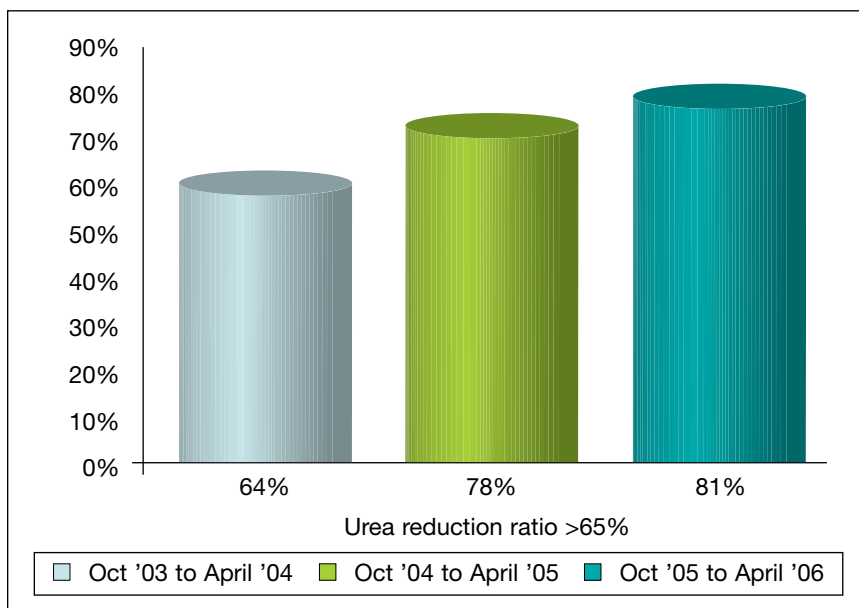


Figure 4. Percentage of veterans who performed more than 65% of dialysis dosing.

agement program developed to educate the patient. The CDE met with the prosthetics staff to review the foot care reminder template and the Preservation-Amputation Care and Treatment (PACT) program directive. This resulted in the prosthetics service providing patients in the di-

alysis unit with orthotic shoes, D-sole shoe inserts, and long-handled mirrors. The podiatry service provided basic foot care (nail and callous care), wound care (including skin grafting), and foot and ankle surgery, both elective (for such conditions as bunions, hammertoes, and neuromas)

and emergent (including incision and drainage, wound debridement, limb salvage, and foot and ankle reconstruction). By continuing to track URRs and their relationship to risk of foot infection or amputation, we were able to expand continuous quality improvement data.

After the institutional review board approved our study application, most of veterans undergoing hemodialysis at the VA NWHCS dialysis unit participated in the foot screening and foot care self-management study.

Participants and study design

To establish a baseline for data comparison, we retrospectively reviewed the medical records of 45 veterans who had received dialysis at least once at the VA NWHCS unit between October 1, 2003, and April 1, 2004. Only 36 of the 45 records represented regular patients of the VA NWHCS dialysis unit; 25 of the 36 consented to have their data included in the baseline (preintervention) block of the study. The 25 participants within this block were all male; 12 (48%) were white, 10 (40%) were black, and 3 (12%) were Hispanic; 14 (56%) had diabetes.

An initial postintervention block of participants (25 of the 36 patients receiving dialysis at this site from October 1, 2004, through April 1, 2005) were all male; 12 (48%) were white; 10 (40%) were black; and 3 (12%) were Hispanic. Within this group, 12 (48%) had diabetes. A second postintervention block of participants (26 of the 42 patients receiving dialysis from October 1, 2005, through April 1, 2006) were all male; 12 (46%) were white; 12 (46%) were black; 1 (4%) was Hispanic; and 1 (4%) was Native American. Within this group, 11 (42%) had diabetes. At the end of both intervention study periods, each participant completed both the short

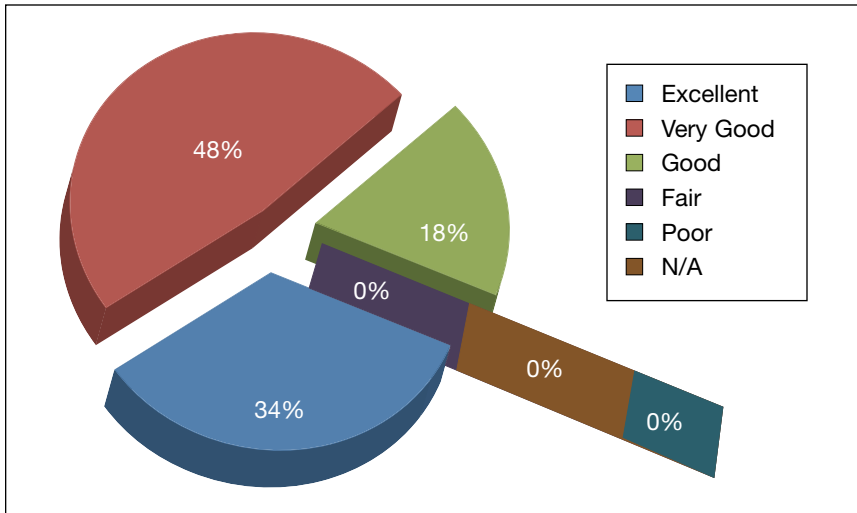


Figure 5. Percentage of veterans in the first study period who responded excellent, very good, or good to the survey question, "My evaluation of my ability to manage my foot care is...."

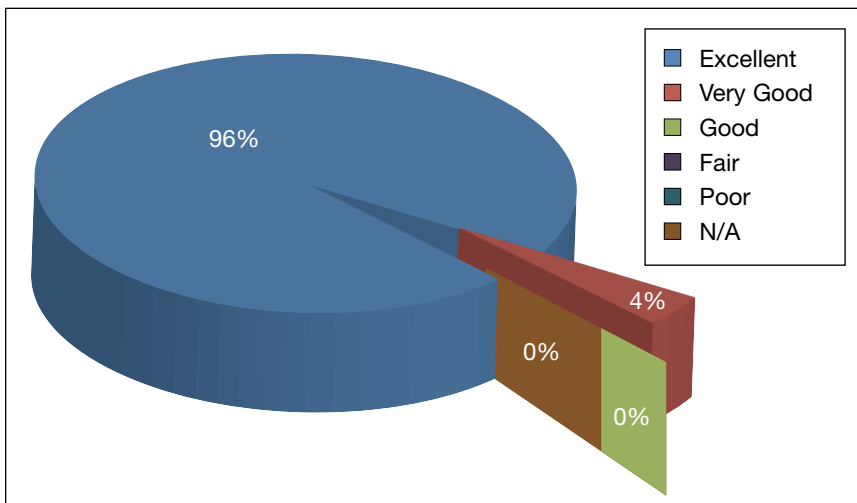


Figure 6. Percentage of veterans in the second study period who responded excellent, very good, or good to the survey question, "My evaluation of my ability to manage my foot care is...."

patient education survey developed by the design team and the VA's Survey of Healthcare Experience of Patients (SHEP) (Figures 1 and 2).

RESULTS

With the implementation and use of the foot care reminder template in

October 2004, 80% were used and completed by April 2005. Between October 2005 and April 2006, 100% were completed.

The baseline retrospective medical record review indicated that 19 infections and 11 amputations had occurred within the 6-month prein-

tervention study period. The initial postintervention data analysis, conducted in April 2005, revealed that 3 infections had occurred and 1 amputation had been performed within the 6 months following implementation of the foot care reminder template and the foot care self-management program; the second postintervention data analysis, conducted in April 2006, showed that 5 infections occurred within the second 6-month study period, but no amputations were performed (Figure 3). This decline in infections and amputations from baseline corresponded with a rise in the percentage of patients with a URR greater than 65%. In April 2004 (prior to introduction of the foot care reminder template and the foot care self-management program), only 64% of study participants had a URR greater than 65%, but this figure rose in the first postintervention study period to 78% (by April 2005) and in the second postintervention study period to 81% (by April 2006). (Figure 4). These results support previous findings of Speckman and colleagues,⁵ who demonstrated that inadequate hemodialysis resulting in a URR of less than 65% is a risk factor for lower extremity amputation among patients with diabetes, as well as the VA and DoD Clinical Practice Guidelines on the Management of Diabetes Mellitus in Primary Care⁴ and the recommendations of the KDOQI 2000 Guidelines for Hemodialysis Adequacy.⁸

With the introduction of the foot care self-management program, 99% of participants in the first study period and 100% of participants in the second study period indicated that they preferred this interactive, computerized educational method to booklets and verbal instruction. Within both study periods, 96% of participants reported satisfaction with

the method on the VA SHEP Patient Satisfaction Survey, answering either that they “strongly agree” (36% in 2005 and 92% in 2006) or “agree” (60% in 2005 and 4% in 2006) with the statement, “I am satisfied with the education I received.” Disagreement with the statement was indicated by only 1% in 2005 (3% indicated that they had “no opinion”) and 0% in 2006 (4% indicated that they had “no opinion”). All participants in both intervention study periods evaluated their ability to manage foot care as either excellent, very good, or good (Figures 5 and 6).

ability to perform foot care self-management and their SHEP satisfaction scores. We noted a reduction in foot infections and nontraumatic amputations after the study interventions were implemented, and these improved patient outcomes required no additional staffing. CPRS data showed a 90% follow-up by clinicians to clinical reminders. With the introduction of these interventions, access to prosthetic devices and services improved greatly, and dialysis nursing staff became more knowledgeable about risks for foot complications.

plications, who may have otherwise been overlooked. The study team highly recommended conducting foot screenings in the pre-ESRD stages to prevent amputations, improve quality of life, and possibly, reduce costs. When Ndip and colleagues¹⁰ conducted foot assessments on patients with diabetes who were undergoing dialysis for renal impairment, they found that dialysis treatment was an independent risk factor for foot ulceration. Their findings highlight the importance of alerting staff to be particularly vigilant to foot care required when treating patients with diabetes and ESRD. Both patients who are new to dialysis and those who have been receiving dialysis treatment for some time should receive intensive education and initiate self-management measures to prevent foot ulcers, as we concluded in our study.

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CONCLUSION

It is beneficial for veterans who are undergoing dialysis to be instructed by a diabetes educator and assisted in foot care by a dialysis foot nurse. Our study team recommends modifying foot care reminder templates to include ICD-9 codes for PVD and ESRD in order to alert staff that patients with these conditions are at high risk for foot complications and thus require foot screening and assessment. Preventive measures, such as those we employed in this patient-centered model, may improve infection and amputation rates in dialysis units and significantly reduce costs. The study team recommends further study to determine patient education retention and continued foot care self-management. ●

Boulton and colleagues⁹ estimated that, depending upon the complexity of the surgery, a single amputation represents a financial cost of between \$43,800 and \$66,215 in 1998 dollars. Based on Boulton's figures, and taking into account the 19.8% rise in the rate of inflation from 1998 to 2005–2006, we calculate that our unit's avoidance of a projected 21 amputations over the course of the 2 study periods saved our facility between \$1,101,920 and \$1,665,837.

DISCUSSION

Maximizing the veterans' time with a patient-centered, foot care self-management program during dialysis improved both their perceived

The fact that our study expanded continuous quality improvement data provided additional support for the project. With the tracking and trending of URRs, infections, and healing and nonhealing wounds, we observed improved outcomes. Studies by O'Hare and colleagues,² Speckman and colleagues,⁵ and Mayfield and colleagues⁶ had previously demonstrated a strong correlation between URRs above 65% and reduced incidence of infection and amputation. This was reflected in our study as well.

Modifying the CPRS foot care reminder template to include ICD-9 codes for PVD and ESRD, alerts staff to veterans at high risk for foot com-

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