# clinical Management Extra

# Falls, Balance Confidence, and Lower-Body Strength in Patients Seeking Outpatient Venous Ulcer Wound Care





2.5 Contact Hours

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#### PURPOSE:

To provide information about a quality improvement project examining falls in persons seeking outpatient wound care. TARGET AUDIENCE:

This continuing education activity is intended for physicians and nurses with an interest in skin and wound care. OBJECTIVES:

After participating in this educational activity, the participant should be better able to:

- 1. Describe the scope of the problem and the related quality improvement project.
- 2. Delineate the results of the project and their implications for treatment of patients with venous ulcers.

### ABSTRACT

**OBJECTIVE:** The authors aim to examine fall occurrence and fall injuries in persons seeking outpatient wound care and to compare falls, balance confidence, and lower-body strength in persons with injection-related venous ulcers (IRVUs) versus persons with venous ulcers (VUs) related to other risk factors besides injection drugs (VUs-other).

**DESIGN:** This quality improvement project used a cross-sectional, comparative design. Participants responded to demographic questions, the Activities-specific Balance Confidence (ABC) Scale, fear of falling, fall numbers, and injuries and performed the 30-second chair-rise test.

SETTING: Outpatient wound service.

**PATIENTS:** Patients (N = 106; mean age, 59.94 years) included men (66%) and women.

**RESULTS:** Sixty patients reported falling; 47 were recurrent fallers. Twenty patients stated they were injured, but did not go to an emergency department. A higher number of total falls was significantly related to more comorbidities. Total falls were significantly related to fear of falling and ABC Scale scores. Those with VUs-other had significantly more comorbidities and higher body mass index values than those with IRVUs. Those with IRVUs were comparable to those VUs-other on number of falls and fear of falling, respectively. Those with IRVUs (7.30) performed significantly more chair rises than those with VUs-other (4.72). Persons with IRVUs had significantly higher ABC Scale scores (63.24%) than those with VUs-other (49.38%).

**CONCLUSIONS:** Falls are a common occurrence in persons seeking outpatient wound care. Despite greater strength sufficient to perform more chair rises among those with IRVUs, fall rates were comparable to those of weaker individuals with other types of VUs. With the high occurrence of falls during the project, long-term risk for fall injury would be high. Further research is needed to clarify interactions between VU risk and patient factors such as strength, age, agility, and impaired cognition.

**KEYWORDS:** venous ulcers, falls, balance confidence, Activities-specific Balance Confidence Scale, 30-second chair-rise test, lower-body strength

ADV SKIN WOUND CARE 2016;29:85-93.

### **INTRODUCTION**

Chronic wounds affect 6.5 million American patients.<sup>1</sup> Venous ulcers (VUs) are commonly occurring chronic leg ulcers, represent approximately 70% of leg ulcer development, and occur in approximately 20% of people with chronic venous insufficiency (CVI) in the United States.<sup>2,3</sup> The occurrence of current/healed VUs was approximately 18% in persons (n = 713) in drug treat-

ment; those who injected in the legs were 9.14 times more likely to develop VUs than those who injected in the arms and upper body only, and 34.64 times more likely as those who never injected.<sup>4</sup> Those who injected in the lower extremities were especially at risk because of marked damage to the venous system.<sup>4</sup> Persons with VUs have been reported to have increased pain, decreased ankle range of motion, calf muscle wasting, decreased walking mobility, prolonged sitting, and reduced standing.<sup>5–7</sup> Comparatively, loss of muscle strength and tone, decreased mobility of leg joints, gait problems, and pain are associated with an increased risk of falls and altered balance confidence in community-dwelling adults.<sup>8,9</sup> Falls are a leading cause of injuryrelated morbidity and mortality among middle-aged and older adults.<sup>10</sup> Data are lacking, in general, about falls, balance confidence, and lower-body strength in patients who seek outpatient wound care, yet falls are a quality indicator in healthcare. The purposes of this project were to (*a*) examine fall occurrence and fall injuries in persons seeking outpatient wound care and (b) compare falls, balance confidence, and lower-body strength in persons with injection-related venous ulcers (IRVUs) versus persons with VUs related to other factors (VUs-other) instead of injection-drug use.

### **CHRONIC VENOUS INSUFFICIENCY**

Normal ankle mobility and painless calf muscle action are required for normal calf pump function.<sup>2</sup> In the general population, persons with CVI have less ankle range of motion and less calf muscle endurance than those without CVI.<sup>11–13</sup> Balance and gait were found to be positively related to better ankle range of motion and CVI in a cohort of injection-drug users.<sup>14</sup>

Injection-drug use adds to the typical CVI risk factors that are reported for the general population. For example, persons who inject drugs have an increased prevalence of deep vein thrombosis, scar tissue occlusion, swelling, and pain in their legs.<sup>15–17</sup> Although most individuals first inject in the arms and upper body, injecting in the lower extremities often accounts for half of the injecting years. For those who injected in the legs, the severity of CVI increased with increasing years of injection use; the greatest increase occurred in the first 6 years of injecting.<sup>4</sup> Older age and more comorbid conditions were found associated with more severe venous disease in injection users.<sup>4</sup> Because injectiondrug use is not generally listed as a risk factor for CVI, it may be missed by clinicians evaluating and treating patients with CVI. Those with a history of injection-drug use may delay wound treatment until the VU is excessively large. An important consideration in VU prevention and treatment is the baby boomer generation, which includes a large number of injection users.<sup>18–20</sup> Baby boomers are aging in high numbers, thus increasing the number of persons with advanced venous disease.

### FALLS

Falls and balance problems are serious concerns for communitydwelling middle-aged adults as well as those 65 years or older.<sup>9,10</sup> In addition, approximately half of older adults who fall, do so more than once, and 10% to 15% of falls result in serious injury (ie, fractures, joint dislocation, head injury), hospitalizations, and disabilities.<sup>21,22</sup> Falling has been associated with low balance confidence.<sup>23,24</sup> Low balance confidence has been reported to restrict the amount and type of physical activity older adults perform, thus leading to further functional decline, muscle weakness, activity restriction, loss of independence, and risk of further falls.<sup>21,22,25</sup>

Pieper et al<sup>26</sup> reported falls occurring 1 or more times in the past year by 65% of patients with IRVUs (n = 20/31) and 40% of patients without VUs (VU–) (n = 12/30); 28 fallers fell more than 1 time. Persons with IRVUs reported significantly more falls per year than did those VU– (mean, 19.58 vs 5.83) and more recurrent falls (19 vs 10). For all fallers, injuries to the legs/knees/ feet were the most common injuries, and 6 injured patients across both groups went to the emergency department for care.

### LOWER-BODY STRENGTH

Mechanical power produced by the skeletal muscles is a significant factor affecting mobility, fall risk, and functional debility in older adults.<sup>27</sup> Lower-body muscle power and strength can be evaluated with a chair-rise test and has been predictive of decreased physical activities of daily living and falls in older people.<sup>27-30</sup> A risk factor for falling is poor neuromuscular function affecting balance.<sup>10</sup> Lower levels of body strength are the primary cause of balance problems and falls in older adults. Examining functional mobility with the five-times-sit-to-stand test, Pieper et al<sup>31</sup> reported participants with IRVUs were 26.5% slower on completion of the five-times-sit-to-stand test than those VU– (P = .081). This study lacked patients with VUs from other causes. The impact of VUs on lower-body strength needs further examination.

### **SUMMARY**

Research about falls, balance confidence, and lower-body strength is scant for patients seeking outpatient wound care, especially for patients with VUs. Falling is associated with poor balance confidence. Lower-body strength is important for balance and has been examined with rising from a chair. The chair-rise test has been predictive of decreased physical activities of daily living and falls in older people. The purpose of this project was to examine fall occurrence, fall injuries, balance confidence, and lower-body strength in persons attending an outpatient clinic that provided wound care. The questions were as follows: (*a*) What were the occurrence of falls and fall injuries in patients seeking outpatient wound care? And (*b*) did falls, balance confidence, and lower-body strength differ between persons with IRVUs and those with

VUs related to other factors? Balance confidence was assessed with the Activities-specific Balance Confidence (ABC) Scale and lower-body strength with the 30-second chair-rise test. This project was done as a quality improvement project.

### **METHODS**

### Design

This quality improvement study used a cross-sectional, comparative design. Inclusion criteria included all patients seeking wound care from May to December 2014 and able to understand and respond in English. Exclusion criteria were physically unable or too mentally ill to respond to the questionnaires or perform the chair-rise test. Three patients were not included: 1 spoke/ understood only Polish, and 2 had low mental status.

### Procedure

Patients coming to the Skin Integrity Clinic were told the clinic was participating in a quality project about falls. They would be asked questions about their demographic background, pain, falls, and balance and perform the 30-second chair-rise test. Data were recorded on forms developed for the project. The medical assistant began the questionnaire after taking vital signs. The nurse practitioner asked about falls and performed the 30-second chair-rise test. Because this project was integrated into the patient's care, some data are missing (ie, patients with time restrictions or project not completed during 1 visit and patient did not return for care).

Because this was a quality project, not a human subject research study, it was not necessary to request institutional review board approval. The authors assessed an internal program in terms of fall risk and helped to improve a program for patients receiving wound care. Knowledge sought directly benefited the program of wound care. The authors are publishing these program evaluation findings so that other wound care programs may benefit from our lessons learned.

### Instruments

The *Demographic and Health Questionnaires* obtained general information about each participant such as sex, race, age, and medical diagnoses. Participants responded to a list of medical diagnoses that a clinician stated they had. Medical diagnoses were those asked of new patients in the clinic and included conditions such as hypertension, heart disease, arthritis, diabetes mellitus, asthma, bronchitis, depression, and so on. They were asked about cigarette use, current alcohol use, years of injection-drug use, and about the length of time they had leg ulcers/wounds. Body mass index (BMI) was calculated from the person's weight in pounds and height in inches (BMI = {weight (lb) / [height (in)]2}  $\times$  703). The demographic instrument has been used in the past, and the

test-retest reliability values for the demographic and health history questionnaires were 0.99 and 0.86, respectively.<sup>4</sup> For persons with VUs, all had at least 1 lower extremity with a VU using the clinical classification of the CEAP (Comprehensive Classification System for Chronic Venous Disorders) scale class VI.32

The Brief Pain Inventory "pain now" severity was asked. Patients rated their pain on a scale that ranged from 0 (no pain) to 10 (pain as bad as you can imagine). The Brief Pain Inventory pain rating has high Cronbach's values ranging from .84 to .85.<sup>33,34</sup>

A fall was defined as unintentionally coming to rest on the ground, the floor, or other lower surface.<sup>35</sup> Patients were asked to think back over the past month if they had fallen and the number of times. If the patient continued in the clinic, at the beginning of each month the person was asked if he/she had fallen the previous month. If a patient had fallen, questions were asked about the number of times falling that month, activity preceding the fall, injuries from the fall, and need of emergency department care. Participants with high numbers of falls in the past month (>20) were asked a second time to verify if the number stated was correct. Participants were categorized as recurrent ( $\geq$ 2 falls) or none/ single fallers. They were asked if they were afraid of falling (yes/no).

The ABC Scale assesses the confidence to maintain balance while performing selected activities.<sup>36</sup> Respondents were asked how confident they were in not losing balance or becoming unsteady when performing 16 items of daily living. Each item was scored from 0% (not confident) to 100% (completely confident). The ABC scores greater than 80% are indicative of highly functioning, usually physically active older adults; scores greater than 50% and less than 80% indicate moderate level of functioning such as in older adults in retirement homes and persons with chronic health conditions.<sup>37</sup> Reliability findings are often 0.90 or greater.<sup>25,38,39</sup> The ABC scores correlate with objective measure of balance in community-dwelling older adults.<sup>40</sup>

The 30-second chair-rise test was used as a measure of functional lower-body strength.<sup>27,29,41</sup> It is a predictor of decreased activities of daily living, mobility, and falls in older persons.<sup>27,29</sup> Low levels of body strength are the primary cause of balance problems and falls in older adults.<sup>42</sup>

The chair-rise test was done in the examination room with a standard chair. Patients wore shoes, sat with their back against the back of the chair, and crossed their arms over their chest. They were told to stand up and sit down as quickly and safely as many times as they were able in 30 seconds. The test ended when they sat for the last time with their back against the back of the chair. The number completed in 30 seconds was recorded. Higher scores indicate better performance. Below-average scores are based on age; for example, for men 60 to 64 years old, less than 14, and for women, less than 12.<sup>43</sup> Good reliability was reported for the original test among older people who were cognitively

healthy (intraclass correlation coefficients = 0.84 and 0.92 for men and women, respectively).<sup>44</sup> Criterion-related validity was demonstrated with comparison weight-adjusted leg-press performance for men and women (r = 0.78 and 0.71, respectively).<sup>41</sup>

### **Data Analyses**

Descriptive statistics were used to examine the frequency and distribution of demographic characteristics, along with means and standard deviations (SDs) of quantitative measures. Correlations and analysis of variance allowed the authors to examine the relationships among the variables. The differences in continuous variables between those with injection-related VUs and those with VUs due to other causes were examined with Student *t* test and analysis of covariance (ANCOVA). A  $\chi^2$  test of association was used for categorical variables. If data were missing for a dependent variable, they were left as missing; thus, the n for analyses varied slightly as indicated in the results from 102 to 106. Mean substitution was used for BMI, which was the only covariate with a missing data value due to 1 missing height, and  $\alpha$  was set to .05 two-tailed for all statistical tests. Analyses were performed using IBM (Armonk, New York) SPSS Statistics version 22.

### RESULTS

### **Participants**

The sample (N = 106; Table 1) included 70 (66%) men and 36 women with mean age of 59.94 (SD, 10.13) years (range, 27–93 years); 101 participants (95%) were African American. The mean number of comorbidities was 3.59 (SD, 1.85). The most common comorbidities were hypertension (n = 79), arthritis (n= 33), hepatitis C

#### Table 1.

## DESCRIPTION OF INDIVIDUALS SEEKING WOUND CARE ( $N_{MAX} = 106$ )

Variable	Mean (SD) or n (%)
Men/women	70 (66%)/36 (34%)
African American	101 (95%)
Age, y	59.94 (10.13)
Comorbidities	3.59 (1.85)
Pain (0- to 10-point scale)	3.34 (3.68)
Body mass index, lb/in <sup>2</sup>	32.12 (11.29)
No. of falls (n = $102$ )	2.70 (4.07)
Fear of falling, n (% yes) (n = 99)	52 (52.5%)
Activities-specific Balance	57.82% (29.28%)
Confidence Scale % (n = 103)	
30-s chair-rise test (n = 102)	6.17 (4.55)

virus (n = 33), cardiovascular disease (such as murmurs, heart valve problem, myocardial infarction, heart failure) (n = 31), diabetes mellitus (n = 26), and depression (n = 23). The participants' BMI ranged from 17.09 to 68.31 lb/in<sup>2</sup> (mean, 32.12 [SD, 11.29] lb/in<sup>2</sup>). There were 100 patients with leg and foot ulcers; 6 patients came to the clinic because of lymphedema, pressure ulcers, surgical incisions, or self-inflicted abdominal wounds from picking skin. For the patients with leg/foot ulcers, 32 (30.2%) had them on the right leg, 32 (30.2%) on the left leg, and 36 (34%) on both legs. Of the patients with leg/foot ulcers, 97 had VUs. All patients with VUs were treated with an Unna boot compression wrap.

In terms of substance use, 62 patients (58.5%) were currently smoking cigarettes; 27 (25.5%) drank alcohol to some degree. Sixty-five patients had a history of injecting street drugs, ranging in duration from 4 to 48 years, and had IRVUs.

Using a 0- to 10-point pain rating scale, the mean pain level was 3.34 (SD, 3.68); 50 patients (47.2%) stated not having pain. Mean pain score for patients with pain was 6.32 (SD, 2.22). The ABC percent scores had a mean of 57.82% (SD, 29.28%). The number of chair stands ranged from 0 to 18 (mean, 6.17 [SD, 4.55]). There were 26 patients who could not perform the chair-rise test. Fear of falling was verbalized "yes" by 52 patients.

# Fall Occurrence and Related Variables: All Participants

Fall data were collected for a mean of 4.09 (SD, 1.61) (range, 1-7 months) for 102 patients. Forty-two patients (41.2%) stated never falling; 13 reported 1 fall; 47 reported 2 to 20 falls. For patients who fell (n = 60), the most common activities at the time of the fall

were walking (n = 37), climbing stairs (n = 8), and moving from a seated chair/scooter to stand (n = 7). Twenty patients stated they were injured (cuts, bumps, bruises, and so on), but none sustained an injury severe enough to go to an emergency department.

For all patients, the total number of falls was not related to age, sex, pain rating, BMI, number of leg ulcers or ulcer area, years of cigarette use, years of injection-drug use, or methadone dose. A higher number of total falls was significantly related to a higher number of comorbidities (r = 0.31, P = .001). Patients (n = 52) reported significantly more falls when they stated they were afraid of falling (mean, 3.75 [SD, 4.83]) than those not afraid (n = 47) (mean, 1.64 [SD, 2.82]) ( $t_{97} = 2.12$ , P = .01). Total falls were significantly related to ABC scores (r = -0.33, P = .001), meaning more falls were associated with worse balance confidence scores. Falling was not significantly associated with the 30-second chairstand test (r = -0.17, P = .08), but it was in the theorized direction.

# Comparison of Patients with IRVUs Versus VUs-Other

A comparison of patients with IRVU versus VUs-other is presented in Table 2. Patients with IRVUs versus VUs-other did not differ significantly in age, sex, race, or pain. Those with VUs-other had significantly more comorbidities (mean, 4.30) than those with IRVUs (mean, 3.50), as well as a higher BMI (mean, 35.58 vs 29.25 lb/in<sup>2</sup>, respectively). Persons with IRVUs had the ulcer for a significantly longer period than those with VUs-other (mean, 14.71 vs 3.98 years).

Those with IRVUs were comparable to those with VUs-other on number of falls (2.78 and 2.70) and fear of falling (53.1% "yes" and 48.3% "yes"), respectively. Those with IRVUs (mean, 7.30)

### Table 2.

# COMPARISON OF INDIVIDUALS WITH INJECTION-RELATED VENOUS ULCERS (IRVUs) (N = 65) AND THOSE WITH VENOUS ULCERS FROM OTHER CAUSES (VUs-OTHER) (N = 32)

Variable	IRVU, Mean (SD) or n (%)	VUs-Other, Mean (SD) or n (%)	Р
Men	46 (70.8%)	18 (56.3%)	NS
African American	63 (97%)	30 (93.75%)	NS
Age, y	60.51 (3.49)	60.31 (15.87)	NS
Comorbidities	3.50 (1.59)	4.30 (1.88)	<.04
Pain (0- to 10-point scale)	3.59 (3.37)	2.60 (3.84)	NS
Body mass index, lb/in <sup>2</sup>	29.25 (6.56)	35.58 (11.70)	.001
Years having leg ulcers	14.71 (10.65)	3.98 (7.66)	<.001
No. of falls	2.78 (4.29)	2.70 (3.70)	NS
Fear of falling, yes <sup>a</sup>	34 (53.1%)	14 (48.3%)	NS
Activities-specific Balance Confidence Scale %	63.24% (24.60%)	49.38% (34.28%)	<.03
30-s chair-rise test	7.30 (4.10)	4.72 (4.66)	.006

Abbreviation: NS, not statistically significant.

<sup>a</sup>The n was 93 rather than 97 because of missing yes/no response.

performed significantly more chair rises than those with VUsother (mean, 4.72). Although both groups had very low ABC Scale scores, those with IRVUs had significantly higher ABC Scale scores (mean, 63.24%) than VUs-other (mean, 49.38%). Analysis of covariance was performed to adjust the group comparison for BMI and comorbidities. Because the homogeneity of regression assumption was not met for BMI, a BMI × group interaction term was included in the ANCOVA. Chair rise and ABC Scale scores were still significant (P = .011 and .015, respectively) after controlling for BMI and comorbidities.

### DISCUSSION

This quality improvement project examined falls in patients seeking care for chronic wounds in an outpatient clinic and compared falls, balance confidence, and lower-body strength in persons with IRVUs and those with VUs-other. The project included all patients seeking care from the clinic and is possibly the first project to examine falls in this population. The number of patients who reported falling was high (n = 60 patients); 47 (78.3%) were recurrent fallers ( $\geq 2$ ). The high number of recurrent fallers is a significant clinical concern for patients seeking wound care because of the risk of injuries. Thus, the eventual risk for injury is high because the monitoring for falls was only a mean of 4 months. The number of falls is similar to the reported work where recurrent falls were more frequent (61.3%) in persons with VUs versus those without ulcers when participants were asked the number of falls during the past year.<sup>26</sup> Although a third of the patients reported injuries from falls, no patient went to the emergency department for care. The lack of a major injury needing care is a positive finding as compared with the report of 10% to 15% of fall injuries in the literature.<sup>21,22</sup> Because the direct medical costs of falls have been reported at nearly \$30 billion and that falls result in 55% of all unintentional injury deaths,<sup>10,45</sup> the high number of outpatients who reported falling is a concern.

For this sample, the number of falls was significantly related to more comorbidities, fear of falling, and low ABC Scale scores, but was not related to the 30-second chair-rise test. The overall mean for the ABC Scale test was 57.8%. The ABC Scale scores greater than 50% and less than 80% indicate moderate level of functioning, such as in persons with chronic health conditions.<sup>37</sup> In fact, ABC Scale scores of less than 69% have been associated with a higher risk of recurrent falls for patients with Parkinson disease.<sup>46</sup> The low ABC Scale scores may be affected by the number of comorbidities (mean, 3.59). The ABC Scale scores significantly correlated with objective measure of balance in community-dwelling older adults.<sup>40</sup> Thus, low balance confidence scores for patients with chronic wounds add to the negative clinical effects of having a lower-extremity wound. Balance confidence is important for these patients to remain active. Being active is crucial for those

with VUs because the compression motion of the calf muscles on the deep venous system forces blood back to the central circulation. Persons with VUs often have lipodermatosclerosis, which is induration and hyperpigmentation of the skin involving the lower leg.47 The histopathology includes significant fibrotic remodeling of the dermal and subcutaneous skin layers.47 Lipodermatosclerosis is associated with advanced CVI and covers the structures of the foot joints, especially the ankle joint and the Achilles tendon.<sup>48</sup> Szewczyk et al<sup>48</sup> reported lipodermatosclerosis significantly lowered range of motion of the ankle joint. In addition, patients with VUs have edema of the lower extremity. Edema is often associated with pain, heaviness, and paresthesia.<sup>49</sup> Edema may make it difficult to move the ankle joint. The calf muscles rapidly atrophy and weaken with disuse.<sup>5</sup> For patients with VUs, decreased balance confidence can result in leg muscle weakness; this contributes to low balance confidence, such as it does in older-adult fallers.<sup>50</sup> Improvement in lower-extremity strength can lead to improvement in balance stability.<sup>50</sup>

Fear of falling was verbalized by 52 patients; those afraid of falling fell significantly more. Fear of falling has been associated with reduced gait performance.<sup>51</sup> Fear of falling can lead to unnecessary avoidance of activities that a person is capable of doing, an increased risk of falling, and progressive loss of quality of life.<sup>52,53</sup> Fear of falling has been reported as high as 60% in some studies.<sup>51</sup> It is not known how fear of falling contributes to falls.<sup>54</sup> Older adults are known to underestimate or overestimate their risk of falling, and this estimation was associated with psychological measures.<sup>55</sup> Asking about fear of falling is a beginning assessment step in exploring falls and fall risk with patients receiving wound care.

Twenty-six persons could not perform the 30-second chair-rise test. Considering the average age of the patients (mean, 59.94 years), the average number of 6 chair stands is low compared with the reported below-average score of less than 14 for men and 12 for women.<sup>43</sup> Nakazono et al<sup>29</sup> reported the reference value for age 60s as 22.15. These numbers for chair rise are consistent with other literature summaries of this test.<sup>56</sup> Functional mobility is a concern for patients with VUs because of ulcer pain and not wanting to move the legs. It is also important to identify patients with lipodermatosclerosis because of its associated restriction on ankle mobility. Aging has been associated with progressively diminished muscle strength and power, flexibility, and postural stability.<sup>57,58</sup> Identification of deficiencies in functional mobility for persons with lower-extremity ulcers may aid development of treatment protocols to maintain an active, independent lifestyle.

Because of the lack of research about patients with IRVUs, 1 aim of this study was to compare falling and its related variables for those with VUs-other. In another study, persons with IRVUs fell significantly more times than those without ulcers.<sup>26</sup> When

persons with IRVUs were compared with patients with VUs-other, the 2 groups were similar in number of falls. Interestingly, there were few significant differences between the 2 wound groups, and often the VUs-other performed worse, that is, fewer chair rises and lower ABC Scale scores. However, when controlling for these variables, significant differences in performance remained. Results of ANCOVA suggest that the differences between chair rises and the ABC Scale test may be due to variables in addition to BMI and comorbidities.

### **CLINICAL IMPLICATIONS**

The ABC Scale test, 30-second chair-rise test, fall documentation, and fear of falling were easily obtained in the outpatient clinic. Asking patients with wounds if they have fallen within a designated period is valuable assessment data. Collecting these data about falls and fall risk variables within wound clinics will help to identify potential fallers early so that fall prevention strategies can be implemented to decrease falls and their serious consequences.<sup>9,59</sup> Sharing fall and fall risk information with the primary provider can facilitate coordination of care among providers. Providing patients with educational materials about fall prevention may be helpful, but educational materials first should be evaluated in terms of the patient's reading level, as well as learning style. Practitioners are encouraged to review educational materials with the patient so there is an opportunity for the patient to ask questions and discuss content.

For patients who are recurrent fallers (falls  $\geq 2$  times per year), physical therapy consultation should be considered. The physical therapist can assess lower-extremity function, gait, strength, and so on, and develop a plan of care. Because most falls occur while walking, evaluation for an assistive device such as a cane or walker may be helpful. Evaluation of the patient's shoes is also important. Having an active lifestyle is crucial for those with VUs because of facilitating venous return as well as having a positive effect on quality of life.<sup>50</sup> Capodaglio et al<sup>60</sup> found a long-term mixed-strength training program significantly improved muscle function, functional ability, and physical activity profiles in healthy, community-dwelling older adults. As more aging persons develop leg ulcers, it is crucial to know what training programs and other interventions are most effective in maintaining independence in this cohort.

### LIMITATIONS

This study had limitations. Because this was a quality improvement study, it was done with the clinic's staff and as part of the patient's care. Some data were missed if the clinic was too busy to ask all questions or perform the physical measure, especially when the patient was new and had complex needs. Sometimes a patient did not return for subsequent visits. The sample included patients from 1 small service that provided wound care; thus, the sample size was restricted by the service. All patients were treated with Unna boot compression wrap, which may have adversely affected ankle mobility, but compression is a critical component of VU treatment. The effect of the compression wrap on falls could not be determined by this study. Lipodermatosclerosis and edema were not measured; thus, the effect of these 2 on fall risk is not known. A detailed cigarette, alcohol, street drug, and prescriptive medication assessment was not done, all of which can affect balance. Future studies about falls in patients receiving wound care need to consider all medications/drugs that patients use (such as prescription, over-the-counter, and illicit). Although fall data were collected in a longitudinal manner, it was limited to 7 months; longitudinal data of a year would give a more thorough description of falls. Fall recall has the potential of error; patients may forget falling or report falling more than what occurred.<sup>61</sup> Patients completed the chair-rise test only 1 time because of time constraints.

### CONCLUSIONS

Persons who have chronic wounds are increasing with the aging of society. Age and comorbidities are concerns for fall risk and falls. Venous ulcer occurrence generally increases with aging and has the potential to alter balance and gait. In the United States, nearly 500,000 adults have  $VUs^{62}$ ; these ulcers primarily occur after the age of 65 years. Examining falls, balance confidence, and lower-body strength in persons seeking outpatient wound care is lacking in the literature. The number of patients who reported falling was high, and many were recurrent fallers ( $\geq 2$ ). The number of recurrent fallers is a significant clinical concern because of the risk of injury. Factors associated with falls in outpatients with wounds have yet to be identified. This project adds to information about falls and fall-related tests, confidence, and lower-extremity strength in persons seeking wound care.

### PRACTICE PEARLS

• Venous ulcers are commonly occurring wounds in individuals seeking wound care,<sup>2,3</sup> and many venous ulcer manifestations increase the risk of falls.<sup>5–9</sup>

• Falls are a leading cause of injury-related morbidity and mortality among middle-aged and older adults<sup>9,10</sup>; they are also a quality indicator in healthcare.

• For patients who came for outpatient wound care, 60 of 102 (58.8%) fell; most (n = 47) fell multiple times. The most common activity at the time of falling was walking. Long-term risk of injury is high.

• A higher number of total falls was significantly related to a higher number of comorbidities, fear of falling, and worse balance confidence, but not to the number of ulcers, per se.

• Although stronger, patients who had injection-related venous ulcers were comparable to patients with other causes of venous ulcers on the number of falls and fear of falling.

• More research is needed; however, assessing fall risk in persons seeking outpatient wound care may lead to fall prevention strategies for these patients.

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