Research article

Documentation of preventive care for pressure ulcers initiated during annual evaluations in SCI

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Objective: Community-acquired pressure ulcers (PrUs) are a frequent cause of hospitalization of Veterans with spinal cord injury (SCI). The Veterans Health Administration (VHA) recommends that SCI annual evaluations include assessment of PrU risk factors, a thorough skin inspection and sharing of recommendations for PrU prevention strategies. We characterized consistency of preventive skin care during annual evaluations for Veterans with SCI as a first step in identifying strategies to more actively promote PrU prevention care in other healthcare encounters.

Design/setting/participants: Retrospective cross-sectional observational design, including review of electronic medical records for 206 Veterans with SCI admitted to 2 VA SCI centers from January-December, 2011.

Outcome measures: Proportion of applicable skin health elements documented (number of applicable elements/skin health elements documented).

Results: Our sample was primarily white (78%) male (96.1%), and mean age = 61 years. 40% of participants' were hospitalized for PrU treatment, with a mean of 294 days (median = 345 days) from annual evaluation to the index admission. On average, Veterans received an average of 75.5% (IQR 68-86%) of applicable skin health elements. Documentation of applicable skin health elements was significantly higher during inpatient vs. outpatient annual evaluations (mean elements received = 80.3% and 64.3%, respectively, $P > 0.001$). No significant differences were observed in documentation of skin health elements by Veterans at high vs. low PrU risk.

Conclusion: Additional PrU preventive care in the VHA outpatient setting may increase identification and detection of PrU risk factors and early PrU damage for Veterans with SCI in the community, allowing for earlier intervention.

Keywords: Pressure ulcers, Veterans, Prevention, Spinal cord injury

Introduction

Persons with spinal cord injury (SCI) are at increased risk for pressure ulcers (PrU) throughout their lifetimes due to decreased mobility, lack of sensation and other physiologic changes.[1,2,3,4,5] Reported prevalence rates of PrUs in SCI have ranged from 17 to 33% for those residing in the community.[2,5,6] High rates of ulcer recurrence also have been reported, ranging from 31% to 79%.[7,8,9] Chen *et al.* found that although PrU risk was relatively stable during the first 10 years following SCI, PrU prevalence was significantly higher at 10–15 years post-SCI.[4] Most persons with SCI will have at least one serious PrU during their lifetimes.[10] Of the estimated 12,000 new SCIs each year and 270,000 people currently living with SCI in the United States,[11] about 12% are Veterans.[12] Total annual Veterans Health

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Administration (VHA) healthcare costs are $100,935 for Veterans with SCI and PrUs vs. $27,914 for those without PrUs ($P < .001$).[10]

Improvements in managing SCI have increased life expectancy of Veterans with SCI,[13] but longer lifespans also increase the likelihood of PrU development, making prevention even more important. The mean duration of SCI in Veterans is greater than 20 years, thus, age and the burden of co-morbid illnesses may increase their PrU risk.[14] PrU prevention relies on identifying and managing individual risk factors, conducting daily skin inspection, redistributing pressure and shear force, assessing and managing nutritional deficits, and providing ongoing education. Beginning during initial rehabilitation following SCI, persons with SCI (and their caregivers) are taught to inspect (e.g. visually with a mirror or by touch) their skin daily to detect PrUs.[15] This is difficult to do, however, because PrUs often develop in areas that are difficult to visualize (e.g. sacrum, ischium, ankles, heels), especially for those with limited mobility.[15–18]

VHA data confirm that PrU development in patients with SCI primarily occurs in the community, with <1% of Veterans hospitalized at VHA SCI Centers developing hospital-acquired PrUs.[13] However, virtually all of the data on PrU prevention comes from institutional settings (acute inpatient and/or long term care). Reducing the incidence and improving treatment of PrUs in community-dwelling Veterans with SCI is an important goal for VHA to address.

VHA has long recognized the importance of prevention in maintaining the health and quality of life of Veterans with SCI by providing lifelong care that is often not available in the private sector. Early detection of secondary complications of SCI and/or comorbidities associated with SCI may decrease morbidity and mortality.

People with SCI require specialized follow-up over their lifetime for maximum health, prevention of complications, and long term management of costs (lifetime costs of care are substantially greater than those of the initial rehabilitation).[19] Clinical experience suggests that proactive and preventative strategies are preferable to responding to medical emergencies or problems after they occur.[20] However, many private insurance providers as well as CMS (Medicare/Medicaid) do not currently reimburse for annual evaluations in people with SCI in the private sector.[21] However, VHA does provide preventive care to Veterans with SCI via an annual Comprehensive Preventive Health Evaluation (or annual evaluation).[22] The evidence supporting the annual evaluation elements, including those that address PrU prevention, are primarily based on expert consensus, with some notable exceptions (e.g. colorectal cancer screening). There are no nationally accepted CPGs that comprehensively address the skin health elements to be included in an annual health evaluation as part of PrU prevention in SCI.

The annual evaluation for Veterans with SCI focuses on identifying, addressing and/or preventing secondary complications. Annual evaluations can be conducted on an inpatient or an outpatient setting and can take one or more days to complete. The setting in which an annual evaluation is conducted (e.g. inpatient vs. outpatient) also depends on a variety of factors, including acuity and Veteran preference.[22] Veterans living at a significant distance from an SCI center are generally admitted to the hospital or receive assistance with lodging during the annual evaluation, depending on their needs.[22]

The annual evaluation for Veterans with SCI has a very extensive scope (Fig. 1) and includes many preventive health care elements, some of which are specific to SCI (e.g. PrU prevention and skin management), as well as preventive care routinely recommended to the general Veteran population (e.g. cholesterol screening and colonoscopy). To address the high rates of PrU development and recurrence in SCI, VHA recommends that annual evaluations include a comprehensive assessment of PrU risk factors, a review of prevention strategies, a thorough skin inspection, and sharing recommendations for PrU prevention with the Veteran.[23]

We focused on annual evaluation components related to promoting skin health using the first edition of the SCI PrU clinical practice guideline (CPG) as the basis for skin health assessment elements.[15] The objective of this study was to characterize the consistency of documentation of receipt of skin health assessment elements during annual evaluations as an initial step in addressing prevention of community acquired PrUs among Veterans with SCI. Our research questions included: (1) How many of the PrU CPG recommended skin health elements are documented during annual evaluations; and (2) Was there a difference in skin health elements documented by annual evaluation setting (inpatient vs. outpatient) and by PrU risk?

Methods

The study used a retrospective, cross-sectional observational design. In brief, we defined the skin health elements to include in the study from SCI PrU CPG[15] and we presented these skin health elements to a focus group of 6 SCI clinician stakeholders to develop consensus for determining rules related to medical record documentation which would indicate participant receipt of skin health

Selected Skin Health-Related Elements of SCI-Specific Annual Evaluation		
a. Medical history and physical	**g. Psychological, social and vocational assessments**	o. Immunizations p. Tuberculosis test
b. Cardiovascular assessment	h. Bowel/bladder assessment	**q. Smoking cessation**
c. Pulmonary function/X-ray	i. Complete blood count	**r. Substance abuse screening/ counseling**
d. Gallbladder ultrasound	**l. Skin assessment, computerized seating evaluation, wheelchair**	**s. Dietary/nutritional assessment**
e. Colonoscopy	**m. Comprehensive rehabilitation functional assessment (ADL, FIM)**	**u. Review prosthetic equipment function and safety**
f. Dental evaluation	n. Autonomic dysreflexia education	**v. Review medications/supplies**

Our study addressed only the bolded items in the table. Source: Collins EG, Langbein WE, Smith B, Hendricks R, Hammond M, Weaver F. Patients' perspective on the comprehensive preventive health evaluation in veterans with spinal cord injury. Spinal Cord. 2005 Jun;43(6):366-74. Used with permission.

Figure 1 Selected skin health-related elements of SCI-specific annual evaluation.

elements. Next, we identified a potential sample and applied the exclusion criteria. We retrospectively reviewed medical records of the sample of participants applying the skin health element documentation rules for individual participants. Finally, we analyzed the data, accounting for individual applicability in analyses.

We obtained a list of all Veterans admitted (n = 588) at two of the largest VHA SCI Centers from January 1 – December 31, 2011. For those with multiple admissions, only the first admission ("index admission") during the study period was retained (n = 386). Electronic medical records were then reviewed retrospectively to identify whether the Veteran received an annual evaluation at a participating SCI center in the 14 months *prior* to the index admission date. The 14 month window was used to capture annual evaluations done prior to the index admission.

Admissions for the purpose of receiving an annual evaluation were excluded from the sample. In addition, a total of 180 records were excluded for the following reasons: the annual evaluation was conducted >14 months prior to the index admission (n = 58); new SCI (n = 37); first admission ever at the participating VHA SCI Center (n = 23), no record of previous annual evaluation found (n = 17) and those at extremely low PrU risk (American Spinal Injury Association [ASIA] D, n = 45). Our final sample included 206 unique Veterans who were admitted during the study period for any reason *except* for an annual evaluation, and who received an annual evaluation within 14 months prior to the admission.

Medical record data

Electronic medical records were reviewed to obtain demographic, patient, SCI, and medical information and documentation of skin health elements assessed or received during the annual evaluation.

Patient characteristics included: age, sex, race/ethnicity, marital status, education, employment status and smoking history. SCI characteristics included level and completeness of injury. We also examined overall illness burden using the medical comorbidities on the Charlson index[24,25] (e.g. diabetes, chronic obstructive pulmonary disease, tumor, renal disease, peripheral vascular disease, congestive heart failure, myocardial infarction, liver disease, dementia, ulcer, advanced liver disease). In addition we collected data on the setting in which the skin health assessment was

Table 1 Operationalizing the dependent variables

Guideline or VA Handbook recommendation	Operationalizing the skin assessment elements	"Gold standard"	Accepted (direct quote from medical record note)
1. Assessment components			
Describe in detail an existing pressure ulcer: anatomical location and general appearance, size (length, width, depth, and wound area), stage, exudate/ odor, necrosis, undermining, sinus tracts, infection, healing, wound margins/ surrounding tissue.	Assessment of skin integrity	Full body skin assessment documented	"Denies problems with skin"
	Assessment with measurements for existing ulcers	Assessment of PrUs with measurements	"2 stage III ischial wounds and a stage II left heel wound"
Monitor and assess the pressure ulcer on a consistent, ongoing basis to determine the adequacy of the plan of care.	Documentation of a treatment plan for existing ulcers	Detailed description of PrU treatment plan	"had flap surgery"
2. Inter-disciplinary/specialist consultations for existing PrUs			
An Interprofessional Pressure Ulcer Committee is established and sustained to develop, implement, monitor, and evaluate the Pressure Ulcer Prevention Program; A certified Wound Care Specialist (registered nurse, physician, physical therapist, occupational therapist, physician assistant, or podiatrist) is a member of the Interprofessional Pressure Ulcer Committee;	Consultation made to a wound care specialist, if warranted	Documentation of assessment and plan completed by wound care specialist	"osteomyelitis found"
	Consultation made to a Podiatrist, if warranted	Documentation of assessment and plan completed by Podiatry	"Refused to follow with ID or Podiatry"
Refer appropriate individuals with complex, deep stage III pressure ulcers (i.e., undermining, tracts) or stage IV pressure ulcers for surgical evaluation.	Consultation made to a plastic surgeon, if warranted	Documentation of assessment and plan by plastic surgeon	"not a good candidate for further surgery"
3. Nutritional assessment and treatment			
Assess nutritional status of all SCI individuals on admission and as needed, based on medical status	Nutritional evaluation or consultation completed	Documentation of assessment and plan completed by Clinical Dietician	"appetite: fair"
Implement aggressive nutritional support measures if dietary intake is inadequate or if an individual is nutritionally compromised.	If a nutritional deficit existed, was there an intervention?	Nutritional supplementation ordered	"already receiving Ensure via peg 1-3x a day"
4. Review supplies/medications			
Cleanse pressure ulcers at each dressing change.	Were relevant supplies reviewed/ renewed, if necessary?	Provider discussed with patient/ caregiver dressing changes and ordered supplies	"none needed"
Describe medications that can increase PrU risk or complicate management of existing PrUs.	Were relevant medications reviewed/ renewed, if necessary?	Provider and patient reconciled medications, refilled those in need	"resides in nursing home"
5. Assess equipment			
Poor posture, long periods spent on bowel or shower chairs and inadequate offloading from a wheelchair cushion are frequent causes of pressure ulcers.	Assessment of bathroom equipment	PT evaluated shower chair and commode brought to clinic	"pt ambulates without devices"
Pressure mapping, seating assessment, and equipment evaluation are vital components of a comprehensive prevention program.	Assessment of transfer equipment	Formal PT evaluation completed of patient's sliding board and lift system	"caregiver uses lift"
Assessment ability to change and control body position.	Assessment of patient ability to transfer	Patient's ability to safely transfer was assessed	"dependent in all ADLs"
Use pressure-reducing bed support surfaces for individuals who are at risk for or who have pressure ulcers.	Mattress evaluation	Mattress surface quality evaluated	"NH resident"
6. Wheelchair evaluation			
Prescribe wheelchairs and seating systems according to individualized anthropometric, ergonomic, and functional principles.	Wheelchair evaluation	Individualized PT evaluation of wheelchair functioning	"Has a manual wheelchair"

Continued

Table 1 ***Continued***

Guideline or VA Handbook recommendation	Operationalizing the skin assessment elements	"Gold standard"	Accepted (direct quote from medical record note)
Use appropriate wheelchair cushions with all individuals with SCI.	Wheelchair cushion evaluation	Wheelchair cushion evaluated by PT for proper placement and support	"Uses wheelchair but can walk without any aid"
Inspect and maintain all wheelchair cushions at regularly scheduled intervals.	Wheelchair pressure mapping evaluation	Patient performed pressure mapping and made recommendations for support surface	"Patient didn't bring chair"
7. Functional assessment			
Assess function whenever a Veteran returns home, or if there is a significant deterioration in the Veteran's functional status, especially mobility.	Functional assessment performed	KT, OT, or PT performed a functional assessment and provided a treatment recommendation or plan	"Followed by KT"
8. Patient education			
Prescribe a power weight-shifting wheelchair system for individuals who are unable to independently perform an effective weight shift.	Counseling on importance of weight shifts	Patient was educated on importance of shifting weight while sitting in wheelchair to prevent skin breakdown	"The pressure ulcer prevention protocol was not needed-patient is not at risk"
Use cushions and positioning aids to relieve pressure on pressure ulcers or vulnerable skin areas by elevating them away from the support surface.	Counseling on importance of pressure relief	Patient instructed to perform pressure reliefs every 15 minutes when sitting in wheelchair	"Reminded to avoid pressure on the open area"
Develop, display, and use an individualized positioning regimen and repositioning schedule.	Counseling on importance of turning	Education documented on the importance of a turning schedule	"Pt refused to be turned q 2"
Teach Veterans and/or designated family members, surrogates, or authorized decision makers how to perform regular (daily) skin inspection…identify and remove the cause of early breakdown…until healed.	Education on what to do if new breakdown or skin worsening	Patient was instructed to call the SCI clinic immediately with any skin breakdown, redness, or worsening appearance of ulcer.	"check the skin daily for any redness"
9. Assess PrU risk factors and co-morbid conditions			
Assess demographic, physical/medical, and psychosocial risk factors associated with pressure ulcer prevention.	Assessment of co-morbid conditions	Co-morbid conditions and patient specific risk factors assessed and addressed	(required—Problem List)
Factors that increase risk for development of pressure ulcers: incontinence-bowel and/or bladder; excessive perspiration; and abnormal fluid accumulation (e.g. edema)	Screening for bowel incontinence	Provider and patient discussed bowel care management and addressed any voiding problems	"has bowel care M,W, F"
	Screening for bladder incontinence	Provider and patient discussed bladder management and addressed any voiding problems	"foley catheter in place"
	Screening for excessive sweating or moisture	Sweating and/or moisture issues discussed between patient and provider	"On propantheline"
10. Assess psycho-social risk factors			
Identify the potential psychosocial impacts of pressure ulcers and immobility and provide referral for therapeutic interventions based upon the individual's characteristics and circumstances.	Psychological assessment performed	Patient received an evaluation by psychiatry with treatment recommendations, if warranted	"History of psychotic disorder"
	Cognitive assessment performed	Assessment of cognitive status done by provider	"Pt has dementia"
If risk level changes, revise prevention plan to be consistent with the Veteran's current condition.	Assessment of availability and involvement of caregivers or support system	Assessment done on patients ability to function independently at home and support system evaluated	"Maximum resources are in place"
	If warranted, address issues with the availability and involvement of caregivers or support system	Caregivers trained by staff on how and when to perform patient's ADLs	"Will resume home health services after discharge"
	Assessment of social or vocational status	Discussion with patient the need for psychosocial or vocational intervention	"works pretty much full time"
	Screened for substance abuse issues	Screened for use of cigarettes/tobacco, alcohol, or illegal substances	"known alcoholic"

completed (inpatient vs. outpatient) and PrU history, and PrU characteristics (if present at the time of the skin health assessment). Previous literature has shown that one of the strongest predictors of future skin breakdown is a previous PrU(s).[26,27] Veterans with documentation of an existing PrU during the annual evaluation or history of a PrU within the prior 12 months were classified as "higher" risk in analyses, all others were considered "lower" risk.

Skin health elements

Based on the 2000 SCI PrU CPG, we identified 32 potential skin health elements related to PrU prevention.[15] We worked with SCI clinicians at the study sites (n=6) to define for each skin health element: to whom it was applicable and how to determine whether it had been assessed and/or received by participant. Not all skin health elements were applicable to all participants. For example, "documentation of skin integrity" was applicable to all participants, however, only those with a current PrU would have received a "PrU wound assessment" and only those with a stage III/IV PrU might have received a "consultation from a wound care nurse". Thus the primary outcome is the proportion of *applicable* skin health elements documented for each participant (i.e. the number of skin health elements documented divided by the number of applicable skin health elements documented for each specific participant).

Each of the 32 skin health elements was reviewed to determine whether it was applicable and/or received. The definition and an example of how each skin health element was defined are presented in Table 1. In addition to reviewing annual evaluation specific electronic progress notes, we also examined History & Physical and admission notes, consults, and/or other progress notes by all SCI providers documented in the electronic medical record during the annual evaluation timeframe. In defining whether a skin health element was assessed during the annual evaluation, explicit documentation of the provider's assessment or action(s) and/or a referral for specialty care in the form of a "consult" was considered the "gold standard." However, assessment or receipt of many skin health elements was less easily ascertained. We worked with SCI clinicians to create standard definitions and proxy measures for documentation of receipt of skin health elements. For example, documentation of receipt of nutritional assessment was determined by any documentation of nutritional status during the annual evaluation. As there is no mandate for specific documentation of skin health elements during annual evaluations, we accepted provider documentation such as: "denies problems with appetite" in addition to the formal consultations ordered and completed by a registered dietician.

If no information was present, the skin health element was coded as not having been done.

Statistical analysis

Demographic, patient, SCI, and medical data were analyzed descriptively using frequencies and proportions for categorical variables and mean and standard deviation (SD) for continuous variables. To answer the first research question, we analyzed the data by participant and by skin health element. Receipt of skin health elements were described by frequencies and percent across elements and then percentage of applicable skin health elements received using means and SD by participant. To address the second research question, chi-Square analyses were used to determine whether annual evaluation setting (inpatient vs. outpatient) influenced the receipt of each individual skin health element (when applicable) and Student's *t*-Test used to determine the effect of annual evaluation setting on the overall mean percentage of skin health elements documented. The same analyses were conducted comparing those at higher risk of PrU development to those who were at lower risk in terms of receipt of each individual skin health element (when applicable) and to determine the effect of PrU risk on overall mean percentage of skin health elements documented. To address the problem of multiple comparisons, we applied a Bonferroni correction. This brought the alpha level required for significance to P=0.001.

All analyses were conducted using SAS 9.3 (SAS Institute Inc., Cary, NC).

Results

Forty percent of the participants' index admission visits were for PrU treatment. The mean time from annual evaluation to the index admission was 294 days (median = 345 days).

Participants were primarily white (78%) and male (96.1%), with a mean age of 60 years (SD=11.4) (Table 2). About half had tetraplegia (53.4%), ASIA A (44.7%) and an injury duration >20 years (51.5%). Approximately a third (27.2%) of participants were current smokers. The most common comorbidities were diabetes (27.2%), COPD (12.6%) and cancer (6.8%). Half (50.6%) of the participants had a previous history of skin breakdown or actual breakdown at the time of evaluation.

Documentation of skin health elements

Seventy percent (n= 144) of Veteran participants received their annual evaluations in the inpatient setting and 30% received outpatient annual evaluations. Veterans had an average of 75.5% (inter-quartile range [IQR] 68–86%) of the 32 applicable skin health elements documented. Skin health elements documented for greater than 90% of the Veteran participants included: documentation of skin integrity, PrU measurements, PrU treatment plan, wound care consultations, medication reconciliation, assessment of co-morbid conditions, screening for bowel/bladder incontinence, nutritional evaluation and intervention, cognitive or functional assessments, social support assessment and screened for substance abuse (including smoking) (Table 3). No participant had documentation of all applicable skin health elements. Applicable skin health elements that were documented for less than 10% of the applicable Veteran participants included: mattress evaluation (9.4%), screening for sweating/moisture issues (3.9%) and education on skin breakdown procedures (2.1%).

Skin health element documentation consistency by setting

Documentation of skin health elements during inpatient annual evaluations was consistently more complete than those in conducted in the outpatient setting (mean applicable skin health elements received = 80.3% and 64.3%, respectively, $P > 0.001$). Outpatient annual evaluations were less likely to include documentation of consultations with specialists, including functional assessment (76.7% vs. 97.2%); psychosocial assessment (75% vs. 94.3%); social/vocational assessment (41.9% vs. 88.7%); review of supplies (37.7% vs. 71.3%); and counseling on PrU reliefs (26.7% vs. 93.1%), weight shifts (11.7 vs. 86.8%) and turning: (9.8% vs. 87.5%) ($P < 0.001$ for all).

Outcomes of skin health element documentation by PrU risk group

As shown in Table 3, none of the skin health elements documented were significantly different by PrU risk group.

Discussion

In this sample of 206 Veterans with SCI, documentation of skin health elements as related to PrU preventive care during annual evaluations was relatively high, despite the fact that there are no national VHA performance

Table 2 Demographics and clinical characteristics, N=206

	Frequency (%)
Demographic Characteristics	
Sex	
Female	8 (3.9)
Male	198 (96.1)
Age, mean(sd)	60.2 (11.4)
<50	31 (15.0)
50-64	114 (55.3)
65+	61 (29.6)
Race/ethnicity	
White	161 (78.2)
Black	24 (11.7)
Other	12 (5.8)
Unknown	9 (4.4)
Marital status	
Not married	106 (51.5)
Married	77 (37.4)
Unknown	23 (11.2)
Education	
High school or less	70 (34.0)
Any college	51 (24.8)
Other	11 (5.3)
Unknown	74 (35.9)
Employment status	
Currently working	13 (6.3)
Not currently working	132 (64.1)
Unknown	61 (29.6)
SCI Characteristics	
Level of injury	
Tetraplegia	110 (53.4)
Paraplegia	80 (38.8)
Unknown	16 (7.8)
ASIA score	
A	92 (44.7)
B	32 (15.5)
C	24 (11.7)
Unknown	58 (28.2)
Duration (years)	
Less than10	39 (18.9)
10–19	40 (19.4)
20 or more	106 (51.5)
Unknown	21 (10.2)
Charlson score, mean (sd)	1.8 (1.2)
Co-Morbid Conditions	
Illness burden	
Diabetes	56 (27.2)
Chronic obstructive pulmonary disease	26 (12.6)
Tumor	14 (6.8)
Renal disease	13 (6.3)
Peripheral vascular disease	12 (5.8)
Congestive heart failure	10 (4.9)
Myocardial infarction	9 (4.4)
Liver disease	3 (1.5)
Dementia	2 (1.0)
Ulcer	2 (1.0)
Advanced liver disease	1 (0.5)
Pressure ulcer	
At annual evaluation	78 (37.9)
At index admission	74 (35.9)
Smoking status	
Former/never	125 (60.7)
Current	56 (27.2)
Unknown	25 (12.1)

Table 3 Receipt of skin health elements by setting and PrU Risk (N=206)

SH Elements	Total N=206	Outpatient N=62	Inpatient N=144	P-Value	Low Risk of PrU N=73	High Risk of PrU N=133	P-Value
Overall completeness, percent received, mean (sd)	75.5 (11.7)	64.3 (9.3)	80.3 (9.0)	**<0.001**	73.2 (12.8)	76.8 (10.9)	0.03
Individual elements	N (%)	N (%)	N (%)		N (%)	N (%)	
Medical: wound related							
Documentation of skin integrity[1]	206 (100)	62 (100)	144 (100)	-	73 (100)	133 (100)	0.13
Documentation of treatment plan for pressure ulcer	67 (100)	16 (100)	51 (100)	0.61	-	67 (100)	-
Consult to wound care specialist[#]	64 (98.5)	13 (100)	51 (98.1)	0.61	-	64 (98.5)	-
Documentation of pressure ulcer measurements	67 (91.8)	16 (88.9)	51 (92.7)	0.61	-	67 (91.8)	-
Consult to plastic surgeon[2]	21 (67.7)	1 (33.3)	20 (71.4)	0.18	-	21 (67.7)	-
Consult to podiatrist[3]	3 (60.0)	1 (50.0)	2 (66.7)	0.71	-	3 (60.0)	-
Educated on skin breakdown procedures	4 (2.1)	2 (3.4)	2 (1.5)	0.39	1 (1.4)	3 (2.4)	0.64
Equipment							
Wheelchair evaluation	158 (82.7)	44 (80.0)	114 (83.8)	0.53	52 (78.8)	106 (84.8)	0.30
Transfer equipment assessed	145 (78.8)	49 (92.5)	96 (73.3)	0.004	55 (82.1)	90 (76.9)	0.41
Bathroom equipment assessed	133 (70.0)	39 (68.4)	94 (70.7)	0.76	44 (64.7)	89 (73.0)	0.23
Wheelchair cushion evaluation	112 (57.1)	23 (41.1)	89 (63.6)	0.004	32 (47.1)	80 (62.5)	0.04
Pressure mapping evaluation[2]	12 (32.4)	1 (16.7)	11 (35.5)	0.37	-	12 (32.4)	-
Mattress evaluation	18 (9.4)	1 (1.7)	17 (12.9)	0.01	4 (5.6)	14 (11.6)	0.17
Function							
Functional assessment	185 (91.1)	46 (76.7)	139 (97.2)	**<0.001**	66 (90.4)	119 (91.5)	0.79
Assess ability to safely transfer	171 (85.9)	44 (75.9)	127 (90.1)	0.009	61 (87.1)	110 (85.3)	0.72
Counseled on PrU reliefs	150 (73.5)	16 (26.7)	134 (93.1)	**<0.001**	49 (68.1)	101 (76.5)	0.19
Counseled on weight shifts	136 (66.0)	11 (17.7)	125 (86.8)	**<0.001**	40 (54.8)	96 (72.2)	0.01
Counseled on turning	132 (64.4)	6 (9.8)	126 (87.5)	**<0.001**	40 (55.6)	92 (69.2)	0.05
Psychosocial							
Cognitive assessment*	203 (99.0)	61 (98.4)	142 (99.3)	0.54	72 (100)	131 (98.5)	0.30
Support system assessed	203 (98.5)	60 (96.8)	143 (99.3)	0.16	71 (97.3)	132 (99.2)	0.26
Screened for substance abuse (smoking, alcohol or drug use)	192 (94.1)	56 (90.3)	136 (95.8)	0.13	64 (90.1)	128 (96.2)	0.08
Psychosocial assessment	171 (89.1)	39 (75.0)	132 (94.3)	**<0.001**	61 (89.7)	110 (88.7)	0.83
Support system addressed	21 (87.5)	5 (100)	16 (84.2)	0.34	5 (83.3)	16 (88.9)	0.72
Social/vocational assessment	151 (74.4)	26 (41.9)	125 (88.7)	**<0.001**	50 (71.4)	101 (75.9)	0.48
Medical: non-wound related							
Medication reconciliation*	198 (99.5)	61 (100)	137 (99.3)	0.51	71 (100)	127 (99.2)	0.46
Co-morbid conditions reviewed*	205 (99.5)	61 (98.4)	144 (100)	0.13	72 (98.6)	133 (100)	0.18
Screened for bowel incontinence	203 (98.5)	60 (96.8)	143 (99.3)	0.16	73 (100)	130 (97.7)	0.20
Screened for bladder incontinence	201 (98.0)	59 (95.2)	142 (99.3)	0.05	73 (100)	128 (97.0)	0.13
Nutritional intervention	80 (95.2)	19 (90.5)	61 (96.8)	0.24	20 (100)	60 (93.8)	0.25
Nutritional consult	186 (94.4)	49 (87.5)	137 (97.2)	0.008	69 (98.6)	117 (92.1)	0.06
Supplies reviewed and renewed[1]	115 (60.5)	23 (37.7)	92 (71.3)	**<0.001**	44 (62.9)	71 (59.2)	0.62
Screen sweating/ moisture issues	8 (3.9)	3 (4.8)	5 (3.5)	0.64	3 (4.1)	5 (3.8)	0.90

[1] Routinely addressed for all inpatients, regardless of reason for admission.
[2] Eligibility for these SH elements excluded those with stage I/II wounds.
[3] Eligibility for this SH element was limited to those with foot ulcers.
* Refers to items that are included on an inpatient nursing template that are done for all inpatients, not just those receiving annual evaluations.
[#] Limited to those patients with existing stage III/IV PrUs. Patients with stage I/II PrUs would not be routinely seen by a wound care nurse or plastic surgeon.
Bolded items remain significant after Bonferroni correction applied.

measures mandating this type of care. Even with relatively high documentation of skin health elements, variability existed in documentation of skin health elements according to setting of the annual evaluation. Veterans with annual evaluations conducted in the outpatient setting had fewer applicable skin health elements documented overall. Although the percentage of applicable skin health elements documented was significantly higher when conducted in the inpatient setting, in no case was all applicable skin health elements documented. Somewhat surprisingly, rates of some important skin health elements that are relatively easy to do were unacceptably low (e.g. wheelchair assessment was done for only 66% of participants).

As shown in Table 3, no significant differences in documentation of skin health elements by high (history of a prior PrU but no current PrU) vs. low PrU risk (no history of a prior PrU and no current PrU) were observed. This underscores the ongoing challenge of how best to focus prevention efforts for both patients and providers.

Medical record documentation is considered a cornerstone of the quality of patient care.[28] Accurate documentation in medical records enables continuity of care by detailing clinical assessment(s), treatment(s) and care planning. Documentation also facilitates communication between clinical team members and provides written evidence that can be used to protect the legal interests of the hospital and/or health care provider(s).

Recommendations in the SCI PrU CPG are primarily based on expert consensus, but no guidance is provided regarding their relative importance (i.e. recommendations are not rank-ordered). Some items are directly related to PrU prevention, while others are more indirectly related (e.g. impaired cognitive status may affect an individual's ability to manage their skin). Our analyses treated all items equally, reflecting the state of the science with respect to PrUs generally, not just in SCI.

Focusing on documentation of provision of skin health elements during annual evaluations in SCI allowed assessment of documentation of current annual evaluation practices related to PrU prevention. Our findings suggest that there may be room for improvement in documentation of skin health elements in both the inpatient and especially in outpatient settings. In general, VHA recommends that SCI annual evaluations be conducted in the inpatient setting. However, our data indicate that about a third of annual evaluations are conducted in the outpatient setting. Thus, improving documentation of skin health elements during outpatient annual evaluations could be desirable as well. This is important because most PrUs among Veterans with SCI are community-acquired.[13] Any improvement in documentation of skin health elements that stimulates additional PrU preventive care in the outpatient setting has the potential to increase identification and detection of PrU risk factors and early PrU damage in the community environment, allowing for earlier intervention.

During inpatient annual evaluations, some of the skin health elements (i.e. PrU risk assessment, cognitive assessment) are routinely provided as part of the general admission assessment conducted for all patients and are documented using a standard template. Use of a standard template or checklist to assess skin health elements during annual evaluations may improve the documentation of other skin health elements and has the potential to increase assessment of skin health elements. A number of the skin health elements we assessed (e.g. pressure mapping, mattress evaluations, and moisture issues/sweating) are not included in computerized annual evaluation templates at either of the study sites.

Protocols and checklists have been shown to improve patient safety through standardization and communication.[23,29] Standardization of practice to improve quality outcomes is a valuable tool to achieve the shared vision for patients and their health care providers.[30,31] Standardized approaches have the potential to improve consistency of preventive care, especially in the face of the myriad of mechanical, metabolic, nutritional, behavioral and environmental factors associated with PrUs in SCI. Others have shown use of checklists or standardized approaches can improve care delivery. For example, a 2004 study of 108 hospital intensive care units that implemented a standardized checklist decreased infection rates by 66%.[32]

As ways to improve PrU prevention in the outpatient setting for Veterans with SCI are examined, there are three sets of players: (1) SCI providers; (2) patients; and (3) caregivers. Many QUERI/QI interventions focus first on modifying provider care delivery behaviors suspected to be influencing patient outcomes, with the long-term goal of improving patient outcomes. By this standard, we identified opportunities to improve the consistency and documentation of skin health elements as part of PrU preventive care during annual evaluations.

The Chronic Care Model (CCM) suggests that health systems must adopt proactive strategies to ensure that guideline recommended care, especially those promoting preventive care, is provided at all health care encounters.[33] The CCM emphasizes improvement in patient self-management and the healthcare delivery system to optimize outcomes for those with chronic health conditions.[34,35] Improving management of chronic conditions requires health systems to actively implement

strategies for embedding active promotion of preventive care into all encounters. This study provides baseline information on preventive care documentation from one provider-patient encounter, the VHA annual evaluation as a first step in identifying strategies for actively promoting PrU prevention care in other provider-patient encounters. The CCM has developed strategies to assist providers in implementing changes to improve care delivery, including flow sheets, visit templates, checklists, reminder tools, and technology to support clinical decision-making.[36] Although decision aids are recommended to support continuity of care for those with chronic conditions, to date, checklist use has been primarily focused on relatively short term problems in acute care (e.g. catheter-related blood stream infections in intensive care units).[32,37]

PrUs in SCI are widely accepted as a complex and multi-factorial problem. Future research should assess whether standardized templates or checklists result in improved documentation, provision of more preventive care and/or improved PrU outcomes. Improving the consistency of documentation of skin health elements of PrU preventative care at the time of annual evaluation, even by a small amount, may be worthwhile when considering the immense cost (>$100,000 annual) per Veteran with SCI and a PrU(s).

Limitations

A major limitation of this study is that it relies on medical record documentation of the skin health elements as evidence of PrU preventive care provided rather than direct observation. We recognize that documentation does not always mean the skin health element was provided.

Although the two participating sites are among the largest VHA SCI centers, the sample size is small and our results may not be generalizable to the other VHA SCI centers. Our results may not apply to the civilian SCI population as comprehensive annual evaluations (like those routinely provided in VHA) are uncommon with SCI, primarily due to lack of reimbursement.

However, the methodology (defining the skin health elements as derived from CPG, developing consensus for determining rules related to documentation indicating receipt of elements with clinician stakeholders, applying the rules to a sample of participants within a given time period, determining applicability for the elements, and accounting for applicability in analyses) and use of such an approach for assessing skin health elements in all provider-patient encounters may be useful outside of the VHA for those interested in this area and those working with civilians with SCI.

We did not observe any significant differences in skin health elements documented by PrU risk group, which may reflect a lack of statistical power.

Veterans with SCI are free to accept or reject provider recommendations of individual skin health elements. Using medical record documentation, it is not possible to know whether a particular skin health element was recommended by the provider but rejected by the Veteran.

Although some studies have documented substantial (>54%) dual (VHA /Medicare) health care utilization,[38] we were unable to determine if Veterans received skin health element assessments outside of VHA SCI centers.

Conclusion

Despite the high PrU risk of the SCI population, we found that completeness of documentation of skin health elements for PrU prevention provided as part of annual evaluations varied, with those conducted in the outpatient setting showing less complete documentation of skin health elements than those conducted in the inpatient setting. While the rate of skin health element documentation was higher for persons receiving annual evaluations as inpatients, there was room for improvement. It is possible that a standardized template would help improve the consistency of documentation of skin health elements in both settings. Future research should address whether providers believe that some of the skin health elements should be prioritized over others, whether this approach is more effective at preventing PrUs and how to further implement such an approach in the community setting. Future studies should also address costs of including skin health assessment in patient encounters.

PrU prevention is predicated on the fact that a more thorough assessment will identify potentially modifiable risk factors. However, better identification may not, by itself, result in a decreased PrU incidence. Whether the inconsistences we found are the result of uneven documentation or whether a provider-focused intervention to improve provision of skin health elements would just improve documentation remains unclear. Identifying gaps in documentation of PrU preventive care in SCI is a necessary step to begin to address the problem of community-acquired PrUs in SCI.

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