

# Smoking behavior and delivery of evidence-based care for veterans with spinal cord injuries and disorders

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**Objective:** Little is known about those veterans with spinal cord injuries and disorders (SCI/D) who smoke cigarettes. This study identified the factors associated with smoking in this population, motivations for smoking, and the readiness for smoking cessation. Current practices for the delivery of evidence-based tobacco cessation were also examined.

**Design:** Methods included surveys of veterans with SCI/D, medical record reviews of current smokers, and telephone interviews with SCI/D providers.

**Setting:** Six Veterans Health Administration facilities with SCI centers and one SCI clinic.

**Participants:** Survey data were analyzed for 1210 veterans, 256 medical records were reviewed, and 15 providers served as key informants.

**Interventions:** Observational study.

**Outcome measures:** Veterans self-reported smoking status, quit attempts, methods and care received, motivation for smoking, and health care conditions. Medical record review and informant interviews examined the tobacco cessation care provided.

**Results:** Whereas 22% of the respondents were current smokers; 51% were past smokers. Current smokers more often reported respiratory illnesses and/or symptoms, alcohol use, pain, and depression than past or never smokers, and approximately half made quit attempts in the past year. Smokers received referral to counseling (57%) and/or prescription for medication/nicotine replacement (23%). Key informants identified difficulty of providing follow-up and patients' unwillingness to consider quitting as barriers.

**Conclusion:** Veterans with SCI/D who smoke also had other health problems. Providers offer counseling and medication, but often have difficulty following patients to arrange/provide support. Identifying other support methods such as telehealth, considering the use of combination cessation therapies, and addressing other health concerns (e.g. depression) may affect tobacco cessation in this population.

**Keywords:** Tobacco cessation, Spinal cord injury, Evidence-based care

## Introduction

There is no question that smoking is harmful, affecting most body systems. The 2004 Surgeon General's report on the health consequences of smoking highlights diseases most commonly associated with smoking (i.e. cancers,

cardiovascular diseases, and respiratory diseases), and also other problems such as the effects of tobacco use on reproductive health, cataracts, low bone density and hip fractures, and peptic ulcer disease.<sup>1</sup> The consequences of smoking are well known and yet prevalence of smoking remains high. The Centers for Disease Control and Prevention reported that during 2008, 20.6% of adults in the United States were current smokers.<sup>2</sup> Perhaps of even more concern are the findings that indicate that persons

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with physical disabilities, who may be especially vulnerable to respiratory-related conditions such as pneumonia, have higher rates of smoking than the general population. For example, data from the 2004 Behavioral Risk Factor Surveillance System survey indicated that while 20.8% of adults in the United States were current smokers, 29.9% of Americans with disabilities smoke.<sup>3</sup> According to that study's authors, this equates to 10 million Americans with disabilities who smoke. Stolzmann and colleagues<sup>4</sup> examined the risk factors for chest illness in individuals with spinal cord injury (SCI) (both veterans and non-veterans) and found that 21.1% of persons with SCI were current smokers.

Smoking is an especially serious health behavior concern for persons with spinal cord injuries and disorders (SCI/D) because neurological deficits commonly place them at risk for respiratory problems. Risk for respiratory problems is elevated in most individuals with higher level SCI/D because respiratory muscle strength is decreased, cough is weak or ineffective, and there is difficulty in clearing secretions. Respiratory complications are the primary cause of death during the first year after injury (28%) and remain a leading cause of death (22%) among individuals who survive the first year.<sup>5</sup> Individuals with SCI/D are 37 times more likely to die from influenza or pneumonia than comparable individuals from the general population.<sup>6</sup> Pneumonia is the leading cause of death during all post-injury time periods through 30 years after SCI, ranging from 18.9% during the first post-injury year to 12.7% after the first post-injury year.<sup>6,7</sup>

The added negative effect of smoking on pulmonary function has been demonstrated among individuals with SCI/D. Almenoff and colleagues<sup>8</sup> used spirometry to examine pulmonary function in persons with SCI. They found that smoking adversely affected pulmonary function in persons with SCI who also smoked as these individuals already had underlying respiratory compromise. In a survey of persons with SCI/D, respondents with tetraplegia who were current smokers reported having greater phlegm and phlegm plus cough than did respondents who did not smoke.<sup>9</sup> Linn found that smokers who had a tetraplegic-level injury were more at risk for decline in pulmonary function than smokers with paraplegia and that this risk increased with age.<sup>10</sup> Another study found that respiratory morbidity was related to tetraplegic-level injury, the number of cigarettes smoked per day, and the interaction between cigarettes smoked and excessive alcohol use.<sup>11</sup>

Another problem that may be associated with smoking is pain. The literature on the relationship between

smoking and pain has been mixed. A review of almost 50 epidemiological studies in the general population found no consistent significant positive relationships between smoking and low back pain.<sup>12</sup> However, other studies have reported increased oral pain and musculoskeletal pain in persons who smoke.<sup>13–15</sup> Chronic pain is common in SCI/D,<sup>16–18</sup> but very little is known about the relationship between smoking and pain in persons with SCI/D. In a recent article, Richards describes the apparent relationship between smoking and neuropathic pain in two persons with SCI.<sup>19</sup> Both patients reported increased pain when they smoked. This report suggests that the relationship between pain and smoking should be more carefully examined in this population.

Veterans with SCI/D are an important focus for smoking research for several reasons. First, the Veterans Health Administration (VA) is responsible for the care of nearly 26 000 veterans with SCI/D, which accounts for approximately 22% of all persons in the US with SCI/D. This makes the VA the largest single network of care for persons with SCI/D.<sup>20</sup> Also, veterans as a group tend to experience a greater number of socioeconomic and lifestyle conditions that have the potential to aggravate medical and functional issues associated with smoking. Compared with the general population, veterans are more likely to be older, unemployed, less educated and to have lower income.<sup>21</sup> Veterans are also more likely to drink alcohol heavily<sup>22</sup> and have more comorbid medical conditions than their counterparts in the general population.<sup>21</sup> Finally, veterans as a group smoke more than do non-veterans.<sup>23</sup>

Estimates of smoking prevalence among veterans with SCI/D vary from 30% using periodic reviews of medical records for smoking prevalence<sup>24</sup> to 19% from a national self-report survey of veterans.<sup>25</sup> Despite the significant detrimental effects that smoking has on this population, a significant number of veterans with SCI/D continue to smoke, and little is known about those who do smoke. Guidelines for smoking cessation have been developed and implemented by the Department of Veterans Affairs and the Department of Defense. This evidence-based guideline includes the use of the five As: ask (about tobacco use), advise (to quit smoking), assess (willingness to quit), assist (the user who is willing to make a quit attempt by providing pharmacotherapy and counseling), and arrange (for follow-up in person or by telephone to see how the person is doing and to provide support).<sup>26</sup> Despite the use of these guidelines, smoking rates for veterans with SCI/D remain high. In summary, smoking is a special health concern among veterans with SCI/D and yet we know little about what factors are associated with

smoking in this population. Also, little is known about providers' experiences with implementing smoking cessation programs in this population. This study utilized medical record reviews and a self-report survey to address these questions. Additionally, semi-structured interviews with key informants were used to study current smoking cessation practices. Gaining a better understanding of veterans with SCI/D who smoke, their motivations for smoking, readiness for smoking cessation, and current practices for tobacco cessation will help us to develop intervention strategies to enhance current smoking cessation care.

## Methods

### *Study design*

This was a multi-site observational study that utilized several methods of data collection including a survey of veterans with SCI/D, a review of patient medical records, and semi-structured interviews with key informants. This study was approved by the local institutional review boards of each participating site.

### *Study sites and participants*

The VA has 24 VA SCI centers. Six SCI centers and one SCI primary care team facility (i.e. a facility that has a designated SCI primary care team consisting of a physician, nurse, and a social worker but does not have an SCI center) volunteered to serve as participating sites for the study. These sites are geographically dispersed, including the east coast, south, midwest, and west regions, and also varied in their success in meeting performance measures for smoking cessation care.

All veterans with SCI/D who received care at one of these sites in the previous 12 months were included in the sample for survey distribution. The local Spinal Cord Dysfunction Registry at each facility was used to identify these veterans and provide contact information. Only those individuals with a diagnosis of multiple sclerosis (ICD-9 code '340') or encephalomyelitis (ICD-9 code '323') were excluded from the survey mailing. Patients who self-reported diagnoses of multiple sclerosis or amyotrophic lateral sclerosis on the survey were removed from the analysis file. Patients with spinal cord impairment due to metastatic cancer are typically not included in the Registry.

### *Data collection*

Surveys were mailed to veterans between August 2006 and April 2008 along with a token incentive and a business reply envelope. For veterans who did not respond to the mailed survey within 3 weeks, a postage-paid return postcard was mailed to them requesting that they either complete and return the

survey or return the postcard indicating that they did not want to participate. In case neither the survey nor the postcard was received within 3 weeks of mailing the postcard, a study team member called the veteran in an attempt to complete the survey over the telephone.

Medical record reviews were completed on patients with respiratory diagnoses of community-acquired pneumonia, chronic obstructive pulmonary disease, or sleep apnea, and additional chart reviews were conducted for those patients who indicated that they were current or recent smokers on the survey. Electronic medical records were retrospectively reviewed for the 12-month period prior to the survey distribution date. Because not everyone who self-reported current or recent smoking on the survey had VA health care utilization during the study review period, charts were only examined for those individuals who had any utilization.

Key informants consisted of SCI health care providers identified by the SCI service chief at each site as being involved in smoking cessation care. Informants included physicians, nurses, nurse practitioners, and respiratory therapists. The semi-structured interviews with key informants were scheduled using email and telephone correspondence and were conducted by telephone.

### *Survey instrument*

#### **Medical and demographic questions**

The survey included general questions about level and duration of injury, demographics including race and education, and living arrangements. Respondents were asked to self-report whether they had any of nine health-care-related complications in the past 12 months (i.e. high blood pressure, weight gain, problem alcohol use, chronic obstructive pulmonary disease, depression, high cholesterol, diabetes, asthma, and pressure ulcers). They were also asked to record their height and body weight (used for body mass index (BMI) calculations). Four items related to general respiratory symptoms were presented and respondents indicated whether or not they regularly experienced shortness of breath, cough, bringing phlegm up from their chest, and chest whistling or wheezing when breathing. Respondents were asked to indicate whether they had ever received a pneumonia vaccine, whether they received an influenza vaccine during the most recent influenza vaccine season, and whether they get an influenza vaccine annually.

#### **Smoking behavior and attitudes**

The survey asked respondents whether they had ever smoked at least 100 cigarettes in their lifetime. If they responded yes, they completed a series of questions

related to smoking. Questions included whether they currently smoked cigarettes, age when they started smoking, the number of cigarettes smoked per day and in the past 30 days, and whether they had made a quit attempt in the past year. For respondents who were current smokers, they were asked whether they had been advised to quit by a health care provider in the past 12 months, whether medication was recommended to assist with quitting, and whether other methods for quitting were discussed. For those who had quit smoking, they were asked how long ago they had quit and what methods they used to assist with cessation including medication, nicotine replacement therapy (NRT), and counseling sessions. These items were part of the Healthcare Effectiveness Data and Information Set, a tool used by most US health plans to measure important dimensions of care and service and for benchmarking.<sup>27</sup> Current smokers completed the 'Why do you smoke' questionnaire.<sup>28</sup> This questionnaire assesses motivation to smoke via seven subscales: stimulation, handling, pleasurable relaxation, tension reduction, psychological addiction, habit, and weight concern. Subscale scores range from 3 (low motivation) to 15 (high motivation), with scores of 11 or greater considered to indicate high motivation to smoke.

The Contemplation (readiness to quit) Ladder, which measures readiness to change smoking behavior, was also included in the survey.<sup>29</sup> The scale consists of 10 statements describing how a person feels about smoking. Response options range from 1 = "I have already quit smoking" to 10 = "I have decided to keep smoking". The lower the score, the greater the readiness to try to quit smoking. Subjects who indicate that they have no plans to quit or have decided to continue smoking (scores between 6 and 10) are considered precontemplators, those who indicate that they have a plan to quit in the next 30 days or 6 months (4 or 5 on the scale) are grouped as contemplators, those who have made changes (respond with a 2 or 3) are in the preparation stage, and those who have already quit smoking (a response of 1) are in the action group.

The last set of smoking-related questions was linked to pain. Respondents were asked whether they experienced frequent pain, and if so how their pain intensity related to their smoking behavior. The survey was pilot tested with five veterans, minor adjustments were made, and it was retested with four more veterans before it was mailed to study participants.

### Medical record review

Chart review questions included questions as to whether patients who smoked were counseled to quit smoking,

what type of counseling they received, and what medications or NRT, if any, were provided. The chart review tool was developed and revised using input from a panel of eight experts in SCI medicine and respiratory medicine. We pilot tested the chart review tool at two study sites on five patients per site. Modifications were made based on this pilot and then two SCI medicine experts reviewed the tool again and made minor modifications before it was used for data collection.

### Key informant interviews

The SCI chief at each study site identified one or more providers who were knowledgeable and could speak on issues related to providing smoking cessation care to patients. A semi-structured interview guide was developed that addressed the following topics: (1) awareness of VA guidelines for tobacco cessation, (2) identification of current treatment approaches used for smoking cessation in SCI, (3) resources and materials available for smoking cessation at their facility, (4) barriers to cessation treatments, and (5) suggestions to improve tobacco screening and management in veterans with SCI/D. The research assistant recorded the informant responses to the interview questions in field notes. The interview guide and the questions that comprised it were piloted with two providers, and minor revisions were made before data collection began.

### Analysis

Statistical analyses were conducted using SAS 8.2 software. Descriptive analyses were used to examine most of the data collected including frequencies and means, and standard deviations. Comparisons between current, past, and never smokers included chi-square analyses of categorical data and analysis of variance for continuous variables. Because of multiple comparisons, we used  $P < 0.01$  as the level of significance. Medical record review data included frequencies. Key informant interview responses were grouped by category using field notes. The research assistant used the question items and larger interview topic areas that comprised the interview guide as ready-made analytic categories and grouped relevant portions of the field notes taken during each call into these categories. Drawing on a procedure known as triangulation through multiple data analysts,<sup>30</sup> the study investigator reviewed the field notes and categorized extracts from the field notes for the first three interviews. Following this review, the research assistant then proceeded to categorize the field notes for the remaining interviews.

## Results

Surveys were mailed to 5980 patients across the 7 study sites. The denominator was adjusted to 4911, as 928 surveys were undeliverable and 79 veterans on the initial mailing list had died. Surveys were returned by 1257 patients for a 26% response rate, of which 1210 answered the question about smoking status. Analyses are based on 1210 cases.

There were several differences in the characteristics of veterans with SCI/D who responded to the survey and smoking-related questions ( $n = 1210$ ) and those who did not respond to the survey or to the smoking questions ( $n = 3701$ ). Respondents were older, had a longer mean duration of injury, were more likely to be married, white, and have paraplegia and an incomplete injury as compared to non-responders. The non-responders appear to resemble our current smoker group, suggesting that smokers may be underrepresented in our analyses (see Table 1).

### Demographics and smoking behavior

Almost all respondents had at least a high school education (92%), 25% lived alone, and 59% were individuals with paraplegia. More than one-fifth (22%) of respondents indicated that they were current smokers, 51% ( $n = 615$ ) were past smokers and 27% ( $n = 332$ ) reported having never smoked (see Table 2). There were a number of differences between those who never smoked, past smokers, and current smokers. Current smokers were more likely to have incomplete injuries, have shorter mean duration of injury, to live alone, and to not be married than the never smoked or past smoker groups. Past smokers were the oldest group (mean = 63.2 years). Those who were current smokers reported smoking an average of 16.9 (std 11.6) cigarettes per day and smoked an average of 26.9 days in the past month.

Demographic characteristics and smoking status were also examined by whether respondents had complete or incomplete injuries. Two statistical differences were noted. The distribution of BMI in the past smoker group by injury status revealed that among individuals with complete injuries, fewer were categorized as obese than among those who had incomplete

injuries (22 vs. 35%;  $P = 0.0082$ ). The other difference was for the current smoker group. There was a significantly larger group of patients with tetraplegia who had incomplete injuries than complete injuries in the smoker group (46 vs. 22%;  $P = 0.0007$ ). No other differences were identified when examined by injury status.

### Health problems and behaviors

An examination of self-reported health problems also revealed differences by smoking status (Table 3). The never, past, and current smokers differed on most health problems reported, including being overweight or obese (BMI) ( $P < 0.0001$ ), alcohol problems ( $P < 0.0001$ ), chronic obstructive pulmonary disease (COPD) ( $P = 0.0012$ ), asthma ( $P = 0.0012$ ), shortness of breath ( $P < 0.0001$ ), chronic cough ( $P < 0.001$ ), chest wheeze ( $P < 0.0001$ ), depression ( $P < 0.0001$ ), and diabetes ( $P = 0.0008$ ). In each of these problem areas, the current smoker group reported the highest rate of problems, except for diabetes, which was reported to be highest in the past smoker group. All three groups differed from each other in shortness of breath, phlegm (from chest), and chest wheeze, with current smokers identifying these problems most frequently. With respect to health-promoting behaviors, respondents who were current smokers reported lower rates of getting influenza and pneumonia vaccines. Finally, current smokers were much more likely to allow smoking in their homes than past and never smoked respondents.

Health problems were also examined by injury status in conjunction with smoking status. Pressure sores were more common for those with complete injuries in both the current and past smoker groups than for respondents with incomplete injuries. The only other statistically significant difference was for chest wheeze in current smokers; chest wheeze was more frequently reported in the incomplete injury group than in the complete injury group (56 vs. 36%;  $P = 0.006$ ).

Although we did not ask patients to self-report whether they had cancer, we were able to examine their medical records for the one year study period to

**Table 1 Respondents vs. nonrespondents to survey**

	Respondent ( $n = 1210$ )	Non-respondent ( $n = 3701$ )	<i>P</i> value
Incomplete injury	61%	53%	<0.0001
Tetraplegia-level injury	37%	44%	<0.0001
White	79%	76%	0.029
Male	96%	97%	0.054
Married	54%	45%	<0.0001
Mean age (years)	60.3 (11.96)	57.9 (13.55)	<0.0001
Mean duration of injury (years)	20.7 (14.7)	18.7 (14.0)	<0.0001

**Table 2 Smoking status by patient demographics**

	Never smoked N = 332 (27%) % or mean (std)	Past smoker N = 615 (51%) % or mean (std)	Current smoker N = 263 (22%) % or mean (std)
Mean age (years)*	58.34 (13.7)	63.16 (10.9)	56.30 (10.0)
Age <50 years <sup>†</sup>	29	9	22
White	78	80	78
Male	94	97	96
Married <sup>‡</sup>	58	59	36
Live alone <sup>§</sup>	21	23	33
Tetraplegia	38	34	40
Incomplete injury <sup>¶</sup>	55	58	73
Mean duration of injury (years)**	20.39 (13.9)	21.79 (15.6)	18.60 (17.0)
Injury duration (<10 years)	28	32	34

\*Never vs. past  $P < 0.0001$ ; past vs. current  $P < 0.0001$ .

<sup>†</sup>Never vs. past  $P < 0.0001$ ; past vs. current  $P < 0.0001$ .

<sup>‡</sup>Past vs. current  $P < 0.0001$ ; never vs. current  $P < 0.0001$ .

<sup>§</sup>Never vs. current  $P = 0.0014$ .

<sup>¶</sup>Past vs. current  $P < 0.0001$ ; never vs. current  $P < 0.0001$ .

\*\*Past vs. current  $P = 0.0046$ .

identify any cases of cancer. Six percent ( $n = 76$ ) of our sample had some diagnosis of cancer; presence of cancer did not differ by smoking status. Prostate cancer was the most frequently identified cancer ( $n = 36$ ), while five patients had a diagnosis of lung cancer.

### Pain

The presence of pain was examined for the past and current smoker groups only, to determine how smoking affected the occurrence and intensity of pain in SCI. While both groups experienced frequent

**Table 3 Self-reported health problems and health behaviors by smoking status**

	Never smoked (n = 332) (%)	Past smoker (n = 615) (%)	Current smoker (n = 263) (%)	P value
Health problems				
High blood pressure	40	46	39.5	0.073
Weight problems	24	27	23	0.35
BMI* (overweight or obese)	71	65	51	0.0001
Alcohol problems <sup>†</sup>	1.5	<1	6	<0.0001
COPD <sup>‡</sup>	4	6.5	12	0.0012
Asthma <sup>§</sup>	2	5	9	0.0012
Shortness of breath <sup>¶</sup>	14	23	34	<0.0001
Cough (chronic)**	13	15	33	<0.001
Phlegm (from chest)**	20	28	46	<0.0001
Chest wheeze**	21	28	52	<0.0001
Depression <sup>††</sup>	23	26	40	0.0001
High cholesterol	26	29	26	0.45
Diabetes <sup>‡‡</sup>	16	23	13	0.0008
Pressure sores	21	20	21	0.93
Cancer <sup>§§</sup>	5	7	6	0.34
Health behaviors				
Flu vaccine past year <sup>¶¶</sup>	81	83	73	0.0048
Flu vaccine every year	81	82	75	0.084
Pneumonia vaccine	84	87	82	0.14
Smoking allowed in home**	16	21	74	<0.0001

\*BMI based on self-reported height and weight data.

<sup>†</sup>Past vs. current  $P < 0.0001$ .

<sup>‡</sup>Past vs. current  $P = 0.0085$ ; never vs. current  $P = 0.0005$ .

<sup>§</sup>Never vs. current  $P = 0.0003$ .

<sup>¶</sup>Never vs. past  $P = 0.0005$ ; never vs. current  $P < 0.0001$ ; past vs. current  $P = 0.0009$ .

\*\*Never vs. current  $P < 0.0001$ ; past vs. current  $P < 0.0001$ .

<sup>††</sup>Past vs. current  $P = 0.0081$ ; never vs. current  $P < 0.0001$ .

<sup>‡‡</sup>Past vs. current  $P = 0.0011$ ; past vs. never  $P = 0.008$ .

<sup>§§</sup>Cancer diagnoses were identified from respondents' medical records as respondents were not asked to self-report cancer diagnoses. As the SCD registry typically does not include individuals who are impaired due to metastatic cancer, these numbers may be an undercount of total cases.

<sup>¶¶</sup>Past vs. current  $P = 0.0012$ .

pain, a larger proportion of the current smokers reported pain than the past smokers (82 vs. 70%;  $P = 0.0003$ ). Only a small number of past smokers (15%) responded to the question about the effect of smoking on pain intensity, whereas almost all current smokers answered this question. For those who responded, a larger proportion of past smokers said that smoking either increased or decreased pain intensity than the current smoker group (38 vs. 21%;  $P < 0.003$ ).

### Cessation attempts and attitudes

The average length of time since past smokers reported quitting smoking was 18.3 years (std = 14.2), with a range of 0–67 years. Because of the greater availability of quit smoking medications and NRT aids over the last several years, we broke the group into those who had quit within the past 10 years (38%;  $n = 231$ ) and those who quit greater than 10 years ago (62%;  $n = 382$ ). Those who quit within the past 10 years were more likely to have tried some type of medication or other cessation strategy than those who quit more than 10 years ago (25 vs. 3%;  $P \leq 0.0001$ ). The most frequently identified strategies for recent quitters included nicotine patch (13%), nicotine gum (4%), prescription medications (5%), and group counseling (9%). The relationship between when a respondent quit smoking and when they experienced their SCI/D was also examined. Of those who quit smoking cigarettes, 37.4% quit before their SCI/D, almost 10% quit within 1 year of their SCI/D diagnosis, while the remaining 52.8% quit more than 1 year after their SCI/D.

Just over half (52%) of the current smokers had tried to quit smoking (defined as stopped smoking for at least 1 day because of trying to quit) in the past 12 months. Those who made attempts to quit did not differ from those who did not make a quit attempt on any demographic characteristics collected in this study. Those respondents who reported having made a quit attempt in the past 12 months were more likely to report having depression vs. no depression (63 vs. 45%;  $P = 0.003$ ), and high cholesterol vs. normal cholesterol (67 vs. 47%;  $P = 0.005$ ). There was a trend for those with hypertension to be more likely to have attempted to quit than those without hypertension (62 vs. 46%;  $P = 0.014$ ). Other self-reported health care problems reported during the past 12 months including alcohol problems, COPD, diabetes, asthma, and pressure ulcers were not related to making a quit attempt.

The majority of current smokers were in either the contemplation (42%) or precontemplation (41%) stages based on their readiness to quit smoking scores. Only

7% were in the preparation stage and 10% indicated that they had already (recently) quit smoking. An examination of the subscales of the *Why do you smoke?* scale indicate the highest scores for the pleasure (mean = 10, std = 3.2) and weight (mean = 10, std = 4.7) subscales (scores of 11 or higher indicate high motivation to smoke). An examination of motivation for smoking by self-reported health problems demonstrated differences between those who reported depression and with those who did not report depression. Only the relaxation subscale was rated significantly higher for those individuals who reported having depression (9.9 (3.9) vs. 8.0 (3.7);  $P = 0.0003$ ). Trends were noted for higher stimulation ( $P = 0.011$ ), craving ( $P = 0.012$ ), and weight management ( $P = 0.026$ ) subscale scores for those individuals who also reported depression (Table 4).

### Medical record review

A total of 256 records were reviewed in which patients were current or recent (<12 months) past smokers; 22 veterans had quit within the past year (8.6%). Almost all records (96%) had documentation of either inpatient or outpatient counseling for tobacco cessation. The type of assistance that the patient received included general advice to quit (88%), referral to counseling or a program such as QUITSMART (57%), and/or prescription for medication or NRT (23%). When medication or NRT was offered, prescriptions for the nicotine patch occurred 53% of the time, nicotine gum 23%, and bupropion in 18% of cases.

### Key informant interviews

Interviews were conducted with 15 providers at six study sites. Informants' mean years of experience working with veterans with SCI/D was 13.8 years. Providers reported screening patients during different encounters including admissions to an inpatient unit, at the time of the annual evaluation, and during outpatient visits. Most providers remarked that they advise veterans to quit smoking. Readiness to quit was assessed by most

**Table 4** Motivation for smoking

'Why do you smoke?' Subscales*	Mean (std)
Stimulation	5.6 (2.8)
Handling	5.7 (5.7)
Pleasure	10.0 (3.2)
Relaxation	8.8 (3.9)
Craving	8.5 (3.6)
Habit	5.6 (2.7)
Weight	10.0 (4.7)

\*Subscores can range from 3 (low motivation) to 15 (high motivation). A score of 11 or higher is considered to indicate high motivation to smoke.

of the providers by asking if the veteran was interested in quitting. When advising about treatment options, smoking cessation clinics (11 of 15 providers) and NRT (14 of 15 providers) were the most frequently mentioned treatment approaches. Follow-up strategies varied. Three providers mentioned follow-up when prescriptions were filled, and two providers discussed making phone calls to see how patients were doing with respect to smoking cessation. Some providers ( $n = 6$ ) remarked that providing follow-up after discharge (arrange) is difficult but that they try to address smoking cessation during return clinic visits.

Several comments from providers offered insights into possible barriers to smoking cessation treatment. Over half of the providers mentioned that one of the biggest barriers to smoking cessation in this population is that these patients see this as one of their few pleasures and they are not interested in quitting. One provider discussed access as a barrier to providing smoking cessation as many veterans live far from a VA facility, making utilization of outpatient smoking cessation programs very difficult; and coordination between SCI centers and other VA facilities for this type of care is often difficult. One suggestion was to use telehealth for education and treatment to address access and coordination of care issues. Some other suggestions mentioned included developing additional peer support for smoking cessation, increasing frequency of follow-up and having more staff time to address smoking cessation with patients.

## Discussion

Smoking continues to be a significant problem in the veteran population with SCI/D. In this study, greater than one in five (22%) of respondents indicated that there were current smokers. Smokers were younger, were less likely to be married, and were more likely to live alone and to have incomplete injuries. Smokers in the SCI/D sample were also more likely to identify a number of current medical and mental health concerns including problems with alcohol use, depression, pain, and respiratory-related illnesses and symptoms including COPD, asthma, cough, phlegm, chest wheeze, and shortness of breath. Smokers were also less likely to receive respiratory vaccinations. Of the 9 health care complications examined in the past 12 months, only diabetes was reported to be more frequent in the past smoker group than the current or non-smoker groups. It is possible that respondents who developed diabetes were more likely to quit smoking following diagnosis, as smoking not only is an established risk factor for type II diabetes, but also contributes to worse clinical

outcomes in those who have diabetes.<sup>31</sup> The respiratory problems identified by smokers in our sample are not surprising, as they are likely a direct result of smoking. Further, the co-occurrence of smoking, pain, depression, and alcohol use also is not unexpected. Depression, pain, alcohol use, and other substance use disorders are associated with a greater prevalence of smoking.<sup>32–35</sup> Of additional concern is that the greater prevalence of health problems and symptoms in the smoker sample is likely tied to greater health care resource use. Although these data were not directly available, smoking has been shown to increase health care use and costs in general.<sup>36</sup> The prevalence of cancer of any type was low in this cohort, regardless of smoking status, with the most frequent cancer identified as prostate cancer. Since our cohort was comprised of older men, this finding is not surprising.

The smokers in this SCI/D population face numerous additional medical and behavioral concerns that could have a bearing on how smoking cessation interventions are delivered. Respiratory symptoms such as those endorsed by the participants in this sample may be predictive of greater interest in smoking cessation treatment.<sup>37,38</sup> Reduction of respiratory symptoms could be an important, motivating objective associated with smoking cessation treatment among persons with SCI/D. However, depressive symptoms and heavy alcohol consumption are well-known predictors of poor response to smoking cessation treatment.<sup>39–41</sup> Providers might consider how to design smoking cessation interventions so as to minimize the potential negative impact of other conditions on smoking cessation, or how to incorporate smoking cessation interventions into treatment for other conditions such as alcohol misuse and depression. It has been suggested that interventions targeting multiple health behaviors can stimulate adaptive change more effectively than single target interventions.<sup>42</sup>

Of those who quit smoking, over half quit smoking more than a year after their injury. Providers might consider making a more concerted effort to address smoking cessation during the time of acute rehabilitation. There is significant focus on prevention of complications such as skin breakdown and infections during rehabilitation, so incorporating smoking cessation at this point may have a greater impact on cessation rates. However, as this is a very stressful time with many ongoing interventions and educational efforts, introducing one more thing, like smoking cessation, may not be optimal. Gradually introducing tobacco cessation over subsequent visits could be considered.

Many of the past smokers in this sample indicated that they did not utilize recommended strategies such



as counseling and/or NRT to quit smoking. However, those who quit smoking more recently (within the past 10 years) were more likely to have utilized these strategies as they became more available. Prior research with veterans with SCI/D indicated that those who had tried these strategies had not found them to be very helpful in quitting.<sup>25</sup> We do not know whether smokers in our sample had tried these strategies in the past and found them to be helpful. It is possible that the veterans in our study might benefit from a combination of counseling and NRT or a combination of medication therapies. A systematic review of combination therapy for smoking cessation that included nicotine patch plus one other agent such as nicotine gum or bupropion SR found combination therapy to be more effective than monotherapy for tobacco cessation.<sup>43</sup> A recent study of triple-combination pharmacotherapy for smoking in medically ill patients found the combination of medications to be more effective than standard-duration nicotine patch treatment.<sup>44</sup> Other strategies include combining medication and behavioral counseling.<sup>45</sup> Personalizing smoking cessation intervention by determining NRT dosing based on a 'quit-success' genotype also shows promise.<sup>46</sup> One strategy that does not appear to be helpful is the suppression of thoughts of smoking, as this can have a rebound effect.<sup>47</sup> A careful study of combination therapies and other innovative strategies may be warranted in a high-risk population like SCI/D, in which single therapy intervention has not been found to be effective.

Over half of current smokers in this study had made a quit attempt in the past year. Most smokers make multiple attempts before they successfully quit smoking. Individuals who make a quit attempt are more likely to be successful on their next quit attempt than those who have not tried to quit in the past year. Furthermore, 42% indicated that they were in the contemplation stage for tobacco cessation, which means that they are planning to quit within the next one to six months. This is the group that providers may want to target and support with respect to cessation efforts.

The veterans with SCI/D who were current smokers were motivated to smoke for pleasure and for managing their weight. Being overweight is a serious problem in SCI/D. Recent studies have documented that between 53 and 66% of veterans with SCI/D are overweight or obese.<sup>48,49</sup> Results from a recent study found that daily smokers had lower BMI than those who never smoked, even though daily smokers more frequently ate whatever they wanted without being concerned about weight. Almost half (48%) of smokers who had tried in the past and 32% of those who tried to quit during the one year

study period cited weight gain as a reason why they started smoking again.<sup>50</sup> Providers should offer veterans with SCI/D alternative strategies to maintain their weight. Pleasure also was a motivator for smokers in this study. Pleasure is a common motivator for smoking in the general population. However, while smoking for pleasure is a major deterrent to making attempts to quit smoking, it does not influence the success of the quit attempt.<sup>51</sup> Providers of veterans with SCI/D should explore with their patients what other activities can provide pleasure in the place of smoking.

With respect to provision of evidence-based care for smoking cessation, our conclusions are limited due to our reliance on medical record reviews where documentation of care was likely inconsistent. The VA monitors the provision of evidence-based smoking cessation care for veterans with SCI/D through their Office of Quality and Performance (OQP) External Peer Review Program (EPRP). The OQP samples and reviews medical records quarterly to track performance measures and monitors. The performance measures for smoking cessation have been followed since 2003. The national EPRP data for veterans with SCI/D indicate that provision of tobacco cessation care is higher than what we found in this study. EPRP data indicate that almost 29% of veterans with SCI/D smoke, that 94% were counseled to quit, 96% were referred to a cessation program, and 91% were offered medications to help quit.<sup>24</sup> Our study criteria for identifying this information differed slightly from the criteria used through the EPRP process to examine tobacco cessation. For example, in this study, we looked for prescriptions for tobacco cessation medication and NRT, rather than whether providers offered this option. We suspect that patients frequently turned down offers for medications, particularly those veterans with SCI/D who were not interested in quitting. EPRP data suggest that providers are providing evidence-based care for tobacco cessation.

Our key informants identified a number of possible barriers to providing evidence-based tobacco cessation care for veterans with SCI/D including difficulty in accessing care, and patients who are not interested in quitting smoking. Access problems including transportation, architecture barriers, attitudinal barriers, and logistical barriers affect the ability to receive care. For example, veterans with SCI/D may rely on specialized transportation that requires advanced scheduling for pick-up and return trips, and further, they may have more limited availability for appointment times (e.g. a bowel care program that takes 3 hours in the morning), so the timeframe in which a patient is available for an appointment is limited. Veterans with SCI/D

who live a great distance from the nearest VA facility may have difficulty with being able to tolerate long car trips. Outpatient tobacco cessation counseling is likely not an option for many of these individuals. One provider suggested utilizing options such as telehealth to provide counseling in or closer to the patient's home. Telephone tobacco-cessation quit lines offer similar improved access to care and support.<sup>52</sup>

Lack of motivation to quit smoking was cited as a barrier to smoking cessation treatment by several key informants, and this was consistent with the finding that only 17% of the study sample was taking action or intending to take action in terms of smoking cessation. Smoking cessation interventions designed to move persons from disinterest to interest in smoking cessation would be especially valuable for involving the majority of smokers in this population. Conversely, interventions aimed at only those persons interested and motivated to quit smoking would be targeting a small minority. An ongoing clinical trial is targeting smokers who are unmotivated to change. The novel intervention includes making a practice quit attempt with or without samples of NRT, with the goal of cessation induction.<sup>53</sup>

### Limitations

Respondents were from a subset of SCI centers and clinics and may not be representative of the veteran SCI/D population. The response rate for the survey was lower than typically experienced in this population. Respondents appeared to be healthier than non-respondents, suggesting that differences between smokers and non-smokers are likely to be greater if the full sample participated. Further, as non-respondents looked more similar to our current smoker group, smokers may be underrepresented in these analyses. Unlike prior research involving surveys with this population in which response rates are often above 50%,<sup>54</sup> the Institutional Review Boards at six of our seven sites required written informed consent for participation. We believe that this severely hampered our response rates as patients may have been confused or concerned by this additional requirement. The review of medical records to determine current practices regarding evidence-based care is limited as to what providers document in the record as to the care they provided. Previous work undertaken to determine vaccination behavior illustrates how providers often fail to document care they provide.<sup>55</sup>

Other limitations were related to the reliability and validity of some of the data collection tools used. The questions about smoking-related pain were pilot tested on fewer than 10 respondents, so their reliability and

validity are unknown. Similarly, pilot testing was limited to key informant interview questions. Finally, because data on items such as the use of smoking cessation strategies are based on self-report and could not be validated, these responses are subject to recall bias.

This study provides valuable information about the smoking status of veterans with SCI/D, their health problems, their motivations for smoking, and their past attempts to quit smoking. These data can inform providers as to what issues need to be addressed in this population with respect to smoking, such as alternatives to weight management, and which individuals to target for intervention.

### Conclusion

Persons with SCI/D are already at high risk of respiratory and other health complications as a result of their injury, yet many of them continue to smoke. Smoking increases their risk of negative health outcomes, and requires concerted efforts by providers to help these individuals to reduce their risk by quitting smoking. Efforts to address other health concerns such as depression or alcohol use, which may be associated with smoking, and the utilization of newer strategies such as combination therapies and improved access through telehealth and telephone quit lines should be examined in this population.

### References

- 1 CDC. Surgeon General's Report: The health consequences of smoking. Centers for Disease Control. 2004 [accessed 2009 Nov 13]. Available from: [www.cdc.gov/tobacco/data\\_statistics/sgr/2004/index.htm](http://www.cdc.gov/tobacco/data_statistics/sgr/2004/index.htm).
- 2 MMWR. State-specific prevalence and trends in adult cigarette smoking – United States, 1998–2007. *Mortal Morbid Wkly Rev* 2009;58(9):221–6.
- 3 Armour BS, Campbell VA, Crews JE, Malarcher A, Maurice E, Richard RA. State-level prevalence of cigarette smoking and treatment advice, by disability status, United States, 2004. *Prev Chronic Dis* 2007;4(4):A86.
- 4 Stolzmann KL, Gagnon DR, Brown R, Tun CG, Garshick E. Risk factors for chest illness in chronic spinal cord injury: a prospective study. *Am J Phys Med Rehabil* 2010;89(7):576–83.
- 5 DeVivo MJ, Krause JS, Lammertse DP. Recent trends in mortality and cause of death in people with spinal cord injury. *Arch Phys Med Rehabil* 1999;80(11):1411–9.
- 6 DeVivo MJ, Black KJ, Stover SL. Causes of death during the first 12 years after spinal cord injury. *Arch Phys Med Rehabil* 1993; 74(3):248–54.
- 7 Ragnarsson KT, Hall KM, Wilmot CB, Carter RE. Management of pulmonary, cardiovascular and metabolic conditions after spinal cord injury. In: Stover SL, DeLisa JA, Whiteneck GG (eds.) *Spinal cord injury: clinical outcomes for the model systems*. Gaithersburg, MD: Aspen; 1995. p. 79–99.
- 8 Almenoff PL, Spungen AM, Lesser M, Baumann WA. Pulmonary function survey in spinal cord injury: influences of smoking and level and completeness of injury. *Lung* 1995;173:297–306.
- 9 Spungen AM, Dicipinigaitis PV, Almenoff PL, Bauman WA. Pulmonary obstruction in individuals with cervical spinal cord lesions unmasked by bronchodilators. *Paraplegia* 1993;31(6):404–7.
- 10 Linn WS, Spungen AM, Gong H, Bauman WA, Adkins RH, Waters RL. Smoking and obstructive lung dysfunction in persons with chronic spinal cord injury. *J Spinal Cord Med* 2003;26(1):28–35.

- 11 Davis DS, McColl MA. Lifestyle risks for three disease outcomes in spinal cord injury. *Clin Rehabil* 2002;16:96–108.
- 12 Leboeuf-Yde C. Does smoking cause low back pain? A review of the epidemiologic literature for causality. *J Manipulative Physiol Ther* 1995;18(4):237–43.
- 13 Vogt MT, Hanscom B, Lauerman WC, Kang JD. Influence of smoking on the health status of spinal patients: the National Spine Network database. *Spine* 2002;27(3):313–9.
- 14 Riley JL, Tomar SL, Gilbert GH. Smoking and smokeless tobacco: increase risk for oral pain. *J Pain* 2004;5(4):218–25.
- 15 Palmer KT, Syddall H, Cooper C, Coggon D. Smoking and musculoskeletal disorders: findings from a British national survey. *Ann Rheumatic Dis* 2003;62(1):33–6.
- 16 Cruz-Almeida Y, Martinez-Arizala A, Widerström-Noga EG. Chronicity of pain associated with spinal cord injury: a longitudinal analysis. *J Rehabil Res Dev* 2005;42(5):585–94.
- 17 Siddall PJ, McClelland JM, Rutkowski SB, Cousins MJ. A longitudinal study of the prevalence and characteristics of pain in the first 5 years following spinal cord injury. *Pain* 2003;103(3):249–57.
- 18 Turner JA, Cardenas DD, Warms CA, McCellan CB. Chronic pain associated with spinal cord injuries: a community survey. *Arch Phys Med Rehabil* 2001;82(4):501–9.
- 19 Richards JS, Kogos SC, Ness TJ, Oleson CV. Effects of smoking on neuropathic pain in two people with spinal cord injury. *J Spinal Cord Med* 2005;28(4):330–2.
- 20 Department of Veterans Affairs Office of Public Affairs. Washington (DC): Department of Veterans Affairs; c2008 [updated 2007 Aug 20; cited 2008 Feb]. Fact sheet: VA and spinal cord injury. Available from: <http://www1.va.gov/opa/fact/spinalcfs.asp/>.
- 21 Larson RJ, Welch HG. Risk for increased utilization and adverse health outcomes among men served by the Veterans Health Administration. *Mil Med* 2007;172(7):690–96.
- 22 Winkleby MA, Fleshin D. Physical, addictive, and psychiatric disorders among homeless Veterans and nonveterans. *Public Health Rep* 1993;108(1):30–6.
- 23 McKinney WP, McIntire DD, Carmody TJ, Joseph A. Comparing the smoking behavior of Veterans and nonveterans. *Public Health Rep* 1997;112(3):212–18.
- 24 Office of Quality & Performance. Performance measures and monitors – 2008 data. Washington, DC: Department of Veterans Affairs. [accessed 2010 April 2]. Available from: <http://vaww.pdw.med.va.gov/archive.asp>.
- 25 Weaver FM, LaVela S, Miskevics S, Clemmons N, Janke EA, Spring B. Smoking behavior and readiness to change in Veterans with spinal cord injuries and disorders. *Rehabil Psychol* 2007;52(3):304–10.
- 26 Department of Veterans Affairs and Department of Defense. Smoking cessation guideline. [accessed 2010 April 2]. Available from: <http://www.oqp.med.va.gov/cpg/cpg.htm>.
- 27 Healthcare Effectiveness Data and Information Set (HEDIS). [accessed 2010 April 2]. Available from: <http://www.ncqa.org/tabid/59/Default.aspx>.
- 28 American Academy of Family Physicians. “Why do I smoke?” quiz. [accessed 2010 Feb 9]. Available from: <http://familydoctor.org/online/famdocen/home/common/addictions/tobacco/296.html>.
- 29 Beiner L, Abrams DB. The contemplation ladder: validation of a measure of readiness to consider smoking cessation. *Health Psychol* 1991;10:360–5.
- 30 Patton MQ. Enhancing the quality and credibility of qualitative analysis. *HSR: Health Serv Res* 1999;34(5):1189–208.
- 31 Fagard RH, Nilsson PM. Smoking and diabetes – the double health hazard! *Prim Care Diabetes* 2009;3(4):205–9.
- 32 Hughes JR. Treatment of smoking cessation in smokers with a past history of alcohol/drug problems. *J Subst Abuse Treat* 1993;10(2):181–7.
- 33 Turner AP, Kivlahan DR, Kazis LE, Haselkorn JK. Smoking among Veterans with multiple sclerosis: prevalence correlates, quit attempts, and unmet need for services. *Arch Phys Med Rehabil* 2007;88(11):1394–9.
- 34 McClave AK, Dube SR, Strine TW, Mokdad AH. Associations between health-related quality of life and smoking status among a large sample of U.S. adults. *Prev Med* 2009;48(2):173–9.
- 35 Wiesbeck GA, Kuhl HC, Yaldizli O, Wurst FM; WHO/ISBRA Study Group on Biological State and Trait Markers of Alcohol Use and Dependence. Tobacco smoking and depression – results from the WHO/ISBRA study. *Neuropsychobiology* 2008;57(1–2):26–31.
- 36 Strum R. The effects of obesity, smoking and drinking on medical problems and costs. *Health Affairs* 2002;21(2):245–53.
- 37 Bernstein SL, Boudreaux ED, Cabral L, et al. Nicotine dependence, motivation to quit, and diagnosis among adult emergency department patients who smoke: a national survey. *Nicotine Tob Res* 2008;10(8):1277–82.
- 38 Boudreaux ED, Baumann BM, Camargo CA, O’Hea E, Ziedonis DM. Changes in smoking associated with an acute health event: theoretical and practical implications. *Ann Behav Med* 2007;33(2):189–99.
- 39 Batel P, Pessione F, Maître C, Rueff B. Relationship between alcohol and tobacco dependencies among alcoholics who smoke. *Addiction* 1995;90(7):977–80.
- 40 Burgess ES, Brown RA, Kahler CW, et al. Patterns of change in depressive symptoms during smoking cessation: who’s at risk for relapse? *J Consulting Clin Psychol* 2002;70(2):356–61.
- 41 DiFranza JR, Guarrera MP. Alcoholism and smoking. *J Studies Alcohol* 1990;51(2):130–5.
- 42 Prochaska JJ, Spring B, Nigg CR. Multiple health behavior change research: an introduction and overview. *Prev Med* 2008;46(3):181–8.
- 43 Shah SD, Wilken LA, Winkler SR, Lin SJ. Systematic review and meta-analysis of combination therapy for smoking cessation. *J Am Pharm Assoc* 2008;48(5):659–65.
- 44 Steinberg MB, Greenhaus S, Schmeizer AC, et al. Triple-combination pharmacotherapy for medically ill smokers: a randomized trial. *Ann Intern Med* 2009;150(7):447–54.
- 45 Swan GE, McClure JB, Jack LM, et al. Behavioral counseling and varenicline treatment for smoking cessation. *Am J Prev Med* 2010;38(5):482–90.
- 46 Rose JE, Behm FM, Drgon T, Johnson C, Uhl G. Personalized smoking cessation: interactions between nicotine dose, dependence and quit-success genotype score. *Mol Med* 2010;16(7–8):247–53.
- 47 Erskine JAK, Georgiou GJ, Kvavilashvili L. I suppress, therefore I smoke: effects of thought suppression on smoking behavior. *Psychol Sci* 2010;21(9):1225–30.
- 48 Weaver FM, Collins E, Kurichi J, et al. Prevalence of obesity and high blood pressure in veterans with spinal cord injuries and disorders: a retrospective review. *Am J Phys Med Rehabil* 2007;86(1):22–9.
- 49 Rajan S, McNelly MJ, Hammond M, Goldstein B, Weaver F. Obesity and its relationship to diabetes mellitus in Veterans with spinal cord injury. *Am J Phys Med Rehabil* 2010;89(5):353–361.
- 50 Pisinger C, Jorgensen T. Weight concerns and smoking in a general population: the Inter99 study. *Prev Med* 2007;44(4):283–9.
- 51 West R. The multiple facets of cigarette addiction and what they mean for encouraging and helping smokers to stop. *COPD* 2009;6(4):277–83.
- 52 Zhu SH, Anderson CM, Tedeschi GJ, et al. Evidence of real-world effectiveness of a telephone quitline for smokers. *New Engl J Med* 2002;347(14):1087–93.
- 53 Carpenter JM, Alberg AJ, Gray KM, Saladin ME. Motivating the unmotivated for health behavior change: a randomized trial of cessation induction for smokers. *Clinical Trials* 2010;7:157–66.
- 54 Weaver FM, Smith B, LaVela S, Wallace C, Evans CT, Hammond M, et al. Interventions to increase influenza vaccination rates in veterans with spinal cord injuries and disorders. *J Spinal Cord Med* 2007;30(1):10–9.
- 55 Weaver FM, Hatzakis M, Evans C, et al. A comparison of multiple data sources to identify vaccinations for Veterans with spinal cord injuries and disorders. *J Am Med Inform Assoc* 2004;11(5):377–79.