

ERECTILE DYSFUNCTION

Erectile Function Predicts Sexual Satisfaction in Men With Spinal Cord Injury



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ABSTRACT

Introduction: Spinal cord injury (SCI) is usually a sudden traumatic event and has a negative effect on sexual function.

Aim: To evaluate the characteristics of sexual activity in men with SCI and identify predictors of being sexually active and having a satisfactory sex life.

Methods: We assessed sexual activity profiles of men with SCI from a Brazilian tertiary rehabilitation center from February to August 2012. All patients older than 18 years with SCI for longer than 1 year were invited to participate. We analyzed age, time since SCI, patient age at SCI, employment status, partner status, completeness of lesion, functional independence, urinary continence, and Sexual Health Inventory for Men (SHIM) score.

Main Outcome Measures: The SHIM was used to assess erectile function (EF). Satisfaction with sex life was analyzed as a dichotomous variable. Predictors of an active and satisfactory sex life were identified using univariable and multivariable analyses.

Results: We evaluated 295 men with mean age of 40.7 ± 14.5 years. Most patients had a complete SCI (65.1%) and 159 (53.9%) were incontinent. The median SHIM score was 5 (interquartile range = 0–16) and only 71 men (24.1%) had a SHIM score of at least 17. Of these men, 159 (53.9%) were sexually active. Only 63 men (39.6%) were satisfied with their sex life after SCI. In univariable analysis, all variables were associated with an active sex life. Those with a SHIM score of at least 17 had a greater likelihood of being sexually active (odds ratio = 116, 95% confidence interval = 14–432). EF was the only parameter associated with a satisfactory sex life (odds ratio = 1.3, 95% confidence interval = 1.2–1.4).

Conclusions: Most men with SCI were sexually inactive and/or dissatisfied with their sex life. Age, duration of SCI, completeness of SCI, continence, having a partner, and good EF were identified as predictors of an active sex life. However, only EF was a predictor of a satisfactory sex life. **Gomes CM, Miranda EP, de Bessa J, et al. Erectile Function Predicts Sexual Satisfaction in Men With Spinal Cord Injury. Sex Med 2017;5:e148–e155.**

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Key Words: Spinal Cord Injury; Erectile Dysfunction; Sexual Behavior; Quality of Life; Epidemiology; Urinary Bladder Neurogenic

Received March 21, 2017. Accepted June 11, 2017.

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<http://dx.doi.org/10.1016/j.esxm.2017.06.002>

INTRODUCTION

Spinal cord injury (SCI) has a known negative effect on quality of life. It might have a specific detrimental effect on male sexual function by affecting patients' quality of life and interpersonal relationships.^{1,2} Studies have shown that sexuality is a key motivating factor in the lives of men with SCI.^{3–5} Among the priorities of rehabilitation in men with SCI, sexual recovery was considered the most important aspiration for paraplegic men, followed by overcoming the desire for lower limb motor recovery and recovery of bladder function.⁶ For tetraplegic subjects, sexual rehabilitation was considered less important than recovery of upper limb function.⁶

It is estimated that 35% to 80% of men become sexually inactive after SCI.^{7,8} Erectile function and the ability to achieve orgasm and ejaculation are impaired in most men with SCI.^{9–12} Satisfaction with sexual life also is decreased in most individuals.^{7,9,13} Younger individuals¹⁴ and those with longer time since SCI¹⁵ seem to have a better chance of being sexually active. Factors such as level of injury and neurologic impairment⁷ and urinary and fecal control^{9,10} have been evaluated, with different results. Other studies have shown that complications of SCI such as pressure ulcers, spasticity, and pain and factors related to a patient's self-esteem also might decrease sexual activity.^{16,17}

Although previous studies have reported the association between sexuality and quality of life in men with SCI,^{18,19} satisfaction with sex life in that population has been poorly evaluated.¹⁹ We believe it would be helpful for clinicians to understand what the major factors are for recovery of sexual satisfaction in this population. Previous studies have shown that the characteristics of the relationship with the partner, the ability to move, and body image seem to play an important role in achieving a satisfactory sex life.^{4,20} Urinary continence also has been considered important for sexual satisfaction in other series.^{10,14,21} It is known that good erectile function is essential for sexual activity and body image and that it can be severely impaired in men with SCI. However, its importance among the various determinants of sexual activity in men with SCI has not been investigated. Moreover, studies evaluating erectile function of men with SCI have not systematically used validated instruments such as the International Index for Erectile Function or the Sexual Health Inventory for Men (SHIM).²² In this study we evaluated sociodemographic aspects and sex life characteristics of men with SCI, with special focus on erectile function, to identify predictors of satisfaction with sex life.

METHODS

Patient Population

In this cross-sectional study, we assessed the sexual function of consecutive men with SCI from a tertiary rehabilitation center from February to August 2012. All patients older than 18 years of age with SCI for more than 1 year who presented for a routine medical visit were invited to participate. The only exclusion

criterion was the presence of associated traumatic brain injury with confirmed cognitive impairment. We evaluated clinical and demographic data such as age, SCI duration, SCI level, and completeness of SCI based on the American Spinal Injury Association Impairment Scale,²³ urinary continence, bladder management methods, and functional independence.

Urinary continence was defined as the absence of urinary leaks and no use of pads or diapers in the past 30 days. The bladder-emptying methods included spontaneous micturition, with or without stimulation maneuvers, clean intermittent catheterization, or use of an indwelling urethral or suprapubic catheter. Patients using a condom catheter who did not perform intermittent catheterization were included among those with spontaneous micturition.

Sample Size Calculation

Before conducting our sample size calculation, we considered a power of 80%, a precision of 5%, and a confidence interval (CI) of 95%. Assuming that the approximate prevalence of an active sex life in men with SCI was 25%, a minimum of 250 individuals would be required. To explore possible predictors of sexual satisfaction with a two-sided significance level of 5%, we aimed at recruiting 300 patients, which represent 20% more than initially calculated. Consecutive eligible participants were invited to participate in the study during their routine follow-up appointments. Of the invited patients, only three did not agree to participate and two were ineligible because they had cognitive deficits secondary to traumatic brain injury. In total, we gathered 295 subjects, resulting in an acceptance rate of 99.0%.

Questionnaire Assessment

A trained research assistant interviewed participants alone without the presence of the partner. This setup was chosen because many patients lacked manual dexterity owing to the SCI and to avoid partner interference on patients' scoring. All patients completed the Functional Independence Measure (FIM) questionnaire, which assesses self-care components (food, personal hygiene, bathing, dressing, and using the toilet), sphincter control (urinary function and defecation), mobility (transfers to bed, toilet, bathroom, and wheelchair, mobility chair wheels, or walking), communication (including comprehension and expression), and social cognition (social interaction, problem solving, and memory). Each item is scored on a seven-point Likert scale, where 1 indicates total dependence and 7 indicates complete independence. The total FIM score ranges from 18 to 126.

Patients completed a structured questionnaire containing items about the frequency and modalities of sexual relations, ability to achieve orgasm and ejaculation, and use of phosphodiesterase type 5 (PDE-5) inhibitors. Those who reported not having any kind of sexual activity with a partner in the past 12 months were considered sexually inactive. We considered

partnered those individuals who reported being involved in a romantic relationship regardless of civil status.

Patients also completed the SHIM, which contains five questions rated on a five-point Likert scale, with lower values representing worse erectile function. The SHIM includes four items exploring erectile function in addition to a single item on intercourse satisfaction. Erectile function was categorized as no erectile dysfunction (ED; SHIM score > 22), mild ED (SHIM score = 17–21), moderate ED (SHIM score = 8–16), or severe ED (SHIM score < 7).²⁴ Satisfaction with sexual life was assessed through specific questioning using a Likert scale from 0 to 5, with 0 indicating “very dissatisfied” and 5 indicating “very satisfied.” Individuals who reported being satisfied or very satisfied were considered to have a satisfactory sex life.

Statistical Analysis

Numerical variables were described by measurements of central tendency (mean or median) and the respective dispersion measurements. Categorical variables were described by their absolute values, percentages, or proportions. To compare the differences of continuous variables, we used the Student t-test or the Mann-Whitney test. For comparison of categorical data, we used the χ^2 test. Univariable and multivariable analyses were performed to identify predictors of sexual activity. The association between independent and dependent variables was determined using bivariate analysis to obtain the odds ratio (OR) and 95% CI. Significant independent variables were chosen through the likelihood ratio test for adjusting the multivariate logistic model. The final logistic model was selected according to the Akaike information criterion. Predictor variables were included in multivariate analysis after significance was found in univariate analysis and included patient age, time since SCI, patient age at SCI, partner status, completeness of lesion, functional independence, urinary continence, and SHIM score. *P* values less than .05 were considered significant and 95% CIs were used as a measure of the accuracy of the results. Analyses were performed using GraphPad Prism 5.0.3 (GraphPad Software, San Diego, CA, USA).

RESULTS

Study Population

A total of 295 men with a median age of 40.7 ± 14.5 years were evaluated. The median time since SCI was 3.6 years (interquartile range [IQR] = 1.6–7.0). The median age at time of injury was 31.3 years (IQR = 22.7–45.4). SCI characteristics are listed in Table 1. Of these subjects, 136 (46.1%) were sexually inactive and 159 (53.9%) were sexually active. Sexual activity profiles are presented in Table 2. In our sample, 68.9% of sexually active patients were partnered, whereas 43.4% of inactive patients had a stable relationship. Of participants, 159 (53.9%) were continent and 136 (46.1%) were incontinent. For the bladder-emptying method, 201 (68.1%) performed

Table 1. Characteristics of spinal cord injury and functional independence

	n (%)
Injury level	
Cervical	129 (44)
Thoracic	133 (45)
Lumbar	33 (11)
AIS classification	
A	192 (65)
B	33 (11)
C	27 (9)
D	34 (12)
E	9 (3)
Trauma mechanism	
Fall	84 (28)
Gunshot	65 (22)
Motorcycle accident	53 (18)
Car accident	43 (16)
Dive	25 (8)
Pedestrian vs car accident	15 (5)
Others	10 (3)
Functional independence (FIM score)*	101 (70–114)

AIS = American Spinal Injury Association Impairment Scale; FIM = Functional Independence Measure.

*Median (interquartile range).

intermittent catheterization, 83 (28.1%) had spontaneous micturition, and 11 (3.8%) used an indwelling urethral catheter.

Sexual Activities

For sexual modalities, 150 patients (50.8%) reported vaginal intercourse, 62 (21%) received oral sex, 18 (6.1%) practiced insertive anal sex, and 12 (4%) reported partnered masturbation. Of sexually active subjects, 33 (20.7%) could ejaculate and 56 (35.2%) could achieve orgasm and 63 (39.6%) considered their sexual life as satisfactory.

The median erectile function score as assessed by the SHIM was 5 (IQR = 2–16). The median SHIM score in sexually active men was 15 (IQR = 9–21, *P* < .001). Only 71 men (24%) had

Table 2. Sex life characteristics of men before and after spinal cord injury

	Before, n (%)	After, n (%)	<i>P</i> value
Sexually active	289 (97.9)	159 (53.8)	<.001*
Monthly frequency of sexual activity			<.001†
>4	229 (77.6)	43 (14.5)	
1–4	50 (16.9)	52 (17.6)	
<1	10 (3.4)	64 (21.7)	
No intercourse	6 (2.0)	136 (46.2)	
Capable of orgasm	284 (96.4)	105 (35.6)	<.001*
Capable of ejaculation	288 (97.6)	61 (20.7)	<.001*

*By Fisher exact test.

†By χ^2 test.

Table 3. Distribution of different variables according to sexual satisfaction

	Sexually active		P value
	Satisfied (n = 63)	Dissatisfied (n = 96)	
Age (y)	36.9 ± 10.9	40.5 ± 13.9	.08*
Median age at SCI (y)	27.8	29.6	.60 [†]
Time since SCI (mo)	6.1	4.6	.17 [†]
Partnered (yes or no)	65%	69%	.50 [‡]
Cervical level (yes or no)	36%	42%	.62 [‡]
AIS A classification	56%	56%	1.00 [‡]
Median FIM score	108	106	.81 [†]
Continent (yes or no)	66%	53%	.10 [‡]
Median SHIM score	19	12	<.001 [†]

AIS = American Spinal Injury Association Impairment Scale; FIM = Functional Independence Measure; SCI = spinal cord injury; SHIM = Sexual Health Inventory for Men.

*By Student t-test.

[†]By Mann-Whitney test.

[‡]By Fisher exact test.

a SHIM score of at least 17. One hundred ten men (37.2%) reported using a PDE-5 inhibitor including 58 (19.6%) who reported significant improvement of erection, 28 (9.4%) who had little improvement, and 14 (4.7%) who did not observe any benefit. Only 10 men (3.3%) reported regular use of intracavernosal injections and 3 (1%) had undergone penile implant surgery.

Predictors of Sexual Activity and Satisfaction

Patients' characteristics according to sexual satisfaction status are demonstrated in Table 3. In univariable analysis, all of the following were associated with an active sex life: patient age, time since SCI, patient age at SCI, partner status, completeness of lesion, functional independence, urinary continence, and SHIM score. Of these variables, only employment status was not associated with sexual activity at univariate analysis because only seven patients (2.3%) were actively employed at the time of inquiry. All variables remained significant at multivariable analysis. Those with a SHIM score of at least 17 had a greater likelihood of being sexually active (OR = 116, 95% CI = 14–432, $P < 0.001$) compared with men with moderate to severe ED (SHIM score < 17; Table 4).

Erectile function measured by the SHIM score and regarded as a continuous variable was the only parameter associated with satisfaction with sexual life at multivariate analysis (OR = 1.3, 95% CI = 1.2–1.4), indicating that for each point of improvement on the SHIM score, there was a 30% increase in the likelihood of having a satisfactory sex life. Men with SHIM scores of at least 17 had an increased chance of being satisfied with their sex life (OR = 3.9, 95% CI = 1.6–5.9, $P < .001$) compared with men with moderate to severe ED (SHIM score < 17). Figure 1 illustrates the difference in SHIM scores when

Table 4. Univariable and multivariable analyses of factors associated with an active sex life

	OR (95% CI)	P value
Univariable analysis		
Age* (per year increase)	0.94 (0.92–0.96)	.04 [†]
Age at SCI* (per year increase)	1.1 (1.02–1.9)	<.001 [†]
Time since SCI* (per year increase)	1.1 (1.01–1.9)	<.001 [†]
AIS A classification (vs B, C, D, E)	0.4 (0.2–0.6)	<.001 [‡]
Preservation of continence (yes or no)	1.8 (1.1–2.8)	.01 [‡]
Partnered (yes or no)	2.8 (1.8–4.5)	<.001 [‡]
FIM score* (per 10-point increase)	1.1 (1.01–1.2)	.01 [†]
SHIM score ≥ 17 (yes or no)	116 (14.4–432.5)	<.001 [‡]
Multivariable analysis		
Age* (per year increase)	0.93 (0.92–0.97)	<.001
Age at SCI* (per year increase)	1.2 (1.1–1.3)	<.001
AIS A classification (vs B, C, D, E)	0.7 (0.5–0.9)	.02
Preservation of continence (yes or no)	1.9 (1.2–2.6)	.01
Partnered (yes or no)	1.9 (1.2–3.2)	.01
SHIM score ≥ 17 (yes or no)	105 (17.89–337.15)	<.001

AIS = American Spinal Injury Association Impairment Scale; CI = confidence interval; FIM = Functional Independence Measure; OR = odds ratio; SCI = spinal cord injury; SHIM = Sexual Health Inventory for Men.

*Continuous variable.

[†]By Student t-test.

[‡]By Mann-Whitney test.

[‡]By Fisher exact test.

comparing dissatisfied with satisfied subjects. Of sexually active patients, 98.5% had a SHIM score higher than 11. In addition, 99% of patients (all except one) with minimal or no ED (SHIM score ≥ 17) were sexually active.

DISCUSSION

In this cross-sectional study, we evaluated the sexual function of men with SCI with special attention to the predictors of sexual activity and satisfaction. As expected, we found that sexual dysfunction was highly prevalent among men with SCI. Most men with SCI were sexually inactive and/or dissatisfied with their sex life. Age, duration of SCI, incomplete lesion, urinary continence, partner status, and erectile function were identified as predictors of an active sexual life. Importantly, however, only erectile function was predictive of satisfaction with sexual life. Erectile function in men with SCI was very important as shown by the greatly increased likelihood of men with a SHIM score of at least 17 being sexually active (OR = 116) and satisfied (OR = 3.04).

The prevalence of sexual dysfunction was high and almost half the subjects (46.1%) were sexually inactive. In Brazilian

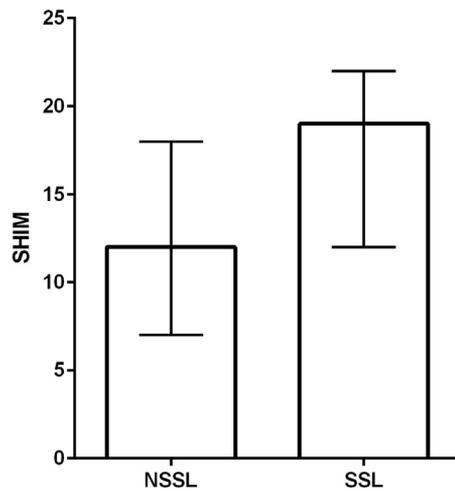


Figure 1. Distribution of SHIM scores according to satisfaction with sex life. Error bars correspond to interquartile range. NSSL = non-satisfactory sex life; SHIM = Sexually Health Inventory for Men; SSL = satisfactory sex life.

individuals without SCI, Moreira et al²⁵ evaluated 1,332 men and described their sexual behavior profile. In that study, 15.4% of patients were younger than 25 years, 41% were 26 to 40 years old, 34.2% were 41 to 60 years old, and 8.4% were older than 61 years. Despite the older mean age of this studied population, the prevalence of sexually inactive men was 4.9%, much lower than that observed in our population of men with SCI. The prevalence of moderate to severe ED was 75.9% in our study in contrast with 46.1% in the general Brazilian population. Anorgasmia was reported in 64.4% of our patients, much higher than the 6.7% rate observed for those 26 to 40 years old in the general population. In addition, 21.3% of men with SCI in our sample considered their sex life satisfying compared with 94.2% in the general population in a similar age group. Comparisons of these reported variables in Brazilian men with and without SCI are presented in [Table 5](#). Anorgasmia (65%) and anejaculation (80%) rates in our study were higher than those in most studies of the SCI population. Reported rates of anorgasmia vary from 35% to 65% and anejaculation varies from 48% to 56% in men with SCI.^{7,12,26,27} We believe that part of this difference is due to the orgasm and ejaculation definitions used in the different studies. Despite the high rates of anejaculation and anorgasmia in our patients, these variables were not associated with satisfaction with sexual life.

For ED treatment, less than half of our patients received some form of therapy. A total of 110 men (37.3%) received oral

Table 5. Comparison of sexual function in patients with and without spinal cord injury in Brazil

	General population ²⁵	Study population
Sexually active	95.1%	53.9%
Moderate to severe ED	46.1%	75.9%
Anorgasmia	6.7%	64.4%
Satisfaction with sex life	94.2%	21.3%

ED = erectile dysfunction.

PDE-5 inhibitors, 10 (3.4%) had used intracavernosal injection therapy, and 3 (1.0%) received penile implants. Among those who were treated with PDE-5 inhibitors, only 14 (12.7%) did not observe any benefit, which confirms the good response to medication in this population and is consistent with other reports in the literature.^{11,28–30} Controlled trials and systematic reviews have shown that the response rates to that medication are almost 90%.^{31,32} Because there is sound evidence in the literature demonstrating the efficacy and safety of PDE-5 inhibitors and other types of non-surgical treatment in men with SCI, we found it surprising that only a few patients had access to any sort of ED treatment. This fact might indicate that more attention should be addressed to this population of men with SCI and medical care providers. It has been demonstrated the sexual education and rehabilitation in patients with SCI can improve overall satisfaction and quality of life.³³

Age, time since SCI, incomplete injuries, urinary continence, having a partner, and erectile function have been evaluated in other studies assessing sexual activity in men with SCI and have been associated with sexual activity. Younger individuals in the general population have more intense sexual activity,²⁵ which is apparently evident in men with SCI.^{10,14} The magnitude of neurologic impairment also is consistently associated with sexual activity and patients with more severe injuries usually have lower rates of sexual activity.^{7,12} Urinary continence also is routinely identified as an important factor for sexual activity.^{4,9,10,14} In our study, the chance of a continent individual to be sexually active was almost two times higher than that of an incontinent subject.

Being in a relationship has great relevance in various aspects of the emotional and sexual life.^{4,5} In our population, men with SCI who were partnered were almost twice as likely to be sexually active as non-partnered individuals. In contrast, Sale et al²¹ reported lower levels of sexual satisfaction in people with SCI who were married than in single subjects. They hypothesized that concerns of the individual with SCI about the partner's sexual satisfaction might explain this questionable finding.

Quality of erection was the only factor associated with satisfaction with sexual life in our study. Studies of individuals without SCI have reported this association, but it had never been tested in men with SCI.^{34,35} Phelps et al²⁰ evaluated 50 men with SCI and found that sexual satisfaction was associated with partner satisfaction, quality of personal relationships, and sexual desire. However, erectile function did not correlate with sexual satisfaction. Reitz et al⁴ evaluated sexual activity and quality of life of 47 men with SCI and found that erectile function was not a predictor of sexual satisfaction. These studies included relatively small numbers of patients who completed exclusively subjective questionnaires rather than validated instruments to assess sexual and erectile function. In our review of the medical literature, only one epidemiologic study used a validated questionnaire for the evaluation of ED in individuals with SCI.²⁴ The investigators used the SHIM questionnaire to evaluate ED as a determinant of psychological stress in 40 men with SCI and found that ED has a

relevant impact. To our knowledge, we have shown for the first time the relation between erectile function measured by a validated questionnaire and sexual satisfaction in men with SCI. Although erectile function is very important for sexual activity and satisfaction, 25% of men with good erections were dissatisfied with their sexual life. This is much higher than the rate of sexual dissatisfaction among men in the general population, which is only approximately 5%.²⁵ Inversely, we observed that some patients with severe ED or who were sexually inactive reported good levels of satisfaction with their sex life. These disparities could be due to factors such as the relationship with the partner, changing interests and priorities, and aspects related to body image. Although urinary continence has been associated with greater sexual satisfaction,^{10,14} we could not confirm this association. We did find that continent men were more likely to be sexually active, but they did not have higher rates of satisfaction with sexual life.

We used the SHIM cutoff value of at least 17 in our analysis because many investigators have used this value in other populations.³⁶ This finding highlights the central importance of erectile function in the determination of sexual activity as opposed to other factors such as level of injury, characteristics of the relationship with the partner, the ability to move, and self-esteem, among others, as demonstrated by previous studies.^{11,16}

Study Limitations

One limitation of this study is the cross-sectional design in which information before SCI might have recall bias. Another limitation is the fact that most of the information was obtained exclusively from validated questionnaires and structured interviews, which can influence the answer because of the limited number of options. More than a limitation of this study, this is a universal limitation of this type of study, which could explain occasional discrepancies in the findings. For this reason, many experts also recommend the combined use of qualitative instruments.³⁷ However, we used non-validated instruments for the evaluation of sexual satisfaction. We share the understanding that validated instruments should be always encouraged in the field of sexual medicine and the use of non-validated structured questionnaires should be kept to a minimum.

Individuals who did not perform vaginal penetration, anal sex, or oral sex were considered sexually inactive. That includes individuals who performed solo masturbation but did not have a partner, which might be considered a narrow definition of sexual activity and could overestimate our numbers. Moreover, we did not evaluate foreplay activity, which could contribute to sexual satisfaction without sexual activity. Further, we did not include aspects related to pain. Studies have estimated 25% to 95% of individuals with SCI experience pain at some point during the initial hospitalization and/or after discharge and that it might influence sexual activity.^{3,38,39} We considered that the inclusion of this analysis and its possible associations might be a confounding factor and draw the attention from our main focus.

CONCLUSIONS

Sexual dysfunction is highly prevalent in men with SCI. In this analysis most men with SCI were sexually inactive and/or dissatisfied with their sex life. Age, duration of SCI, completeness of spinal cord lesion, being continent, having a partner, and good erectile function were identified as predictors of an active sex life. However, only erectile function was predictive of satisfaction with sex life.

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Conflicts of Interest: The authors report no conflicts of interest.

Funding: This study was funded by a research grant from the Sao Paulo Research Foundation (FAPESP; 2010/10919-3) and a support grant from the Memorial Sloan Kettering Cancer Center (P30 CA008748).

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REFERENCES

1. Manns PJ, Chad KE. Components of quality of life for persons with a quadriplegic and paraplegic spinal cord injury. *Qual Health Res* 2001;11:795-811.
2. Post MW, de Witte LP, van Asbeck FW, et al. Predictors of health status and life satisfaction in spinal cord injury. *Arch Phys Med Rehabil* 1998;79:395-401.

3. Wood-Dauphinee S, Exner G, Bostanci B, et al. Quality of life in patients with spinal cord injury—basic issues, assessment, and recommendations. *Restor Neurol Neurosci* 2002;20:135-149.
4. Reitz A, Tobe V, Knapp PA, et al. Impact of spinal cord injury on sexual health and quality of life. *Int J Impot Res* 2004;16:167-174.
5. Post MW, Van Dijk AJ, Van Asbeck FW, et al. Life satisfaction of persons with spinal cord injury compared to a population group. *Scand J Rehabil Med* 1998;30:23-30.
6. Anderson KD. Targeting recovery: priorities of the spinal cord-injured population. *J Neurotrauma* 2004;21:1371-1383.
7. Dahlberg A, Alaranta HT, Kautiainen H, et al. Sexual activity and satisfaction in men with traumatic spinal cord lesion. *J Rehabil Med* 2007;39:152-155.
8. Ku JH, Oh SJ, Jeon HG, et al. Sexual activity in Korean male patients on clean intermittent catheterization with neurogenic bladder due to spinal cord injury. *Int J Urol* 2006;13:42-46.
9. Anderson KD, Borisoff JF, Johnson RD, et al. The impact of spinal cord injury on sexual function: concerns of the general population. *Spinal Cord* 2007;45:328-337.
10. Biering-Sorensen I, Hansen RB, Biering-Sorensen F. Sexual function in a traumatic spinal cord injured population 10–45 years after injury. *J Rehabil Med* 2012;44:926-931.
11. Deforge D, Blackmer J, Garritty C, et al. Male erectile dysfunction following spinal cord injury: a systematic review. *Spinal Cord* 2006;44:465-473.
12. Sipski M, Alexander CJ, Gomez-Marin O. Effects of level and degree of spinal cord injury on male orgasm. *Spinal Cord* 2006;44:798-804.
13. van Koppenhagen CF, Post MW, van der Woude LH, et al. Changes and determinants of life satisfaction after spinal cord injury: a cohort study in the Netherlands. *Arch Phys Med Rehabil* 2008;89:1733-1740.
14. Valtonen K, Karlsson AK, Siosteen A, et al. Satisfaction with sexual life among persons with traumatic spinal cord injury and meningomyelocoele. *Disabil Rehabil* 2006;28:965-976.
15. Fisher TL, Laud PW, Byfield MG, et al. Sexual health after spinal cord injury: a longitudinal study. *Arch Phys Med Rehabil* 2002;83:1043-1051.
16. Sharma SC, Singh R, Dogra R, et al. Assessment of sexual functions after spinal cord injury in Indian patients. *Int J Rehabil* 2006;29:17-25.
17. Fitzharris M, Cripps RA, Lee BB. Estimating the global incidence of traumatic spinal cord injury. *Spinal Cord* 2014;52:117-122.
18. Cobo Cuenca AI, Sampietro-Crespo A, Virseda-Chamorro M, et al. Psychological impact and sexual dysfunction in men with and without spinal cord injury. *J Sex Med* 2015;12:436-444.
19. Choi YA, Kang JH, Shin HI. Sexual activity and sexual satisfaction in Korean men with spinal cord injury. *Spinal Cord* 2015;53:697-700.
20. Phelps J, Albo M, Dunn K, et al. Spinal cord injury and sexuality in married or partnered men: activities, function, needs, and predictors of sexual adjustment. *Arch Sex Behav* 2001;30:591-602.
21. Sale P, Mazzarella F, Pagliacci MC, et al. Predictors of changes in sentimental and sexual life after traumatic spinal cord injury. *Arch Phys Med Rehabil* 2012;93:1944-1949.
22. Alexander MS, Brackett NL, Bodner D, et al. Measurement of sexual functioning after spinal cord injury: preferred instruments. *J Spinal Cord Med* 2009;32:226-236.
23. Kirshblum SC, Burns SP, Biering-Sorensen F, et al. International standards for neurological classification of spinal cord injury (revised 2011). *J Spinal Cord Med* 2011;34:535-546.
24. Barbonetti A, Cavallo F, Felzani G, et al. Erectile dysfunction is the main determinant of psychological distress in men with spinal cord injury. *J Sex Med* 2012;9:830-836.
25. Moreira ED Jr, Abdo CH, Torres EB, et al. Prevalence and correlates of erectile dysfunction: results of the Brazilian study of sexual behavior. *Urology* 2001;58:583-588.
26. Benevento BT, Sipski ML. Neurogenic bladder, neurogenic bowel, and sexual dysfunction in people with spinal cord injury. *Phys Ther* 2002;82:601-612.
27. Alexander M, Rosen RC. Spinal cord injuries and orgasm: a review. *J Sex Marital Ther* 2008;34:308-324.
28. Hultling C, Giuliano F, Quirk F, et al. Quality of life in patients with spinal cord injury receiving Viagra (sildenafil citrate) for the treatment of erectile dysfunction. *Spinal Cord* 2000;38:363-370.
29. Mittmann N, Craven BC, Gordon M, et al. Erectile dysfunction in spinal cord injury: a cost-utility analysis. *J Rehabil Med* 2005;37:358-364.
30. Soler JM, Previnaire JG, Denys P, et al. Phosphodiesterase inhibitors in the treatment of erectile dysfunction in spinal cord-injured men. *Spinal Cord* 2007;45:169-173.
31. Smith-Harrison LI, Patel A, Smith RP. The devil is in the details: an analysis of the subtleties between phosphodiesterase inhibitors for erectile dysfunction. *Transl Androl Urol* 2016;5:181-186.
32. Yuan J, Zhang R, Yang Z, et al. Comparative effectiveness and safety of oral phosphodiesterase type 5 inhibitors for erectile dysfunction: a systematic review and network meta-analysis. *Eur Urol* 2013;63:902-912.
33. New PW, Seddon M, Redpath C, et al. Recommendations for spinal rehabilitation professionals regarding sexual education needs and preferences of people with spinal cord dysfunction: a mixed-methods study. *Spinal Cord* 2016;54:1203-1209.
34. Fugl-Meyer AR, Lodnert G, Branholm IB, et al. On life satisfaction in male erectile dysfunction. *Int J Impot Res* 1997;9:141-148.
35. Weiss P, Brody S. International Index of Erectile Function (IIEF) scores generated by men or female partners correlate equally well with own satisfaction (sexual, partnership, life, and mental health). *J Sex Med* 2011;8:1404-1410.

36. Ficarra V, Sooriakumaran P, Novara G, et al. Systematic review of methods for reporting combined outcomes after radical prostatectomy and proposal of a novel system: the survival, continence, and potency (SCP) classification. *Eur Urol* 2012; 61:541-548.
37. Abramson CE, McBride KE, Konnyu KJ, et al. Sexual health outcome measures for individuals with a spinal cord injury: a systematic review. *Spinal Cord* 2008;46:320-324.
38. Rintala DH, Loubser PG, Castro J, et al. Chronic pain in a community-based sample of men with spinal cord injury: prevalence, severity, and relationship with impairment, disability, handicap, and subjective well-being. *Arch Phys Med Rehabil* 1998;79:604-614.
39. Demirel G, Yilmaz H, Gencosmanoglu B, et al. Pain following spinal cord injury. *Spinal Cord* 1998;36:25-28.