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HOW POTENT IS POTENT? EVALUATION OF SEXUAL FUNCTION AND BOTHER IN MEN WHO REPORT POTENCY AFTER TREATMENT FOR PROSTATE CANCER: DATA FROM CaPSURE

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ABSTRACT

Objectives. To characterize the association between potency and comprehensive sexual function. The accurate assessment of sexual function is critical for the evaluation of outcomes after treatment of prostate cancer. The assessments of potency typically used in this context, however, may be oversimplified.

Methods. CaPSURE is a large, observational database of men with prostate cancer. Participants complete health-related quality-of-life questionnaires, including the University of California, Los Angeles Prostate Cancer Index, every 6 months after treatment. A total of 5135 men completed at least one questionnaire and did not use medications for erectile function. The men were categorized as potent or impotent based on their ability to have erections and/or intercourse in the prior 4 weeks. Using the remaining questions on the Prostate Cancer Index, sexual function and bother scores were calculated for each group.

Results. Of the 5135 men, 27.4% were potent. The mean sexual function scores were 56 and 13 for potent and impotent men, respectively ($P < 0.0001$). The corresponding mean bother scores were 62 and 36 ($P < 0.0001$). The function scores ranged from 0 to 100 and 0 to 92 among potent and impotent men, respectively, and bother scores from 0 to 100 in both groups. Function was inversely associated with age in both groups, but bother did not change among potent men and ameliorated among impotent men. Individual Prostate Cancer Index questions correlated with potency to a variable extent.

Conclusions. Although potent and impotent men have divergent sexual function and bother scores after treatment, the wide range of these scores in both groups denotes a complex picture of sexual function. The simple documentation of potency after treatment provides an insufficient measure of sexual health-related quality of life and should be supplemented with more comprehensive measures. *UROLOGY* 61: 190–196, 2003. © 2003, Elsevier Science Inc.

With earlier diagnosis as a result of prostate-specific antigen screening, men with prostate cancer are increasingly likely to enjoy extended

survival after treatment.¹ Quality of life, therefore, has assumed a position of growing importance with respect to both evaluation of treatment outcomes and individual patient decision-making. Sexual function and sexual bother are two of the health-related quality-of-life (HRQOL) domains most commonly affected by prostate cancer treatment, as well as by the comorbidity and advanced age faced by many patients with prostate cancer.²

The population-based National Health and Social Life Survey found that erectile dysfunction and decreased libido become more common with advancing age; men 50 to 59 years are roughly three times as likely to report these complaints as men 18 to 29 years old. Other domains, however, such as orgasmic capacity and sexual pleasure, were not affected by age.³ All treatments for prostate cancer

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are associated with potential impairment in sexual HRQOL⁴; even patients treated expectantly experience a decline in sexual function after diagnosis.⁵ The pretreatment potency status has been demonstrated to predict erectile function after both radical prostatectomy⁶ and radiotherapy⁷; thus an accurate evaluation of sexual function before and after treatment may help predict the likelihood of an adverse impact on this domain, guide patient decision-making, and measure the impact of treatment on HRQOL.

Reported potency rates after radiotherapy and radical prostatectomy have varied widely, from 2% to 86% of men after radiotherapy⁸⁻¹¹ and 14% to 82% of men after radical prostatectomy.¹²⁻¹⁵ This variance may be a result of the limitations of physician-reported outcome assessment, differences in patient populations, and variation in time points relative to treatment at which potency was evaluated. Another major source of divergence, however, is certainly the multiplicity of potency definitions used in contemporary studies. Helgason *et al.*¹⁶ found at least 17 different definitions of potency in the world published studies, generally involving the ability to have erections adequate for vaginal penetration or intercourse.¹⁶ The National Institutes of Health Consensus on Erectile Dysfunction defines impotence as "the inability to achieve or maintain an erection sufficient for satisfactory sexual performance."¹⁷ Such definitions may oversimplify the full picture of sexual function, which also includes libido, orgasm, ejaculation, perception of sexual function, and bother attributable to the level of sexual function.

Several objective surveys of sexual function have been described,^{18,19} but only the sexual function and bother domains of the University of California, Los Angeles Prostate Cancer Index (PCI),²⁰ recently updated as the Expanded Prostate Index Composite,²¹ have been validated in the setting of prostate cancer,²⁰ as well as in healthy older men without prostate cancer,²² and men of variable ages presenting with erectile dysfunction.²³ We aimed to describe the relationship between patient-reported potency and overall sexual HRQOL in a large, national prostate cancer patient set, through a focused analysis of the sexual domains of the PCI.

MATERIAL AND METHODS

Our patient sample was drawn from CaPSURE (Cancer of the Prostate Strategic Urologic Research Endeavor), a longitudinal, observational database of patients with biopsy-proven prostate cancer drawn from a network of urologists at community and academic urology practice sites throughout the United States. Men are recruited consecutively by urologists at each site. At the time of entry and semiannually thereafter, men complete a self-administered survey, including questions assessing HRQOL; they are followed up until death or withdrawal from the study. Additional details of the project

method have been previously reported.^{24,25} As of August 2001, 7379 men had been invited to participate and 7195 (97.5%) agreed.

The CaPSURE patient questionnaires include the PCI; for this study, the sexual function and sexual bother scales were extracted. The sexual function domain is assessed with eight questions addressing level of sexual desire, ability to have an erection, ability to reach orgasm, quality of erections, frequency of erections, erections with morning or evening awakening, frequency of intercourse, and overall sexual function, all in the prior 4 weeks. The sexual bother domain is assessed with a single question. Each domain is scored on a scale of 0 to 100 points, with higher values representing better quality of life; higher sexual function and bother scores indicate better function and less bother, respectively.²⁰ For inclusion in the present study, patients needed to have completed at least one questionnaire since primary treatment; questionnaires were ignored if the sexual function and/or bother scales were incomplete. For this study, the first questionnaire completed after treatment was analyzed. Patients were excluded if they were using medications for erectile dysfunction to avoid distortion of the sexual function responses.

For the purposes of this study, men were categorized as potent or impotent on the basis of their answers to two questions on the sexual function subscale assessing frequencies of erections and intercourse. Men were considered potent if they reported erections greater than 50% of the time when desired and/or vaginal or anal intercourse at least one time in the prior 4 weeks. All other men were considered impotent. Sexual function scores were then calculated according to answers to the remaining six questions on the PCI. This abbreviated six-item instrument, scored on the same 0 to 100 scale as the full subscale, demonstrated excellent internal consistency in our data set, with a Cronbach's alpha value of 0.91 versus 0.93 for the full eight-item subscale.

The demographic and clinical characteristics of potent men were compared with those of impotent men using the chi-square test for categorical variables and the Mantel-Haenszel chi-square test for ordinal and categorized continuous variables. Descriptive statistics were calculated for sexual function and bother scores among potent and impotent men; the mean scores were compared with Student's *t* test. The impact of age on sexual function and bother was assessed by analysis of variance, and multiple pairwise comparisons among age levels were performed using Bonferroni's analysis. Finally, the ability of each sexual function question to predict potency was tested with logistic regression analysis, and the correlation between each question and potency status was assessed by calculating Pearson's coefficient (*r*). All analyses were conducted using Statistical Analysis System software, version 8.2 (SAS Institute, Cary, NC).

RESULTS

At the time of analysis, 5624 men in CaPSURE had completed at least one questionnaire after primary treatment. Of these, 489 (8.6%) were excluded on the basis of the use of medications for erectile dysfunction (4.8% of those diagnosed before 1999 and 18.7% of those diagnosed since 1999). Of the remaining 5135 patients, 1405 (27.4%) were potent and 3730 (72.6%) were impotent according to the criteria detailed above. The mean and median ages of all patients were 63.9 and 68.0 years, respectively.

Table I presents the clinical and demographic characteristics of our patient population. The po-

TABLE I. Demographic and clinical characteristics of potent and impotent men

Characteristic	Impotent (n)	Potent (n)	P Value
Total	3730	1405	
Age at diagnosis (yr)			
≤60	514 (13.8)	332 (23.6)	
61–70	1584 (42.5)	576 (40.0)	
>70	1464 (39.3)	367 (26.1)	
Unknown	168 (4.5)	130 (9.3)	<0.0001
Race			
White	3300 (88.5)	1181 (84.1)	
African American	298 (8.0)	148 (10.5)	
Latino	59 (1.6)	30 (2.1)	
Other	73 (2.0)	46 (3.3)	0.0002
PSA (ng/mL)			
<4.0	344 (9.2)	139 (9.9)	
4.0–10.0	1518 (40.7)	652 (46.4)	
10.01–20.0	695 (18.7)	229 (16.3)	
>20.0	648 (17.4)	134 (9.6)	
Unknown	525 (14.1)	251 (17.9)	<0.0001
Gleason sum			
2–4	431 (11.6)	196 (14.0)	
5–6	1671 (44.8)	658 (46.8)	
7	687 (18.4)	230 (16.4)	
8–10	413 (11.1)	99 (7.1)	
Unknown	528 (14.2)	222 (15.8)	<0.0001
Clinical T stage			
T1	932 (25.0)	440 (31.3)	
T2	2224 (59.6)	733 (52.2)	
T3	295 (7.9)	66 (4.6)	
T4	25 (0.7)	6 (0.4)	
Unknown	254 (6.8)	160 (11.4)	<0.0001
Education			
Grade school	283 (7.6)	68 (4.8)	
Some high school	448 (12.0)	156 (11.1)	
High/tech school	956 (25.6)	321 (22.8)	
Some college	693 (18.6)	274 (19.5)	
College graduate	571 (15.3)	228 (16.2)	
Graduate school	540 (14.5)	284 (20.2)	
Unknown	239 (6.4)	74 (5.3)	0.6868
Income			
≤\$10,000	360 (9.7)	130 (9.3)	
\$10,001–30,000	1226 (30.2)	326 (23.2)	
\$30,001–50,000	787 (21.1)	301 (21.4)	
\$50,001–75,000	442 (11.9)	194 (13.8)	
>\$75,000	421 (11.3)	268 (19.1)	
Unknown	594 (15.9)	186 (13.2)	<0.0001
Treatment			
Prostatectomy	1410 (37.8)	480 (34.2)	
Radiotherapy	516 (13.8)	157 (11.2)	
Brachytherapy	153 (4.1)	70 (5.0)	
Cryotherapy	113 (3.0)	19 (1.4)	
Hormonal therapy	885 (23.4)	217 (15.4)	
Watchful waiting	302 (8.1)	160 (11.4)	
Other/unknown	337 (9.0)	295 (20.0)	<0.0001

KEY: PSA = prostate-specific antigen.

Numbers in parentheses are percentages.

P values are calculated by chi-square for categorical variables, and by Mantel-Haenszel chi-square for ordinal and categorized continuous variables.

tent men were younger and had higher incomes than the impotent men and were less likely to be white. Impotent men were more likely to have higher prostate-specific antigen levels, Gleason scores, and clinical T stages. The mean and median prostate-specific antigen levels at diagnosis were 9.8 (± 16.0) and 6.1 ng/mL among potent men and 14.2 (± 21.1) and 7.4 ng/mL among impotent men, respectively.

The mean sexual function scores for potent and impotent men were 56 (± 22) and 13 (± 16), respectively ($P < 0.0001$). The corresponding mean bother scores were 62 (± 34) and 36 (± 41 ; $P < 0.0001$). The range of sexual function scores was 0 to 100 for potent men and 0 to 92 for impotent men; the bother scores ranged from 0 to 100 in both groups. The interquartile range for the function scores was 42 to 71 and 0 to 22 in potent and impotent men and for the bother scores was 25 to 100 and 0 to 75, respectively. Figure 1 illustrates the overall range of scores, and Table II presents the scores for potent and impotent men by age group. The sexual function and bother scores were higher among potent men than among impotent men, with broad ranges of scores for both domains in both groups—28% of potent men reported that sexual dysfunction was a “moderate problem” or “big problem” (bother score 0 to 25); 61% of impotent men gave the same response.

By analysis of variance, older men, whether potent or impotent, had lower sexual function scores than younger men. Bonferroni analysis revealed that men younger than 60 years had higher scores than those older than 70 years in both groups. The same trend did not hold for sexual bother scores, however. Age did not have a significant impact on bother among potent men, and among impotent men, the bother scores increased—indicating less bother—with advancing age. Men older than 70 years had significantly higher scores than did those in their 60s, followed by those younger than 60. The proportion of men with bother scores of 0 to 25 (considering sexual dysfunction to be a moderate to big problem) fell from 70% among those 60 and younger to 55% of those older than 70 years.

Each question on the abbreviated subscale correlated with potency at the $P < 0.0001$ level, but the degrees of correlation as measured by r values varied widely, from 0.46 for level of sexual desire to 0.72 for overall sexual function. In multivariate logistic regression analysis, all questions except desire significantly predicted potency; the quality of erections exhibited the strongest predictive ability by Wald chi-square. The range of responses on each question was 0 to 100 for both potent and impotent men.

COMMENT

Sexual health is an important determinant of HRQOL and the most common cause of disease-specific distress in men with prostate cancer.²⁶ Men with prostate cancer, moreover, are more likely than those without the disease to report severe distress from loss of sexual function.²⁶ Most men—with or without cancer—are willing to trade life expectancy for intact sexual function.^{26,27} Significantly, however, when asked to rank-order a set of 93 questions about their diagnosis, patients with early-stage prostate cancer placed the effect of treatment on sexual function at number 46, well below most primary oncologic concerns and below issues relating to bladder and bowel function.²⁸

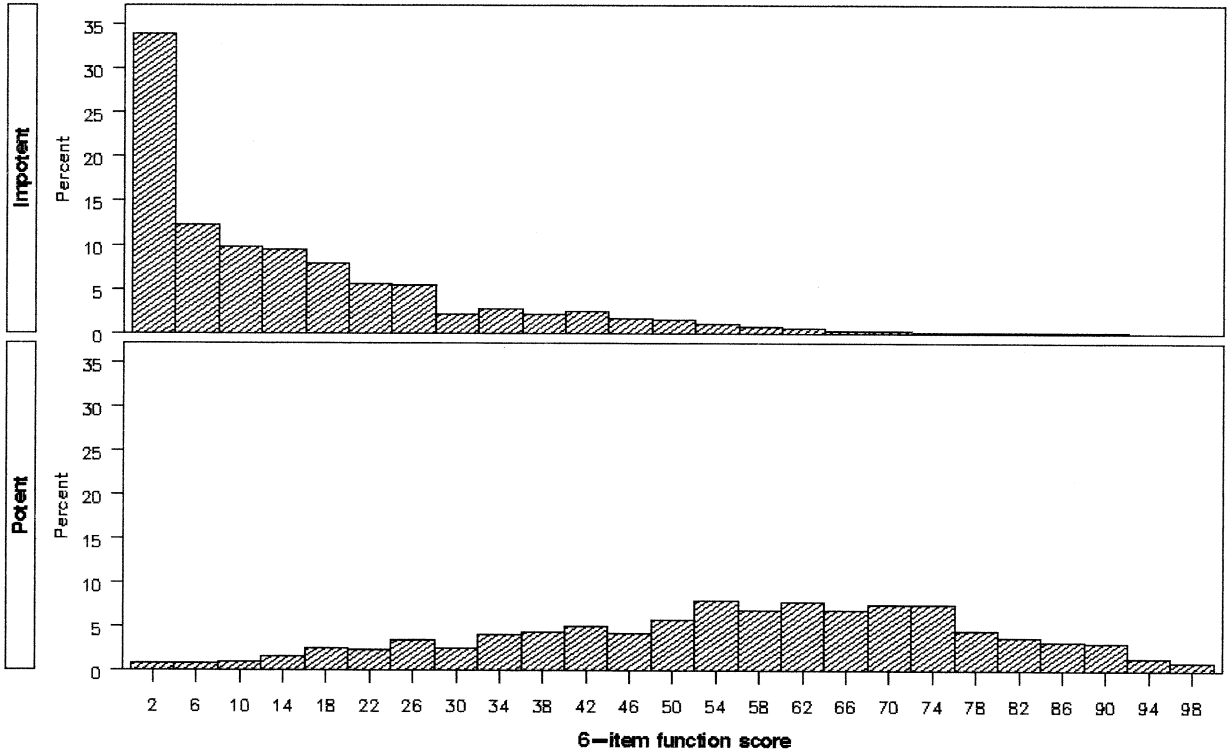
Sexual function often declines in potent men undergoing prostate cancer treatment, whether local therapy or androgen deprivation. The accurate appraisal of a patient's sexual HRQOL is therefore crucial both before and after treatment. We postulated that the assessment of potency alone—as is the prevalent standard in clinical practice and in most reported case series—is an inadequate proxy for a more complete sexual assessment. This study therefore sought to describe more fully the patterns of sexual function and bother among men who would be classified as potent or impotent by standard binary definitions.

We found, not surprisingly, that significant differences exist in the summary sexual function and bother scores between potent and impotent patients. More importantly, however, we found a broad variation in the scores in both groups of men, as evinced by the wide ranges and large standard deviations across subject groups. Many men report low sexual function scores despite having erections and/or intercourse, and some men who are impotent report relatively high function scores. The variation in bother scores was even more dramatic, ranging from 0 to 100 in both potent and impotent men, with a large overlap in interquartile ranges as well. Nearly 40% of impotent men reported little to no bother, and more than 25% of potent men reported significant bother.

We found that although sexual function declined with age in both potent and impotent men, bother ameliorated to an extent among older impotent—but not potent—men. These findings are potentially significant given that older men have been shown to exhibit different responses to intermittent withdrawal of androgen deprivation therapy, with greater gains in sexual function than younger men, but no change in sexual bother.²⁹ We also found a significant association between potency and individual questions from the PCI, although

Sexual function scores

A



Sexual bother scores

B

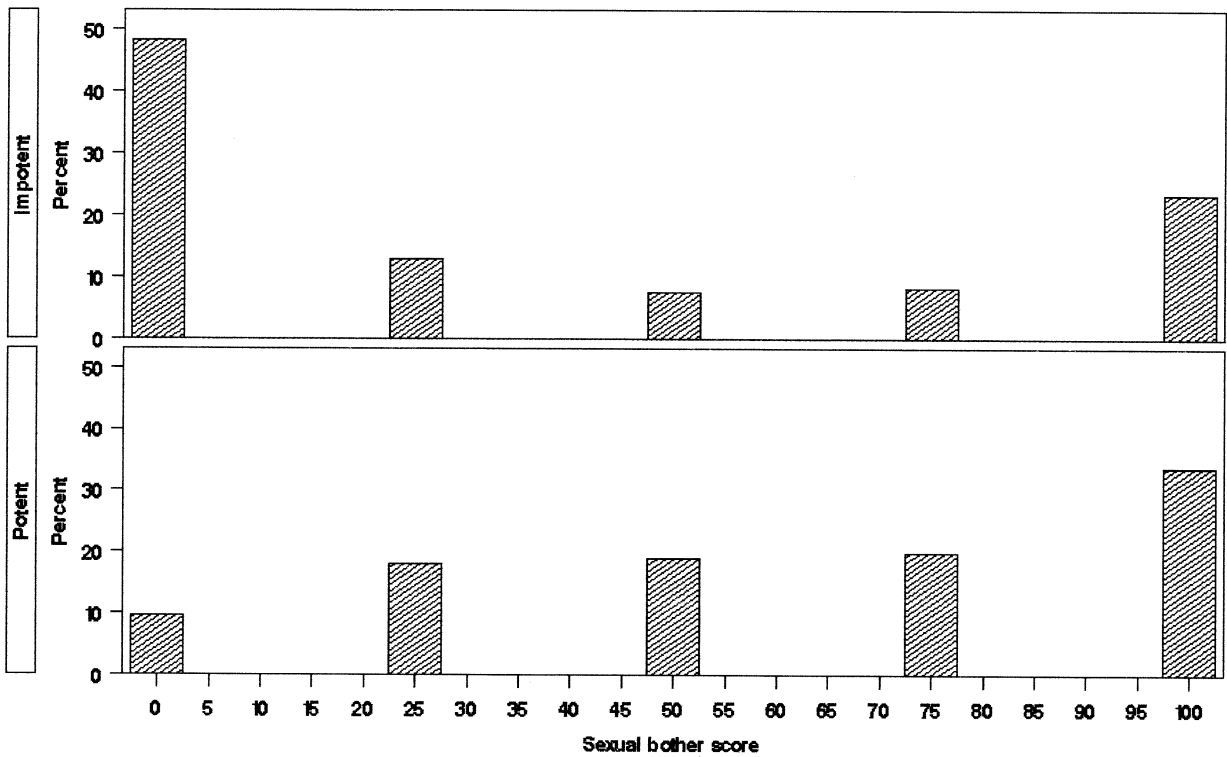


FIGURE 1. Sexual function and bother scores. Overall distributions of (A) sexual function scores and (B) sexual bother scores among impotent and potent men.

TABLE II. Sexual function and bother by age group

	Age (yr)	Potency	Mean	SD	P Value
Sexual function (6-item subscale)	<61	Impotent	14.89	15.38	0.0275
	61–70	Impotent	13.58	15.31	
	>70	Impotent	12.76	15.99	
	<61	Potent	58.48	22.39	0.0013
	61–70	Potent	54.88	21.28	
	>70	Potent	52.57	20.88	
Sexual bother (1-item subscale)	<61	Impotent	28.66	35.86	<0.0001
	61–70	Impotent	33.38	40.00	
	>70	Impotent	41.88	44.17	
	<61	Potent	62.24	34.51	0.8172
	61–70	Potent	61.21	34.63	
	>70	Potent	60.60	33.34	

P values are calculated by analysis of variance.

the degree of correlation varied notably. Overall sexual function and the quality of erections had the strongest correlation, desire and waking erections the weakest.

Although this was a cross-sectional and retrospective analysis, CaPSURE data are collected prospectively, without regard to any specific hypothesis. CaPSURE practice sites have not been chosen at random; therefore, our patient set cannot be assumed to represent a statistically valid sample of the U.S. patient population. The database does, however, represent a broad mix of locales and practice types and represents as good an approximation as is available.

For simplicity, patients using erectile aids were excluded from the study. These patients have been previously found to have higher sexual function scores, but worse bother scores, attributed to distress over the need for erectile therapy.³⁰ The other limiting decision we made was to assess sexual HRQOL only after treatment. The numbers of patients in CaPSURE for whom pretreatment information is available are growing, and we expect that ongoing research, assessing function and bother both before and after treatment, will both validate known quantitative predictors of adverse outcomes in these HRQOL domains and identify new ones. Finally, we freely recognize that although our definition of potency approximated the National Institutes of Health consensus definition and did identify two distinct patient populations with respect to sexual function and bother, it was entirely arbitrary. In practice, each patient decides for himself what constitutes satisfactory potency; we are currently planning a follow-up study that will directly assess patient self-assessment of potency status in relation to global sexual function and bother.

CONCLUSIONS

The HRQOL domains of sexual function have been well established. Most clinical series reporting outcomes from various treatments for prostate cancer, however, continue to report rates of “potency” after treatment. We have demonstrated that although potency status, by one definition, does indeed predict to an extent the other dimensions of sexual function and bother, there is great variability in each of these dimensions within each group. Any measurement of “potency” as a binary outcome of treatment for prostate cancer will inadequately reflect a patient’s sexual HRQOL; more comprehensive assessment of sexual HRQOL, using instruments such as the PCI subscales, should therefore be standard in research reports, and should be incorporated into clinical practice before and after treatment of prostate cancer.

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