Erectile Dysfunction and Sexual Problems Two to Three Years After Prostatectomy Among American, Norwegian, and Spanish Patients

Anne Holck Storås,1 Martin G. Sanda,2 Olatz Garin Boronat,3 Peter Chang,4 Dattatraya Patil,5 Catrina Crociani,4 Jose Francisco Suarez,6 Milada Cvancarova,1 Jon Håvard Loge,1,7 Sophie D. Fosså1,7

Abstract

Erectile dysfunction (ED) and sexual problems are important adverse effects after prostatectomy. We found a discrepancy in the reported fraction of patients from the United States (n = 494), Norway (n = 472), and Spain (n = 111) who reported ED 2 to 3 years after prostatectomy. However, after adjusting for pretreatment variables, we did not find any statistical significant differences in the association between the countries of treatment and the proportion of men with postprostatectomy ED or sexual problems.

Background: The incidence of erectile dysfunction (ED) and sexual problems after radical prostatectomy has differed greatly in reports from different centers and countries; however, few studies have taken baseline factors into account. We compared the incidence of ED and sexual problems 2 to 3 years after radical prostatectomy in American, Norwegian, and Spanish men for whom selected clinically relevant demographic and medical pretreatment variables were available. Patients and Methods: From 2003 to 2009, 1077 men (United States, n = 494; Norway, n = 472; and Spain, n = 111) scheduled for prostatectomy responded to an Expanded Prostate Cancer Index Composite questionnaire before treatment and 2 to 3 years after prostatectomy. On multivariate analysis, the odds ratios for ED and sexual problems were calculated, adjusted for the pretreatment variables found significant (P < .01) on univariate analysis. Results: For all patients and for those without ED preoperatively, no statistically significant association was detected between the country of prostatectomy and the likelihood of reporting post-prostatectomy ED or sexual problems despite the significant differences among the 3 countries in the unadjusted analyses. Conclusion: Adjusting for important pretreatment variables, no intercountry differences were detected. Thus, a thorough knowledge about the pretreatment medical and demographic factors is essential for valid comparisons of the incidence of postprostatectomy ED and sexual problems among different studies.

Introduction

Impaired sexual function is one of the most common adverse effects of prostatectomy. With a 15-year overall survival rate of 62%, most patients will have to live with potentially adverse postoperative effects for many years.1 Furthermore, after prostatectomy, the preservation of the patient’s sexual life is often used as a criterion of success. Patients, physicians, and health administrators are eager to compare the prevalence of impaired sexual function documented at their hospital or in their country with the results from other institutions or countries. However, published reports have revealed a wide range in the prevalence of postprostatectomy erectile dysfunction (ED).2,3

Keywords: Adverse effects, International comparison, Prostate cancer, Quality of life

1Department of Oncology, Oslo University Hospital, The Norwegian Radium Hospital, Oslo, Norway
2Department of Urology, Emory University Hospital, Atlanta, GA
3Institut Hospital del Mar d’Investigacions Mèdiques, Barcelona, Spain
4Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, MA
5Emory University Hospital, Atlanta, GA
6Hospital Universitari de Bellvitge, Barcelona, Spain
7University of Oslo, Oslo, Norway

Submitted: Aug 24, 2015; Revised: Oct 10, 2015; Accepted: Oct 17, 2015

Address for correspondence: Anne Holck Storås, MD, National Resource Center for Late Effects after Cancer Treatment, Division of Surgery and Cancer Medicine, Oslo University Hospital, The Norwegian Radium Hospital, Postboks 4953, Oslo 0424, Norway.

E-mail contact: annhol@ous-hf.no
Sexual function and sexual problems are important features of sexual life as perceived by patients. However, no international consensus has been reached regarding the definition of ED and sexual problems. In patient-completed questionnaires, ED could thus be assessed differently by the affected patients. Furthermore, not all patients experience ED as a problem.3,6

Several factors have been shown to affect postprostatectomy sexual life outcomes, such as patient age, comorbidity, pretreatment erectile function, and operative technique, such as nerve-sparing procedures.2,7 However, few reports have adjusted for these factors when comparing interinstitutional rates of postprostatectomy ED or sexual problems.

To gain more insight into postprostatectomy adverse effects, we initiated a collaboration among research groups from the United States (Prostate Cancer Outcomes and Satisfaction Treatment Quality Assessment), Norway (Norwegian Urological Cancer Group), and Spain (Spanish Group of Localized Prostate Cancer, Barcelona). We had previously documented significant differences between erectile function and sexual problems reported by patients scheduled for curative treatment of prostate cancer (PCa) from Norway, the United States, and Spain.7 In the present study, we compared patient-reported erectile function and their experience of sexual problems after surgery in the same cohort. We anticipated finding significant intergroup differences 2 to 3 years after prostatectomy in the incidence of no erectile dysfunction (NoED) and sexual problems but that these differences would disappear after adjusting for important pretreatment variables. A secondary aim was to assess the relationship between postprostatectomy erectile function and sexual problems, separately, for each of the 3 countries.

Patients and Methods

Study Design and Patients

The local ethical committees approved the creation of a combined de-identified electronic data file of the American, Norwegian, and Spanish patients. The eligibility criteria were histologically confirmed PCa; clinical stage T1 or T2 tumor; known level of pretreatment prostate-specific antigen (PSA) and Gleason score; retropubic, laparoscopic, or robot-assisted prostatectomy with or without nerve-sparing surgery; no neoadjuvant androgen deprivation therapy; and valid responses to the questions on quality of erection and overall sexual problems before and 2 to 3 years after prostatectomy using the Expanded Prostate Cancer Index Composite (EPIC)-26/EPIC-50 questionnaire.8,9 In the present study, the term “valid” implied that substitutions for missing responses were not required.

For each patient, the file also contained their medical and sociodemographic data (comorbidity, PCa risk group,10 age, education, and paired relationship) and surgical technique.

Clinical Variables

Risk Groups. The risk groups were defined according to the European Guidelines on Prostate Cancer Treatment from 2012.10 Low-risk PCa was defined as stage cT1-T2a, Gleason score 2 to 6, and PSA level < 10 ng/mL. Intermediate risk was defined as stage cT2b-T2c, Gleason score 7, and PSA level of 10 to 20 ng/mL. Finally, high risk was defined as stage cT3a and/or Gleason score 8 to 10 and/or PSA level > 20 ng/mL.

Patient and Methods. The level of education was dichotomized into “less than high school” (low) and “high school or more” (high). Relationship status was dichotomized into “no paired relationship” versus “paired relationship.” Comorbidity (yes vs. no) was defined for any patient reporting ≥ 1 of 5 co-existing adverse health conditions: (1) diabetes; (2) heart failure, myocardial infarction, and/or angina; (3) stroke; (4) peptic ulcer and/or irritable bowel disease, and (5) asthma and/or bronchitis and/or breathing problems.

EPIC Questionnaire. Before any treatment and 2 to 3 years after surgery, the patients completed an EPIC-26 or EPIC-50 questionnaire.9,18 The original questionnaire included 50 items (EPIC-50)8 but was later abbreviated to 26 items (EPIC-26).9 These EPIC instruments assess the 5 domains most often affected by PCa treatment: urinary (2 domains), sexual, bowel, and hormonal. Each domain includes several questions with multiple choice responses. For the sexual domain, the items separate patient-reported function and domain-specific bother.9,10 Within each domain, a score can be calculated. The answers can also be dichotomized, resulting in categories that are probably easier to understand by patients than scores. However, no definition of ED and sexual problems has been provided for the EPIC. The present report included the dichotomized responses to 2 identical items in the sexual domain in the EPIC-26/50, 1 addressing sexual function and 1 sexual problem experience.

The answers for question (Q)12/Q39 “How would you describe the usual quality of your erections during the last 4 weeks?” were dichotomized as NoED (erection firm enough for intercourse) and ED (erection firm enough for masturbation and foreplay only but not firm enough for any sexual activity or none at all). The answers for Q12/Q39 “Overall, how would you rate your ability to function sexually during the last 4 weeks?” were dichotomized into sexual problems (described as a moderate or large problem) and no sexual problems (described as small, very small, or no problems).

Data Management and Statistical Analysis

Binary variables are described using proportions and percentages. Crude between-country differences regarding the categorical variables were analyzed using χ² tests.

ED and sexual problems 2 to 3 years after treatment for all patients were the dependent variables on the univariate and multivariate regression analyses. The strength of the associations is expressed by odds ratios (ORs) and 95% confidence intervals (CIs). ED and sexual problems were also assessed in the subgroup of men with NoED before treatment.

P < .01 was considered statistically significant. All tests were 2-sided. PASW for personal computers, version 21.0, was used for the statistical analyses.

Results

The medical records for 1353 patients who had undergone prostatectomy were available from the United States, Norway, and Spain. Because of ≥ 1 missing answers for Q9 and Q12 at baseline and/or at 2 to 3 years, 109 American, 155 Norwegian, and 12 Spanish patients were excluded from the study, for 1077 eligible men (United States, n = 494, Norway, n = 472, Spain, n = 111).

Compared with the Norwegian and Spanish patients, the American patients were significantly younger and reported fewer
comorbidities and a larger proportion had a high level of education (Table 1). Of the 494 American patients, 53% had low-risk PCa compared with 30% of the Norwegian and 39% of the Spanish patients \( (P < .01) \). Also, 80% of the American, 43% of the Norwegian, and 20% of the Spanish patients had undergone bilateral nerve-sparing surgery \( (P < .01) \).  

**Erectile Function**

Of the 1077 eligible patients, 829 patients (77%) reported NoED before prostatectomy (United States, 83%; Norway, 74%; Spain, 60%), with statistically significant differences among each of the 3 groups \( (P < .01) \; \text{Figure 1} \). At 2 to 3 years after surgery, 290 men (27% of all eligible patients) reported NoED. Of the 176 American patients, 36% reported NoED compared with 22% of the 103 Norwegian and 10% of the 11 Spanish patients \( (P < .01) \).  

**Erectile Function Among Patients With NoED Pretreatment**

Of the 829 patients with erections firm enough for intercourse (NoED) before prostatectomy, 272 (33%) had preserved NoED. Statistically significant differences were found among the patients from the 3 countries, with good erectile function (NoED) retained for 40% of the American, 28% of the Norwegian, and 14% of the Spanish patients (Norway vs. United States, \( P < .01 \); Norway vs. Spain, \( P = .02 \); United States vs. Spain, \( P < .01 \); Figure 2).  

<table>
<thead>
<tr>
<th>Variable</th>
<th>US (n = 494)</th>
<th>Norway (n = 472)</th>
<th>Spain (n = 111)</th>
<th>Total (n = 1077)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;65 years</td>
<td>381 (77)</td>
<td>286 (61)</td>
<td>56 (50)</td>
<td>723 (67)</td>
<td>&lt;.01&lt;sup&gt;a,b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Median</td>
<td>60</td>
<td>64</td>
<td>56</td>
<td>62</td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>39-79</td>
<td>44-77</td>
<td>45-75</td>
<td>39-79</td>
<td></td>
</tr>
<tr>
<td>No reported comorbidity</td>
<td>429 (87)</td>
<td>334 (71)</td>
<td>72 (65)</td>
<td>835 (78)</td>
<td>&lt;.01&lt;sup&gt;a,b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Living together</td>
<td>431 (87)</td>
<td>445 (95)</td>
<td>98 (88)</td>
<td>974 (91)</td>
<td>&lt;.01&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Education more than high school level</td>
<td>422 (85)</td>
<td>246 (52)</td>
<td>6 (5)</td>
<td>674 (63)</td>
<td>&lt;.01&lt;sup&gt;a,b,c&lt;/sup&gt;</td>
</tr>
<tr>
<td>Risk group&lt;sup&gt;d&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&lt;.01&lt;sup&gt;a,b,c&lt;/sup&gt;</td>
</tr>
<tr>
<td>Low</td>
<td>263 (53)</td>
<td>140 (30)</td>
<td>43 (39)</td>
<td>446 (41)</td>
<td></td>
</tr>
<tr>
<td>Intermediate</td>
<td>199 (40)</td>
<td>270 (57)</td>
<td>65 (58)</td>
<td>534 (50)</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>32 (7)</td>
<td>62 (13)</td>
<td>3 (3)</td>
<td>97 (9)</td>
<td></td>
</tr>
<tr>
<td>Nerve sparing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&lt;.01&lt;sup&gt;a,b,c&lt;/sup&gt;</td>
</tr>
<tr>
<td>Bilateral</td>
<td>397 (80)</td>
<td>205 (43)</td>
<td>22 (20)</td>
<td>624 (58)</td>
<td></td>
</tr>
<tr>
<td>Unilateral</td>
<td>59 (12)</td>
<td>138 (29)</td>
<td>6 (6)</td>
<td>203 (19)</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>37 (8)</td>
<td>129 (27)</td>
<td>80 (74)</td>
<td>246 (23)</td>
<td></td>
</tr>
<tr>
<td>NoED before treatment&lt;sup&gt;e&lt;/sup&gt;</td>
<td>412 (83)</td>
<td>351 (74)</td>
<td>66 (60)</td>
<td>829 (77)</td>
<td>&lt;.02&lt;sup&gt;a,b,c&lt;/sup&gt;</td>
</tr>
<tr>
<td>Sexual problems before treatment</td>
<td>434 (88)</td>
<td>388 (82)</td>
<td>79 (72)</td>
<td>901 (84)</td>
<td>&lt;.01&lt;sup&gt;a,b,c&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Data presented as n (%), unless otherwise noted.  
Abbreviations: NoED = no erectile dysfunction; US = United States.  
<sup>a</sup>Norway versus US.  
<sup>b</sup>US versus Spain.  
<sup>c</sup>Norway versus Spain.  
<sup>d</sup>According to European guidelines.  
<sup>e</sup>Erection firm enough for sexual intercourse.
only age and no nerve-sparing surgery remained significantly associated with the patients’ report of ED 2 to 3 years after prostatectomy.

On multivariate analysis, reporting a pretreatment sexual problem (OR, 3.0; 95% CI, 2.1-4.3) and prostatectomy without a nerve-sparing procedure (OR, 1.6; 95% CI, 1.2-2.1)
remained significantly associated with a postprostatectomy sexual problem.

**Erectile Function Versus Sexual Problem**

Among the 246 American, 254 Norwegian, and 57 Spanish patients whose erectile function changed from NoED before prostatectomy to ED 2 to 3 years postoperatively, 35% of the American, 37% of the Norwegian, and 44% of the Spanish patients reported no sexual problem ($P = .45$; Figure 4A).

For patients in whom NoED was retained postoperatively (Figure 4B), 83% of the American and 85% of the Norwegian patients reported no sexual problems ($P = .77$). Owing to the small sample size, the Spanish patients were excluded from this analysis.

**Discussion**

In the multivariate analyses, our comparative study did not reveal statistically significant differences among patients who had undergone prostatectomy at the participating American, Norwegian, and Spanish institutions 2 to 3 years previously in the prevalence of ED or the experience of a sexual problem. Differences among the 3 countries regarding postprostatectomy ED emerged only in the unadjusted analyses. Pretreatment ED, age $\geq 65$ years, and a non–nerve-sparing procedure were independent variables associated with postprostatectomy ED. Pretreatment report of a sexual problem and nonperformance of a nerve-sparing procedure significantly increased the likelihood of a sexual problem after treatment. Similar results were observed for ED in the subanalysis, restricted to NoED before treatment. Furthermore, approximately one third of the patients developing postprostatectomy ED did not report sexual problems, with no differences among the 3 countries.

In reviews, including patients from both American and European hospitals, large interinstitutional variability of the prevalence of postprostatectomy ED has been documented, leaving the impression that the success rate of postprostatectomy NoED varies between different institutions.4,12 This might leave the impression, not least in the lay press, that retaining erectile function after surgery primarily depends on the skills of the institution’s urologists. However, the reviews have not usually accounted for the patients’ pretreatment status, including potency and medical and sociodemographic factors, making it more difficult for both medical professionals and, in particular, patients and the media to conduct valid comparisons of the results.

Increasing age, low education level, non–nerve-sparing prostatectomy, and, not least, pretreatment ED have been shown to reduce the likelihood of postprostatectomy NoED.13,14 Our results have confirmed these findings. Thus, our findings of nonsignificant between-country differences in ED in the adjusted analyses are important. These findings emerged, not only when analyzing all patients, but also in the subgroup of patients with NoED before surgery. The findings for sexual problems reported after prostatectomy were similar to those for postprostatectomy ED. The performance of bilateral nerve-sparing prostatectomy remained the only modifiable variable with a positive effect on the preservation of postprostatectomy erectile function and a reduction of sexual problems, confirming the findings from other studies.15

Two large-scale American studies, the Prostate Cancer Outcomes Study (PCOS)16 and Cancer of the Prostate Strategic Urologic Research Endeavor (CaPSURE)17 have documented differences in treatment outcomes in American patients with different ethnicities over several years. In the PCOS, African Americans had better recovery of sexual function compared with non-Hispanic whites, who were more likely to report moderate or large sexual problems at 60 months.18 The CaPSURE study found no differences in sexual function or sexual problems 1 year after treatment.19 Baseline sexual function was not assessed in that study.
<table>
<thead>
<tr>
<th>Variable (Reference vs. Other Categories)</th>
<th>All Patients$^a$ (n = 1077)</th>
<th>Patients With NoED Before Treatment$^b$ (n = 829)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ED After RP</td>
<td>Sexual Problems After RP</td>
</tr>
<tr>
<td></td>
<td>UA (95% CI)</td>
<td>OR (95% CI)</td>
</tr>
<tr>
<td>Sexual function before treatment (NoED vs. ED)</td>
<td>6.2 (3.8-10.3)</td>
<td>4.6 (2.8-7.7)</td>
</tr>
<tr>
<td>Sexual problem before treatment (no vs. yes)</td>
<td>2.1 (1.5-3.1)</td>
<td>1.5 (1.0-2.2)</td>
</tr>
<tr>
<td>Comorbidity (no vs. yes)</td>
<td>2.9 (2.0-4.0)</td>
<td>1.9 (1.3-2.7)</td>
</tr>
<tr>
<td>Age (&lt;65 vs. ≥65 years)</td>
<td>2.1 (1.6-2.9)</td>
<td>1.2 (0.9-1.8)</td>
</tr>
<tr>
<td>Education (high school or more vs. less)</td>
<td>0.9 (0.6-1.4)</td>
<td>.66</td>
</tr>
<tr>
<td>Living together (yes vs. no)</td>
<td>2.1 (1.3-2.4)</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>Risk group (reference: low)</td>
<td>2.4 (1.4-4.1)</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>Intermediate</td>
<td>1.6 (1.1-2.3)</td>
<td>.01</td>
</tr>
<tr>
<td>High</td>
<td>3.8 (2.5-5.8)</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>Nerve sparing (reference: bilateral)</td>
<td>2.0 (1.5-2.6)</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>Unilateral</td>
<td>5.0 (2.6-9.6)</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>None</td>
<td>3.2 (2.2-4.6)</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>Country (reference: US)</td>
<td>2.0 (1.4-3.1)</td>
<td>&lt;.01</td>
</tr>
</tbody>
</table>

Abbreviations: CI = confidence interval; ED = erectile dysfunction; MA = multivariate analysis; NoED = no erectile dysfunction; OR = odds ratio; RP = radical prostatectomy; UA = Univariate analysis; US = United States.

$^a$ED and sexual problems after prostatectomy were dependent variables in analysis of all patients.

$^b$ED after prostatectomy was the dependent variable in analysis of patients with NoED before treatment.
Namiki et al. have demonstrated that differences exist in erectile function and sexual problems among American and Japanese men treated for prostate cancer. They pointed to the cultural differences between the 2 groups. To the best of our knowledge, we are the first to compare patients’ postprostatectomy erectile function and sexual problems between American and European men, accounting for differences in the pretreatment variables known to be associated with erectile dysfunction. We found significantly more American patients with NoED before treatment than men who underwent surgery in Norway and Spain. Furthermore, the American patients were younger and more had low-risk tumors, possibly more often enabling bilateral...
ED and Sexual Problems 2-3 Years After Prostatectomy

nerve-sparing prostatectomy. These differences in favorable predictive factors explain the greater proportion of Americans with postprostatectomy NoED that emerged on univariate analysis. However, as illustrated in Figure 1, the percentage reduction of men with NoED was rather similar. Moreover, in the multivariate analyses, no statistically significant differences among the 3 groups regarding ED were apparent.

The discrepancy between erectile function and the report of sexual problems in our study is another important finding. For at least one third of our patients, ED 2 to 3 years after surgery was not perceived as a sexual problem, with approximately similar percentages in the 3 countries. Furthermore, only 1 of 6 patients with preservation of NoED reported having sexual problems. Developing postprostatectomy ED is therefore not equivalent to reporting a sexual problem. We did not know the specific content of these men’s sexual problems; however, similar results were reported by Kimura et al for men with postprostatectomy ED. The question could also be asked whether erectile function (NoED vs. ED) or the patient’s perception of a problem has the greatest impact on the patient’s quality of life, an important outcome for all patients with PCa. Finally, and importantly, our findings suggest that future analyses should differentiate between functional aspects and problem experience. Such a distinction is enabled by the different items in the sexual domain of the EPIC instrument.

Strengths and Limitations

Our results apply to patients who underwent surgery 5 to 10 years earlier, and the prevalence of postprostatectomy ED might have decreased during the past decades as urologists gained more experience with nerve-sparing prostatectomy. Also, we did not have data available for the postoperative use of erectile aids, which might have differed among the 3 countries, not least because of possible out-of-pocket expenses for these drugs. It is also questionable whether our results from the 3 multicenter research groups truly reflect the experience of the individual country’s average patient undergoing prostatectomy. The Norwegian patients were from a national study that also included community hospitals, and the American and Spanish patients had been treated at university hospitals. The main strength of our study was the availability of pretreatment data for a large cohort of patients from different countries and the use of the same questions about their postprostatectomy sexual life, thus enabling valid comparisons.

Conclusion

Valid statements about any differences between countries and institutions regarding the development of postprostatectomy ED and sexual problems can only be made if both the patients’ pretreatment factors, such as age and preprostatectomy erectile function, and the performance of bilateral nerve-sparing prostatectomy are considered. To enable such comparisons, equal reporting of all variables is required. Our results also underline the importance of reporting sexual function and sexual problems as 2 different dimensions of sexual life.

Clinical Practical Points

- Many studies have reported on the adverse effects after prostatectomy, and it is well known that both erectile dysfunction and sexual problems are common postoperatively.
- Patients, physicians, and health administrators are all eager to know the post-treatment results at different institutions and countries.
- The present study compared ED and sexual problems 2 to 3 years after prostatectomy for men treated in the United States, Norway, and Spain.
- Bivariate analysis showed statistically significant differences among the 3 countries in the proportion of men reporting ED.
- However, after adjusting for age, pretreatment erectile function, and bilateral nerve-sparing prostatectomy, no statistically significant differences emerged among the patients from the 3 countries.
- This finding highlights, not only the importance of adjusting for pretreatment variables when analyzing post-treatment results, but also the importance of standardization in reporting these variables.

Acknowledgments

PROSTQA Template for Group Credit PROSTQA Consortium study group (Study Investigators, DCC and Coordinators): The PROSTQA Consortium includes contributions in cohort design, patient accrual and follow-up from the following investigators: Meredith Regan (Dana Farber Cancer Institute, Boston, MA); Larry Hembroff (Michigan State University, East Lansing, MI); John T. Wei, Dan Hamstra, Rodney Dunn, Laurel Northouse and David Wood (University of Michigan, Ann Arbor, MI); Eric A Klein and Jay Ciezki (Cleveland Clinic, Cleveland, OH); Jeff Michalski and Gerald Andriele (Washington University, St. Louis, MO); Mark Litwin and Chris Saigal (University of California—Los Angeles Medical Center, Los Angeles, CA); Thomas Greenfield, PhD (Berkeley, CA); Louis Pisters and Deborah Kuban (MD Anderson Cancer Center, Houston, TX); Howard Sandler (Cedars Sinai Medical Center, Los Angeles, CA); Jim Hu and Adam Kibel (Brigham and Women’s Hospital, Boston, MA); Douglas Dahl and Anthony Zietman (Massachusetts General Hospital, Boston, MA); Peter Chang Andrew Wagner, and Irving Kaplan (Beth Israel Deaconess Medical Center, Boston, MA) and Martin G. Sanda (Emory, Atlanta, GA). We acknowledge PROSTQA Data Coordinating Center Project Management by Jill Hardy, MS (Michigan State University, East Lansing, MI), Erin Najuch and Jonathan Chipman (Dana Farber Cancer Institute, Boston, MA) and Carina Crociani, MPH (Beth Israel Deaconess Medical Center, Boston, MA); grant administration by Beth Doiron, BA (Beth Israel Deaconess Medical Center, Boston, MA), and technical support from coordinators at each clinical site. The Multicentric Spanish Group of Clinically Localized Prostate Cancer. The project is funded by the PROSTQA grants (NIH R01 CA95662; NIH1 RC1CA146596) and grants from Instituto de Salud Carlos III FEDER, (p113/00412).

Disclosure

The authors have stated that the have no conflicts of interest.
References