CJNR 2014, Vol. 46 Nº 2, 42–56

Exploring the Impact of Prostate Cancer Radiation Treatment on Functions, Bother, and Well-Being

Maher M. El-Masri, Susan M. Fox-Wasylyshyn,
Colvin D. Springer, Sheila Cameron

Though many studies have explored the effects of radiation therapy on urinary, sexual, and bowel function and/or bother, few have focused on symptom experiences from diagnosis through the first year following completion of radiation therapy. The purpose of this study was to compare the effect of 3 types of radiation treatment on functions, bother, and well-being in men with prostate cancer at 1, 6, and 12 months after completion of treatment. A repeated measures survey ($N = 73$) found that none of the function, bother, emotional, social, or functional well-being scores were significantly different among the 3 groups. However, within-subjects-only repeated measures ANCOVA suggested that emotional well-being and social well-being are different over time. The findings show that clinical treatment of prostate cancer has an impact on functions, bother, and well-being of patients. Thus, it is important that nurses and other health-care providers listen to what patients are saying before, during, and after treatment.

Keywords: adult health, cancer, quality of life, social support

Résumé

Étude des effets du traitement du cancer de la prostate par radiothérapie sur les fonctions corporelles, les gênes physiques et le bien-être

Maher M. El-Masri, Susan M. Fox-Wasylyshyn,
Colvin D. Springer, Sheila Cameron

Bien que de nombreuses études aient examiné les effets de la radiothérapie sur les fonctions ou les gênes urinaires, sexuelles et intestinales, peu ont mis l'accent sur les symptômes ressentis à partir du diagnostic jusqu'à la fin de l'année suivant le traitement. L'objectif de cette étude était de comparer les effets de trois types de radiothérapie sur les fonctions, les gênes et le bien-être d'hommes atteints d'un cancer de la prostate un mois, six mois et douze mois après la fin du traitement. Un sondage intégrant des mesures répétées (N = 73) a permis de constater qu'il n'y avait pas de variation importante entre les trois groupes quant aux mesures touchant les fonctions corporelles, les gênes physiques ou le bien-être social, émotionnel ou fonctionnel. Toutefois, l'analyse de covariance des mesures répétées touchant les sujets uniquement laisse entendre que le bien-être émotionnel et le bien-être social évoluent dans le temps. Les conclusions de l'étude indiquent que le traitement clinique du cancer de la prostate a une incidence sur les fonctions corporelles, les gênes physiques et le bien-être des patients. Il est par conséquent important que le personnel infirmier et les autres professionnels de la santé prennent le temps d'écouter les patients avant, pendant et après leur traitement.

Mots-clés : cancer de la prostate, cancer, qualité de vie, bien-être social

Background

Prostate cancer remains one of the most commonly diagnosed cancers in men, despite reports of a decline in incidence (Canadian Cancer Society, 2011; Jemal, Seigel, Xu, & Ward, 2010). The Canadian Cancer Society (2011) estimates that prostate cancer accounts for 10% of all cancer-related deaths in men. While advances in early diagnosis and radiation treatment (Choi & Hung, 2010; Leibel et al., 2003; Mangar et al., 2005; Tangney, Ahmad, Collins, & O'Sullivan, 2010) contribute to improved survival among this patient population (Bellmunt et al., 2009), such treatment has been reported to have a negative influence on the functions, bother (i.e., the extent to which problems are perceived by the individual patient), and well-being of men with prostate cancer (Eton & Lepore, 2002). However, little is known about whether different radiation therapies have different effects on functions, bother, and well-being throughout the first year following treatment.

Routine screening tests such as prostate-specific antigen (PSA) or digital rectal examination are often used to diagnose prostate cancer prior to the onset of clinical symptoms. Consequently, the occurrence of treatment-related symptoms/problems may suggest to otherwise asymptomatic patients that treatments are harmful rather than helpful or that their cancer is worsening. It is therefore important that the effects of treatment on patients' functions and feelings of well-being are understood so that they can be clearly communicated to the men and their families. However, it is not clear how men's reports of functions, bother, and well-being vary across different types of radiotherapy over time. This gap is especially disconcerting because accurate knowledge about the differential effects of treatments are needed as health professionals assist patients with the selection of cancer therapies and their understanding of the effects of such therapies on their functions, bother, and well-being. Further, It is important that health-care providers give the same attention to the impact of the clinical treatment on functions, bother, and well-being of patients and their families.

Although a plethora of studies have explored the effects of various types of radiotherapy on urinary, sexual, and bowel function and/or bother, few (Guedea et al., 2009; Litwin et al., 2007; Pinkawa et al., 2009; Tanaka et al., 2010) have focused on these effects from diagnosis through the first year following completion of therapy. Further, although a number of studies (Eller et al., 2006; Joseph et al., 2008) have explored feelings of well-being among men with prostate cancer, their findings are inconsistent. Using the Functional Assessment of Cancer Treatment for patients with prostate cancer (FACT-P) to measure well-being, Eller et al. (2006) report a difference between patients who received radical prostatectomy and those who received two different combinations of brachytherapy in a study comparing the three groups at baseline, 1 month, and 3 months. Although the investigators report between-group differences, they did not adjust for baseline scores (time 1) while comparing times 2 and 3. Instead, they compared the scores across all three times. Failure to adjust for baseline differences poses a significant threat to the validity of their findings. However, in a comparison of health-related quality of life between men receiving external beam radiotherapy (EBR) and men receiving high dose radiation brachytherapy in combination with EBR (HDR/EBR), Joseph et al. (2008) found no between-group differences in physical, social/family, emotional, or functional well-being at 12 months post-treatment.

The aforementioned literature shows a need to further study the impact of prostate cancer radiotherapy on functions, bother, and well-being of patients throughout the year following treatment. This is particularly important in light of reports (Balderson & Towell, 2003; Nelson, Balk, & Roth, 2010) suggesting that social/family, physical, and functional well-being are all inversely associated with psychological distress, depression, and anxiety among these patients. Thus, the purpose of this study was to compare the effect of three types of radiation treatment (brachytherapy, HDR/EBR, and EBR) on functions, bother, and well-being of men with prostate cancer at 1, 6, and 12 months after completion of treatment. This study is the second of two studies conducted using this sample. The first (Cameron, Springer, Fox-Wasylyshyn, & El-Masri, 2012) explored the effect of radiotherapy on functions and bother 1 month after treatment and examined the predictors of post-treatment perceived health state.

Findings from this study can be used to support evidence-based decision-making by nurses and other health-care providers as they care for men with prostate cancer throughout the first year following treatment. The psychosocial focus of our study is especially important in achieving a balance between the clinical and psychosocial aspects of treating men with prostate cancer: nurses and other health-care providers need to consider the experiences of patients and their families with regard to the impact of clinical treatments on the men's perceived functions, bother, and well-being.

Methods

Design

A repeated measures survey was conducted with a convenience sample of 73 men with localized non-metastatic prostate cancer to explore the impact of three radiation treatment modalities on their functions, bother, and well-being. The sample constituted all available patients who attended a Regional Cancer Centre that provides a range of cancer services in southwestern Ontario, Canada. Eligible participants (a) had a confirmed diagnosis of localized prostate cancer; (b) were about to undergo radiation treatment (brachytherapy, HDR/EBR, or EBR alone); (c) were able to read and understand English; and (d) were able to provide informed consent. The participants were asked to complete the survey prior to treatment initiation and at 1, 6, and 12 months following completion of their treatment.

Procedures

Prior to commencement of the study, ethical clearance was obtained from the respective research ethics boards (i.e., university and hospital boards). The principal investigator and a research assistant then described the study to potential participants during a routine orientation class that registered nurses at the Regional Cancer Centre provide to introduce patients and their families to their course of treatment (i.e., type, times, and place of treatments). After the presentation, the researchers gave potential participants written information about the study, described the role and expectations of participants, answered their questions, and invited them to enrol. Consenting patients were then asked to complete the baseline survey (described below) either onsite or offsite. Participants who opted to complete the survey offsite mailed it to the investigators in a stamped, addressed envelope that was provided. To minimize the burden on participants and thus increase the likelihood of their continued participation, the research assistant called participants at home to complete the post-treatment questionnaire via telephone. Given that treatment periods varied by type of therapy, patients completed their first post-treatment survey at 1 month following completion of their respective treatment protocol (i.e., 4 weeks for the brachytherapy group, 4 to 6 weeks for the HDR/EBR group, and 6 to 8 weeks for the EBR-only group). The content of the pre- and post-treatment surveys was identical except that the demographic section was not included in the latter.

Instrumentation

Our survey was composed of demographic and psychometric questionnaires. The demographic questionnaire elicited information pertaining to age, marital status, living arrangement, history of cancer, stage of cancer, and mode of cancer detection. The psychometric questionnaire elicited information pertaining to self-perceived functions, bother, and well-being using the Expanded Prostate Cancer Index Composite (EPIC) survey

(Wei, Dunn, Litwin, & Sandler, 2000) and the Functional Assessment of Cancer Therapy-General (FACT-G), Version 3 (Cella et al., 1995).

The 50-item EPIC evaluates patient function and bother in each of four domains: urinary, bowel, sexual, and hormonal. An example of a function item is "How often have you had bloody stools during the last four weeks?" while an example of a bother item is "How big a problem, if any, has having bloody stools been for you during the last four weeks?" Items on the EPIC are measured on a five-point Likert scale ranging from 1 to 5, later transformed to standardized weighted scores ranging from 0 to 100. Responses were coded such that higher scores indicated better function and less bother. The scoring was performed in accordance with published guidelines for the EPIC (Sanda, Wei, & Litwin, 2002). The 50-item EPIC was modified in this study, with a reduced number of items. All items in the urinary and bowel domains were retained. Four of the original nine items pertaining to sexual function were deleted due to their sensitivity (these items pertained to quality and frequency of erections, frequency of sexual intercourse, and frequency of waking with an erection). Only one of the four sexual bother items was retained. This asked how problematic sexual functioning or lack of sexual functioning was for the participant. The impact of hormonal domain was not explored in our study due to the very small number of participants who reported receiving hormonal therapy.

Wei et al. (2000) report high internal consistency (Cronbach's alpha ≥ 0.82) and test-retest reliability ($r \geq 0.80$) for each of the EPIC's domain scales (i.e., urinary, bowel, and sexual) and suggest that internal consistency and test-retest reliability were satisfactory when the domains were further reduced to function and bother sub-domains. In our sample, the Cronbach's alpha coefficients were 0.75 for urinary function, 0.89 for urinary bother, 0.81 for bowel function, 0.93 for bowel bother, and 0.95 for sexual function. Internal consistency testing was not required for the single-item sexual bother scale.

Three subscales of the FACT-G — functional well-being (FWB), emotional well-being (EWB), and social well-being (SWB) — were used to measure health-related quality of life. The FACT-G was developed to measure quality of life among patients with any type of cancer (Cella et al., 1995) and it has well-established evidence of reliability and validity (Cella et al., 1993, 1995; McQuellon et al., 1997). Cella et al. (1995) recommend that scores for each of the FACT-G subscales be calculated by multiplying the number of items in the subscale by the sum of the scores for these items and then dividing by the number of items answered. In this study, we implemented case-mean substitution to impute missing data on individual items; thus, scores on each subscale were calculated by summing the scores on all items in the subscale. Given that a number of items in the FACT-G were administered in reverse form (i.e., higher scores represented poorer quality of life), back reversing of these items was performed prior to scoring. One item pertaining to sexual activity and satisfaction in the SWB subscale was deleted because this improved its Cronbach's alpha from 0.66 to 0.75. Deletion of this item resulted in a six-item SWB subscale. Cronbach's alpha on the EWB (6 items) and the FWB (7 items) was 0.85 and 0.92, respectively. Each item on the FACT-G subscales was measured on a Likert scale ranging from 1 to 5, with higher scores reflecting better well-being.

Data Analysis

Data analyses were conducted using SPSS Version 20. Basic descriptive statistics were performed to describe the demographic characteristics of the sample and compare these across the three treatment groups. Scores on each outcome measure were calculated based on the guidelines outlined in the instrumentation section. Between-subjects repeated measures analysis of covariance (RM-ANCOVA) was performed to compare each study outcome among the three treatment groups at 1, 6, and 12 months while adjusting for baseline scores. Given that no group differences were found across any of the outcomes, the analysis was also performed in the context of a within-subjects RM-ANCOVA to compare the scores on each of the study outcomes at 1, 6, and 12 months while adjusting for their baseline scores. Post hoc pairwise Bonferroni adjustments were then made to examine the difference in the scores across each pair of time periods (i.e., 1 vs. 6 months, 1 vs. 12 months, and 6 vs. 12 months). All data analysis procedures were performed using a two-tailed alpha of 0.05 as the criterion for statistical significance.

Results

Sample Characteristics

The mean age of the participants was 67.6 years (*SD* ± 5.9). The majority of participants were either married or living common-law ($n = 61$; 83.6%). Forty participants (54.8%) had high-school education or less, while 33 (45.2%) had postsecondary education. While 15.1% ($n = 11$) had a personal history of cancer, a slim majority had a family history of cancer ($n = 51$; 69.9%). Further, 63% of participants ($n = 46$) had stage 1 cancer, 31.5% ($n = 23$) stage 2, and 5.5% ($n = 4$) stage 3. The mean PSA score was 7.47 (*SD* ± 7.4; median = 5.84). The results further suggest that the three treatment groups (brachytherapy, HDR/EBR, and EBR) were not significantly different on any of the aforementioned sample characteristics.

Repeated Measures Results

Table 1 displays the results of the mixed between-within-subjects RM-ANCOVA and suggests that, overall, the three treatment groups were not statistically different on any of the study outcomes after adjusting for baseline scores. While there were no significant interactions between time and treatment in any of the study outcomes, within-subjects differences (i.e., scores over time) were found in all outcomes except urinary function ($F = 1.59$; $p = .208$), bowel function ($F = 1.21$; $p = 0.303$), sexual bother ($F = 0.21$; $p = 0.810$), and emotional well-being ($F = 0.39$; $p = 0.676$).

Table 1 ***Function, Bother, and Well-Being in Men With Localized Prostate Cancer, Across Radiation Treatment Groups***

Variable	**Brachy-therapy (n = 29)**	**HDR/ EBR (n = 23)**	**EBR Only (n = 21)**	**Between Groups F (df = 2)**	**Within Subjects F (df = 2)**	**Inter-action F (df = 2)**
Urinary function	438.6 (12.1)	438.9 (13.2)	463.74 (15.6)	1.12	1.59	1.22
Urinary bother	501.9 (16.3)	492.9 (16.9)	534.5 (28.9)	1.13	3.89*	1.34
Bowel function	625.3 (17.3)	593.7 (19.2)	580.2 (20.8)	1.03	1.21	.64
Bowel bother	593.3 (16.0)	551.0 (17.6)	549.0 (19.8)	1.17	5.87**	1.46
Sexual function	88.9 (7.3)	104.4 (7.8)	97.0 (8.5)	1.27	5.70**	.32
Sexual bother	67.4 (4.1)	61.8 (4.6)	67.8 (4.8)	.49	.21	.54
Social well-being	22.9 (.3)	23.0 (.4)	23.2 (.4)	.31	4.85**	1.9
Emotional well-being	23.1 (.4)	22.7 (.4)	23.4 (.4)	.84	.39	1.35
Functional well-being	28.7 (.6)	28.5 (.7)	28.8 (.8)	.22	5.88**	1.69

Notes: HDR = high dose radiation; EBR = external beam radiation; F's and significance levels from mixed between-within-subjects RM-ANCOVA with interaction effects.
* $p < .05$, ** $p < .01$

Table 2 ***Function, Bother, and Well-Being in Men With Localized Prostate Cancer, Over Time***

Variable	**Time 1 (1 Month) *M (SD)***	**Time 2 (6 Months) *M (SD)***	**Time 3 (12 Months) *M (SD)***
Urinary function	388.4 (96.4)$_a$	448.0 (66.8)$_b$	464.7 (58.9)$_c$
Urinary bother	442.4 (141.7)$_a$	525.3 (103.1)$_b$	557.5 (99.5)$_c$
Bowel function	572.8 (140.0)$_a$	611.3 (119.2)$_{a,b}$	626.0 (104.0)$_b$
Bowel bother	561.9 (158.8)$_a$	604.1 (131.6)$_{a,b}$	616.1 (120.4)$_b$
Sexual function	77.3 (103.6)$_a$	104 (110.0)$_{a,b}$	123.9 (118.3)$_b$
Sexual bother	65.8 (30.6)$_a$	64.7 (28.2)$_a$	66.8 (29.5)$_a$
Social well-being	27.5 (3.0)$_a$	21.3 (2.1)$_b$	21.5 (2.2)$_b$
Emotional well-being	12.8 (2.5)$_a$	26.4 (3.4)$_b$	26.5 (3.5)$_b$
Functional well-being	28.3 (4.9)$_a$	28.9 (4.6)$_a$	29.2 (4.8)$_a$

Note: Means in the same rows with different subscripts are significantly different from each other at $p < .05$ according to Bonferroni-adjusted pairwise comparisons following within-subjects-only RM-ANCOVA.

Table 2 displays the within-subjects-only analyses performed on each of the study outcomes, highlighting the adjusted mean scores at each time period and the *p* values of their respective Bonferroni-adjusted pairwise comparisons. These pairwise results suggest that there were time-related changes in all outcomes except sexual bother and functional well-being.

Discussion

After adjusting for baseline scores, our between-subjects repeated measures findings suggest that there were no differences among the three radiation treatments with regard to any of the outcome variables. However, the within-subjects comparisons showed time-related changes in urinary bother, bowel bother, sexual function, social well-being, and functional well-being, which are important changes for men and their families to understand. No interaction effects were found between treatment groups and time in any of the study outcomes. Given the absence of between-group differences and interactions, subsequent within-subjects ANCOVA (which ignored treatment groups) with Bonferroni-adjusted pairwise comparisons revealed that there were time-related changes on all outcomes except sexual bother and FWB.

Although other prospective studies have compared the impact of different treatments over time (Huang, Sadetsky, & Penson, 2010; Lev et al., 2009; Litwin et al., 2007; Talcott et al., 2003), our study is unique in comparing three radiation treatments (brachytherapy, HDR/EBR, and EBR) over time. Further, ours is one of only a few longitudinal studies (Huang et al., 2010; Lev et al., 2009; Talcott et al., 2003) to control for baseline scores of the outcome variables. Lastly, of the studies that we reviewed, none examined the same time intervals that were used in our study. These differences make it difficult to compare our findings with those of other studies.

The finding of an absence of between-treatment differences suggests that the impact of treatment on functional/bother domains and well-being may not be an important factor to consider when selecting among these three approaches to radiotherapy. However, this finding is not consistent with those of previous studies. We caution that the lack of between-group differences in our study may be unique to our sample and/or issues with statistical power, given our relatively small sample. In fact, post hoc power analysis revealed that our actual power for RM-ANCOVA among the three groups was 69% and that a sample of 105 participants was needed to yield 80% power based on a small to medium effect size ($f = 0.25$). Thus, we recommend that these findings be investigated with a larger sample.

Our findings suggest a significant improvement in bowel function between 1 and 12 months. As expected, this corresponded with improvement in bowel bother as indicated by higher scores for bowel bother. Although sexual function was low across all three time periods, the within-subjects analysis suggests that participants experienced significant improvement in sexual function between 1 and 12 months. However, this improvement was not accompanied by an improvement in sexual bother. This apparent discrepancy between the sexual function and sexual bother findings is not surprising, as others (Penson, Litwin, & Aaronson, 2003) have found that function and bother do not always correlate. It is also possible that the slight functional improvements are not satisfactory and thus lead these patients to experience feelings of bother as their problems linger over time.

Consistent with our findings with respect to the sexual and bowel domains, urinary function demonstrated significant improvement between 1 and 12 months. Unlike the sexual and bowel domains, urinary function also showed significant incremental improvements between 1 and 6 months and between 6 and 12 months. Corresponding improvements in urinary bother were seen for all three time frames, suggesting that urinary bother diminished as function improved.

It is interesting that when function scores were high over time, as with urinary and bowel functions, patients experienced statistically significant improvements in their sense of bother. However, despite statistically significant improvement in the relatively low sexual function scores, there was no corresponding improvement in sexual bother. These findings suggest that a patient's sense of bother is only somewhat linked to their sense of function — that is, an improvement in function may not necessarily decrease the sense of bother if the function improvement is marginal and does not change the score from a low to a high range, as in this study. Thus, it is important that nurses not only consider whether a function improves over time, but also pay attention to the degree of improvement. Patients who experience relative functional improvement but continue to experience lower than optimal functions are likely to experience a sense of bother that needs to be addressed.

Our results indicate that there were no changes in functional well-being throughout the course of the study. This finding is likely related to the relatively high levels of functional well-being at 1 month, which left little room for improvement in subsequent months. At 1 month, participants had relatively low levels of EWB. By 6 months, EWB scores had nearly doubled, at which point they levelled off and showed no further change between months 6 and 12. This improvement in EWB corresponds to improvements in the sexual, urinary, and bowel functions and thus may reflect a sense of optimism with respect to their progress and prognosis.

Participants in this study reported high levels of SWB at 1 month post-treatment. This is likely related to the tendency of family and friends to rally around individuals during the time frame following a cancer diagnosis and subsequent initiation of treatment. By months 6 and 12, participants had experienced a significant drop in SWB in comparison to their scores at 1 month. These lower scores may be related to the fact that the acute crisis phase of a cancer diagnosis and its treatment had passed, resulting in a possible reduction in the high level of support that is typically provided to patients during the crisis phase of their illness.

Implications for Practice

Given that men with prostate cancer may not experience problems when the cancer is first diagnosed, and that symptoms are likely to manifest after radiation treatment, it is important that nurses and other health-care providers prepare both patients and families for the nature of those potential symptoms during the first follow-up year. Since most scores were lowest at the initial phase of treatment completion (i.e., at 1 month), nurses and other health professionals may need to pay special attention to emotional concerns during this critical time. Functional impairment due to treatment may be misinterpreted by patients and their families as a sign of health deterioration. Our findings pertaining to sexual function and bother scores indicate that improvement in sexual function might not translate to a reduction in sense of bother and thus nurses may need to assess sexual function and bother separately.

We caution nurses against generalizing our finding concerning the seemingly similar impact of the three radiation treatments on functions, bother, and well-being among men with prostate cancer. We recommend that our results be further investigated before our suggested implications for practice with regard to this finding are considered. We also recommend that the observational self-report nature of our study and the fact that it was conducted with a relatively small sample be considered. We recommend that it be replicated with a larger sample that will provide sufficient power to analyze the data while adjusting for the clustered nature of observations and the collinearity among multiple outcomes.

In conclusion, our results suggest that the functions, bother, and well-being scores of men with prostate cancer who receive radiotherapy are likely to improve over time, regardless of the nature of that therapy. Although sexual function improved over time, persistent low scores indicate that sexual function continues to be a problem a year after completion of treatment. Finally, the findings of our research add to the growing literature that highlights the fact that clinical treatment of cancer has an impact on functions, bother, and well-being of patients and their families. Thus, it is essential that patients' experiences and concerns be considered before, during, and after radiation treatment. Specifically, nurses and other health-care providers need to inform patients and their families about what to expect during the first 12 months after completion of radiation treatment. Furthermore, it is important that patients feel that they are being listened to and that their experiences are being considered by their health-care providers.

References

Balderson, N., & Towell, T. (2003). The prevalence and predictors of psychological distress in men with prostate cancer who are seeking support. *British Journal of Health Psychology, 8*(Pt 2), 125–134. doi: 10.1348/135910703321649114.

Bellmunt, J., Macia, F., Malmusi, D., Llorente, J. A., Carles, J., Lloreta, J., . . . Castells, X. (2009). Impact of PSA implementation and combined radiation and hormonal therapy (RT+HT) on outcome of prostate cancer patients. *European Journal of Cancer, 45*(16), 2804–2809. doi: 10.1016/j.ejca.2009.06.019.

Cameron, S., Springer, C., Fox-Wasylyshyn, S., & El-Masri, M. (2012). A descriptive study of functions, symptoms, and perceived health state after radiotherapy for prostate cancer. *European Journal of Oncology Nursing, 16*(3), 310–314. doi: 10.1016/j.ejon.2011.07.007.

Canadian Cancer Society. (2011). *Canadian cancer statistics 2011: Featuring colorectal cancer.* Toronto: Author. Retrieved May 26, 2014, from http://www.cancerasian.com/images/news/Canadian_Cancer%20Statistics_2011_English.pdf.

Cella, D. F., Bonomi, A. E., Lloyd, S. R., Tulsky, D. S., Kaplan, E., & Bonomi, P. (1995). Reliability and validity of the Functional Assessment of Cancer Therapy-Lung (FACT-L) quality of life instrument. *Lung Cancer, 12*(3), 199–220. doi: 10.1016/0169-5002(95)00450-f.

Cella, D. F., Tulsky, D. S., Gray, G., Sarafian, B., Linn, E., Bonomi, A., & Brannon, J. (1993). The Functional Assessment of Cancer Therapy scale: Development and validation of the general measure. *Journal of Clinical Oncology, 11*(3), 570–579.

Choi, M., & Hung, A. Y. (2010). Technological advances in radiation therapy for prostate cancer. *Current Urology Reports, 11*(3), 172–179. doi: 10.1007/s11934-010-0102-z.

Eller, L. S., Lev, E. L., Gejerman, G., Colella, J., Esposito, M., Lanteri, V., . . . Sawczuk, I. (2006). Prospective study of quality of life of patients receiving treatment for prostate cancer. *Nursing Research, 55*(2 Suppl), S23–S36.

Eton, D. T., & Lepore, S. J. (2002). Prostate cancer and health-related quality of life: A review of the literature. *Psychooncology, 11*(4), 307–326. doi: 10.1002/pon.572.

Guedea, F., Ferrer, M., Pera, J., Aguilo, F., Boladeras, A., Suarez, J. F., . . . Ventura, M. (2009). Quality of life two years after radical prostatectomy, prostate brachytherapy or external beam radiotherapy for clinically localised prostate cancer: The Catalan Institute of Oncology/Bellvitge Hospital experience. *Clinical and Translational Oncology, 11*(7), 470–478. doi: 10.1007/s12094-009-0387-x.

Huang, G. J., Sadetsky, N., & Penson, D. F. (2010). Health related quality of life for men treated for localized prostate cancer with long-term followup. *Journal of Urology, 183*(6), 2206–2212. doi: 10.1016/j.juro.2010.02.013.

Jemal, A., Siegel, R., Xu, J., & Ward, E. (2010). Cancer statistics, 2010. *CA: A Cancer Journal for Clinicians, 60*(5), 277–300. doi: 10.3322/caac.20073.

Joseph, K. J., Alvi, R., Skarsgard, D., Tonita, J., Pervez, N., Small, C., & Tai, P. (2008). Analysis of health related quality of life (HRQoL) of patients with clinically localized prostate cancer, one year after treatment with external beam radiotherapy (EBRT) alone versus EBRT and high dose rate brachytherapy (HDRBT). *Radiation Oncology, 3,* 20. doi: 10.1186/1748-717x-3-20.

Leibel, S. A., Fuks, Z., Zelefsky, M. J., Hunt, M., Burman, C. M., Mageras, G. S., . . . Ling, C. C. (2003). Technological advances in external-beam radiation therapy for the treatment of localized prostate cancer. *Seminars in Oncology, 30*(5), 596–615. doi: 10.1016/S0093-7754(03)00354-3.

Lev, E. L., Eller, L. S., Gejerman, G., Kolassa, J., Colella, J., Pezzino, J., . . . Sawczuk, I. (2009). Quality of life of men treated for localized prostate cancer: Outcomes at 6 and 12 months. *Support Care Cancer, 17*(5), 509–517. doi: 10.1007/s00520-008-0493-2.

Litwin, M. S., Gore, J. L., Kwan, L., Brandeis, J. M., Lee, S. P., Withers, H. R., & Reiter, R. E. (2007). Quality of life after surgery, external beam irradiation, or brachytherapy for early-stage prostate cancer. *Cancer, 109*(11), 2239–2247. doi: 10.1002/cncr.22676.

Mangar, S. A., Huddart, R. A., Parker, C. C., Dearnaley, D. P., Khoo, V. S., & Horwich, A. (2005). Technological advances in radiotherapy for the treatment of localised prostate cancer. *European Journal of Cancer, 41*(6), 908–921. doi: 10.1016/j.ejca.2004.12.028.

McQuellon, R. P., Russell, G. B., Cella, D. F., Craven, B. L., Brady, M., Bonomi, A., & Hurd, D. D. (1997). Quality of life measurement in bone marrow transplantation: Development of the Functional Assessment of Cancer Therapy-Bone Marrow Transplant (FACT-BMT) scale. *Bone Marrow Transplantion, 19*(4), 357–368. doi: 10.1038/sj.bmt.1700672.

Nelson, C. J., Balk, E. M., & Roth, A. J. (2010). Distress, anxiety, depression, and emotional well-being in African-American men with prostate cancer. *Psychooncology, 19*(10), 1052–1060. doi: 10.1002/Pon.1659/.

Penson, D. F., Litwin, M. S., & Aaronson, N. K. (2003). Health related quality of life in men with prostate cancer. *Journal of Urology, 169*(5), 1653–1661. doi: 10.1097/01.ju.0000061964.49961.55.

Pinkawa, M., Asadpour, B., Piroth, M. D., Gagel, B., Nussen, S., Kehl, M., . . . Eble, M. J. (2009). Health-related quality of life after permanent I-125 brachytherapy and conformal external beam radiotherapy for prostate cancer — a matched-pair comparison. *Radiotherapy and Oncology, 91*(2), 225–231. doi: 10.1016/j.radonc.2008.11.005.

Sanda, M. G., Wei, J. T., & Litwin, M. S. (2002). *Scoring instructions for the Expanded Prostate cancer Index Composite (EPIC).* Ann Arbor: University of Michigan. Retrieved May 26, 2014, from from http://www.med.umich.edu/urology/research/EPIC/EPIC-Scoring-2.2002.pdf.

Talcott, J. A., Manola, J., Clark, J. A., Kaplan, I., Beard, C. J., Mitchell, S. P., . . . D'Amico, A. V. (2003). Time course and predictors of symptoms after primary prostate cancer therapy. *Journal of Clinical Oncology, 21*(21), 3979–3986. doi: 10.1200/jco.2003.01.199.

Tanaka, N., Fujimoto, K., Asakawa, I., Hirayama, A., Yoneda, T., Yoshida, K., . . . Konishi, N. (2010). Variations in health-related quality of life in Japanese men who underwent iodine-125 permanent brachytherapy for localized prostate cancer. *Brachytherapy, 9*(4), 300–306. doi: 10.1016/j.brachy.2009.07.013.

Tangney, M., Ahmad, S., Collins, S. A., & O'Sullivan, G. C. (2010). Gene therapy for prostate cancer. *Postgraduate Medicine, 122*(3), 166–180. doi: 10.3810/pgm.2010.05.2154.

Wei, J. T., Dunn, R. L., Litwin, M. S., Sandler, H. M., & Sanda, M. G. (2000). Development and validation of the Expanded Prostate cancer Index Composite (EPIC) for comprehensive assessment of health-related quality of life in men with prostate cancer. *Urology, 56*(6), 899–905.

Maher M. El-Masri, RN, PhD, is Professor and Research Chair, Faculty of Nursing, University of Windsor, Ontario, Canada. Susan M. Fox-Wasylyshyn, RN, PhD, is Associate Dean and Associate Professor, Faculty of Nursing, University of Windsor. Colvin D. Springer, MD, is Radiation Oncologist, Department of Oncology, Windsor Regional Cancer Centre. Sheila Cameron, RN, EdD, DSc, is Professor Emeritus, Faculty of Nursing, University of Windsor.