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Differences in Symptom Clusters Identified Using Occurrence Rates Versus Symptom Severity Ratings in Patients at the End of Radiation Therapy

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Abstract

The purposes of this study were to: identify the number and types of symptom clusters using yes/no responses from the Memorial Symptom Assessment Scale (MSAS); identify the number and types of symptom clusters using severity scores from the MSAS; compare the identified symptom clusters derived using severity scores to those derived using occurrence ratings; and evaluate for differences in symptom cluster severity scores between patients with breast and prostate cancer at the end of radiation therapy (RT). Separate exploratory factor analyses were performed to determine the number of symptom clusters based on symptom occurrence rates and symptom severity ratings. While specific symptoms within each symptom cluster were not identical, three very similar symptom clusters (i.e., "mood-cognitive" symptom cluster, "sickness-behavior" symptom cluster, "treatment-related" symptom cluster) were identified regardless of whether occurrence rates or severity ratings were used to create the symptom clusters at the end of RT. However, the factor solution derived using the severity ratings fit the data better. Significant differences in severity scores for all three symptom clusters were found between patients with breast and prostate cancer. For all three symptom clusters, the patients with breast cancer had higher symptom cluster severity scores than the patients with prostate cancer.

Keywords

symptom clusters; exploratory factor analysis; breast cancer; prostate cancer; radiation therapy; sickness behavior

Introduction

The clinical reality that oncology patients experience multiple symptoms as a result of their disease and its treatment fostered the need to do research on multiple symptoms and symptom

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clusters. In 2001, two papers in the oncology literature presented compelling evidence of the deleterious effects of symptom clusters on patient outcomes.[1,2] In addition, as part of the National Institutes of Health (NIH) State of the Science Conference on Symptom Management in Cancer: Pain, Depression, and Fatigue,[3] the concept of a symptom cluster was explored in terms of its occurrence, assessment, and treatment. This research, as well as the NIH conference, stimulated a series of studies on symptom clusters (for reviews see[4-6]).

A variety of instruments and approaches were used to assess multiple symptoms in oncology patients and to derive symptom clusters from these assessments. The three most commonly used instruments in these symptom cluster studies were the M. D. Anderson Symptom Inventory (MDASI[7]), the Symptom Distress Scale (SDS[8]), and the Edmonton Symptom Assessment Scale (ESAS[9]). However, a comparison of the symptom clusters identified across the studies that used the MDASI,[7,10-13] the SDS,[14] and the ESAS[15-17] is difficult for two reasons. First, the number of symptoms evaluated by these instruments ranged from 9 for the ESAS to 13 for the MDASI. In fact, only five symptoms (i.e., pain, fatigue, nausea, lack of appetite, shortness of breath) are common across all three instruments. Second, while the MDASI and the ESAS evaluate symptom severity, the SDS evaluates symptom distress. Therefore, it is not surprising that inconsistent results are found across these studies in terms of the number of clusters identified as well as the specific symptoms within each cluster.

Another factor that contributes to the difficulty in making comparisons of symptom clusters across studies is the heterogeneity of the samples that were evaluated in terms of cancer diagnoses, stage of disease, and cancer treatments. About half of the studies[7, 10-12, 16, 17] used heterogeneous samples that ranged in age from 50 to 68 years. In these cross-sectional studies, the patients underwent a variety of cancer treatments and 24% to 100% had metastatic disease. In the studies that evaluated for symptom clusters in homogeneous samples in terms of cancer diagnosis, four assessed patients with lung cancer,[13,14,18,19] one focused on patients with brain tumors,[20] one on patients with prostate cancer,[21] and one evaluated patients with brain metastasis.[15] However, even in these homogeneous samples, patients were at various stages of their disease and underwent different treatments. In addition, the instruments used to evaluate symptom clusters varied across these studies.

Finally, a variety of analytic procedures (e.g., factor analysis, cluster analysis, multiple dimensional scaling) were used to identify symptom clusters with both heterogeneous and homogeneous samples of patients in terms of their cancer diagnoses. The majority of the studies used factor analysis to derive between one and four symptom cluster.[7,11-16,18, 20-22] In the four studies that used the MDASI with heterogeneous samples,[7,11-13] two to three symptom clusters were derived using factor analysis. While different symptom clusters or factors were reported across these four studies, they represent combinations of the following domains: a “general” symptom factor, a “gastrointestinal” symptom factor, and an “emotional” symptom factor. The commonality in the symptom factors across these four studies is encouraging and may be related to the use of the same instrument despite differences in patients' cancer diagnoses and treatments.

In contrast, in the three studies that evaluated symptom clusters in patients with lung cancer using factor analysis,[14,18,19] while one to four symptom clusters were identified, commonalities in the clusters were not as evident. Differences in the number of clusters as well as differences in the composition of the clusters may be related to differences in the instruments used to assess the symptoms (i.e., SDS[8]) versus Physical Symptom Experience Scale[23]), the number of symptoms assessed (i.e., 13 versus 37), or the dimensions of the symptom assessed (i.e., distress versus severity). In the study that evaluated patients with prostate cancer at 8 months following treatment,[21] two distinct symptom clusters were identified (i.e., fatigue and emotional cluster; sexual dysfunction, bowel dysfunction, and pain cluster).

Because of the numerous methodologic differences across the studies of symptom clusters done to date, it is difficult to draw definitive conclusions regarding the number and types of symptom clusters that occur in oncology patients with a specific cancer diagnosis or in those who undergo a specific cancer treatment. In addition, it is interesting to note that none of the studies used the Memorial Symptom Assessment Scale (MSAS) to evaluate for symptom clusters. This omission is serious because the MSAS is the most comprehensive multidimensional symptom inventory (i.e., 32 symptoms) available with well established validity and reliability.[24] Finally, as Miaskowski and colleagues noted,[25] studies are needed that compare the number and types of symptom clusters based on whether the symptom clusters are derived using ratings of symptom occurrence (i.e., present or absent) or symptom severity. In addition, symptom cluster studies need to be done with homogeneous samples of patients in terms of cancer diagnosis and/or treatment.

Given the numerous methodologic issues across the symptom cluster studies done to date, this study focused on a homogeneous sample of oncology patients in terms of cancer treatment (i.e., radiation therapy (RT)) and on a comparison of symptom clusters derived using occurrence and severity ratings. The purposes of this study, in a sample of oncology patients at the end of RT, were to: identify the number and types of symptom clusters using the yes/no responses from the MSAS; identify the number and types of symptom clusters using the severity scores from the MSAS; compare the identified symptom clusters derived using the MSAS severity scores to those derived using the occurrence ratings; and evaluate for differences in symptom cluster severity scores between patients with breast and prostate cancer.

Materials and Methods

Participants and Settings

This study is part of a descriptive, longitudinal study that evaluated the trajectories of fatigue, pain, and sleep disturbances in oncology outpatients over the course of RT. Patients were included if they were: adults (> 18 years of age) who were able to read, write, and understand English; had a Karnofsky Performance Status (KPS) Score of ≥ 60; and were scheduled to receive primary or adjuvant RT. Patients were excluded if they had metastatic disease; had more than one cancer diagnosis; or had a diagnosed sleep disorder. Patients were recruited from RT departments located in a Comprehensive Cancer Center and a community-based oncology program. This study was approved by the Human Subjects Committee at the University of California, San Francisco and at the second study site.

Study Procedures

At the time of the simulation visit (i.e., approximately 1 week prior to the start of RT), patients were approached by a research nurse to discuss participation in the study. After obtaining written informed consent, they were asked to complete a number of baseline questionnaires and symptom inventories. Additional assessments were done over the course of RT and for four months after the completion of RT. Demographic and clinical data, as well as data from the MSAS [24] that was collected at the end of RT were used in these analyses. Patients' medical records were reviewed for disease and treatment information.

Instruments

The demographic questionnaire provided information on age, gender, marital status, education, ethnicity, and employment status. In addition, patients completed a checklist of co-morbidities and the KPS scale.[26] The KPS is widely used to evaluate the functional status of cancer patients and has well established validity and reliability.[27]

The MSAS is a self-report questionnaire designed to measure the multidimensional experience of symptoms.[24] The MSAS contains a list of 32 physical and psychological symptoms that occur as a result of cancer or cancer treatment. Using the MSAS, patients were asked to indicate whether or not they had experienced each symptom in the past week (i.e., symptom occurrence). If they had experienced the symptom, they were asked to rate its severity, its frequency of occurrence, and its distress. Symptom severity was measured using a 5-point Likert scale (i.e., 0=not at all, 1=mild, 2=moderate, 3=severe, 4=very severe). The patients' responses to the symptom occurrence and severity items were used to create the symptom clusters. The reliability and validity of the MSAS is well established.[24,28]

Data Analysis

All analyses were done using SPSS Version 15 and MPlus version 5.0.[29] Prior to the symptom cluster analyses, appropriate descriptive statistics were used to generate information on the patients' demographic and clinical characteristics, as well as on symptom occurrence and severity.

Separate exploratory factor analyses (EFAs) were used to determine the number of symptom clusters based on occurrence and severity ratings. While it is more accurate to describe the results of the EFA as “symptom factors” in this paper the term symptom cluster will be used to describe the results of the EFAs. Factor analysis is a generic term for several procedures that aim to identify whether correlations between a set of observed variables can be explained by a few latent, unobserved variables (i.e., factors). In order to have sufficient variation in the data to perform the EFAs, symptoms that were present in ≥ 20% but not more than 80% of the patients were used in these analyses.

The major decisions in factor analysis include how to estimate communality; how to determine the number of factors; and how to determine the method for rotating the factors to obtain the simple structure. For the dichotomous occurrence data, tetrachoric correlations were used to create the matrix of associations.[30] For the severity data, polychoric correlations were used to create the matrix of associations. For both of these EFAs, the simple structure was estimated using the method of robust unweighted least squares with geomin (oblique) rotation. The robust unweighted least squares estimator was chosen to achieve more reliable results because of the relatively small sample size (i.e., < 200) and because the scales for the MSAS items are dichotomous or ordered categorical.[30-32]

Factor loadings were considered meaningful if they exceeded 0.30.[33,34] The number of factors was considered sufficient to explain the symptom correlations, if the model's Chi-Square was not significant, the comparative fit index (CFI) was ≥ 0.95, and the root mean square error of approximation (RMSEA) was ≤ 0.06.[35] For each EFA, two, three, and four factor solutions were inspected and the solution with the smallest Chi square statistic was selected as the best solution.

Differences in severity scores (calculated as the mean rating of the items within each symptom cluster) for each of the symptom clusters between patients with breast and prostate cancer were evaluated using the Mann-Whitney two sample rank-sum test. All calculations used actual values. Adjustments were not made for missing data. Therefore, the cohort for each analysis was dependent on the largest set of available data. Differences were considered statistically significant at the $p < 0.05$ level.

Results

Demographic and Clinical Characteristics

As shown in Table 1, approximately 51% of the 160 patients in this study were male and 51% were married, with a mean age of 61.1 (SD=11.5) years. The majority of the patients were Caucasian (72.8%) and well educated (16.1 ± 2.9 years of education).

The clinical characteristics of the sample are summarized in Table 2. Slightly more than half of the patients had prostate cancer. Almost all of the breast cancer patients had undergone surgery prior to RT compared to only 9.8% of the patients with prostate cancer. The mean KPS score for the sample was 92.4 (SD=9.7), the mean number of comorbid conditions was 4.9 (SD=2.5), and the types of comorbid conditions were diverse.

Symptom Occurrence and Severity

The occurrence rates and severity scores for the 32 symptoms on the MSAS are summarized in Table 3. The thirteen symptoms that occurred in ≥ 20% of patients are bolded on Table 3. The five symptoms that occurred most frequently were: lack of energy (59.4%), followed by pain (51.8%), difficulty sleeping (47.1%), feeling drowsy (44.4%), and sweats (39.9%). About 20% of the patients experienced 10 or more concurrent symptoms. Of the patients who had symptoms, the mean symptom severity scores ranged from 1.00 for hair loss to 2.58 for problems with sexual interest or activity. The five most severe symptoms were: problem with sexual interest or activity (2.58 ± 1.06, n=33), vomiting (2.50 ± 0.71, n=2), changes in skin (2.24 ± 0.83, n=45), swelling of arms or legs (2.10 ± 0.99, n=10), and difficulty sleeping (1.99 ± 0.80, n=76).

Symptom Clusters Based on Symptom Occurrence

As shown in Table 4, the EFA of the dichotomous ratings of symptom occurrence revealed three symptom clusters. The three factor solution indicated a good fit between the data and the model (χ^2 = 27.8, p = 0.18, RMSEA = 0.04, CFI = 0.98). An examination of the various symptoms within each factor was done to name each symptom clusters. The name of the symptom cluster was based on the majority of the symptoms within the cluster. The symptoms in factor 1 (i.e., difficulty concentrating, difficulty sleeping, feeling sad, sweats, worrying, itching, feeling irritable) were named the “mood-cognitive symptom cluster”. The symptoms in factor 2 (i.e., pain, lack of energy, feeling drowsy) were named the “sickness behavior symptom cluster”. Factor 3 included the symptoms of problem with urination and changes in skin and was named the “treatment-related symptom cluster”. It should be noted that while the symptom on the MSAS is stated as “problem with urination”, this symptom loaded negatively on the “treatment-related” symptom factor which indicates that patients who had a skin problem had no problem with urination. Cough did not load on any factor.

Symptom Clusters Based on Symptom Severity Ratings

As shown in Table 5, a three factor solution indicated a good fit between the data and the model (χ^2 = 24.6, p = 0.22, RMSEA = 0.04, CFI = 0.99) when symptom severity ratings were used in the EFA. The symptoms in Factor 1 (i.e., difficult concentrating, feeling sad, worrying, itching, feeling irritable) were named the “mood-cognitive symptom cluster”. The symptoms in Factor 2 (i.e., pain, lack of energy, feeling drowsy, difficulty sleeping, sweats) were named the “sickness behavior symptom cluster”. The symptoms in Factor 3 (i.e., problem with urination, changes in skin) were named the “treatment-related symptom cluster”. Again, cough did not load on any factor.

Comparison of the Factor Structures Derived from Ratings of Symptom Occurrence and Severity

Tables 4 and 5 summarize the symptom clusters derived from these two EFAs. For both EFAs, a three factor solution fit the data best. In addition, across the EFAs, the majority of the symptoms were contained within the same factors. However, in terms of the fit indices, the factor solution derived from the severity ratings ($\chi^2 = 24.6$, $p = 0.22$, RMSEA = 0.04) fit the data better than the factor solution derived from the occurrence ratings ($\chi^2 = 27.8$, $p = 0.18$, RMSEA = 0.05).

Evaluation of Differences in Symptom Factor Severity Scores Between Patients with Breast and Prostate Cancer

The Pearson's correlations among the various symptoms within each symptom cluster and the reliability estimates for each of the symptom clusters based on symptom severity scores are presented in Table 6. For the “mood-cognitive” cluster, the inter-item correlations ranged from 0.23 to 0.65 and its Cronbach's alpha was 0.78. For the “sickness-behavior” symptom cluster, the inter-item correlations ranged from 0.16 to 0.64 and its Cronbach's alpha was 0.73. In these two symptom clusters, all of the symptoms within a cluster (except for sweats x feeling drowsy) were significantly correlated with each other. In contrast, for the “treatment-related” symptom cluster, the inter-item correlation was -0.22 and its' Cronbach's alpha was 0.36.

As shown in Table 7, significant differences in all three symptom cluster severity scores were found between patients with breast and prostate cancer. For all three symptom clusters, the patients with breast cancer had higher symptom cluster severity scores than the patients with prostate cancer.

Discussion

To our knowledge, this study is the first to evaluate for differences in symptom clusters in a homogeneous sample of oncology patients who underwent RT using both the occurrence rates and severity ratings from the MSAS. While the specific symptoms within each cluster were not identical, three very similar symptom clusters were identified regardless of whether occurrence rates or severity ratings were used in the EFAs. However, because the factor solution derived using the severity ratings fit the data better, future studies of symptom clusters need to consider using this approach and include the use of estimation techniques that are appropriate for factor analysis with non-normally distributed, ordered categorical items. Most factor analytic studies of items like those on the MSAS utilized methods that assume multivariate normality – an assumption that is often violated with symptom data.

A comparison of the specific symptom clusters identified in this study using symptom severity scores to previous reports that identified symptom clusters using severity or distress scores and factor analysis revealed some similarities as well as some distinct differences. Across the four studies of heterogeneous samples that used either the MDASI[7,11,12] or the ESAS,[15] a “sickness-behavior” symptom cluster was identified that included pain, fatigue, drowsiness, and sleep disturbance. However, this symptom cluster was not clearly identified in the symptom cluster studies of more homogeneous samples of patients with lung cancer[13,18,19] and brain tumors.[20] In contrast, only two of the previous studies of heterogeneous samples[11,12] and two studies of homogeneous sample of patients with brain tumors[20] or prostate cancer[21] found a distinct mood-cognitive symptom cluster.

The differences in the symptom clusters identified across studies may be related to differences in cancer diagnoses, cancer treatments, as well as the point in the patient's disease trajectory when symptoms were assessed. Another factor that may contribute to differences in symptoms

contained within a cluster is the number as well as the specific symptoms on the symptom inventory. For example, on the MDASI only two symptoms (i.e., feeling sad and distress) evaluate psychological status, while on the MSAS, four symptoms (feeling sad, worrying, feeling nervous, feeling irritable) evaluate psychological status. Finally, the differences in the specific symptoms within a cluster may be due to whether severity[7,11-13,18-21] or distress[14,15] ratings were used in the factor analyses. Findings from this study as well as comparisons across studies suggest that the number and specific symptoms, as well as the rating scales that are included on a multidimensional questionnaire need to be considered in future studies of symptom clusters.

This study identified a treatment-related symptom cluster that included the symptoms of problem with urination and changes in skin. Clinical experience suggests that the problem with urination symptom would be more likely to occur in the men who underwent RT for prostate cancer and that changes in skin would occur more frequently in women who underwent RT for breast cancer. In fact, at the end of RT, 70% of the men reported a problem with urination compared to only 4.3% of the women ($\chi^2 = 64.74$, $p < 0.0001$). In contrast, 43.1% of the women reported changes in skin compared to only 4.0% ($\chi^2 = 29.24$, $p < 0.0001$) of the men, respectively. This finding of a radiation treatment specific symptom cluster and perhaps within radiation treatments, a diagnosis specific radiation treatment-related symptom cluster warrants additional investigation. Due to sample size limitations within each diagnosis, separate factor analyses for breast and prostate cancer patients' symptom clusters could not be performed. However, this analysis needs to be done with larger samples. In fact, some support for the hypothesis that diagnosis specific treatment-related symptom clusters do exist comes from work by Gleason and colleagues[20] who found a language cluster in patients with brain tumors who underwent RT. In addition, work by Maliski and colleagues,[21] identified a disease specific symptom cluster (i.e., sexual dysfunction, bowel dysfunction, and pain) in patients with prostate cancer.

One symptom cluster that was not identified in this sample, but was identified in previous studies of heterogeneous samples of oncology patients[7,11-13] is a gastrointestinal symptom cluster that included the symptoms of nausea and vomiting. While these symptoms are listed on the MSAS, they were reported by only 9% and 1% of this sample of patients. This finding suggests that this symptom cluster may occur more frequently in patients who receive CTX as noted in previous symptom cluster research.[12]

An interesting finding in this study is that women with breast cancer reported higher scores for all three of the symptom clusters. This finding is similar to previous studies that assessed for gender differences in the symptom experience.[36-40] For example, Degner & Sloan[38] and Cooley et al.[37] found that women reported higher symptom distress scores than men. In addition, higher rates of depressive symptoms[41,42] and higher fatigue severity scores[36,39,40] were found in women compared to men. However, others studies have not found gender differences in the symptom experience of oncology patients.[28,43,44] Therefore, further research is needed on gender differences in the prevalence of, as well as the severity and distress associated with the symptoms of cancer and cancer treatment.

The limitations of this study need to be mentioned. The sample size was relatively small and did not allow for separate evaluations of symptom clusters in patients with breast and prostate cancer. In addition, because only a single time point in the course of RT was assessed, the stability of symptom clusters over the course of RT was not evaluated. Finally, the low Cronbach's alpha for the treatment-related symptom cluster suggests that this finding needs to be interpreted with caution. The low Cronbach's alpha may be partially explained by the fact that only two symptoms were included in this factor. Future studies need to address these limitations.

Despite these limitations, findings from this study suggest that symptom clusters derived from ratings of severity rather than occurrence provide a more stable factor structure. In addition, future studies of symptom clusters need to consider an evaluation of homogeneous samples of patients in terms of both cancer diagnoses and treatments.

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Table 1

Demographic characteristics of the sample (n=160)

Characteristic	Mean (SD)
Age (years)	61.1 (11.5)
Education (years)	16.1 (2.9)
	n (%)
Gender	
Female	78 (48.7)
Male	82 (51.3)
Ethnicity	
Caucasian-White	115 (72.8)
African American	25 (15.8)
Asian or Pacific islander	9 (5.7)
Hispanic	4 (2.5)
Other	5 (3.2)
Marital status	
Married/partnered	80 (51.0)
Separated or divorced	33 (21.0)
Never married	27 (17.2)
Widowed	9 (5.7)
Not married but living together	8 (5.1)
Employment status	
Employed	69 (44.5)
Unemployed	86 (55.5)

SD = standard deviation

Table 2

Clinical characteristics of the sample (n=160)

Characteristic	Mean (SD)
Mean number of comorbid conditions	4.9 (2.5)
Karnofsky Performance Status Score	92.4 (9.7)
Total dose of radiation administered (cGys)	6299.1 (1020.1)
	n (%)
Diagnosis	
Breast cancer	78 (48.7)
Prostate cancer	82 (51.3)
Previous cancer treatment	
Surgery	
Lumpectomy	57 (74.0)
Partial mastectomy	9 (11.7)
Simple mastectomy	4 (5.2)
Prostatectomy	8 (9.8)
Chemotherapy	43 (55.8)
Hormonal therapy	74 (46.3)
Five most common comorbid conditions	
Back problems	52.8%
Allergies	47.7%
Arthritis	35.5%
Hemorrhoids	34.4%
Headaches	32.5%

cGys = centigrays, SD = standard deviation

Table 3

Symptom occurrence and severity

Symptoms*	Occurrence %	Severity** Mean (SD)
Lack of energy	**59.4**	1.96 (0.73)
Pain	**51.8**	1.83 (0.76)
Difficulty sleeping	**47.1**	1.99 (0.81)
Feeling drowsy	**44.4**	1.86 (0.68)
Sweats	**39.9**	1.97 (0.75)
Problems with urination	**37.1**	1.91 (0.76)
Difficulty concentrating	**35.9**	1.55 (0.69)
Feeling irritable	**34.0**	1.67 (0.71)
Itching	**31.9**	1.90 (0.78)
Worrying	**29.7**	1.89 (0.89)
Feeling sad	**26.9**	1.74 (0.79)
Cough	**22.3**	1.75 (0.76)
Changes in skin	**20.0**	2.24 (0.83)
Feeling nervous	18.4	1.68 (0.67)
Dry mouth	17.2	1.70 (0.70)
Numbness/tingling in hands/feet	16.5	1.80 (0.76)
Diarrhea	17.1	1.67 (0.64)
Problems with sexual interests or activity	15.7	2.58 (1.06)
Constipation	13.9	1.91 (0.75)
Dizziness	11.6	1.11 (0.32)
“I don't look like myself”	12.1	1.75 (0.85)
Shortness of breath	9.6	1.60 (0.63)
Nausea	8.9	1.62 (0.65)
Lack of appetite	8.9	1.38 (0.51)
Feeling bloated	8.3	1.93 (0.73)
Weight loss	7.5	1.09 (0.30)
Swelling of arms or legs	5.6	2.10 (0.99)
Changes in the way food tastes	4.1	1.67 (0.82)
Mouth sores	3.4	1.33 (0.82)
Vomiting	1.4	2.50 (0.71)
Difficulty swallowing	1.4	1.50 (0.71)
Hair loss	0.7	1.00 (0.00)

* Symptoms in bold face type were included in the factor analyses,

** Severity scores can range from 1 (mild) to 4 (very severe), SD = standard deviation

Table 4

Exploratory factor analysis using ratings of symptom occurrence at the end of radiation therapy

Symptoms	Factor 1 (Mood-cognitive symptom cluster)	Factor 2 (Sickness-behavior symptom cluster)	Factor 3 (Treatment-related symptom cluster)
Difficulty concentrating	**.74**		
Difficulty sleeping	**.42**		
Feeling sad	**.93**		
Sweats	**.49**		
Worrying	**.97**		
Itching	**.34**		
Feeling irritable	**1.00**		
Pain		**.63**	
Lack of energy		**.75**	
Feeling drowsy		**1.03**	
Problem with urination			**-.67**
Changes in skin			**.80**

Extraction method: robust unweighted least squares, Rotation method: Geomin (oblique) rotation

Table 5

Exploratory factor analysis using ratings of symptom severity at the end of radiation therapy

Symptoms	Factor 1 (Mood-cognitive symptom cluster)	Factor 2 (Sickness-behavior symptom cluster)	Factor 3 (Treatment-related symptom cluster)
Difficulty concentrating	**.55**		
Feeling sad	**.68**		
Worrying	**.95**		
Itching	**.37**		
Feeling irritable	**.83**		
Pain		**.58**	
Lack of energy		**.84**	
Feeling drowsy		**1.1**	
Difficulty sleeping		**.44**	
Sweats		**.34**	
Problem with urination			**-.61**
Changes in skin			**.75**

Extraction method: robust unweighted least squares, Rotation method: Geomin (oblique) rotation

Table 6

Inter-item correlations among symptoms within each symptom cluster using ratings of symptom severity

Factor 1 – Mood-Cognitive Symptom Cluster					
	Difficulty concentrating	**Feeling sad**	**Worrying**	**Itching**	**Feeling irritable**
Difficulty concentrating	1				
Feeling sad	.57*	1			
Worrying	.55*	.65*	1		
Itching	.37*	.23*	.35*	1	
Feeling irritable	.37*	.49*	.51*	.23*	1
Cronbach's alpha for Factor 1					.78
Factor 2 – Sickness behavior Symptom Cluster					
	Pain	Lack of energy	Feeling drowsy	Difficulty sleeping	Sweats
Pain	1				
Lack of energy	.46*	1			
Feeling drowsy	.27*	.64*	1		
Difficulty sleeping	.39*	.32*	.21*	1	
Sweats	.28*	.37*	.16	.38*	1
Cronbach's alpha for Factor 2					.73
Factor 3 – Treatment-related Symptom Cluster					
	Problem with urination		Changes in skin		
Problem with urination	1				
Changes in skin	-.22*		1		
Cronbach's alpha for Factor 3			.36		

* Correlation is significant at the 0.05 level (2-tailed).

Table 7

Differences in the mean symptom cluster severity scores between patients with breast and prostate cancer at the end of radiation therapy*

Symptom Cluster	Breast cancer M (SD)	Prostate cancer M (SD)	Z-value**	p-value
Mood-cognitive symptom cluster	.67 (.61)	.31 (.49)	-4.00	.000
Sickness-behavior symptom cluster	1.02 (.67)	.53 (.55)	-3.88	.000
Treatment-related symptom cluster	2.40 (.55)	1.39 (.48)	-7.70	.000

* Possible range of symptom severity scores = 0 to 4

** Mann-Whitney U test

M = mean symptom severity score

SD = Standard deviation