Original Article

A Longitudinal Analysis of Symptom Clusters in Cancer Patients and Their Sociodemographic Predictors

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Abstract

Context. Exploring the relationships between concurrent symptoms or "symptom clusters" (SCs) longitudinally may complement the knowledge gained from the traditional approach of examining individual symptoms or SCs crosssectionally.

Objectives. To identify consistent SCs over the course of one year and determine the possible associations between SCs and demographic and medical characteristics, and between SCs and emotional distress.

Methods. This study was an exploratory longitudinal analysis of SCs in a large sample of newly diagnosed cancer patients. Patients provided symptom assessment data at baseline, three, six, and 12 months. A factor analysis was conducted (controlling for the patient over time) on pain, fatigue, anxiety, depression, sleep, weight change, and food intake items to identify clusters. A panel regression on each cluster explored associations with demographic and medical characteristics and distress.

Results. In total, 877 patients provided baseline data, with 505 retained at 12 months. Three SCs explained 71% of the variance. The somatic cluster included pain, fatigue, and sleep; the psychological cluster included anxiety and depression; and the nutrition cluster consisted of weight and food intake. Low income and treatment with radiation or chemotherapy predicted higher somatic symptom burden. Younger age, being female, low income, and treatment with surgery predicted more psychological symptomatology. Older age and treatment with surgery predicted higher nutritional burden. Patients with higher somatic, psychological, and nutritional symptom burden reported higher distress.

Conclusion. The presence of SCs across the first year of diagnosis supports the need for routine and ongoing screening for the range of symptoms that may be experienced by patients. Further work is needed to develop interventions that

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better target individual symptoms that cluster, as well as the entire cluster itself. J Pain Symptom Manage 2014;47:566–578.

Key Words
Symptom clusters, longitudinal study, factor analysis, panel regression, distress, cancer

Introduction

Patients diagnosed with and treated for cancer often present with multiple symptoms that potentially interact with one another.[1,2] Exploring the relationships between concurrent symptoms or "symptom clusters" (SCs) may complement the knowledge gained from the traditional approach of examining individual symptoms.[3] SCs are defined as multiple symptoms that are "related to each other but are not required to share the same aetiology."[4] A systematic review of 65 studies revealed several cancer patient–reported SCs, including fatigue-pain, fatigue-insomnia, fatigue-insomnia-pain, anxiety-depression, depression-pain, depression-fatigue, nausea-vomiting, and pain-constipation.[5] These clusters have been found to negatively impact functional status[4,6–8] and quality of life[8–10] and to interfere with treatments and adherence.[11] SCs also may have prognostic value.[12]

Yet, ambiguity exists in the literature relating to the criteria used to define the number of symptoms that make up SCs (two vs. three symptoms);[13,14] the statistical methods used to determine the presence of clusters;[5] the type of symptoms and dimensions of symptoms used to determine clusters;[11] the stability of SCs over time;[14] and which SCs are site specific and which are independent of treatment and disease variables.[11] Similarly, there is little consensus on the predictors of SCs, including age, gender, cancer type, stage of disease, and treatments, thus warranting further investigation.[2,7,10,11,15,16]

As well, there is a paucity of research examining the association between SCs and emotional distress. There has been an increased international focus on emotional distress in patients with cancer as distress has become recognized as the sixth vital sign in cancer care.[17–19] Given that emotional distress may often be a consequence of SCs,[14] it is important to explore the relationship across time and cancer types.

Most studies of SCs have been conducted cross-sectionally with only one assessment time in both heterogeneous[2,4,8] and homogeneous patient groups, including ovarian,[9] breast,[20] and lung[21] cancer patients. These studies provide important information on the type and prevalence of SCs but shed little light on temporal patterns as patients progress through the cancer trajectory. Furthermore, studies that have examined SCs longitudinally usually focused on specific patient groups (e.g., breast,[8,22] lung,[23] and brain[24] cancers; or patients receiving chemotherapy[25]). However, this approach does not allow an investigation of the features of SCs that may be common to various disease sites and treatments. Only one other study to date, by Molassiotis et al.,[3] has examined SCs over the first year of diagnosis in a heterogeneous population of 143 newly diagnosed cancer patients. Symptoms were assessed at baseline, three, six, and 12 months, with 113 patients retained at 12 months. Six SCs with relatively stable core symptoms were identified using the Memorial Symptom Assessment Scale: gastrointestinal, hand/foot, body image, respiratory, nutritional, and emotional.[3] Like Molassiotis et al., we have chosen to focus on heterogeneous samples, with the goal of determining broader and common SCs across diagnostic groups.

Although previous studies provide important insights into the pattern of SCs experienced by patients at particular points in the disease trajectory, they rely on cross-sectional analysis techniques. Conducting separate factor analyses,[3,24,25] cluster analyses,[8] or Cronbach's alpha at each time point[23] limits the findings, as such strategies do not take into account correlations in symptom experiences that can occur *between* time points.[25]

Assessing SCs longitudinally may enable the identification of consistent clusters over time[25,26] and facilitate the development of comprehensive tools assessing multiple concurrent