The Patient Care Monitor–Neutropenia Index: Development, Reliability, and Validity of a Measure for Chemotherapy-Induced Neutropenia

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Purpose/Objectives: To provide an initial evaluation of the psychometric properties of the Patient Care Monitor 1.0 Revised–Neutropenia Index (PCM-N), a symptom-based assessment tool designed to measure health-related quality-of-life (HRQOL) changes associated with chemotherapy-induced neutropenia.

Design: Known-groups methodology and self-report instrument validation.

Setting: A large community oncology practice in Memphis, TN.

Sample: 424 patients with cancer in four samples.

Methods: All patients in the first three samples were assessed at baseline of chemotherapy administration and at a point analogous to midcycle. The fourth sample underwent a cross-sectional evaluation of the ability of the PCM-N to distinguish patients with febrile neutropenia, severe afebrile neutropenia, and no neutropenia.

Main Research Variables: PCM-N score, grade of neutropenia, and febrile status.

Findings: Internal consistency reliability and factor analysis supported the single additive scale structure of the 13 items of the PCM-N. The PCM-N demonstrated good known-groups validity and was able to distinguish patients with grades 3–4 neutropenia from those with grades 0–2. The tool also was able to distinguish patients with febrile neutropenia, severe afebrile neutropenia, and no neutropenia. Receiver operating characteristic analyses provided a psychometrically based threshold score.

Conclusions: The PCM-N is a reliable and valid instrument sensitive to changes in HRQOL associated with moderate-to-severe chemotherapy-induced neutropenia.

Implications for Nursing: Nurses can use the PCM-N as a rapid and cost-effective tool for monitoring symptoms of neutropenia in patients with cancer.

Chemotherapy-induced neutropenia is a treatment side effect with several notable consequences for patients with cancer. The most important is increased likelihood of infection, particularly when the absolute neutrophil count falls below 500/mm^3. More than 60,000 patients with cancer were hospitalized for neutropenia in 1999, with a corresponding 7% inpatient mortality rate (Caggiano, Weiss, Rickert, & Linde-Zwirble, 2005). In addition, neutropenia is a dose-limiting factor for many regimens and may compromise optimal cancer treatment by requiring dose reduction or delay (Chang, 2000; Crawford et al., 1991; Elting, 1998; Pettengell et al., 1992), both of which can impact disease progression and long-term survival (Bonadonna & Valagussa, 1981; Glaspy, Hackett, Flyer, Dunford, & Liang, 2001).

Neutropenia complications can adversely affect health-related quality of life (HRQOL) (Nirenberg et al., 2006a, 2006b; Padilla & Ropka, 2005). For example, patients with febrile neutropenia had worse symptom profiles than patients without neutropenia for abdominal pain, anorexia, asthenia, dehydration, fatigue, rigors, and vomiting (Glaspy et al., 2001). Similar patterns have been shown in patients with severe afebrile neutropenia, although those results were nonsignificant trends (Glaspy et al., 2001). Another investigation showed greater symptom burden for patients with neutropenia grades 3–4 compared to those with grades 0–2; symptoms included depression, physical symptom distress, social limitations and isolation, and limitations on normal physical activities (Fortner, Houts, & Schwartzberg, 2006).

To date, few self-report instruments are sensitive to changes in HRQOL specific to neutropenia. One measure, the Functional Assessment of Cancer Therapy–Neutropenia Subscale (FACT-NS) (Calhoun, Chih-Hung, Welshman, & Cella, 2002; Wagner et al., 2008), was designed to assess HRQOL specific to neutropenia and has demonstrated good psychometric properties. However, the FACT-NS has been unable to use a single time point score to differentiate patients who had grades 3–4 neutropenia from those who did not, and the tool has not been validated on a broad demographic sample (Wagner et al., 2008). In addition, whether the FACT-NS will be useful as an outcome measure or a clinical symptom screener is unclear