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# Exercise in Patients Receiving Hematopoietic Stem Cell Transplantation: Lessons Learned and Results From a Feasibility Study

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People with hematologic malignancies such as acute myeloid leukemia and lymphoma receive high-dose chemotherapy followed by hematopoietic stem cell transplantation (HSCT) as curative therapy (Hahn et al., 2001, 2003, 2006; Oliansky et al., 2008, 2009; Rowe et al., 1994). HSCT recipients frequently experience considerable deterioration of their health status as a result of dose-intensive therapy, particularly during the immediate post-transplantation period. This deterioration in health status has the potential to affect all aspects of life, and the impact may be felt for years following treatment. A marked reduction in physical activity immediately following high-dose chemotherapy and HSCT has been documented (Hacker et al., 2006). Although the specific cause is not understood, the physical inactivity may be protracted and sufficient to cause physical deconditioning, loss of muscle mass, and decreased strength and endurance (Coleman et al., 2003; Cunningham et al., 1986). Aerobic and strength-training exercises have been used successfully to increase levels of physical activity. Aerobic exercise improves cardiorespiratory conditioning, whereas strength training is more effective in minimizing skeletal muscle wasting associated with prolonged physical inactivity (American College of Sports Medicine Position Stand, 2009). A strength-training intervention that minimizes muscle wasting in patients undergoing HSCT is particularly attractive if the end result is an enhanced ability to perform activities of daily living and improved health status perceptions and quality of life.

Although the beneficial effects of exercise are well documented, few exercise studies have been conducted in the HSCT population and only three have incorporated strength training (Coleman et al., 2003; Cunningham et al., 1986; Hayes, Davies, Parker, & Bashford, 2003). Most focused on aerobic training (Carlson, Smith, Russell, Fibich, & Whittaker, 2006; Dimeo et al., 1996; Dimeo, Fetscher, Lange, Mertelsmann, & Keul, 1997) or a combination of aerobic and strength training (Coleman et al., 2003; Hayes et al., 2003). When aerobic and strength training are combined, determining the individual effects

**Purpose/Objectives:** To test the feasibility and acceptability of a strength-training intervention in patients receiving hematopoietic stem cell transplantation (HSCT).

**Design:** One-group prospective, repeated-measures design.

**Setting:** Academic medical center in the midwestern United States.

**Sample:** Convenience sample of 10 patients receiving HSCT.

**Methods:** The strength-training intervention consisted of a comprehensive program of progressive resistance to strengthen the upper body, lower body, and abdominal muscles using elastic resistance bands. Instruction and low-intensity training began while the patients were hospitalized and progressed to a moderate level immediately following discharge from the hospital. Training continued for six weeks following hospital discharge.

**Main Research Variables:** Acceptability of the strength-training intervention was evaluated via subjective assessment and by determining the patient's ability to perform the exercises. Feasibility was evaluated by determining the number of patients who were able to complete the prescribed strength intervention and whether the patients used elastic resistance bands.

**Findings:** The strength-training intervention was refined from an unsupervised, home-based program to a combination supervised and unsupervised program with weekly clinic visits. Patients reported that the exercises were very acceptable, although some started out at a very low intensity.

**Conclusions:** This pilot study demonstrates the feasibility and acceptability of the strength-training intervention. The level of supervision required for the strength-training intervention was higher than expected.

**Implications for Nursing:** Strength training may be an effective intervention to alleviate problems with decreased physical activity, reduced muscle mass, and fatigue in HSCT recipients. Additional research is needed.

of either one alone is difficult, and that information is an important consideration when trying to minimize the burden associated with exercise training. Only one study employed strength training alone; however, the intervention lasted only 35 days following the transplantation while the patient was hospitalized, and the intensity of the strength training was not described (Cunningham et