Moving to Wellness: A Pilot Study Examining a Nurse-Driven Exercise Program in Acutely Ill Patients With Cancer

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Preventing patients with cancer from falling is a particularly important strategy for avoiding serious patient harm. Patients with cancer often fall as a result of overestimating their abilities as they adapt to the onset of fatigue and diminished functional status or muscle strength. That deconditioning can develop quickly with immobilization or prolonged recumbency. The effect of regularly supervised exercise programs led by nurses on maintaining muscle strength, thus preventing falls and reducing pressure ulcers, was examined in this feasibility study. Patients’ muscle strength was assessed through the development and use of the Moving to Wellness Assessment Tool before implementing the Moving to Wellness Exercise Program. Of the 16 study participants, 81% maintained or improved their muscle strength compared to their original score. This pilot study was a unique opportunity to engage patients in a nurse-driven program to support minimal deconditioning of patients with cancer during acute illness.

Fatigue and diminished functional status are well-known common symptoms among patients with cancer. Fatigue is linked to adverse outcomes such as pressure ulcers and increased risk of patient falls (Holley, 2002; O’Connell, Baker, Gaskin, & Hawkins, 2007). One study found muscle weakness was a clinically significant side effect of chemotherapy in adult patients older than 65 years and was attributed to patient falls (Extermann, 2006). In addition, in patients with cancer, falls often occur when patients overestimate their abilities as they adapt to the onset of fatigue and diminished functional status. Patients do not anticipate that bedrest coupled with chemotherapy and other medications results in weakness, which places them at higher risk for a fall. That deconditioning reportedly has many causes, including the disease itself, side effects of treatment, and comorbid conditions (Crannell & Stone, 2008; Mustian et al., 2009).

Deconditioning, a multisystem dysfunction observed with immobilization or prolonged recumbency, is different from and is not always associated with fatigue (Crannell & Stone, 2008). A 10% decrease of muscle strength can occur after each week of bedrest (Mustian et al., 2009). Prolonged bed rest causing loss of muscle mass, plasma volume, and reduced cardiac output resulting in decreased work capacity are consistent findings across studies over time (Greenleaf & Kozlowski, 1982; Levine, Zuckerman, & Pawelczyk, 1997). Deconditioning produces reductions in aerobic capacity, muscle strength, and mass, and has been linked to increases in length of stay, falls, and costs, as well as decreases in patient satisfaction (Crannell & Stone, 2008; Mustian et al., 2009).

Exercise is the method of choice in preventing and treating deconditioning (Crannell & Stone, 2008). Exercise programs reported in the literature are structured and usually led by a physical therapist or exercise physiologist (Galvão & Newton, 2005; Knols, Aaronson, Uebelhart, Fransen, & Aufdemkampe, 2005; Stevinson, Lawlor, & Fox, 2004; Young-McCaughan et al., 2005). Various exercise programs were reported, including aerobic workouts, cycling, resistance training, and walking.
One systematic review of controlled trials concluded that no evidence exists to suggest the best mode, frequency, intensity, or duration of activity for optimizing positive outcomes in patients with cancer (Stevinson et al., 2004).

In a study by Mustian et al. (2009), patients with cancer receiving radiation therapy were randomized into an individualized tailored, home-based progressive walking program or a therapeutic resistance band exercise program. The authors theorized that the cancer-related fatigue that patients exhibit is caused, in part, by physical deconditioning resulting from the reduction of physical activity and exercise. The study investigated the effect of regular exercise on muscle strength, cancer-related fatigue, and quality of life. Patients who participated in the exercise program had less loss of muscle strength postintervention than the control group, although it was not statistically significant. At the three-month follow-up after finishing radiation therapy, the exercise group had increased their muscle strength, whereas the control group had lost muscle strength. Similar results were found with muscle mass, where the exercise group showed greater muscle mass than the control group at postintervention and three months. Cancer-related fatigue was significantly lower and quality of life was significantly higher in the exercising group at three months.

Muscle strength as a measure of deconditioning was mentioned in five of the 34 studies in a systematic review by Knol et al. (2005). Similarly, in a systematic review of controlled trials by Stevinson et al. (2004), four of the 33 studies used muscle strength as an outcome measure. Stevinson et al. (2004) suggested that cancer or its treatment may alter muscle function and lead to a deconditioned state, which prolonged inactivity from surgery, and adjuvant therapy exacerbated debilitation and fatigue.

The role of nursing in studies related to the deconditioning of patients with cancer is difficult to identify in the literature. Ambulating patients has always been considered part of nursing practice. Nursing textbooks as early as the 1960s (Fuerst & Wolff, 1969) devoted entire chapters to patient exercise and provided guidelines for bedridden and ambulatory patients. Prioritizing patient ambulation and activity has long been standard practice for patients on surgical units. Postoperative orders routinely include instructions for ambulating patients quickly and consistently. Alternatively, the emphasis on ambulation is not a routine part of medical nursing for nonsurgical patients, and those with cancer in particular.

The staff and administrators of a community medical center in Bridgeport, CT, had an interest in minimizing deconditioning while increasing nurse autonomy in the mobilization of at-risk populations. This pilot study sought to measure the efficacy of nurse-led exercise and ambulation on hospitalized patients with cancer. As acute care facilities have become driven by patient outcomes such as decreasing falls and pressure ulcers, this initiative for increasing mobilization was congruent with the initiatives of the organization. An evidence-based intervention was initiated by nurses who are well-aware of the deconditioning effects of acute illness. The literature review in the early phase of this project further motivated the investigators, who found nothing in publication similar to their idea to improve care for patients with cancer.

Methods

A program of nurse-directed exercise entitled “Moving to Wellness” was developed by an interdisciplinary group of nurses, physicians, and physical and occupational therapists. Each patient with a cancer diagnosis admitted to the 20-bed oncology unit was invited to be part of the exercise program. Based on the spectrum of patient conditions, the exercise plan fell into three categories: Exercise Plan #1 (Bed), Exercise Plan #2 (Chair), Exercise Plan #3 (Walk). In Exercise Plan #1, a plan of light exercise, range of motion, and stretching was implemented for patients who were essentially bedbound. In Exercise Plan #2, the same types of interventions were adjusted for those patients who were able to sit in a chair at the bedside. In Exercise Plan #3, patients who were able to ambulate were given an appropriate exercise regimen that included individualized goals for walking. All three programs were designed to be simple and easy to follow and very much focused on patient safety. Information packets, developed by a multidisciplinary team of nurses and occupational and physical therapists, that included pictures, descriptions, helpful tips, and information about safety and support were given to patients and families. Approval was obtained by the medical center’s institutional review board. The consent process shared the purpose of the study and its proposed benefits to patients with cancer.

Patients were included in the study if they had a diagnosis of cancer, were a patient on the oncology unit, were medically stable, and had no contraindication to exercise. Patients with conditions that would put them at risk if they participated in exercise were excluded from the study. Some of those conditions included deep vein thrombosis, superior vena cava syndrome, respiratory distress, certain infections, and cellulitis. All participants were aged 18 years and older. Patients who could not read or understand English were excluded from the study.

Cancer diagnoses, stage of disease, treatments, and interventions were not considered when developing inclusion and exclusion criteria. Muscle assessments were conducted on patients at the beginning of the study, weekly, and at day of discharge. On informed consent, the nurse caring for the patient assessed him or her according to the Moving to Wellness Muscle Assessment Tool (see Figure 1) and calculated the total score, which assigned the patient to the type of exercise plan. The patient then was reassessed at least weekly or with change in condition and again at discharge. Analysis was conducted by comparing individual study participants’ own scores across times.

Preparation for the pilot program included mandatory training classes for the nursing staff on the oncology unit. Education sessions covered the purpose of the study, literature review, outcomes and goals, methodology, form completion, and review of each exercise program. The exercise program was instructed to the nursing staff by a certified physical therapist.

All patients admitted to the oncology unit during the 10-month enrollment period were approached and invited to participate in the study. The admitting nurse contacted the clinical research nurse to discuss the study with the patient and obtain consent. The admitting physician was contacted.
to sign a letter of support of patients who chose to enroll in the program. Once the patient enrolled, the nursing staff was notified and provided with a clipboard of Moving to Wellness Muscle Assessment Tools to be used for the admission, weekly, and discharge assessments.

The Moving to Wellness Muscle Assessment Tool was completed by the staff nurse. Based on the muscle assessment score, patients were assigned to one of the three exercise plans. The initial exercise program was instructed by the nursing staff and incorporated into the nursing plan of care. The role of the patient was to complete the exercise plan at least once a day. Nurses documented daily whether the patient was able to complete the exercise. Patients had the option to complete exercises independently or with the support of family members using the instructional booklets. Patients enrolled in the study also could opt not to follow the plan on a given day if desired.

Benefits, as instructed by the nurse, were reinforced on a daily basis, along with safety measures and fall precautions. Follow-up muscle strength assessments were completed weekly and at the time of discharge by the patients’ nurse. Changes in the score were evaluated by the nurse, who could dictate a change in the appropriate exercise plan. If a change was warranted, the nurse would educate the patient and family regarding the change and provide education on the appropriate exercise plan.

**Tool Development and Evaluation**

The foundation of the study required an objective and thorough assessment of muscle strength that was appropriate for use in acute care. The Moving to Wellness Muscle Assessment Tool was developed for the study, as the researchers found no tool in the literature to meet the needs of the study. The tool is a user-friendly, objective measure of major muscle groups that could be used in the acute care setting. Standard practices of muscle assessment, well known in physical assessment literature, gave the framework for the tool. Seven muscle groups were incorporated and a criterion-based numeric scale for scoring each muscle group was included (LeMone & Burke, 2008). The muscle grading criteria used ranged from one to four in each of the seven categories, with descriptions of the criteria for scoring detailed in the tool to support consistency among users. Through the work of an interdisciplinary group of professionals, the Moving to Wellness Muscle Assessment Tool was crafted to allow staff a consistent form of assessing patient strength on seven muscle groups. The scores of the seven muscle groups were totaled to categorize the patient for an exercise plan while hospitalized. A total score of 7–11 would place the patient into Exercise Plan #1 (Bed), a score of 12–21 into Exercise Plan #2 (Chair), and a score of 22–28 into Exercise Plan #3 (Walk).

The reliability of the Moving to Wellness Muscle Assessment Tool is supported by the nature of the specific physical attributes being measured. Muscle strength, as a concrete concept, supported the ability to consistently measure attributes of muscle groups using this tool. The stability of the tool was assessed through test-retest procedures and repeated observations over a six-month period. Nurses trained in the use of the tool administered it on the same sets of patients and then compared their results during that period. That process was repeated in tool development and as a part of training.

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### Moving to Wellness Muscle Assessment Tool

<table>
<thead>
<tr>
<th>Muscle Group</th>
<th>Scoring Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hip Muscles (Raise straight leg while supine.)</td>
<td>1: Passive ROM (Patient cannot move muscle independently.)</td>
</tr>
<tr>
<td>Quadriceps Muscles (Straighten the leg.)</td>
<td>2: Full ROM against gravity (Patient can independently do activity.)</td>
</tr>
<tr>
<td>Gluteal and Leg Muscles (Alternately cross legs while sitting.)</td>
<td>3: Full ROM against some resistance (Patient can move independently with some pushing in the opposite direction.)</td>
</tr>
<tr>
<td>Ankle and Foot Muscles (Bend foot up and down.)</td>
<td>4: Full ROM against full resistance (Patient can move independently with full pushing in the opposite direction.)</td>
</tr>
<tr>
<td>Deltoid Muscles (Hold arms up.)</td>
<td>1</td>
</tr>
<tr>
<td>Biceps Muscles (Bend the arm.)</td>
<td>2</td>
</tr>
<tr>
<td>Triceps Muscles (Straighten the arm.)</td>
<td>3</td>
</tr>
</tbody>
</table>

**Total Score** = 1 + 2 + 3 + 4

**Score Interpretation**

- **Exercise Plan #1 (Bed):** 7–11
- **Exercise Plan #2 (Chair):** 12–21
- **Exercise Plan #3 (Walk):** 22–28

**FIGURE 1. Moving to Wellness Muscle Assessment Tool**

*Note: Tool courtesy of St. Vincent’s Medical Center. Used with permission.*
staff in the use of the tool. The process produced a reliability coefficient of 0.98.

The goal of the tool was to measure muscle groups to total scores and categorize patients into an exercise program. The overarching goal of muscle strength assessment was achieved through the scoring of seven muscle groups in an objective manner, with criteria for scoring included in the tool. An expert panel of nurses, physical therapists, occupational therapists, and physicians contributed to the development of the tool, which was adapted from long-standing accepted practices of evaluating strength in major muscle groups. Therefore, the face validity of the instrument was determined to be strong. In addition, face validity was supported by groups of nurses who tested the tool in pretest procedures for study purposes.

Concurrent validity was supported when patient scores on the tool were consistent with the nurses’ assessments of the patients’ exercise capacity. For example, patients who had almost no physical limitations of overall health consistently scored high with the tool and were in Exercise Plan #3. That level of concurrent validity was critical for the effective use of the tool. If scores on the tool were putting patients into inappropriate categories of exercise, the tool would have been ineffective.

In addition, the investigators continually monitored the tool’s ability to discriminate the appropriate level of exercise as the patient’s condition changed. When a patient’s score indicated a different level of exercise, the investigators discussed this change with the primary nurse to ensure that it was appropriate. No nurses or patients voiced concern over an inappropriate level of exercise. That measure was taken as an evaluation of the tool’s effectiveness but primarily to ensure safe patient care.

The concept of the study was originated by direct care providers seeking a more nurse-driven approach to maximizing patient strength mobilization and improving related outcomes. An objective tool, based on standards of medical practice, was adapted, created, and tested within the resources of the study. Clearly, acute care patients with cancer have confounding variables that can impact muscle strength and the ability to participate in an exercise program. The intent of the tool is not to give overt level of strength but to have an individualized assessment of the patients’ strength to use as a benchmark for maintaining or improving when compared only to their own scores. Therefore, extensive psychometric testing of the Moving to Wellness Muscle Assessment Tool was not performed in this small pilot study.

Results

Forty-one adult patients with cancer were enrolled in this clinical research study. Of those, 16 patients who met the study criteria were included in the analysis of data collected from February 2009 to December 2009. More than half of the patients who were interested in the study were eliminated as a result of incomplete consent. The sample was predominantly men (62%), with a mean age of 64 years (range = 33–84 years). Multiple myeloma (19%), leukemia (19%), and lung cancer (19%) comprised the majority of the diagnoses.

Of the 16 study participants, seven patients (44%) maintained their muscle strength, six (38%) showed improvement, and three patients had declined in their muscle strength scores. Although the sample did not show a statistically significant improvement of muscle assessment scores (p = 0.39), results did indicate that 81% of patients were able to maintain or even improve muscle strength assessments, although 19% of the sample had a decline in measured muscle strength.

Discussion

This pilot study was a learning experience on many levels. The institutional review board was an initial barrier to the project, as it had never encountered an RN as a principle investigator. Education was required for the board’s members about nursing studies and the value of nurse-led research projects. Because this was a new phenomenon for the medical center, the consent process was very conservative and required a signed statement of support by the physician for each patient. The oncologists on the unit had been educated about the project, included in the assessment tool development, and were supportive of the project. In the end, the project served to foster a recognition of nurses as researchers and paved the way for future studies.

A major challenge of the pilot study was the recruitment of participants. That challenge was related to the two-tier consent process. Logistically, nurses would discuss the project with patients during the admission process or soon after. Physicians often were not present at this time and the form would go unsigned for a period of time; therefore, 13 patients were unable to start the program. Five patients with a short length of stay were not hospitalized long enough to allow for any comparison of muscle strength.

Because of the size of the sample (N = 16), analysis of the data could not support an increase in the mean scores of muscle assessments during the hospital stay. That said, 81% of patients either maintained muscle strength or improved. Nineteen percent of patients actually decreased in muscle strength assessment. The patients who had declines in muscle strength missed or refused to exercise two to five days of their admission because of being too ill or off the unit for an extended period of time for a procedure or testing. Based on the lack of studies of this nature on hospitalized patients, the authors cannot compare the current study’s findings to the literature. Despite that, the researchers saw the improvement or maintenance of muscle strength for most of the sample as a benefit of the intervention. However, larger controlled trials are needed to determine the efficacy of this intervention.

One positive aspect of the project included an increased awareness of nursing’s role in the prevention of deconditioning through activity and exercise. Mobilization of patients has long been considered the domain of the physical therapist. However, with increasingly limited hospital resources and physical therapist shortages, other models to mobilize patients are required. Nurses are ideally positioned to assume this role.

Although nurses were interested in the study, they often had competing priorities and challenges existed regarding keeping nurses engaged in the project over time. Within the first six
weeks of initial education, participation in the research protocol was strong, but as time passed, participation decreased. After about 16 weeks, the nurses had to be reeducated to improve participation and compliance to complete the data accrual. The presence of one dedicated research nurse to oversee the project, monitor compliance, and assist in the flow process would have improved compliance with the data tools and overall participation in the study.

Original goals of the study involved looking at the impact of this study on unit fall rates. Because of the small sample size, that analysis was not possible. Of note, one patient who was enrolled in the study did experience a fall, although not while carrying out the exercises. Future plans for the unit are to incorporate Moving to Wellness into the standard of care for the oncology unit and study the long-term impact in relation to quality outcomes on issues such as falls, pressure ulcers, and length of stay.

Qualitatively, patients and families responded very well to the program. Patients with cancer voiced satisfaction in having a treatment plan to participate in, and some families requested the exercise program on subsequent admissions. Nurses observed that this population of patients seemed to benefit from having an activity to focus on that would help their health. Families enjoyed being included in the program and felt that it provided activity and distraction from their feelings of helplessness and loss of power during the hospital stay.

The development of the Moving to Wellness Muscle Assessment Tool was a key aspect of the study and has great potential for additional use and testing with larger groups. The literature supported the objective testing of muscle strength, but no tool geared toward acute care existed. Acute care on medical and oncology units often overlooks the importance of the nurse’s role in maintaining patients’ strength and mobilization to achieve best outcome. The authors hope that the tool created can be used to support more studies focused on nurses as key players to prevent deconditioning. Such care should be collaborative but not completely dependent on other disciplines. Use of this tool with larger samples of patients to support the psychometric properties is welcomed.

As a result of the pilot program, the inpatient oncology unit is planning to incorporate this type of program into the unit’s standard care. The nurses and administrators evaluated the quantitative and qualitative data and found multiple benefits. Engaging nurses to be more proactive in mobilization of patients with cancer, as appropriate to their physical condition, is consistent with improving outcomes and preventing deconditioning. Plans are being made to examine the performance improvement data of the unit as the program is established and larger numbers of patients can be evaluated.

This pilot project was a unique opportunity to engage patients in a nurse-driven program to support minimal deconditioning of patients with cancer during acute illness. Adherence to a nurse-driven inpatient exercise program supports and prioritizes nurses as key players in optimal patient care. Previously published data supports that participating in regular physical activity provides physical and psychological benefits for patients with cancer. However, a gap in the literature existed concerning the acute care aspects of interventions to support strength and mobility for acutely ill people with cancer. Additional research on this topic is encouraged to support optimal patient outcomes and high-quality nursing care, which emphasizes patient mobility as a standard nursing practice.

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References


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