

## JOURNAL CLUB

# Prediction of Falls in Older Adults With Cancer: A Preliminary Study

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This article has been chosen as particularly suitable for reading and discussion in a Journal Club format. The following questions are posed to stimulate thoughtful critique and exchange of opinions, possibly leading to changes on your unit. Formulate your answers as you read the article. Photocopying of this article for group discussion purposes is permitted.

1. What proportion of our usual clientele can be considered geriatric?
2. What assessment do we perform to determine a patient's fall risk in the hospital? In his or her home?
3. By understanding some of the variables that might be associated with increased incidence of falls, what precautions should we take on our unit?
4. To what extent do our discharge planning and patient education include information for older adults regarding fall prevention?

At the end of the session, take time to recap the discussion and make plans to follow through with suggested strategies.

**Purpose/Objectives:** To determine the extent to which falls occur in older adult patients with cancer; to identify how falls relate to depression, age, functional status, and cognition; and to develop a model for predicting falls.

**Design:** Descriptive, prospective, quantitative.

**Setting:** Patients in the Senior Adult Oncology Program at the H. Lee Moffitt Cancer Center and Research Institute.

**Sample:** 165 patients aged 70 years or older with any diagnosis of cancer, treatment type, and stage.

**Methods:** Data were collected during a one-time interview using a comprehensive geriatric assessment consisting of the Instrumental Activities of Daily Living (IADL) Scale, Activities of Daily Living (ADL) Scale, Geriatric Depression Scale, Mini-Mental State Examination, and a fall assessment.

**Main Research Variables:** Falls, functional status, depression, cognition, age, and gender.

**Findings:** IADL scores were found to be a predictor of falls while controlling for age and ADL status. An IADL score of 22 predicts a 21% risk of a fall. Fall risk increases to 81% at an IADL score of 9.

**Conclusions:** IADL score is a predictor of falls in this older adult population with cancer. ADL scores are not a predictor of falls when IADL is included in the model.

**Implications for Nursing:** Nurses must play a vital role in conducting fall screening and risk assessments for older adults with cancer.

### Key Points . . .

- Functional status as measured by the Instrumental Activities of Daily Living Scale is predictive of falls.
- Depression, cognition, and functional status correlate with falls.
- Nurses should conduct comprehensive assessments that include functional status, fall occurrence, depression, and cognitive status to enhance the care of older adults with cancer.

associated symptoms (anemia and fatigue), impairment of functional status, and general deconditioning (Holley, 2002; Kurtz, Kurtz, Given, & Given, 1993; Kurtz, Kurtz, Stommel, Given, & Given, 1999). Little research has been conducted in the area of falls and older adults with cancer. The purpose of the current research was to explore the frequency of falls that occurred in community-dwelling older adults diagnosed with cancer and how those falls related to scores on a comprehensive geriatric assessment (CGA) consisting of depression, age, functional status, and cognition screening instruments.

**D**uring a 12-month follow-up study, researchers found that 40% of community-dwelling adults aged 70 years or older had experienced a fall (Hausdorff, Rios, & Edelberg, 2001). Older adults with cancer may have additional issues that can precipitate a fall, such as cancer treatment-

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The research questions included “What is the frequency of falls in a population of older patients with cancer?” “What is the relationship of falls to scores on screening instruments often administered as part of a CGA (depression, age, functional status and cognition)?” and “Are the scores on the Instrumental Activities of Daily Living (IADL) Scale (Lawton & Brody, 1969) predictive of falls in a population of older patients with cancer?”

## Background

### Definition of Falls

The Kellogg International Working Group on the Prevention of Falls in the Elderly defined a fall as occurring when a person unintentionally comes to the ground or some lower level other than as a consequence of a violent blow, loss of consciousness, sudden onset of paralysis as in stroke, or an epileptic seizure (“The Prevention of Falls,” 1987). The Prevention of Falls Network Europe Consensus (Lamb, Jorstad-Stein, Hauer, & Becker, 2005) defined a fall as “an unexpected event in which the participant comes to rest on the ground, floor, or lower level” (p. 1619). Another definition suggests that a fall is a sudden, unintentional change in position causing an individual to land at a lower level, not as a consequence of a sudden onset of paralysis, epileptic seizure, or force (Feder, Cryer, Donovan, & Carter, 2000; Tinetti, Baker, et al., 1994). Most definitions have in common the notion that falls are involuntary and are not the result of loss of consciousness or external force. A “near fall” or stumble also may be considered a fall because the body comes to rest at a lower level; however, not all studies subscribe to the same definitions of falls and near falls (Wolf et al., 2003).

### Fall Assessment as Part of a Comprehensive Geriatric Assessment

A risk assessment of falls can be conducted regardless of whether a fall has occurred already; it determines a person’s risk of a fall by considering the home environment, slip precautions, weakness, and fatigue, all of which can contribute to falls. A fall assessment solicits information on a fall that already has occurred and the circumstances surrounding the fall. A CGA is defined as a multidimensional assessment that generally focuses on issues of cognition, emotion, functional status, physical health, and social support (Overcash, Beckstead, Extermann, & Cobb, 2005; Overcash, Beckstead, Moody, Extermann, & Cobb, 2006). CGAs can include any type of valid and reliable instrument particular to the needs of the population surveyed. Some of the common measurement instruments used in CGAs are the Geriatric Depression Scale (GDS) (Yesavage et al., 1982), the IADL scale (Lawton & Brody, 1969), the Activities of Daily Living (ADL) Scale (Katz, Downs, Cash, & Grotz, 1970), and the Mini-Mental State Examination (MMSE) (Folstein, Folstein, & McHugh, 1975), along with data collected as part of the patient history and physical examination. Fall assessments have a prominent place among the instruments that make up a CGA in that cognitive, emotional, and functional limitations of a person can enhance fall risk (Pluijm et al., 2006; Stevens, Powell, Smith, Wingo, & Sattin, 1997; Wolf et al., 2003). Limitations in functional status (Chu, Chiu, & Chi, 2006; Tinetti, Mendes de Leon, Doucette, & Baker, 1994), depression (Cesari et al., 2002; Sheeran, Brown, Nassisi, & Bruce, 2004; Turcu

et al., 2004), and cognition (Kose, Cuvalci, Ekici, Otman, & Karakaya, 2005; O’Connell, Cockayne, Wellman, & Baker, 2005) have been shown to be fall risk factors, and complete assessment can help enhance the care of older adults with cancer (Extermann et al., 2005; Overcash, 1998).

Functional status is particularly important to older adults with cancer in that symptoms of cancer treatment, such as neuromuscular deficits from chemotherapy, can lead to reduced physical functioning and increased risk of falls (Stevens, 2005; Visovsky, 2006). Complications such as asterixis (incompetent postural muscle control) from specific chemotherapy regimens also can increase the risk of falls (Babiy, Stubblefield, Herklotz, & Hand, 2005) and reduce functional independence. In populations of older adults, regardless of whether they have been diagnosed with cancer, those without functional status limitations are less likely to experience injury from falls (Stevens et al., 1997) and those participating in exercise are less likely to fall (Suzuki, Kim, Yoshida, & Ishizaki, 2004).

### Assessment of Fall and Risk of Fall

Two types of fall risk factors exist for patients with cancer. **Intrinsic factors** are issues that are likely to arise as a result of cancer treatment (e.g., anemia, fatigue, pain), gait and balance problems, and medications. **Extrinsic factors** are environmental concerns such as uneven walking areas, rugs, and slippery surfaces (Holley, 2002). Assessment of fall risk varies according to the characteristics of a population. Older adults who are frail may require more in-depth assessment of falls and fall risk than stronger older adults. One of the first steps in assessing falls or risk of falls is to ask whether a fall has occurred in the past year (“Guideline for the Prevention of Falls,” 2001). Older adults should be interviewed concerning falls at least once a year, and if a fall has occurred, a “Get up and Go” test is necessary for additional assessment (Mathias, Nayak, & Isaacs, 1986). A Get up and Go test focuses on how a person rises from a chair and begins to ambulate. Another aspect of a more in-depth assessment to understand fall risk is the timed “Up and Go” test (Podsiadlo & Richardson, 1991), which assesses the time required for a patient to perform the tasks in the Get up and Go test. Older adults who have fallen and not undergone further fall assessment are 30% more likely to fall again as compared to those who have undergone adequate fall follow-up screening (Salter et al., 2006).

Gait assessment can provide information regarding fall risk. Older adults with increased stride time variability were found to be significantly at risk for falls (Hausdorff et al., 2001). Variations in gait and gait speed have been found to be useful in predicting falls in older adults in community dwellings (Montero-Odasso et al., 2004, 2005). Inability to balance while standing on one leg also has been found to be a predictor of injury from falls (Vellas et al., 1997).

Environmental fall-assessment instruments have been developed for inpatient older adults (Morse, Black, Oberle, & Donahue, 1989), community-dwelling older adults (Lord, Menz, & Tiedemann, 2003), and older adults in the home (Johnson, Cusick, & Chang, 2001).

## Methods

### Population and Sample

A prospective convenience sample of patients aged 70 years or older receiving care at the Senior Adult Oncology Program

at the H. Lee Moffitt Cancer Center and Research Institute participated in the study. Participants were recruited if they had been diagnosed with cancer (any tumor type and stage) and were receiving some type of treatment (hormone therapy, chemotherapy, or radiation therapy) or observation. Institutional review board approval was granted from the author's university prior to participant interviews.

## Instruments

The **ADL scale** (Katz et al., 1970) measures basic functional status. Six areas are addressed in the tool: bathing, dressing, toileting, incontinence, transferring, and feeding. Each function is rated as independent, requires some assistance, or requires total assistance. Any dependence in one of the areas indicates that further clinical assessment should be performed.

The **IADL scale** addresses more refined activities that are important to independence (Lawton & Brody, 1969)—ability to use the telephone, shop, prepare food, do work around the house, do laundry, handle finances, and be responsible for medications—as well as mode of transportation. Similar to the ADL scale, each area is scaled by ability (independent, requires assistance, or completely dependent), and any limitation requires further evaluation by a clinician.

The **GDS** is a valid and reliable screening instrument for depression and is used commonly in geriatric health care (Yesavage et al., 1982). The GDS consists of 15 yes-or-no questions. If five or more questions are answered yes, the test is considered positive for depression.

The **MMSE** is used commonly to assess cognition problems (Folstein et al., 1975). Orientation, memory, language function, and praxis are the domains examined. The MMSE is totaled with a high score of 30. Scores of 25 or less are indicative of dementia. The MMSE can be used to assess older adults who do not have overt cognitive loss to screen for dementia and evaluate the effectiveness of treatment.

Falls were assessed per America Geriatrics Society guidelines ("Guideline for the Prevention of Falls," 2001) using the Kellogg International Work Group definition of falls.

## Procedures

Each participant was screened once using a CGA. The assessment instruments were scored according to their individual cut points and published scoring guidelines. Screening required approximately 30 minutes, and the instruments were administered by a geriatrics nurse practitioner or a geriatrics RN. Information concerning treatment type, age, and diagnosis were collected. All data were entered into Microsoft Excel® (Microsoft Corporation, Redmond, WA), and analysis was completed in SPSS® (SPSS Inc., Chicago, IL).

## Analysis

Data analysis consisted of descriptive techniques that used frequencies and cross-tabulation commands to describe the relationship between falls and gender. A Pearson product moment correlation coefficient was used to examine the relationship among age, IADL, ADL, MMSE, and GDS scores. The relationship among falls and IADL, ADL, MMSE, and GDS scores was explored by using a point biserial correlation. Multiple regression analysis was used to construct a model to predict falls. Bivariate regression was used to understand the relationships between the individual instruments' total scores and falls.

**Table 1. Sample Characteristics**

Characteristic	Women (N = 125)		Men (N = 40)	
$\bar{X}$ age (years)	77.5		78	
Overall $\bar{X}$ = 77.6 years	—		—	
Characteristic	n	%	n	%
<b>Chemotherapy</b>				
Active	25	20	11	28
Past	28	22	13	33
Never	72	58	16	40
<b>Site of cancer</b>				
Breast	78	62	—	—
Colon	11	9	7	18
Lymphoma	15	12	12	30
Prostate	—	—	8	20
Other	21	17	13	33
<b>Falls</b>	24	19	13 <sup>a</sup>	33
<b>No falls</b>	101	81	26 <sup>a</sup>	65

<sup>a</sup> One man did not indicate whether he had experienced a fall.

Note. Because of rounding, percentages may not total 100.

## Results

The mean age of the sample (N = 165) was 77.6 years, and 70% were female. The most prevalent cancer types were breast (50%), lymphoma (15%), colon (11%), prostate (6%), and other less common hematologic malignancies. The percentage of patients actively undergoing chemotherapy was 20%, 25% had received chemotherapy in the past, and 55% had never been on chemotherapy (see Table 1).

The number of participants who experienced a fall during the study was 37 (21%). The percentage of men who fell was 33%, compared to 19% of the women. In a bivariate logistic regression model, gender was not a significant factor for the prediction of falls.

A correlation coefficient was used to assess the relationships among the variables of age, IADL total score, MMSE total score, and GDS total score. Because falls is a dichotomous variable and the other covariates were nondichotomous, a point biserial correlation was used. The most robust correlation was between IADL total score and falls,  $-0.313$  ( $p = 0.000$ ). Falls and ADL total score had the second strongest correlation at  $-0.215$  ( $p = 0.000$ ). Falls and MMSE total score were  $-0.169$  ( $p = 0.031$ ), and falls and GDS total score were  $0.158$  ( $p = 0.043$ ). Table 2 provides additional correlations.

**Table 2. Correlations and Point Biserials Among Variables**

Variable	Falls	Age	IADL Scale	MMSE	ADL Scale	GDS
Falls	—	0.082	$-0.238^*$	$-0.125^*$	$-0.186^*$	0.116*
Age	—	—	$-0.272^*$	$-0.144$	$-0.177^*$	0.190*
IADL scale	—	—	—	$-0.429^*$	0.620*	$-0.447^*$
MMSE	—	—	—	—	0.251*	$-0.272^*$
ADL scale	—	—	—	—	—	$-0.377^*$

N = 165

\*  $p < 0.05$

ADL—Activities of Daily Living; GDS—Geriatric Depression Scale; IADL—Instrumental Activities of Daily Living; MMSE—Mini-Mental State Examination

IADL scores were found to be a predictor of falls when controlling for age and gender using multiple logistic regression (see Table 3). Age, gender, and MMSE scores were not found to be significant using each variable separately in a bivariate regression model with falls as the dependent variable (see Table 4). The ADL scores alone, when accounting for age, were a predictor of falls ( $p = 0.010$ ); however, when IADL scores were included in the regression, ADL scores no longer were significant ( $p = 0.322$ ). A participant score of 22 of a possible 24 on the IADL scale offered a 21% risk of a fall. A score of 9 on the IADL scale offered an 81% risk of a fall, whereas a score of 17 offered a 43% risk of a fall (see Figure 1).

## Discussion

This preliminary study was performed as part of a project intended to better understand non-cancer-related health limitations and was a first step in developing a conceptual model specific to functional status and falls in older adults with cancer. Assessing for functional status limitations using the IADL scale can offer a predictive value for falls. The total score on the IADL scale is 24 (Lawton & Brody, 1969); however, an IADL score of 22 was associated with a 21% probability of a fall for the current sample of patients with cancer. Clinicians should be especially vigilant with patients who have several limitations based on the IADL scale and should evaluate fall risk (Cesari et al., 2002; Johnson et al., 2001; Myers & Nikolett, 2003).

Although the fall prediction model needs to be tested in more participants for it to be developed further, the variables of age and gender were not found to be significant in the regression model. The finding is addressed in the geriatric medicine and nursing literature in that chronologic age should not be a limiting factor for cancer treatment (Balducci & Extermann, 2000; Balducci & Yates, 2000; Overcash, 1998). Moreover, chronologic age is not entirely predictive of chemotherapy toxicity, and factors such as functional status and comorbidities should be considered (Balducci & Extermann; Chen et al., 2003).

Little research has been conducted concerning falls and older adults with cancer; therefore, comparing the data used in the present study to established norms is difficult. The population surveyed was obtained at a tertiary care center with older adults who had relatively high functioning despite diagnoses of cancer. In the sample, 23% admitted that they had experienced a

**Table 4. Summary of Bivariate Regression Analysis of Fall Prediction**

Variable	B	SE B	$\beta$	p
MMSE	0.168	0.086	1.183	0.049
GDS	-0.135	0.059	0.873	0.049
ADL scale	0.451	0.155	1.570	0.004
Age	-0.049	0.037	0.953	0.191
Gender	-0.744	0.409	0.475	0.069
IADL scale	0.216	0.063	1.240	0.001

ADL—Activities of Daily Living; GDS—Geriatric Depression Scale; IADL—Instrumental Activities of Daily Living; MMSE—Mini-Mental State Examination; SE—standard error

fall in the past year. Because falls occur in independent, high-functioning older adults, fall screening should take place in all populations of older adults and not just the obviously frail. In another study of falls in an inpatient hospice in the United Kingdom, approximately 10% of patients sampled fell, but that finding may be a result of a limited amount of time spent out of bed (Pearse, Nicholson, & Bennett, 2004).

Because many patients may not volunteer or may forget to offer information concerning falls, specific fall-assessment questions must be included in nursing assessments (Ganz, Higashi, & Rubenstein, 2005). Operationalizing fall screening includes the development of nursing interventions to reduce the opportunity for or injury from falls. Simply assessing for occurrence of falls and fall risk without further follow-up nursing interventions would not be responsible. Several evidence-based resources are available to help healthcare providers develop a reasonable plan of care for older adults who are at risk for falls ("Guideline for the Prevention of Falls," 2001; Lyons, 2005; Stevens, 2005).

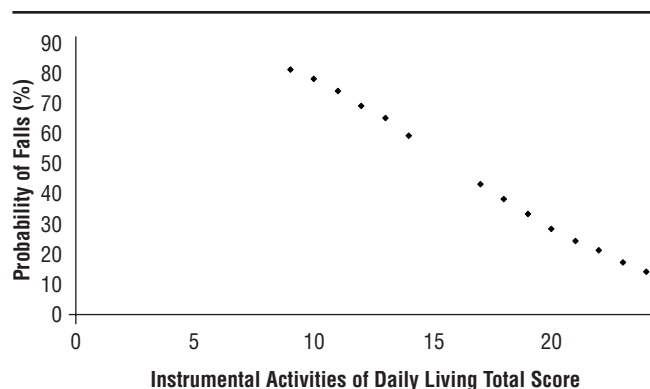
Gender was not predictive of falls in the present sample, although the general geriatric literature has suggested that women are more likely to fall (Pluijm et al., 2006). Moreover, in a sample of older adults in community dwellings, women were 2.2 times more likely than men to experience a nonfatal injury from a fall (usually a fracture) (Stevens & Sogolow, 2005). The finding should be considered in future nursing research to determine whether older adult men with cancer are at higher risk for falls.

A limitation of the study is the high functional status of the sample. Future studies of falls should be conducted in older adults with cancer with functional status scores that are more normally distributed. Additionally, the American Geriatrics Society question of fall occurrence was not necessarily timed with the diagnosis of cancer, cancer progression, or initiation of cancer treatment. Theoretically, participants could have fallen prior to diagnosis of cancer. This was a preliminary study simply designed to determine whether and to what extent falls were occurring in patients in the outpatient older adult oncology program at the H. Lee Moffitt Cancer Center and Research Institute. Because the study revealed a relatively moderate to high fall rate, future studies will be designed to accommodate a broader array of data to establish a more convincing argument that falls may occur to a higher degree in patients with cancer compared to community-dwelling older adults who have not been diagnosed with cancer. The date of a fall in relation to diagnosis of cancer, history of falls, circumstance of the fall, progression of cancer, and the initiation

**Table 3. Summary of Logistic Regression Analysis of Fall Prediction**

Variable	B	SE B	$\beta$	p
<b>Regression model</b>				
Age	-0.010	0.042	0.990	0.809
Gender	-0.407	0.464	0.666	0.381
IADL scale	0.207	0.066	1.230	0.002
<b>Regression model with ADL scale</b>				
Age	-0.010	0.042	0.990	0.807
Gender	-0.362	0.469	0.696	0.441
IADL scale	0.163	0.080	1.177	0.043
ADL scale	0.197	0.198	1.217	0.322

ADL—Activities of Daily Living; IADL—Instrumental Activities of Daily Living; SE—standard error



**Figure 1. Probability of Falls Related to Instrumental Activities of Daily Living Score**

of cancer treatment will be considered as factors in a future study. Moreover, issues of sensory deficits, anemia, fatigue, and medications will be included. Another limitation of the study was that the population sample predominately consisted of well-educated, Caucasian, middle-class older adults with generally intact social support systems. Future studies should include a sample more representative of the entire community. The distribution of primary cancer sites was limited in that the older adult oncology program generally does not see patients with lung cancer; therefore, most of the diagnoses included breast, prostate, colon, and hematologic malignancies.

## Conclusions

The IADL functional status instrument score was found to be predictive of falls in older patients with cancer, but age and

gender were not. Scores from components of the CGA such as the GDS, MMSE, and ADL all are correlated with falls. Based on the findings from this study, nurses should conduct a thorough nursing assessment that includes functional status, fall assessment, depression screening, and cognition assessment. Older adults with limitations on the IADL functional status assessment should be screened for risk of falls. Future research is planned to conduct an expanded falls nursing study in a population of more functionally limited older adults with cancer to determine whether the fall prediction model is consistent with these published findings.

Nurses must be attuned to the prevalence and risk of falls occurring in older adults with cancer. They must play a vital role in conducting fall screening and risk assessments. Identifying older adults at risk for falls will direct nurses' education efforts to patients with cancer in need of fall precaution teaching.

Using the American Geriatrics Society fall-screening question concerning occurrence and risk for falls on those who have experienced a fall can enhance patient care. Patients may not think to include falls in their health history, especially in an oncology clinic, so nurses should integrate fall assessment into the general nursing assessment. Reducing falls and injury from falls can be a prime role of oncology nurses in inpatient and outpatient situations. Conducting and coordinating comprehensive assessments can enhance the care of older adults with cancer and their family caregivers.

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