Comparison of the Health and Functional Status Between Older Inpatients With and Without Cancer Admitted to a Geriatric/Internal Medicine Unit

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Background. Cancer is predominantly a disease in the population aged 65 years and older. Previous studies have suggested that older cancers patients seen in oncology departments are healthy with few comorbidities. Relatively little is known about the health and functional status of older cancer inpatients, especially outside oncology units. The purpose of this study is to compare the health and functional status of older cancer and noncancer inpatients admitted to a geriatric/internal medicine unit.

Methods. A retrospective chart review was conducted on inpatients 65 years old and older, who had been hospitalized during a period of 2 years in the geriatric/internal medicine unit. The health and functional status of 144 inpatients with active cancer was compared to that of 682 inpatients without active cancer. Eight domains were compared: functional status, comorbidity, medication, nutritional status, neurosensory deficits, cognition, mood, and mobility. The hospitalization measures (length of stay, death, need for palliative care) were also compared.

Results. We found that inpatients with active cancer were younger, had less comorbidity and less cognitive impairment, but were more depressed and at greater risk for malnutrition than patients without cancer. These two groups were similar in terms of functional status, neurosensory deficit, and mobility. Cancer patients had a significantly shorter length of stay, required more palliative care, and were more likely to die during hospitalization.

Conclusion. These findings indicate that older cancer patients admitted to a geriatric/internal medicine unit present with multiple active geriatric problems, have characteristics distinct from those of traditional geriatric patients, and require specific care and management.

Cancer is a predominant disease in the population aged 65 years and older. More than 60% of all incident cases of cancer and >70% of all deaths from malignant tumors occur in older individuals (1). One of the difficulties in managing older cancer patients is that this population is quite heterogeneous. Older patients may exhibit many, some, or no health problems in multiple domains such as comorbidity or functional, emotional, and cognitive status, all of which can interfere with the management of the cancer.

Literature suggests that a geriatric assessment may help oncologists in the management of older cancer patients (2–4). A geriatric assessment generally includes an evaluation of the patient in several domains, most commonly the physical, mental, socioeconomic, functional, and environmental domains (5). Geriatric assessment has been proven to be useful for the traditional geriatric population (6,7) and has started to be used in clinical and research settings for older cancer populations. However, studies in oncology have indicated that roughly 2/3 of older cancer outpatients are well functioning (8–11), 2/3 are cognitively intact (9,12), and a majority have ≤3 comorbidities (8–10). Studies comparing older cancer patients with other populations suggest that older cancer patients referred to an oncology department have a lower prevalence of comorbidities and disabilities than the traditional geriatric population has (13) and that they are quite similar to younger cancer patients (14,15).

Although older cancer patients seen in oncology departments appear to be in relatively good health, there is a lack of data on the health and functional status of older cancer patients seen outside the oncology care setting, especially for persons admitted to acute medical units. Only two small descriptive studies (16,17) have shown that older cancer inpatients present with a high prevalence of disability, comorbidity, and cognitive impairment, and have suggested that older cancer inpatients would benefit from a geriatric assessment. No comparison was made, however, to the noncancer patients admitted to the same unit. Therefore, no studies have compared the health and functional status of older cancer and noncancer inpatients. Moreover, no study has assessed these populations within the same hospital unit. Our study proposes to address this gap in our understanding of older cancer patients.

METHODS

Study Setting, Sample, and Design

This is a retrospective chart review of inpatients, 65 years old and older, hospitalized in the general internal medicine/geriatric unit of the University Hospital Center (Marseilles, France) between January 2003 and December 2004.

Patients were generally admitted to the unit for reasons of acute illness, chronic comorbid condition, infectious...
disease, or organ failure or due to signs or symptoms potentially cancer-related and requiring a diagnostic procedure. Cancer patients were defined as individuals diagnosed with an active cancer either before or after admission; noncancer patients were defined as those with no cancer or with a past history of cancer already in remission before admission. Cancer patients presenting with cancer-related treatment toxicities (such as febrile aplasia or vomiting) were instead admitted to the oncology department.

Patients were admitted from home, the emergency department, another department of the hospital, or another hospital or institution. The decision to admit an older patient to the geriatric/ internal medicine unit or to another internal medicine unit was based on bed availability and not on specific clinical criteria.

Each patient underwent a structured interview during the first 48 hours of stay. The interview was conducted by a geriatrician and was based on a self-report questionnaire and performance-based measures. Patients were asked questions about their baseline status prior to admission.

Data Collection

Demographic data (age, sex, marital status) were recorded from the patient charts. To assess health and functional status, eight domains were selected from the standard evaluation in the unit for their predictive validity in terms of morbidity or mortality (18–25). These domains were: functional status, comorbidity, medication, nutritional status, neurosensory deficits, cognition, mood, and mobility.

Disability was quantified using the 6-item Katz index (26) for basic Activities of Daily Living (ADL) and a 4-item Instrumental Activities of Daily Living (IADL) scale (27), which includes managing money, using transportation, using the telephone, and taking medication.

Ten groups of comorbidities were selected: cardiovascular diseases, hypertension, diabetes, depression, dementia, other neurological diseases, respiratory diseases, gastrointestinal diseases, osteoarticular diseases, and renal failure (Appendix). The number of medications (including those for cancer treatment) was calculated for each patient.

Nutritional status was assessed using the Mini-Nutritional Assessment Short Form (MNA-SF) (28). Patients were considered at risk for malnutrition if they scored < 11 of a total score of 14.

The presence of neurosensory deficits (hearing and visual) was defined as a deficit in either hearing or seeing. Patients with trouble hearing and/or requiring hearing aids were considered to have a hearing deficit. Patients with trouble seeing, despite the use of glasses, were considered to have a visual deficit.

The Mini-Mental State Examination (MMSE) (29) was used to assess cognition. A score of < 26 of 30 suggested a diagnosis of cognitive impairment. The MMSE was not administered during the first 48 hours if the patient was medically unstable or delirious.

The 4-item Geriatric Depression Scale (mini GDS) (30) was used for the screening of depression. A score of ≥ 1 indicated possible depression.

To assess mobility, the one-leg standing balance test (31) and a self-reported history of falls were used. Balance was considered abnormal if the patient was unable to stay balanced on one leg for > 5 seconds. For falls, patients were asked if they experienced any falls in the last 3 months. Patients with abnormal balance and/or a history of falls were considered to have a deficit in mobility.

Hospitalization measures (length of stay, death) were collected from the patient charts after discharge. The use of palliative care was also recorded.

Data Analysis

Descriptive statistics of patient characteristics, health and functional status measures, as well as hospitalization outcomes were calculated. For categorical variables, differences between cancer and noncancer patients were tested using the Cochran–Mantel–Haenszel test; for count and score measures, Poisson regression was used. Both tests were adjusted for age and sex. The rate of missing data was assessed in both groups.

A two-sided z-level of 5% was assumed for all tests. The effect of multiple testing was also verified to account for possible false discoveries by adjustment of the false discovery rate (32). All statistical analyses were carried out using SAS 9.1 (Cary, NC).

Results

A total of 826 patients, 65 years old and older, were admitted during the study period. Of the 826 patients evaluated, 144 were cancer patients and 682 were noncancer patients. Mean age was 79.1 (standard deviation [SD] ± 7.3) and 81.7 (SD ± 7.9) for cancer and noncancer patients, respectively (p < .001). Women represented 54.2% of the cancer group and 62.3% of the noncancer group (p = .07).

Table 1 presents the characteristics of cancer patients. For solid tumors, breast cancer was the most common diagnosis, followed by prostate, lung, and colorectal cancer. At the time of admission, 3/4 of the solid tumor cancer patients had metastases. For hematological malignancies, leukemia and lymphoma were the most common diagnoses. The majority of cancer patients were admitted for an acute medical problem and 1/4 for the diagnosis of cancer. Only half of the patients diagnosed with cancer before admission were followed in a cancer treatment center. Roughly 70% of cancer patients had progressive disease, but more than half were not currently receiving treatment. Of those patients receiving treatment, the common therapy was chemotherapy.

Table 2 shows the comparison of health and functional status of patients with and without cancer. Compared to noncancer patients, cancer patients had significantly less cardiovascular disorder, hypertension, dementia, renal failure, neurological disorder, and cognitive impairment, but had more depressive symptoms and were at greater risk for malnutrition. There was no difference between the two groups in terms of ADL, IADL, mobility, and neurosensory deficits. There was also no difference in the number of medications across the two groups, even with the inclusion of cancer-related drugs.

Results for hospitalization measures are shown in Table 3. Cancer patients had a slightly shorter length of
DISCUSSION

To our knowledge, this is the first study to address differences in domains of geriatric assessment between older cancer and noncancer inpatients admitted to the same geriatric/internal medicine unit. We found that cancer inpatients were younger, had fewer comorbidities and less cognitive impairment, but were more depressed and at greater risk for malnutrition than were noncancer inpatients. However, these two groups were similar in terms of ADL and IADL disability, neurosensory deficit, and mobility. Our results agree with those of Repetto and colleagues (13) in terms of age and comorbidity, but in terms of disability they found that older persons seen in outpatient oncology clinics had less disability than did older persons without cancer seen in geriatric clinics. This difference is likely due to the fact that older cancer patients admitted to hospital are in a more advanced stage of their cancer. These results indicate that, although disability in the general geriatric population is generally a result of a multisystem decline or a catastrophic event, disability in older cancer patients is mainly a result of the cancer itself or the side effect of cancer treatment.

We detected a high prevalence of malnutrition and depression in our cancer patients. Two of three cancer inpatients presented with an advanced cancer, of which a majority were receiving cancer therapy. Physical symptoms of the disease, treatment-related side effects, and the presence of cytokine-mediated metabolic changes (33) may have contributed to the elevated prevalence of malnutrition. Half of older cancer patients scored positive in screening for depression, whereas only 10% of them were diagnosed with depression before admission. Side effects due to cancer-related drugs (in particular corticosteroids), cancer-related pain, and reduced life expectancy may have precipitated the risk of depression in these patients. These data corroborate the fact that clinicians often fail to recognize and assess depression in older cancer patients (34,35). This emphasizes the importance of a complete medical and functional assessment to detect and treat geriatric problems in the older cancer population admitted to a geriatric/internal medicine unit.

Previous studies have indicated that older cancer patients are healthier than are traditional geriatric patients (7,13). Whereas this may be true for older cancer patients seen in oncology departments, the relatively poor overall health and functional status of our older cancer patients suggest that this may not be the case for older cancer patients seen outside the oncology setting. Moreover, this finding suggests that there is a large segment of the older cancer population that is not properly understood and that is poorly represented in studies of older cancer patients.

Clinical observation in the community supports the existence of differences in functional decline before dying among four types of illness trajectories: sudden death, death due to cancer, death due to organ failure, and frailty (36,37). Cancer patients experience more rapid disability during the 3–5 months before death. In contrast, patients with organ failure or frail patients experience a progressive functional decline. These different pathways have important implications for health care delivery. In our study, the proportion of older patients with at least one ADL or IADL disability was similar in both cancer and noncancer patients. However, in the subgroup of patients who died, cancer patients were less disabled at admission than were noncancer patients. This finding suggests that older cancer patients hospitalized in an acute care unit (in particular, those patients with advanced cancer) are more likely to die before developing disability. Although only 5.6% of patients received...
Palliative care, almost 20% of cancer patients died during their hospitalization, compared to 7.6% of noncancer patients. Good end-of-life care must allow for this unpredictable timing of death.

This study has several limitations. First, it is a monocentric study. We cannot exclude a potential bias of referral. The proximity of the anticancer research center and the presence within the same hospital of units treating a specific cancer population may have increased the number of cancer patients in our study. However, our data were obtained from unselected patients referred to the internal medicine/geriatric unit and are likely to reflect real differences in the

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Patients With Cancer (Mean ± SD; N, %)</th>
<th>Patients Without Cancer (Mean ± SD; N, %)</th>
<th>Age- and Sex-Adjusted p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group size</td>
<td>144 (17.4%)</td>
<td>682 (82.6%)</td>
<td>—</td>
</tr>
<tr>
<td>Comorbidity</td>
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<td></td>
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<tr>
<td>Cardiovascular*</td>
<td>28 (19.4%)</td>
<td>216 (31.7%)</td>
<td>.008&lt;sup&gt;1&lt;/sup&gt;</td>
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<td>Hypertension*</td>
<td>26 (18.1%)</td>
<td>184 (27.0%)</td>
<td>.042&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>Depression*</td>
<td>18 (12.5%)</td>
<td>73 (10.7%)</td>
<td>.623</td>
</tr>
<tr>
<td>Diabetes*</td>
<td>17 (11.8%)</td>
<td>87 (12.8%)</td>
<td>.513</td>
</tr>
<tr>
<td>Dementia*</td>
<td>14 (9.7%)</td>
<td>156 (22.9%)</td>
<td>.003&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>Respiratory*</td>
<td>9 (6.3%)</td>
<td>68 (10.0%)</td>
<td>.121</td>
</tr>
<tr>
<td>Osteoarticular*</td>
<td>8 (5.6%)</td>
<td>67 (9.8%)</td>
<td>.153</td>
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<td>Digestive*</td>
<td>7 (4.9%)</td>
<td>26 (3.8%)</td>
<td>.725</td>
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<tr>
<td>Renal failure*</td>
<td>6 (4.2%)</td>
<td>86 (12.6%)</td>
<td>.005&lt;sup&gt;1&lt;/sup&gt;</td>
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<tr>
<td>Neurological*</td>
<td>5 (3.5%)</td>
<td>130 (19.1%)</td>
<td>&lt; .001&lt;sup&gt;1&lt;/sup&gt;</td>
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<td>Functional status</td>
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<tr>
<td>ADL*</td>
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<td>0</td>
<td>29 (20.1%)</td>
<td>139 (20.4%)</td>
<td>.863</td>
</tr>
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<td>1–5</td>
<td>46 (31.9%)</td>
<td>238 (34.9%)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>63 (43.8%)</td>
<td>253 (37.1%)</td>
<td></td>
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<tr>
<td>IADL*</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>0</td>
<td>36 (25.0%)</td>
<td>215 (31.5%)</td>
<td>.632</td>
</tr>
<tr>
<td>1–3</td>
<td>53 (36.8%)</td>
<td>210 (30.8%)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>49 (34.8%)</td>
<td>206 (30.2%)</td>
<td></td>
</tr>
<tr>
<td>Cognition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MMSE&lt;sup&gt;2&lt;/sup&gt;</td>
<td>22.1 ± 8.7</td>
<td>19.5 ± 8.7</td>
<td>.003&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>Mood</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mini-GDS (≥ 1 depressive symptom)*</td>
<td>59 (50.0%)</td>
<td>208 (37.9%)</td>
<td>.020&lt;sup&gt;3&lt;/sup&gt;</td>
</tr>
<tr>
<td>Nutrition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MNA-SF &lt; 11*</td>
<td>94 (69.6%)</td>
<td>340 (53.3%)</td>
<td>&lt; .001&lt;sup&gt;3&lt;/sup&gt;</td>
</tr>
<tr>
<td>Medication</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of medications&lt;sup&gt;1&lt;/sup&gt;</td>
<td>4.9 ± 3.1</td>
<td>5.2 ± 2.8</td>
<td>.238</td>
</tr>
<tr>
<td>Neurosensory deficit*</td>
<td>62 (43.1%)</td>
<td>270 (39.6%)</td>
<td>.229</td>
</tr>
<tr>
<td>Mobility</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>History of alls*</td>
<td>48 (35.3%)</td>
<td>249 (38.7%)</td>
<td>.910</td>
</tr>
<tr>
<td>Negative one-leg balance score*</td>
<td>100 (75.2%)</td>
<td>520 (80.4%)</td>
<td>.577</td>
</tr>
</tbody>
</table>
| Notes: *Cochran-Mantel–Haenszel test. <sup>1</sup>Statistically significant. <sup>2</sup>Poisson regression. <sup>3</sup>Standard deviation; ADL = activities of daily living; IADL = instrumental activities of daily living; MMSE = Mini-Mental State Examination; Mini-GDS = 4-item Geriatric Depression Scale; MNA-SF = Mini-Nutritional Assessment Short Form.

The proximity of the anticancer research center and the presence within the same hospital of units treating a specific cancer population may have increased the number of cancer patients in our study. However, our data were obtained from unselected patients referred to the internal medicine/geriatric unit and are likely to reflect real differences in the
populations studied. Second, we used a list of comorbid conditions that has not yet been validated. Comorbid conditions were coded according to the International Classification of Diseases (ICD-10th revision, French version). We could not exclude that a low severity of comorbidity may not have been recorded in the patient chart. But the type of coding was the same in both groups. Third, our results reflect the current health care system in France. The majority of general internal medicine units receive an unselected group of patients presenting with multiple problems. Our results may not be easily generalized to other countries because of differences in health care systems.

Conclusion
Older cancer inpatients seen outside of oncology departments present with multiple active geriatric problems and require specific care and management. This study emphasizes the heterogeneity in the health and functional status of the older cancer population, and contributes to fill the lack of data on the health status of older cancer inpatients. It suggests that there is a segment of the older cancer population that is not represented in studies of older cancer patients and that is managed outside the oncology setting. As the incidence of cancer increases in older populations of the Western world, the organization and delivery of care in geriatric/internal medicine units may have to take into account this emerging geriatric population. Further studies are necessary to establish the impact of the older cancer population on geriatric/internal medicine units and to determine the social and medical resources necessary for adequate care.

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Dr. Retornaz carried out the data analysis as part of her fellowship in the Division of Geriatric Medicine, McGill University. Drs. Retornaz, Seux, and Soubeynard are affiliated with the Department of Internal Medicine and Geriatrics, Centre Hospitalo-Universitaire Sainte Marguerite, Marseille, France. Drs. Retornaz, Sourial, Monette, and Bergman are affiliated with the Division of Geriatric Medicine, Department of Medicine, McGill University, Jewish General Hospital, Montreal, Quebec, Canada and with the Solidage McGill University Research Group, Center for Clinical epidemiology and Community Studies, Lady Davis Institute for Medical Research, Jewish General Hospital, McGill University, Montreal, Quebec, Canada. Dr. Braud was affiliated with the Department of Oncology, Institut Paoli-Calmettes, Marseille, France. She is deceased.

Drs. Retornaz, Seux, and Braud were involved in the concept and design of the study. Drs. Retornaz and Seux were responsible for data collection. Drs. Retornaz, Seux, and Sourial were involved in data management, analysis, and interpretation. Drs. Retornaz, Monette, Bergman, and Soubeynard were involved in the data analysis and the preparation of the manuscript.

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APPENDIX

Classification of Comorbidities

Patients in the following 10 groups scored positive if they had at least one underlying comorbidity. For example, patients with angina and chronic heart failure scored positive in the cardiovascular group.

Cardiovascular
Coronary artery disease (myocardial infarction, angina)
Congestive heart failure

Thromboembolic disease (pulmonary embolism, peripheral thrombophlebitis)
Pericarditis
Endocarditis
Peripheral vascular disease
Cardiac arrhythmia
Orthostatic hypotension
Chronic venous insufficiency

Depression

Hypertension

Diabetes

Dementia
Alzheimer’s disease
Vascular dementia
Dementia in Parkinson’s disease
Dementia with Lewy bodies
Frontotemporal dementia

Respiratory
Chronic obstructive pulmonary disease
Chronic pulmonary insufficiency or respiratory insufficiency
Interstitial pulmonary fibrosis
Pneumoconiosis

Osteoarticular disease
Osteoporosis with or without fractures
Osteomalacia
Osteoarthritis
Crystal arthropathy
Rheumatoid arthritis
Connective tissue disease (Gougerot–Sjögren’s syndrome)

Digestive
Gastroesophageal reflux disease
Peptic ulcer disease
Chronic gastritis
Hepatitis C cirrhosis
Alcoholic cirrhosis
Primary biliary cirrhosis

Renal failure

Neurological
Parkinson’s disease
Peripheral neuropathy
Stroke
Epilepsy
Normal pressure hydrocephalus