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The association between Memorial Sloan Kettering Frailty Index with 30-day survival among patients aged ≥75 with cancer and COVID-19

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Abstract

Background: Advanced age and multiple comorbidities have been established as a risk factor for more severe disease and increased mortality among patients with COVID-19, yet the impact of frailty in patients with cancer 75 years and older who are admitted, remains unclear.

Methods: To better understand the clinical presentation and course of illness for this population, we conducted a chart review of patients with cancer age 75 and older who were admitted to a comprehensive cancer center within 72 h of a confirmed COVID-19 diagnosis over a three-month period (March 1, 2020-May 31, 2020). Frequency and proportion of characteristics were reported. We additionally assessed the association between frailty and 30-day mortality using univariable logistic regression.

Results: Our cohort consisted of 70 patients. We found evidence that increased frailty based on MSK-FI was associated with increased risk of 30-day mortality (OR 1.37, 95% CI 1.00, 1.87; p-value = 0.051), though this did not meet conventional levels of significance.

Conclusion: Our analysis showed evidence of some association between degree of frailty and 30-day survival among older patients with cancer aged ≥75 who were admitted with COVID-19 infection. This finding illustrates the importance of frailty screening in the care management of older patients with cancer and COVID-19.

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1. Introduction

In December 2019, a novel coronavirus (SARS-CoV-2) was identified after a reported cluster of cases of pneumonia in Wuhan, China heralding the start of the COVID-19 pandemic. The COVID-19 pandemic has disproportionally affected older adults, with greater than 81% of deaths being in those >65 [1]. Mortality data among patients with cancer and COVID-19 during the height of the first surge in New York City (March – May 2020) showed that the median ages of patients who died and survived were 76 and 66, respectively [2]. Cancer is a disease of the aging and greater than 50% of older patients with cancer are frail or pre frail and at heightened risk for poor tolerance to cancer treatment and overall mortality [3]. Frail older adults often have atypical disease presentations due to diminished reserves and lack of ability to respond to stressors compared to younger patients. For example, patients with COVID-19 may present with functional decline with the absence of more common symptoms such as fever or cough [4]. Given that many patients with cancer have competing risk factors for complications and death [2,5] the effects of COVID-19 on this population have been a major concern to the oncology community. In this communication we describe our assessment of the relationship between frailty and short-term mortality in older patients with cancer when faced with COVID-19 infection. We conducted a retrospective observational study of patients with cancer age ≥75 at a comprehensive cancer center during the initial surge of COVID-19 in the Spring of 2020, with emphasis on clinical presentation and the impact of frailty on 30-day mortality.

2. Methods

This retrospective study was approved by the Memorial Sloan Kettering Cancer Center Institutional Review Board.

We examined data from our institution’s electronic health record (EHR) to identify all patients ≥75 who had a laboratory confirmed diagnosis of COVID-19 within 3 days before or after hospital admission over a three-month period (March 1, 2020-May 31, 2020). COVID-19 was diagnosed based on a positive result of a PCR assay of nasal pharyngeal
swabs. Three patients diagnosed with COVID-19 initially admitted to another institution prior to transfer to our hospital were included in our study. Coded data elements extracted from the EHR for analysis included demographics, vital signs, laboratory findings, treatments administered, ICU admission, hospital disposition and mortality. Manual chart review was performed by study staff to abstract presenting symptoms (e.g. fever, cough, etc.) and clinical conditions that developed over the course of hospitalization (e.g. pneumonia, need for mechanical ventilation, etc.). We also abstracted comorbid conditions, cancer diagnosis, stage and recent anticancer treatment (e.g. chemotherapy, radiotherapy) as well as therapies administered for COVID-19 management. Frailty score was determined based on the Memorial Sloan Kettering Frailty Index (MSK-FI) derived at our institution based on the Modified Frailty Index [6]. In brief, the MSK-FI consists of ten comorbidities and one component related to functional assessment (refer to MSK-FI article listed under references for more details). The functional assessment component is based on four patient-reported activities of daily living and one patient reported instrumental activity of daily living. MSK-FI score ranges from 0 to 11, with a higher score indicating greater frailty [7].

Demographic and clinical characteristics, symptoms on presentation or during hospitalization, presence of comorbid conditions prior to admission, conditions arising during hospitalization, presence of elevated laboratory values within 72-h of admission, and type of COVID-19 treatment administered were reported as frequency and proportion across the cohort. To assess the association between frailty and 30-day mortality we used a univariable logistic regression with 30-day mortality for a patient with an MSK-FI score of 2 is 13% (95% CI 5.3%, 30%) and 22% (95% CI 14%, 34%) for a patient with an MSK-FI score of 4.

3. Results

Over the study period, we identified 70 patients ≥75 who were admitted to the hospital and had confirmed COVID-19. Median age was 81 (quartiles 77–83) and the oldest patient in our cohort was 97 years old. Half of patients were female, 49% were married. 71% were White, 17% were Black and 11% Asian. The most common comorbidities were Hypertension (70%), Type II Diabetes (24%), Chronic Kidney Disease (16%), and Coronary Artery Disease (16%) and 51% had a history of smoking. Five (7.1%) patients had cognitive impairment or a diagnosis of dementia. The most common cancer diagnoses were Lung and bronchus (20%), Genitourinary (16%) and Lymphoma (13%). Among our cohort of 70 patients, 13 patients (19%; 95% CI 10%, 30%) had hematomal malignancies. More than half (53%) of patients had received active anticancer treatment in the past two months. Fevers or chills (51%), cough (49%), weakness (39%), shortness of breath (36%), fatigue (30%), functional decline (26%), and anorexia (26%), were the most common presenting symptoms. Laboratory markers that had the highest elevations on admission were IL-6 (83%), D-dimer (79%), C-reactive protein (57%) and ferritin (51%). Commonly prescribed therapies included hydroxychloroquine (63%), azithromycin (46%), ceftriaxone (39%) and convalescent plasma (10%).

During the course of hospitalization 49% had pneumonia, with 66% reaching levels of hypoxemia requiring oxygen. Nearly one quarter (24%) developed delirium, and 21% experienced acute respiratory distress syndrome. Within 30 days of admission, seventeen patients (25%; 95% CI 15%, 36%) died, eight (11.6%; 95% CI 5.1%, 22%) required ICU admission and five (7.2%; 95% CI 2.4%, 16%) were readmitted to the hospital. Two of the 17 patients who died required ICU admission. MSK-FI scores revealed that 19 patients (27%) were considered non-frail with scores ≤2. Seven patients (10%) had a score of 3, 19% scored 4, 21% scored 5 and the remaining 16 patients (23%) had a score of 6 or higher, indicating severe frailty. In this cohort of patients, increased frailty was associated with increased risk of 30-day mortality (OR 1.37, 95% CI 1.00, 1.87; p-value = 0.051; Fig. 1), though this did not meet conventional levels of significance. Patient characteristics for our full cohort are presented in Table 1. Post-hoc analyses evaluating 30-day mortality or ICU admission based on whether patients were on active cancer treatment in the 2 months prior to COVID-19 infection, yielded non-significant higher rates of outcome in patients not on active treatment compared to those who were (39% vs 27%, respectively; difference = 12%; 95% CI around the difference: −11%, 34%; p-value = 0.3).

4. Discussion

According to the CDC, the rate of hospitalization and death increases by age among patients with COVID-19. Their analysis found that, with a
delay in many treatments and follow up with providers including cancer therapy [11]. During the COVID-19 pandemic, there has been infection may be more challenging as the needed precautions to min-

COVID-19 vaccine was not yet developed during our study period. 

nerable risk group. MSK-FI has been validated in patients aged the median age in those studies (66

tality in our cohort was 25% (95% CI 15%, 36%), which was comparable to patients with cancer admitted with COVID-19. That being said, 30-day mor-

such as functional decline and anorexia were common among older pa-

bidities. Additionally, we observed that atypical presentation of disease was evidence that greater frailty was associated with increased risk of 

in hospital mortality [9].

The presence of comorbidities and frailty often occur concomitantly in older adults and result in diminished functional status, quality of life and many times worsened prognosis [4]. Our cohort was notably frail and 90% of patients had two or more comorbid conditions, maximum of 7 comor-

Additionally, we observed that atypical presentation of disease such as functional decline and anorexia were common among older pa-

The approach to the care of patients with cancer has evolved, also evoking the question on the appropriate intensity of cancer treatments to offer in times of a pandemic [5,11]. Under emergency situations, more than ever, cancer treatment-related clinical decisions and advance care planning should take into consideration patients’ level of fitness, life expect-

The COVID-19 pandemic has also resulted in swift expansion of tele-

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Table 1
Patient characteristics for our full cohort and based on MSK-FI.

|                         | All Patients N = 70 |
|-------------------------|---------------------|
| Age during inpatient admission | 81 (77, 83) |
| Male                    | 35 (50%) |
| Marital Status          |                     |
| Single                  | 11 (16%) |
| Married                 | 34 (48%) |
| Widowed                 | 17 (24%) |
| Divorced                | 7 (10%) |
| Unknown                 | 1 (1.4%) |
| Race                    |                     |
| White                   | 50 (71%) |
| Black                   | 12 (17%) |
| Asian                   | 8 (11%) |
| Residence               |                     |
| New York County         | 19 (27%) |
| Kings County            | 18 (26%) |
| Queens County           | 14 (20%) |
| Bronx County            | 8 (11%) |
| Rest of NY              | 6 (8.6%) |
| New Jersey              | 4 (5.7%) |
| Florida                 | 1 (1.4%) |
| Functional Status*      | 46 (66%) |
| MSK-FI Score            |                     |
| ≥1                      | 4 (5.7%) |
| 2                       | 15 (21%) |
| 3                       | 7 (10%) |
| 4                       | 13 (19%) |
| 5                       | 15 (21%) |
| ≥6                      | 16 (23%) |

* Functional status as used in the MSK-FI is based on limitation with bathing, dressing, grooming, walking outside the home, or preparing meals.

reference group age 18–29, the hospitalization rate was 4 times higher in age 50–64, 6 times higher in age 65–74, 9 times higher in age 75–84, and 15 times higher in those aged ≥85 compared to the reference group. Similarly, death rate was 35 times higher in ages 50–64, 95 times higher in ages 65–74, 230 times higher in ages 75–84, and 610 times higher in those aged ≥85 [8]. However, these findings were not limited to patients with cancer. Thus, for the purposes of our study, we focused on patients aged ≥75 who would typically be considered the most vul-

terable risk group. MSK-FI has been validated in patients aged ≥75, which is also generally the age we use for referral to Geriatrics in our in-

stitution.

Our study found that within the oldest population of patients, there was evidence that greater frailty was associated with increased risk of 30-day mortality. These findings are consistent with findings from an-

other multicenter cohort study which found that among older adults with COVID-19 who were admitted, the degree of frailty increased risk of in hospital mortality [9].

The study has several limitations given limited sample size, retro-

spective nature of this study, and short observation period. Additionally, ECOG performance status scores were not available for all patients.

To conclude, in this small study we have found some evidence of an association between degree of frailty and 30-day survival among older patients with cancer aged ≥75 who were admitted with COVID-19 infec-
tion, underscoring the importance of risk stratification of older adults based on their frailty level and not on their chronological age alone. This work adds evidence to recommendations to incorporate frailty screening into the care of older adults with cancer to better stratify risk-based interventions, especially during a global health crisis.

Author Contributions

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Conflicts of Interest

The authors declare no conflicts of interest and have nothing to disclose.
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