Frailty and Cause-Specific Hospitalization among Aging HIV-Infected and Uninfected Persons

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ABSTRACT

Background: Hospitalization events exact a substantial economic and clinical burden for aging HIV-infected populations. Frailty is a key aging-related syndrome, predictive of major adverse clinical outcomes, including all-cause hospitalization among older HIV-uninfected adults. We have previously reported the association of frailty with advanced HIV and mortality; however, limited data exist on the relationship of frailty to hospitalizations due to infectious or non-infectious causes among HIV-infected persons or their uninfected counterparts.

Methods: Frailty was ascertained in the ALIVE cohort of persons with prior or current injection drug use based on the 5 Fried phenotype criteria. Hospitalization events were ascertained from 2005-2012 and categorized using Agency for Healthcare Research and Quality clinical classification software into: chronic disease, infectious disease, and non-chronic non-infectious conditions. Cox proportional hazards models were used to estimate the risk (hazard ratios [HR] with 95% confidence intervals [CI]) for time to first hospitalization for each category.

Results: Among 1303 participants with a median age of 48 years, 32% were HIV infected, and 12% were frail. In multivariable models adjusting for age, sociodemographics, comorbidity, substance use, and HIV/AIDS status, frailty was significantly associated with chronic disease (aHR 2.03; 95% CI, 1.40, 2.89), and infectious disease (aHR 2.41; 95% CI, 1.54, 3.76) hospitalization; but not with non-chronic non-infectious hospitalization (aHR 1.07; 95% CI, 0.72, 1.55). A prior AIDS diagnosis was associated with increased hospitalization risk in all 3 categories. Among HIV-infected persons, independent of D42 count, HIV viral load, or prior AIDS, frailty was significantly associated with increased AIDS hospitalization risk (aHR 6.30; 95% CI, 1.20, 33.1). Frailty was also independently associated with non-AIDS infectious disease hospitalization risk (aHR 2.21; 95% CI, 1.40, 3.50).

Conclusion: The frailty phenotype selectively predicts vulnerability to chronic disease and infectious disease related hospitalization, independent of comorbidity, degree of HIV immunosuppression and virologic control. Frail persons are susceptible to increased hospitalization for both AIDS and Non-AIDS infection. Further elucidation of frailty pathways may facilitate interventions to reduce health care utilization and improve clinical management for aging HIV-infected persons and their high risk counterparts.

INTRODUCTION

Persons with a history of injection drug use (PWID) comprise a significant subset of the U.S. population and continue to be at heightened risk for HIV acquisition. Both the HIV and PWID populations have been aging over the last 2 decades. The synergistic interaction between HIV, injection drug use, and age can result in increased mortality, morbidity, and health care utilization. Early identification of those HIV+ and at risk PWID most vulnerable to adverse clinical outcomes may facilitate interventions to improve health outcomes for this high risk group. Frailty is a key aging-related syndrome of vulnerability found to be associated with increased morbidity and mortality among older HIV-uninfected adults. We have previously identified a significant relationship of frailty with both HIV and increased mortality risk among PWID. In this study, we sought to determine the relationship of frailty to risk for specific classes of hospitalization events in this population.

METHODS

FRAILITY PHENOTYPE

Physical shrinking (Weight loss)

≥ 5% body weight loss since prior visit by direct measurement of weight

Low physical activity

“Does your health now limit the kinds or amounts of vigorous activities you can do, like lifting heavy objects, running, or participating in strenuous sports?”

Positive: limited a lot

Poor endurance (Exhaustion)

“During the past week, I felt that everything I did was an effort” OR “During the past week, I could not get going”

Positive: moderate or most of time

Grip strength (Jamar dynamometer)

Positive: weakest 20% stratified by gender and BMI quartiles

Slow gait

Time to walk 4m at usual pace Positive: slowest 20% by gender and median height

FRAIL

Positive for 3 or more criteria

Comorbid Disease Conditions

• Diabetes
• Hypertension
• Cerebrovascular accident
• Cardiovascular disease
• Renal disease

• Obstructive lung disease
• Obesity
• Malignancy
• Liver disease

FRAILTY AND ALL-CAUSE HOSPITALIZATION

<table>
<thead>
<tr>
<th>Comorbid conditions</th>
<th>Adjusted HR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1.00 (1.00, 1.00)</td>
</tr>
<tr>
<td>1-2</td>
<td>1.33 (1.10, 1.61)</td>
</tr>
<tr>
<td>≥ 3</td>
<td>2.39 (1.59, 3.52)</td>
</tr>
</tbody>
</table>

HIV Status

Negative: Ref

HIV+ = Ref

HIV+, AIDS: Ref

Frailty Status

Robust: Ref

Pre frail: 1.02 (0.83, 1.26)

Frail: 1.43 (1.07, 1.91)

SUMMARY

• Frailty is significantly associated with all-cause, chronic disease and infectious disease hospitalization risk.

• Frailty is significantly associated with both AIDS and Non-AIDS infectious disease hospitalization risk.

• Frailty targeted interventions may mitigate infectious disease and chronic disease related morbidity and healthcare utilization among aging HIV-infected persons.

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