Impact of Race, Age, and Multimorbidity on Aggressiveness of End-of-Life Care

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Background

- Prior studies have documented variations in end-of-life (EOL) care by older patients with cancer.
- However, seldom have these studies accounted for multimorbidity (MM), which is highly prevalent in older cancer patients.
Study Objective

- In a U.S. representative sample of U.S. older adults who have died from cancer, test the independent association between receipt of aggressive EOL care and each of:
  - higher levels of MM, and
  - Patient race
Study Hypotheses

- Adjusting for age, race, sex, and marital status, income, education, self-reported health status, and perceived life expectancy, higher level of MM is associated with less aggressive cancer care.

- Race remains significantly associated with receipt of aggressive care, even after controlling for MM and other patient covariates.
METHODS
Data Sources

- Linked database consisting of:
  - The Health and Retirement Study, 1991-2008
  - Survey data on a U.S. representative sample of older adults
  - Medicare enrollment and claims data
  - The National Death Index
Institutional Approvals

• Our study was approved by:
  • The Institutional Review Board, University Hospitals of Cleveland
  • the Health and Retirement Study (University of Michigan)
  • Centers for Medicare and Medicaid Services
Study Population

- Medicare fee-for-service beneficiaries
  - Age 65+ years and receiving their care through the fee-for-service system
  - Died from cancer
    - Date and cause of death identified from the National Death Index.
Dependent Variable(s)

Indicators of receipt of aggressive care, based on the following services:

- Acute care visits (admission to the hospital or to the Emergency Department (ED) within 30 days of death)
- Chemotherapy, radiation, or cancer-directed surgery within 30 days of death
- Admission to the Intensive care unit (ICU) within 30 days of death
- Died in the hospital

Medicare Claims data
Main Independent Variable: MM

- MM based on the occurrence and co-occurrence of chronic conditions (CC), functional limitations (FL), and geriatric syndromes (GS)
  - MM0/MM1: none or only one of CC, FL, or GS
  - MM2: presence of two of CC, FL and GS
  - MM3: presence of all three of CC, FL, and GS
Depiction of Multimorbidity (MM) based on the occurrence and co-occurrence of chronic diseases, functional limitations, and geriatric syndromes.
Components of MM (self-reported)

- **Chronic Conditions:**
  - Diabetes
  - Hypertension
  - Heart disease
  - Lung disease
  - Stroke
  - Psychiatric conditions
  - Arthritis

- **Functional limitations**
  - Upper body functioning
  - Lower body functioning
  - Activities of daily living
  - Instrumental Activities of Daily Living

- **Geriatric Syndromes**
  - Cognitive impairment
  - Depressive symptoms
  - Visual impairment
  - Hearing impairment
  - Falls
  - Incontinence
Other independent variables

- Age (66-69, 70-74, 75-79, 80-84, 85+)
- Race (Non-Hispanic Black/White)
- Sex
- Marital Status (married vs. not)
- Income (in quartiles)
- Education (College vs. not)
- Self-reported health (fair/poor vs. excellent, very good, and good)
- Perceived life expectancy (% chance of dying within the next 10 years)

Health and Retirement Study
Analytic approach

- Descriptive analysis
- Multivariable logistic regression models to evaluate the association between MM and receipt of aggressive cancer care, after adjusting for patient covariates
RESULTS
Study population

• N = 835 decedents

• Mean age (standard deviation): 78.7 years (7.2)

<table>
<thead>
<tr>
<th>Indicators of aggressive care:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute care in the last 30 days of life</td>
<td>55.1%</td>
</tr>
<tr>
<td>Cancer-directed treatment in the last 30 days of life</td>
<td>24.6%</td>
</tr>
<tr>
<td>Admitted to the ICU in the last 30 days of life</td>
<td>9.5%</td>
</tr>
<tr>
<td>Died in the hospital</td>
<td>21.7%</td>
</tr>
</tbody>
</table>
Aggressive EOL care by MM

Other comparisons were not significant at $p < 0.05$

* Small cells were suppressed accordance with privacy rules
Acute care in relation to components of MM

None of the comparisons was significant at p < 0.05
Cancer-directed treatment in relation to components of MM

Comparisons for chronic conditions were not significant at p < 0.05
ICU admission in relation to components of MM

Comparisons were not significant at p < 0.05
Aggressive care (any outcome) in relation to components of MM

Other comparisons were not significant at \( p < 0.05 \)
In-hospital death in relation to components of MM

Comparisons were not significant at p < 0.05
Receipt of aggressive care by Race

All comparisons (except for ICU admission) significant at \( p < 0.01 \)

* Small cells were suppressed accordance with privacy rules
Receipt of aggressive care by Age

None of the other comparisons was significant at $p < 0.05$.

* Small cells were suppressed accordance with privacy rules.
## Results from the Multivariable Analysis

<table>
<thead>
<tr>
<th>Variable of interest</th>
<th>Acute care</th>
<th>Cancer-directed Treatment</th>
<th>ICU</th>
<th>Any (treatment, Acute care, or ICU)</th>
<th>Died in hospital</th>
</tr>
</thead>
<tbody>
<tr>
<td>MM:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0/1</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>2</td>
<td>0.84 (0.53-1.33)</td>
<td>0.68 (0.41-1.13)</td>
<td>0.51 (0.24-1.08)</td>
<td>0.72 (0.44-1.17)</td>
<td>0.98 (0.56-1.73)</td>
</tr>
<tr>
<td>3</td>
<td>1.09 (0.68-1.74)</td>
<td>0.64 (0.38-1.08)</td>
<td>0.79 (0.48-1.28)</td>
<td>0.79 (0.48-1.28)</td>
<td>1.20 (0.67-2.13)</td>
</tr>
<tr>
<td>Race:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Hispanic Black</td>
<td>2.35 (1.43-3.84)</td>
<td>1.83 (1.10-3.06)</td>
<td>1.11 (0.52-2.37)</td>
<td>2.44 (1.46-4.08)</td>
<td>2.07 (1.26-3.43)</td>
</tr>
<tr>
<td>All Other</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Age:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>66-69</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>70-74</td>
<td>0.91 (0.55-1.52)</td>
<td>0.98 (0.57-1.69)</td>
<td>1.75 (0.74-4.15)</td>
<td>0.79 (0.46-1.34)</td>
<td>1.16 (0.63-2.11)</td>
</tr>
<tr>
<td>75-79</td>
<td>1.03 (0.62-1.71)</td>
<td>0.89 (0.52-1.53)</td>
<td>1.28 (0.53-3.07)</td>
<td>0.85 (0.50-1.45)</td>
<td>1.17 (0.65-2.12)</td>
</tr>
<tr>
<td>80-84</td>
<td>0.85 (0.51-1.40)</td>
<td>0.55 (0.31-0.98)</td>
<td>0.95 (0.38-2.38)</td>
<td>0.63 (0.37-1.07)</td>
<td>1.05 (0.57-1.93)</td>
</tr>
<tr>
<td>85+</td>
<td>0.89 (0.52-1.50)</td>
<td>0.36 (0.19-0.68)</td>
<td>0.80 (0.30-2.15)</td>
<td>0.66 (0.38-1.14)</td>
<td>0.66 (0.34-1.27)</td>
</tr>
</tbody>
</table>

Model adjusts for patient sex, marital status, income, education, self-rated health, and perceived life expectancy.
When examining components of MM in multivariable models,

- Patients with chronic conditions were more likely than patients without to be admitted to the ED or to the hospital.
- Patients with 2 or more geriatric syndromes were nearly half as likely than those without to undergo cancer-directed treatment in the last 30 days of life.
- This association persisted after adjusting for the presence of chronic conditions and/or functional limitations.
Summary findings

- **Non-Hispanic Black race:**
  - **Unadjusted and multivariable analysis:**
    Higher use of acute care, cancer-directed treatment, and in-hospital death in Blacks than in Whites. No difference in ICU use by race.

- **Older age** associated with lower likelihood of receiving cancer-directed treatment, both in unadjusted and multivariable analysis. No association between age and other forms of aggressive treatment.
Summary findings, cont’d

- **MM:**
  - **Unadjusted analysis:** Higher MM, particularly more FL and GS, associated significantly and negatively with cancer-directed treatment.
  - **Multivariable analysis:** no statistically significant association between MM and receipt of any form of aggressive care.
Conclusion

- Rather than MM, receipt of aggressive care appears to be driven to some extent by age, but more importantly by race, a construct that encapsulates beliefs and cultural factors.

- Implication: Consideration should be given to developing concept of palliative care among different ethnic groups.
Study Strengths and Limitations

• **Strengths:**
  - U.S. representative sample of older adults
  - Measures of MM, health status, and perceived life expectancy that are usually not available in administrative databases
  - Our construct of MM, which accounts for the occurrence and co-occurrence of chronic conditions, functional limitations, and/or geriatric syndromes
  - Use of claims data ascertaining the use of health services

• **Limitations:**
  - Retrospective look at EOL care
  - Absence of variables measuring patient, preferences, beliefs, and attitudes regarding EOL
Acknowledgments

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Questions?