Increasing Burden and Complexity in Two Index Conditions: Heart Failure and Dementia

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HCSRN-OAICs
AGING Initiative
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Today’s Speakers

Mayra Tisminetzky, MD, PhD, MPH

Ariel Green, MD, MPH
Multimorbidity Burden and Adverse Outcomes in Older Adults with Heart Failure

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Division of Geriatric Medicine
University of Massachusetts Medical School

AGING initiative

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October 25, 2018
The most common chronic condition experienced by adults is multimorbidity, the coexistence of multiple chronic diseases or conditions

_Tinetti et al_
Background

- Majority of **health care used** by those with ≥ 2 chronic conditions

- Multimorbidity greatly **increases the risk of hospitalization and death** among patients with HF
Patients with HF, especially older adults, present with multiple chronic conditions, and health care providers often face the prospect of managing not just HF

Older adults with multiple chronic conditions usually excluded from RCTs

Lack of clinical guidelines, adverse interactions between drugs and diseases
Background

How much blood is pumped out?

- **Preserved Ejection Fraction**
  - $\approx 50-70\%$ is pumped out during each contraction
  - (Usually comfortable during activity)

- **BORDERLINE Ejection Fraction**
  - $\approx 41-49\%$ is pumped out during each contraction
  - (Symptoms may become noticeable during activity.)

- **REDUCED Ejection Fraction**
  - $\leq 40\%$ is pumped out during each contraction
  - (Symptoms may become noticeable even during rest.)

It is also possible to have a diagnosis of heart failure with a seemingly normal (or preserved) ejection fraction of greater than or equal to 50%.

HF with preserved ejection fraction is almost exclusively a disorder of older adults.
Overall Aim

To assess multimorbidity burden and its association with clinical outcomes in adults with HF according to age, sex and HF type.

Clinical outcomes

HF related and any cause hospitalization

All-cause mortality
Each site contains a Virtual Data Warehouse. Warehouse is comprised of electronic datasets, populated with linked demographic, administrative, ambulatory pharmacy, outpatient laboratory test results, and health care utilization.
CVRN HF adult members identified with HF from 2005-2012
N=114,705

Patients ≥ 21 years old were identified based on either having been hospitalized with primary discharge diagnosis of HF and/or having ≥3 ambulatory visits with associated HF diagnoses, with at least one visit being with a cardiologist

Study sample

Excluded for the following:
• Death on index date (N=136)
• Disenrollment on index date (N=18)

Final Cohort of Adults with HF
N=114,553
Study Design


Analysis sample: CVRN-HF cohort

- Adults ≥21 years of age
- Diagnosed heart failure defined as
  - ≥1 primary discharge diagnosis of HF
  - Having ≥3 ambulatory visits coded for HF with at least one visit being to a cardiologist during the study period using ICD-9 codes (398.91, 402.x1, 404.01, 404.03, 404.11, 404.13, 404.91, 404.93 and 428.x)
- Known gender
- ≥365 days of continuous health plan enrollment before the index date
- ≥365 days of continuous pharmacy benefit coverage before the index date
Multimorbidity Measurement

The 26 Chronic conditions were identified using ICD-9 codes attached to encounters from inpatient, emergency and ambulatory diagnoses and procedures, found in the VDW.

Chronic conditions were summed for each study subject to create a multimorbidity count.

Study population stratified into four multimorbidity burden groups based on sample distribution quartiles.
Clinical Outcomes

**Hospitalizations** were identified from each site’s VDW, and admissions for HF were based on a primary discharge diagnosis for HF using the same ICD-9 inclusion codes.

**Deaths** were identified from hospital and billing claims databases, administrative health plan databases, state death certificate registries, and Social Security Administration files.
### Patient characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Overall n=114,553</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Characteristic</strong></td>
<td><strong>n=(%)</strong></td>
</tr>
<tr>
<td>Age, median,</td>
<td>75.0</td>
</tr>
<tr>
<td>Age group, years</td>
<td></td>
</tr>
<tr>
<td>&lt; 55</td>
<td>9,897 (8.6)</td>
</tr>
<tr>
<td>55-64</td>
<td>17,276 (15.1)</td>
</tr>
<tr>
<td>65-74</td>
<td>28,215 (24.6)</td>
</tr>
<tr>
<td>75-84</td>
<td>36,637 (32.0)</td>
</tr>
<tr>
<td>85-94</td>
<td>20,635 (18.0)</td>
</tr>
<tr>
<td>&gt; 95</td>
<td>1,893 (1.7)</td>
</tr>
<tr>
<td>Women</td>
<td>52,585 (45.9)</td>
</tr>
<tr>
<td>Black/African American</td>
<td>12,872 (11.2)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>15,001 (13.1)</td>
</tr>
<tr>
<td>Morbidity count, median</td>
<td>6.0</td>
</tr>
</tbody>
</table>
## Prevalence of chronic conditions

<table>
<thead>
<tr>
<th>Chronic condition</th>
<th>Overall, (n=114,553) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>88,871 (77.6)</td>
</tr>
<tr>
<td>Visual impairment</td>
<td>81,067 (70.8)</td>
</tr>
<tr>
<td>Chronic kidney disease</td>
<td>58,096 (50.7)</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>46,725 (40.8)</td>
</tr>
<tr>
<td>Arthritis</td>
<td>44,293 (38.7)</td>
</tr>
<tr>
<td>Anemia</td>
<td>41,211 (36.0)</td>
</tr>
<tr>
<td>Atrial fibrillation</td>
<td>37,862 (33.1)</td>
</tr>
<tr>
<td>Chronic obstructive pulmonary disease</td>
<td>29,575 (25.8)</td>
</tr>
<tr>
<td>Hearing impairment</td>
<td>20,163 (17.6)</td>
</tr>
<tr>
<td>Asthma</td>
<td>17,340 (15.1)</td>
</tr>
<tr>
<td>Depression</td>
<td>16,702 (14.6)</td>
</tr>
<tr>
<td>Osteoporosis</td>
<td>14,703 (12.8)</td>
</tr>
<tr>
<td>Myocardial infarction</td>
<td>12,607 (11.0)</td>
</tr>
<tr>
<td>Ischemic stroke</td>
<td>5,836 (5.1)</td>
</tr>
<tr>
<td>Dementia</td>
<td>5,503 (4.8)</td>
</tr>
<tr>
<td>Mobility impairment</td>
<td>4,636 (4.0)</td>
</tr>
</tbody>
</table>
## Baseline medication

<table>
<thead>
<tr>
<th>Medication</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>n=114,553 (%)</td>
<td></td>
</tr>
<tr>
<td>ACE inhibitor/ARB</td>
<td>74,084 (64.7)</td>
</tr>
<tr>
<td>Aldosterone receptor antagonist</td>
<td>8,583 (7.5)</td>
</tr>
<tr>
<td>Anti-arrhythmic drugs</td>
<td>8,218 (7.2)</td>
</tr>
<tr>
<td>Anticoagulant</td>
<td>28,176 (24.6)</td>
</tr>
<tr>
<td>Antiplatelet agent</td>
<td>13,001 (11.3)</td>
</tr>
<tr>
<td>βeta-blocker</td>
<td>75,214 (65.7)</td>
</tr>
<tr>
<td>Calcium channel blocker</td>
<td>36,348 (31.7)</td>
</tr>
<tr>
<td>Digoxin</td>
<td>18,344 (16.0)</td>
</tr>
<tr>
<td>Nitrates</td>
<td>25,080 (21.9)</td>
</tr>
<tr>
<td>Statins</td>
<td>67,248 (58.7)</td>
</tr>
</tbody>
</table>
Frequency of counts multiple chronic conditions

![Frequency of counts multiple chronic conditions graph]

- Frequency, %
- Number of morbidities

The graph shows the frequency distribution of counts multiple chronic conditions. The x-axis represents the number of morbidities ranging from 1 to 18, and the y-axis indicates the frequency percentage.
Frequency of multiple chronic conditions

- 0-4 morbidities
- 5-6 morbidities
- 7-8 morbidities
- 9 or more morbidities
Outcomes by age group

All-cause mortality

HF-related hospitalization

Any cause related hospitalization
Outcomes overall and by sex

A

All-cause mortality

B

HF-related hospitalization

C

Any cause related hospitalization
Outcomes by HF type

A. All-cause mortality

B. HF-related hospitalization

C. Any cause related hospitalization
Summary

Increasing risk of adverse clinical outcomes with greater multimorbidity burden

Similar trends were found in men and women, across a broad age spectrum, and in those with preserved, reduced, and borderline ejection fraction

Impact of multimorbidity burden was prominent in persons aged < 65 years
Strengths and Limitations

Strengths

• Community-based health systems
• Broad geographic, socioeconomic diverse cohort

Limitations

• Lack of information on severity of disease or time from diagnosis
• Lack of cause of death data
Conclusions

Large observational studies using a simple analytical approach, summing the number of chronic conditions, can help to identify important high risk subgroups of patients with HF and inform the design of future RCTs with the greatest relevance to patients at the highest risk of adverse outcomes.
Multimorbidity Burden and Adverse Outcomes in a Community-Based Cohort of Adults with Heart Failure

Mayra Tismintzky, MD, PhD, Jerry H. Gurwitz, MD, Dongjie Fan, MSPH, Kristi Reynolds, MPH, PhD, David H. Smith, PhD, RPh, David J. Magid, MD, MPH, Sue Hee Sung, MPH, Terrence E. Murphy, PhD, Robert J. Goldberg, PhD, and Alan S. Go, MD

OBJECTIVES: To assess multimorbidity burden and its association with clinical outcomes in adults with heart failure (HF) according to sex, age, and HF type.

DESIGN: Retrospective cohort study.

SETTING: Five healthcare delivery systems across the United States.

PARTICIPANTS: Adults with HF (N=11,455).

MEASUREMENTS: We characterized participants with respect to the presence of 26 chronic conditions categorized into quartiles based on overall burden of comorbidity (<5, 5–6, 7–8, ≥9). Outcomes included all-cause death and hospitalization for HF or any cause. Multivariable Cox regression was used to evaluate the adjusted association between the categorized burden of multimorbidity and outcomes.

RESULTS: Individuals with more morbidities were more likely to die than those with fewer than 5 morbidities (5–6 morbidities; adjusted hazard ratio (aHR)=1.27 (95% confidence interval (CI)=1.24–1.31); ≥9 morbidities; aHR=1.52, 95% CI=1.48–1.57). Multivariable Cox regression was used to evaluate the adjusted association between the categorized burden of multimorbidity and outcomes.

CONCLUSION: After adjustment, higher levels of multimorbidity predicted worse HF outcomes and may be an important consideration in strategies to improve clinical and person-centered outcomes.

Key words: multimorbidity; heart failure; comorbidity; multiple chronic conditions

Heart failure (HF) develops frequently in the presence of multiple other concomitant chronic conditions, which may complicate clinical management and treatment.

From the *Meyers Primary Care Institute, a joint endeavor of University of Massachusetts Medical School, Reliant Medical Group, and Fallon Health, Worcester, Massachusetts; Division of Geriatric Medicine, Department of Medicine, University of Massachusetts Medical School, Worcester, Massachusetts; †Department of Quantitative Health Sciences, University of Massachusetts Medical School, Worcester, Massachusetts; Division of Research, Kaiser Permanente Northern California, Oakland, California; ‡Department of Research and Evaluation, Kaiser Permanente Southern California, Pasadena, California; §Center for Health Research, Kaiser Permanente Northwest, Oregon, Portland; **The Kaiser Institute for Health Research Denver, Denver, Colorado; ††Section of Geriatrics, Department of Internal Medicine, School of Medicine, Yale University, New Haven, Connecticut; †‡Department of Epidemiology and Biostatistics, University of California, San Francisco, San Francisco, California; †§Departments of Medicine, University of California, San Francisco, California; and the †¶Department of Health Research and Policy, School of Medicine, Stanford University, Stanford, California.

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Impact Statement

We certify that this work is novel. Our study included a large sample of individuals with confirmed heart failure with borderline ejection fraction. Our findings are likely to be generalizable to the large group of individuals with heart failure because of the breadth of geographic and demographic diversity in our community-based population.

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Mentors/Collaborators

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Dr. Alan Go (Division of Research, Kaiser Permanente Northern CA)

Dr. Robert Goldberg (University of Massachusetts Medical School)

Dr. Terry Murphy (Yale University)

Dr. Heather Allore (Yale University)

Sue Hee Sung (Division of Research, Kaiser Permanente Northern CA)

Dongjie Fan (Division of Research, Kaiser Permanente Northern CA)
THANK YOU

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Future ideas  ROI Award

Aim 1: To examine the effectiveness of selected medical therapies on death, HF hospitalization and all-cause hospitalizations in a large, community-based population of older adults with HF across a range of levels of multimorbidity burden and left ventricular ejection fraction.

Aim 2: To evaluate targeted adverse outcomes, including kidney dysfunction, hyperkalemia, sodium disturbances, bradycardia, and syncope, associated with selected HF therapies in older adults with HF, stratified by multimorbidity burden and left ventricular ejection fraction.

Aim 3: To characterize the potential benefits and adverse outcomes associated with selected HF therapies in older adults with HF and two prevalent comorbidity dyads—HF-diabetes and HF-anemia—that are common and substantially increase the risks of death and morbidity.
Future ideas  Pilot study

To examine the individual and combined effects of burden of non-cardiac multimorbidity and functional limitation on hospitalizations and mortality in a large community of adults with incident HF.
Optimizing Medications for People with Dementia and Multiple Chronic Conditions

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Johns Hopkins University
Disclosures

• No disclosures

• My research is supported by grants from the National Institute on Aging
Mrs. R:
82 years old

- Clouded cognition
- Anxiety
- Frequent falls
- Dry mouth
- Urinary Incontinence
- Macular degeneration
- Polypharmacy
- Lower extremity edema
- Heart failure
- Atrial fibrillation
Mrs. R’s medications

- Amiodarone 200 mg BID
- Apixaban 5 mg BID
- Metoprolol 25 mg daily
- Losartan 50 mg daily
- Atorvastatin 20 mg daily
- Furosemide 20 mg daily
- KCl 20 meq daily
- Solifenacin 10 mg daily
- Buspirone 5 mg BID
- Lorazepam 0.5 mg BID
- Ca/Vit D 1 tablet daily
- Eye vitamins 1 tablet BID
- Fish oil 1 capsule daily
- Zoledronic acid annually
Deintensification is rare

- Most people with dementia have multiple chronic conditions (MCCs)
- Among veterans with diabetes and dementia, 52% had tight control (mean HbA1c 6.3%)
- 1 in 6 nursing home residents with advanced dementia were prescribed a statin

Prescribing for people with dementia and MCCs is challenging

- Dementia plus other conditions:
  - Polypharmacy
  - 10% - 56% of people with dementia are taking a potentially inappropriate medication (PIM)
  - Increased risk of adverse drug events, hospitalization, mortality

Medication Discussions in Primary Care for Older Adults with Cognitive Impairment: A Qualitative Analysis of Recorded Medical Encounters
Methods

• Qualitative content analysis of audio-recorded clinical encounters from SAME Page trial

• 93 patient-caregiver dyads at 2 primary care clinics and 1 hospital-based geriatrics clinic in Baltimore

• All 93 visits audio-recorded and transcribed
### Demographics

<table>
<thead>
<tr>
<th>Patients</th>
<th>N = 93</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age (SD), y</td>
<td>79.9 (7.6)</td>
</tr>
<tr>
<td>Female gender, n (%)</td>
<td>48 (51.6)</td>
</tr>
<tr>
<td>Nonwhite or Hispanic, n (%)</td>
<td>39 (41.9)</td>
</tr>
<tr>
<td>Beyond HS education, n (%)</td>
<td>44 (47.3)</td>
</tr>
<tr>
<td>Mean MMSE score (SD)</td>
<td>21.6 (6.8)</td>
</tr>
<tr>
<td>≥10 prescription medicines, n (%)</td>
<td>23 (24.7)</td>
</tr>
</tbody>
</table>
Themes

Clinician strategies for discussing optimal prescribing

Clinician strategies for facilitating patient/caregiver engagement in medication decisions

Factors complicating optimal prescribing
Clinician strategies for discussing optimal prescribing

- Balance of benefits and harms may change with aging and dementia
- Deintensifying overall medical care
- Prioritizing function and quality of life
- Symptoms cannot always be “fixed”
- Limitations or uncertainty of evidence
- Diminishing returns
Clinician strategies for discussing optimal prescribing

Symptoms cannot always be “fixed” with medication

Patient asks to increase tamsulosin dose because of nocturia.

Clinician: There's always simple things like... eliminating your fluid intake in the evening.

Patient: Oh, it's like the discussions we've had before about you're growing older and there are things happening to your body.
Clinician strategies for discussing optimal prescribing

Symptoms cannot always be “fixed” with medication

Clinician: There's no easy answer... but part of the flip side is that... in medicine, we want to do no harm.

- 70 yo, MMSE 29, intervention, general primary care
Clinician strategies for discussing optimal prescribing

Balance of benefits and harms may change with aging and cognitive impairment

Patient has had multiple hypoglycemic episodes.

Clinician: Normally in diabetes, we think about the risk of kidney disease, the risk of eye disease...but as we get older, the risk of a low sugar reaction is actually more important...You could...fall, you hit your head and break your hip.

- 75 yo, MMSE 25, usual care, general primary care
Clinician strategies for discussing optimal prescribing

Limitations or uncertainties of evidence

Patient is taking aspirin and rivaroxaban and has “balance issues.”

Clinician: The problem with blood thinners is that if you fall and injure yourself, you can bleed. But it's a risk versus a benefit... There are people who are three and four of these medicines... Now they're at great risk to have bleeding, but they're also at great risk to have blood clots... The reason why I have a lot of gray hair is that it's a constant battle.

- 76 year old, MMSE 20, intervention group, general primary care
Clinician strategies for facilitating patient/caregiver engagement

• Reassuring patient that clinician will not withdraw appropriate care
• Reassuring patient that clinician will monitor closely for negative consequences resulting from deprescribing
• Explicitly eliciting patient or caregiver perspective on medication change
Clinician strategies for facilitating patient/caregiver engagement

Reassuring patient that clinician will not withdraw appropriate care

Clinician: This is my first time meeting you, and I don't want to change everything for you right at once. I want to get to know you a little bit more...And then work together on minimizing your medications. Understanding that I need to take care of your neuropathy, I need to make sure you're sleeping okay, and I need to make sure your blood pressure is okay. So I will not sacrifice what needs to be done, but I will try to minimize the amount of medicine that we use for it.

- 78 yo, MMSE 26, intervention, geriatrics clinic
Strategies for facilitating patient/caregiver engagement

Reassuring patient that clinician will monitor closely for negative consequences resulting from deprescribing

Clinician: You don't need Amlodipine for your blood pressure, your blood pressure is doing well even on a lower dose and I think you're going to do fine without out it. We'll check you again down the road, the short road.

- 81 yo, MMSE 26, intervention, geriatrics clinic
Clinician strategies for facilitating patient/caregiver engagement

Explicitly eliciting patient or caregiver perspective on medication change

**Clinician:** This falling is a new event...Now we have an event that is happening, we need to modify. Down the road, if I want to take you off of the amitriptyline and replace it with something for neuropathy, would you be okay with that?

- 78 yo, MMSE 26, intervention, geriatric service clinic
Factors complicating optimal prescribing

- Patient or caregiver expectations
- Discordance between clinician recommendations and patient or caregiver preferences
- Balancing disease-based care vs. quality of life
- Distressing behavioral and psychological symptoms of dementia
- Clinician attention diverted by complexity
Factors complicating optimal prescribing

Patient or caregiver expectations

**Patient:** I need something now with my bladder.

**Clinician:** The medicines that we use to slow the bladder down, kind of have side effects... The side effects can be things like dry mouth. But they can also be like dizziness... We have to be very, very care - but look, it's always a risk versus a benefit...
Clinician: I have a patient about your age, actually, who had a similar problem... She was really miserable. And I mean, we were able to put her on a very small dose of a medicine. And she's like a new woman. I mean, I got to tell you, it's really incredible... [Writing prescription for oxybutynin] I wouldn't give it to you if I didn't think it wasn't safe... I just want to be clear that... it can have these subtle effects on you.

- 83 yo, MMSE 24, intervention, general primary care
Factors complicating optimal prescribing

Discordance between clinician recommendations and patient or caregiver preferences

Caregiver: [Describing patient’s recent hospitalization.] So this...young doctor comes in...It was the cholesterol medicine, the atorvastatin. I said, ‘Why does he have to discontinue that?’ ‘Oh, well studies show that after the age of 70 it's not very effective.’ I said, ‘Well I bet you we could find studies that show that it is.’

- 100 yo, MMSE 9, intervention, geriatrics clinic
Factors complicating optimal prescribing

Balancing disease-based care vs. treatment burden

Patient: I take 5 pills in the morning, 9 after I eat and 5 more in the evening, bedtime, 19 pills...

Clinician: Your diabetes was perfect...you were at 5.8 so we don't need to do anything different, I'll just see you back in six months for your complete physical, okay?

- 85 yo, MMSE 30, intervention, general primary care
Conclusions and Next Steps

Test communication strategies with patients and caregivers

Build evidence base related to competing risks and outcomes of deintensification
Thank you!

ariel@jhmi.edu
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Kathryn.Anzuoni@meyersprimary.org

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