

# Patterns of scheduled follow-up appointments following hospitalization for heart failure: insights from an urban medical center in the United States

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**Objectives:** Although postdischarge outpatient follow-up appointments after a hospitalization for heart failure represent a potentially effective strategy to prevent heart failure readmissions, patterns of scheduled follow-up appointments upon discharge are poorly described. We aimed to characterize real-world patterns of scheduled follow-up appointments among adult patients with heart failure upon hospital discharge.

**Patients and methods:** This was a retrospective cohort study performed at a large urban academic center in the United States among adults hospitalized with a principal diagnosis of congestive heart failure between January 1, 2013, and December 31, 2014. Patient demographics, administrative data, clinical parameters, echocardiographic indices, and scheduled postdischarge outpatient follow-up appointments were collected.

**Results:** Of the 796 patients hospitalized for heart failure, just over half of the cohort had a scheduled follow-up appointment upon discharge. Follow-up appointments were less likely among patients who were white and had heart failure with preserved ejection fraction and more likely among patients with Medicaid and chronic obstructive pulmonary disease. In an adjusted multivariable regression model, age  $\geq 65$  years was inversely associated with a scheduled follow-up appointment upon hospital discharge, despite higher rates of several cardiovascular and noncardiovascular comorbidities.

**Conclusion:** Just half of the patients discharged home following a hospitalization for heart failure had a follow-up appointment scheduled, representing a missed opportunity to provide a recommended care transition intervention. Despite a greater burden of both cardiovascular and noncardiovascular comorbidities, older adults (age  $\geq 65$  years) were less likely to have a follow-up appointment scheduled upon discharge compared with younger adults, revealing a disparity that warrants further investigation.

**Keywords:** appointments, patient readmission, ageism, heart failure

## Introduction

Heart failure affects about 6 million people in the United States and costs >30 billion dollars per year.<sup>1</sup> Given its heavy burden on the health care system, there is increased focus on improving the quality and efficiency of health care delivery for this patient population. Readmission rates, namely at 30 days, have become an important measure of health care quality. In addition to contributing to patient morbidity and mortality, 30-day readmissions are now closely tied to reimbursement.<sup>2</sup> Although imperfect as a single metric of quality, readmission rates reflect care provided both during hospitalization and after discharge and have led to increased emphasis on improving transitions of care.

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Although interventions aimed at reducing readmission rates for heart failure patients have produced mixed results, outpatient follow-up is generally agreed upon as an important element of any transitional program<sup>3,4</sup> and is supported by the American Heart Association and the American College of Cardiology.<sup>5</sup> Among hospital-based strategies, Bradley et al<sup>6</sup> demonstrated scheduled follow-up appointments upon discharge to be associated with reduced risk-standardized 30-day readmission rates. Despite their important impact on readmission, real-world patterns of scheduled follow-up appointments upon discharge are not well described.

This study sought to characterize patterns of scheduled follow-up appointments for adult patients with heart failure upon hospital discharge, as identifying and subsequently targeting deficiencies related to scheduling follow-up appointments may offer a cost-effective strategy to curb readmission rates.

## Patients and methods

### Population

This retrospective cohort included consecutive patients admitted with a principal diagnosis of congestive heart failure who were subsequently discharged home from the Medicine service at an 850-bed urban academic tertiary medical center in New York City, New York (USA), between January 1, 2013, and December 31, 2014. A principal diagnosis of congestive heart failure was identified based on the presence of any of the following International Classification of Diseases, ninth revision, Clinical Modification codes,<sup>7</sup> as used by the Centers for Medicare & Medicaid Services for publicly reporting heart failure quality measures: 402.01, 402.11, 402.91, 404.01, 404.03, 404.11, 404.13, 404.91, 404.93, or 428.xx.

Patients discharged to another hospital, skilled nursing facility, and short or intermediate care facility were excluded. Patients discharged with hospice care were also excluded. This study was approved by the Weill Cornell Institutional Review Board (Protocol #1404014979R001). The Weill Cornell Institutional Review Board deemed informed consent unnecessary, given the retrospective nature of the study.

### Data collection

Patient demographic and administrative data were acquired through an automated query of the electronic health record. Clinical parameters including heart failure characteristics and patient comorbidity were collected at the time of discharge by manual chart review. Structural and functional cardiac indices were collected from echocardiograms performed as close to the discharge date as possible, up to 6 months prior.

Heart failure with preserved ejection fraction (HFpEF) was defined based on guideline criteria,<sup>5</sup> a left ventricular ejection fraction  $\geq 50\%$  on echocardiography. Scheduled post-discharge outpatient follow-up appointments were defined as any appointment with a specified date and time after discharge and were identified by reviewing the discharge summary from the electronic health record, which contains a specified section for scheduled follow-up appointments. Follow-up appointments were classified based on specialty. Appointments with physician extenders including nurse practitioners and physician assistants were included based on the specialty of the supervising physician. If a follow-up appointment was scheduled with both a cardiologist and noncardiology physician, both were included in the analysis. At this medical center, inpatient medical providers and/or administrative staff must call the offices of the requested outpatient providers in order to schedule follow-up appointments.

### Statistical methods

The primary outcome of interest was the presence of a scheduled follow-up appointment upon discharge. Descriptive statistics were performed, stratified by follow-up appointment, age, and payer status. Associations were tested for statistical significance using the Pearson  $\chi^2$  statistic for dichotomous variables and the Student's *t*-test for continuous variables with confidence intervals set to 95%. We used multivariable logistic regression to identify factors associated with a scheduled follow-up appointment, adjusting for demographic variables as well as comorbidities found to have statistical significance in bivariate analysis. All calculations were performed using IBM SPSS Statistics Version 20 (IBM Corporation, Armonk, NY, USA).

## Results

### Scheduled follow-up appointments

A total 796 unique patients with a mean age of  $70 \pm 15$  years were hospitalized with a principal diagnosis of heart failure. Patients had a scheduled follow-up appointment in 56% of cases, including 45% with a cardiologist and 31% with a noncardiology physician. Among the patients, 30% had a scheduled follow-up appointment within 7 days of discharge and 44% had a scheduled appointment within 14 days. The underlying reasons for why patients did not have a scheduled follow-up appointment were not known.

As shown in Table 1, patients who did not have a scheduled follow-up appointment were older, more commonly white, and less likely to have Medicaid compared with those with a scheduled follow-up appointment. Patients without a scheduled follow-up appointment had a slightly higher

**Table 1** Patient demographics and clinical indices, stratified by scheduled follow-up appointment

Parameter	All (n=796)	FUA absent (n=353)	FUA present (n=443)	P-value
Age (mean ± SD, years)	70±15	72±14	69±16	<b>0.004</b>
Female, % (n)	41 (330)	43 (153)	40 (177)	0.34
White race, % (n)	34 (273)	39 (136)	31 (137)	<b>0.025</b>
Payer status, % (n)				
Medicare	70 (558)	71 (252)	69 (306)	0.48
Medicaid	11 (88)	7 (25)	14 (63)	< <b>0.001</b>
Heart failure characteristics				
Left ventricular ejection fraction (mean ± SD)	42±19	44±19	40±19	<b>0.003</b>
Heart failure preserved ejection fraction, % (n)	42 (315)	48 (158)	37 (157)	<b>0.002</b>
Right ventricular dysfunction, % (n)	46 (346)	44 (145)	47 (201)	0.37
Severe valvular disease, % (n)	9 (74)	9 (31)	10 (43)	0.72
New York Heart Association Class III/IV, % (n)	93 (739)	95 (334)	91 (405)	0.69
Cardiovascular comorbidities, % (n)				
Coronary artery disease	52 (414)	52 (182)	53 (233)	0.77
Hypertension	77 (614)	78 (275)	77 (339)	0.65
Diabetes	39 (309)	37 (132)	40 (177)	0.46
Atrial fibrillation/flutter	38 (306)	38 (133)	39 (173)	0.69
Ventricular tachycardia	6 (50)	7 (23)	6 (27)	0.81
Cerebrovascular accident	16 (127)	15 (53)	17 (74)	0.52
Peripheral vascular disease	9 (68)	9 (30)	9 (38)	0.58
Noncardiovascular comorbidities, % (n)				
Chronic obstructive pulmonary disease	15 (118)	11 (40)	18 (78)	<b>0.01</b>
End-stage renal disease	5 (39)	6 (22)	4 (17)	0.12
Gastrointestinal bleed	10 (78)	12 (42)	8 (36)	0.08
Liver disease	5 (37)	4 (14)	5 (23)	0.41
Cancer	24 (195)	22 (76)	27 (119)	0.08
Major psychiatric disorder	10 (78)	9 (31)	11 (47)	0.39

**Note:** Bold indicates  $P < 0.05$ .

**Abbreviations:** FUA, follow-up appointments; SD, standard deviation.

left ventricular ejection fraction and higher rates of HFpEF compared to those with a scheduled follow-up appointment. New York Heart Association classification and frequency of right ventricular dysfunction and severe valvular disease were similar between groups. Regarding cardiovascular comorbidities, prevalence of coronary artery disease, atrial fibrillation/flutter, hypertension, diabetes, cerebrovascular accident, and peripheral vascular disease were similar between groups. Among noncardiovascular comorbidities, chronic obstructive pulmonary disease occurred more commonly among patients with a scheduled follow-up appointment. Prevalence of other noncardiovascular comorbidities, including gastrointestinal bleeding, liver disease, cancer, and major psychiatric disorders, were comparable between groups.

## Scheduled follow-up appointments among older adults

Of the patient cohort, 68% (n=540) represented older adults, aged 65 years and older. Older adults had a scheduled follow-up appointment upon discharge less frequently than younger adults. They were less likely to be scheduled to see a cardiologist or a noncardiology physician compared with younger adults (Table 2). Noncardiology physicians predominantly included primary care physicians (67%) and medicine subspecialties (27%). Rates of scheduled follow-up appointments within 7 days and within 14 days of discharge did not differ between age groups.

Table 3 demonstrates patient characteristics stratified by age. Older adults were more commonly white and more

**Table 2** Rates of scheduled follow-up appointments

Parameter	All (n=796)	Age ≥65 years (n=540)	Age <65 years (n=256)	P-value
Scheduled appointment, % (n)	56 (443)	52 (278)	65 (165)	<b>0.001</b>
With cardiologist, % (n)	45 (356)	42 (227)	50 (129)	<b>0.03</b>
With other physician, % (n)	31 (250)	28 (152)	38 (98)	<b>0.004</b>
Within 7 days of discharge, % (n)	30 (237)	31 (166)	28 (71)	0.39
Within 14 days of discharge, % (n)	44 (351)	43 (233)	46 (118)	0.43

**Table 3** Patient demographics and clinical indices, stratified by age

Parameter	All (n=796)	Age ≥65 years (n=540)	Age <65 years (n=256)	P-value
Female, % (n)	42 (330)	43 (232)	38 (98)	0.21
White, % (n)	34 (273)	40 (215)	23 (58)	<0.001
Payer status, % (n)				
Medicare	70 (558)	90 (487)	28 (71)	<0.001
Medicaid	11 (88)	3 (15)	29 (73)	<0.001
Heart failure characteristics				
Left ventricular ejection fraction (mean ± SD)	42±19	44±18	36±20	<0.001
Heart failure preserved ejection fraction, % (n)	42 (315)	45 (233)	31 (75)	<0.001
Right ventricular dysfunction, % (n)	46 (346)	44 (145)	47 (113)	0.75
Severe valvular disease, % (n)	9 (74)	10 (50)	10 (24)	0.94
New York Heart Association Class III/IV, % (n)	93 (739)	93 (501)	93 (238)	0.92
Cardiovascular comorbidities, % (n)				
Coronary artery disease	52 (414)	58 (315)	39 (100)	<0.001
Hypertension	77 (614)	80 (434)	70 (180)	<b>0.002</b>
Diabetes	39 (309)	37 (202)	42 (107)	0.24
Atrial fibrillation/flutter	38 (306)	46 (247)	23 (59)	<0.001
Ventricular tachycardia	6 (50)	6 (31)	2 (19)	0.36
Cerebrovascular accident	16 (127)	19 (101)	10 (26)	<b>0.002</b>
Peripheral vascular disease	9 (68)	9 (48)	8 (20)	0.61
Noncardiovascular comorbidities, % (n)				
Chronic obstructive pulmonary disease	15 (118)	17 (90)	11 (28)	<b>0.03</b>
End-stage renal disease	5 (39)	3 (15)	9 (24)	<0.001
Gastrointestinal bleed	10 (78)	12 (63)	6 (15)	<b>0.01</b>
Liver disease	5 (37)	4 (20)	7 (17)	0.07
Cancer	24 (195)	29 (157)	15 (38)	<0.001
Major psychiatric disorder	10 (78)	9 (48)	12 (30)	0.21

**Note:** Bold indicates  $P < 0.05$ .

**Abbreviation:** SD, standard deviation.

likely to have Medicare. Regarding their heart failure, older adults had a higher left ventricular ejection fraction, with higher rates of HFpEF, compared with younger adults. Patient groups were similar with respect to New York Heart Association classification, right ventricular dysfunction, and severe valvular disease.

Among cardiovascular comorbidities, coronary artery disease, atrial fibrillation/flutter, hypertension, and cerebrovascular accident occurred more frequently among older adults compared with younger adults. Diabetes, peripheral vascular disease, and ventricular tachycardia occurred with similar frequency between groups. Older adults also had higher rates of noncardiovascular comorbidities including chronic obstructive pulmonary disease, gastrointestinal bleeding, and cancer. Rates of liver disease and major psychiatric disorders were comparable between groups.

Stratification by payer status (Table 4) revealed the characteristics of patients with Medicare (mean age  $76 \pm 12$  years) to parallel the characteristics of older adults – those with Medicare were more commonly white, more frequently had HFpEF, and had a higher burden of comorbidities, including coronary artery disease, hypertension, atrial fibrillation/flutter, cerebrovascular accident, cancer, and gastrointestinal bleeding.

## Multivariable regression analysis

In the multivariable regression analysis, age  $\geq 65$  years was inversely associated with having a scheduled follow-up appointment upon hospital discharge, after adjusting for sex, race, payer status, HFpEF, and chronic obstructive pulmonary disease (Table 5). In this adjusted model, patients with HFpEF were also less likely to have follow-up appointments compared with those with heart failure with reduced ejection fraction (HFrEF). On the other hand, this model revealed that patients with concurrent chronic obstructive pulmonary disease were more likely to have a follow-up appointment upon discharge compared with those without chronic obstructive pulmonary disease.

## Discussion

There are several important findings in this study. First, despite guideline recommendations, only half of the cohort was scheduled for any follow-up appointments upon discharge. Second, comorbidities were common among patients admitted with heart failure, but most were not associated with higher rates of scheduled follow-up appointments. Third, patients with HFpEF were less likely to have scheduled follow-up appointments compared with those with HFrEF.

**Table 4** Patient demographics and clinical indices, stratified by payer status

Parameter	Medicare (n=558)	Medicaid (n=88)	Other (n=150)	P-value
Age (mean ± SD, years)	76±12	55±12	58±13	<0.001
Female, % (n)	43 (238)	46 (40)	35 (52)	0.15
White, % (n)	38 (211)	16 (14)	32 (48)	<0.001
Heart failure characteristics				
Left ventricular ejection fraction (mean ± SD)	44±19	37±20	38±18	<0.001
Heart failure preserved ejection fraction, % (n)	45 (242)	31 (26)	33 (47)	0.004
Right ventricular dysfunction, % (n)	45 (238)	52 (43)	46 (65)	0.48
Severe valvular disease, % (n)	10 (52)	10 (8)	10 (14)	1.00
New York Heart Association Class III/IV, % (n)	93 (521)	93 (82)	91 (136)	0.52
Cardiovascular comorbidities, % (n)				
Coronary artery disease	57 (317)	49 (43)	37 (55)	<0.001
Hypertension	80 (447)	75 (66)	67 (101)	0.004
Diabetes	28 (155)	33 (29)	23 (35)	0.27
Atrial fibrillation/flutter	44 (245)	19 (17)	29 (44)	<0.001
Ventricular tachycardia	7 (36)	7 (6)	5 (8)	0.86
Cerebrovascular accident	13 (73)	3 (3)	7 (11)	0.008
Peripheral vascular disease	11 (62)	11 (10)	7 (11)	0.39
Noncardiovascular comorbidities, % (n)				
Chronic obstructive pulmonary disease	15 (82)	21 (18)	10 (15)	0.08
End-stage renal disease	5 (28)	2 (2)	6 (9)	0.43
Gastrointestinal bleed	12 (65)	1 (1)	8 (12)	0.01
Liver disease	5 (26)	7 (6)	4 (6)	0.60
Cancer	18 (98)	8 (7)	9 (14)	0.006
Major psychiatric disorder	10 (56)	11 (10)	8 (12)	0.66

**Note:** Bold indicates  $P < 0.05$ .

**Abbreviation:** SD, standard deviation.

Finally, despite a greater burden of both cardiovascular and noncardiovascular comorbidities, patients  $\geq 65$  years old were less likely to have a follow-up appointment scheduled upon discharge compared with younger adults after controlling for other factors.

Postdischarge office follow-up has been identified as a key element of care transitions.<sup>3</sup> It has frequently been incorporated into transitional care model interventions aimed at improving postdischarge outcomes, such as readmission and mortality, and is supported by the American Heart Association and American College of Cardiology.<sup>5</sup> Consistent with a rate of 61% observed in a previous study,<sup>8</sup> this cohort demonstrated a scheduled follow-up appointment

rate of just  $>50\%$ . Similar to a recently published study by Baker et al,<sup>9</sup> this included just 30% with a follow-up appointment within 7 days of discharge, the optimal time interval recommended by the American College of Cardiology's Hospital to Home program.<sup>10</sup> These statistics occurred within health systems where the importance of follow-up appointments is emphasized, thus highlighting an important area for improvement and suggesting the need to identify barriers to scheduling follow-up appointments. At present, reasons for inadequate follow-up rates are not well understood. Investigating factors such as provider availability and prioritization of hospitalized patients for follow-up appointments in particular may be informative and potentially reveal opportunities for improvement.

Comorbidity is an important factor associated with hospital readmissions, preventable hospitalizations, and mortality<sup>11,12</sup> in patients with heart failure. Previous literature demonstrates that older adults have higher rates of comorbidity compared with their younger counterparts.<sup>13</sup> In this cohort, several cardiovascular and noncardiovascular comorbidities were more common among older adults compared with younger adults, including coronary artery disease, atrial fibrillation/flutter, hypertension, cerebrovascular accident, cancer, chronic obstructive pulmonary disease, and gastrointestinal bleeding.

**Table 5** Multivariable logistic regression model for scheduled follow-up appointments (model chi-square=31.20,  $P < 0.001$ )

Variable	Odds ratio (95% confidence interval)	P-value
Age $\geq 65$ years	0.69 (0.49–0.98)	<b>0.03</b>
HFpEF	0.68 (0.50–0.93)	<b>0.01</b>
Female	0.91 (0.67–1.23)	0.55
White race	0.78 (0.57–1.07)	0.12
Medicaid	1.53 (0.89–2.64)	0.12
COPD	1.80 (1.18–2.74)	<b>0.01</b>

**Note:** Bold indicates  $P < 0.05$ .

**Abbreviations:** HFpEF, heart failure with preserved ejection fraction; COPD, chronic obstructive pulmonary disease.

Interestingly, despite the fact that many of these conditions are independently associated with a worse prognosis in heart failure,<sup>14–17</sup> only patients with chronic obstructive pulmonary disease were more likely to have a scheduled follow-up appointment upon discharge. These findings suggest that, while consideration of comorbid conditions is increasingly being recognized as an important priority in heart failure management,<sup>18,19</sup> there is ongoing need for care transition strategies to better incorporate this concept into real-time discharge planning.

HFpEF represents an important subtype of heart failure, with a prevalence comparable to that of HFrEF.<sup>20</sup> Consistent with these findings, HFpEF was common in our study, comprising 42% of the cohort. The majority of patients with HFpEF were  $\geq 65$  years old, paralleling other studies<sup>20–22</sup> that have characterized HFpEF as a geriatric syndrome.<sup>23</sup> HFpEF patients perform particularly poorly following hospitalization for heart failure, illustrated by outcomes from the OPTIMIZE registry where one third of patients hospitalized with HFpEF were either rehospitalized or dead within 3 months of discharge.<sup>21</sup> Comparing HFpEF and HFrEF in  $>40,000$  Medicare recipients, Cheng et al<sup>24</sup> found similar adjusted mortality rates and a higher all-cause readmission rate among patients with HFpEF, demonstrating poor outcomes among heart failure patients irrespective of ejection fraction. Despite these findings, our study revealed that patients with HFpEF were less likely to have a scheduled follow-up appointment upon discharge. An antiquated view among care providers that HFpEF represents a benign subtype of heart failure given the preservation of ejection fraction may contribute to this finding.

Surprisingly, our study also demonstrated that patients aged 65 years and older were less likely to have a follow-up appointment scheduled, despite a higher burden of cardiovascular and noncardiovascular comorbidities compared with younger patients. This remained after controlling for comorbidities and HFpEF. Postdischarge follow-up for older adults is particularly important given that age is a well-documented risk factor for hospital readmission.<sup>25,26</sup> Older adults contend with unique age-related issues including multimorbidity<sup>27,28</sup> and polypharmacy,<sup>29</sup> frailty,<sup>30,31</sup> and cognitive impairment<sup>32</sup> that may increase vulnerability to worse outcomes following hospital discharge. Additionally, posthospital syndrome has been described as a transient condition of increased susceptibility to adverse health events related to exposure to stress during hospitalization<sup>33</sup> and is particularly relevant for the elderly.<sup>34</sup> Altfeld et al<sup>35</sup> demonstrated that most geriatric patients experienced problems within the first 2 days

of discharge, including almost half of whom had difficulty understanding and complying with self-care needs and one-third of whom struggled to cope with change. Postdischarge follow-up has the potential to alter this course. Follow-up appointments offer the medical provider with an opportunity to elicit and manage symptomatology related to suboptimally treated disease, gaps in knowledge that may contribute to poor self-efficacy, and nonadherence to medications and/or diet. They also provide allotted time for patients and/or caregivers to ask questions and voice concerns to their physicians in person, facilitating improved communication and strengthened physician–patient interrelationships. Finally, they create a setting in which medication reconciliation can occur, as errors and discrepancies in discharge medications are common.<sup>36,37</sup> Indeed, follow-up appointments represent an important pillar in care transitions, bridging acute inpatient care of volume overload to outpatient disease management of chronic heart failure. Although other modalities beyond follow-up appointments can provide critical postdischarge contact with medical providers, neither postdischarge nursing telephone calls nor telemedicine capabilities were used at our institution during the study period. Thus, our finding that older adults had lower rates of scheduled follow-up appointments upon discharge is concerning.

Treatment of patients based on their age can result from implicit thoughts and behaviors that occur even without conscious awareness or control.<sup>38</sup> Previous studies examining differences in medical care provided to older adults compared with the general population have found physicians to be less engaged, less supportive,<sup>39</sup> and less likely to offer potentially life-saving treatment.<sup>40</sup> Among  $\sim 58,000$  patients admitted with heart failure, Forman et al<sup>41</sup> demonstrated that older adults were less likely to receive counseling or follow-up. Whether age-related provider bias is a significant contributor to lower rates of scheduled follow-up appointments is unclear and warrants further investigation.

Our study has some limitations. First, our cohort originated from a single institution, albeit a large academic center located in a diverse urban area. Variations in age, race, and payer status revealed a heterogeneous cohort, offering generalizability to a wide range of patients. Investigation of local patterns and trends facilitated a patient-level examination of potential barriers to widespread implementation of an evidence-based intervention – early postdischarge follow-up. Second, we could not account for follow-up appointments scheduled by the patient after discharge or the rate at which they were actually seen by a provider, as these data were not available. It is plausible that patients not scheduled for

a follow-up appointment upon discharge either preferred or were encouraged to schedule a follow-up appointment after they returned home. However, in light of challenges older adults face following hospitalization, incorporating appointments scheduled by the patient following discharge would likely have widened the difference observed between older and younger adults. Third, some scheduled appointments may not have been adequately documented, potentially leading to an underreporting of scheduled appointments. This likely represented a minority of cases, as the study was conducted at an institution where documentation of a follow-up appointment in the specified section of the discharge summary is required, if scheduled. Furthermore, it is unlikely that underreporting would have affected age groups differently and, therefore, would not have changed results in a significant manner.

## Conclusion

Only half of the patients discharged home following a hospitalization for heart failure had a follow-up appointment scheduled, representing a missed opportunity to provide a recommended care transition intervention. Scheduled follow-up appointments were less common among patients aged  $\geq 65$  years, a particularly vulnerable population whose outcomes might be improved by identifying sources of this disparity.

## Disclosure

The authors report no conflicts of interest in this work.

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