POPULATIONS AT RISK

Reports of Financial Disability Predict Functional Decline and Death in Older Patients Discharged from the Hospital

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BACKGROUND: The financial ability to pay for food and medical care is needed to maintain health in older persons following a serious illness. Therefore, we hypothesize that the inability to pay for basic needs, which we call financial disability, predicts adverse health outcomes in older patients discharged from the hospital.

OBJECTIVES: To determine the frequency of reported financial disability in older adults being discharged from a hospital, to determine patient characteristics associated with financial disability, and to examine the relationship between financial disability and functional decline and mortality.

DESIGN: Prospective cohort study.

SETTING/PARTICIPANTS: Two thousand two hundred patients 70 years and older admitted to the general medicine services at two teaching hospitals in Ohio.

MAIN OUTCOME MEASURES: Respondents were interviewed at the time of discharge to determine patients' financial ability to pay for 6 needs: groceries, general bills, medications, medical bills, a small emergency, and a major emergency. We determined functional decline in ability to perform activities of daily living from discharge to 90 days post-hospital discharge, and death 1 year after hospital discharge.

RESULTS: Financial disability was reported to be severe (unable to pay for 3–6 needs) for 21% of patients and moderate (unable to pay for 1–2 needs) for 36%. Financial disability was more common and more severe ($P < .001$) in persons with an annual household income less than \$10,000, in persons with fewer than 12 years of formal education, in African Americans, and in women. In patients with no financial disability, moderate financial disability, and severe financial disability, functional decline 3 months after hospital discharge occurred in 15%, 20%, and 25%, respectively ($P = .001$), and 1-year mortality rates were 24%, 27%, and 32%, respectively ($P = .002$). After adjustment for potential confounders, the association of financial disability with functional decline ($P = .003$) and mortality ($P = .02$) remained significant.

CONCLUSION: Reports of financial disability at hospital discharge identified vulnerable older adults with increased risk for functional decline and death. Interventions that alleviate financial disability may improve health outcomes in older adults discharged from hospital.

KEY WORDS: financial disability; functional decline; death.

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More than 10% of older Americans live below the federal poverty line,¹ and many more spend a substantial amount of their financial resources on medicines and other medical expenses after an acute hospitalization.^{2,3} Poverty may worsen health outcomes in older persons, as suggested by long-term population-based studies that demonstrate that community-dwelling older persons with low income have higher rates of functional decline and death.^{4–7} The effects of poverty may be especially pronounced after hospitalization when older persons are especially vulnerable. A quarter or more of older patients are discharged from hospital with greater disability than before the illness,^{8,9} a quarter die during the year after discharge,¹⁰ and many suffer economic strain in meeting their health care needs and daily financial obligations after discharge.^{2,3} For these reasons, financial disability, which we define as inability to pay for basic needs, may have adverse effects on self-care function and survival after hospitalization for an acute medical illness.

In this study, we measured financial disability at the time of discharge from hospital by asking patients about their ability to pay 4 personal expenses (groceries, general bills, a small emergency, a major emergency) and 2 health care expenses (medications, medical/dental bills). We focused on patient reports of financial disability rather than income, because many persons are uncomfortable reporting their income,^{11,12} because the adverse effects of low income on the ability to pay for necessities may be ameliorated by social programs, personal wealth, and the financial resources of family members,^{2,13,14} and because the ability to pay for basic needs may have a more direct and immediate consequence on health outcomes than income alone.^{15–17} We examined the relationship of financial disability to characteristics known to be associated with socioeconomic status, including gender, race, and education.^{18–22} We then tested the hypothesis that patients reporting financial disability have higher rates of decline in ability to perform activities of daily living (ADL) and of death after hospital discharge.

METHODS

Setting and Participants

We studied patients aged 70 years or older who were discharged alive after admission to the general medicine services

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An abstract of this study was presented at the May 2002 annual meetings of the Society of General Internal Medicine in Atlanta, GA, and the American Geriatrics Society in Washington, DC, and at the October UCSF 2002 Clinical Research Symposium in San Francisco, CA.

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of two urban teaching hospitals, University Hospitals of Cleveland and Akron City Hospital, both in Ohio. Of 11,475 patients admitted to the general medical services (excluding intensive care units and specialty services), 3,163 were randomly selected on admission and enrolled in randomized trials to evaluate an intervention aimed at improving functional outcomes at discharge^{23,24}; 3,047 patients were discharged alive. For the analyses presented here, patients from the intervention and control groups were combined because the two groups had similar numbers of independent ADL at discharge and similar mortality rates 1 year after discharge.^{10,23}

The study cohort consisted of the 2,200 patients who were discharged alive and for whom financial disability was determined at discharge, as described below. Of the 847 patients for whom financial disability was not determined, 427 responded to fewer than 5 of the 6 items used to measure financial disability (see below) and 420 were discharged from the hospital before they could be interviewed. Compared to the 2,200 patients in the study cohort, the 847 patients for whom financial disability was not determined were older (mean age, 81 years vs 80 years for those in the study cohort; $P < .001$), had more comorbidities on the Charlson scale (mean, 2.3 vs 2.0; $P = .006$), and were dependent in more ADL on admission (mean, 2.4 vs 1.8; $P < .001$); the two groups did not differ ($P > .1$) in gender or education.

Data Collection and Measurements

Trained interviewers obtained data from patients or surrogates on admission, at discharge, and 90 days and 1 year after hospital discharge. Surrogates answered questions on behalf of the patient when the patient scored 5 or more errors on a 10-item Short Portable Mental Status Questionnaire (SPMSQ),²⁵ or if the patient was too ill to be interviewed. We included surrogate responses because we sought to identify patients who experienced financial disability, and the use of surrogates to assess the clinical and socioeconomic needs of cognitively impaired patients is well accepted.^{26,27}

Financial disability was measured in interviews at discharge with 1,496 (68%) patients and 704 (32%) surrogates. We used a 6-item questionnaire based on items used previously to measure financial strain.^{16,28,29} The 6 items inquired whether the patient agreed with the statement that he or she had enough money to pay 4 personal expenses (groceries, bills, a small emergency, a major emergency) and two health care expenses (medications, medical/dental bills) (see Appendix available online at www.blackwellpublishing.com/products/journals/suppmat/jgi/jgi30315/jgi30315.htm). The response categories were strongly agree, agree, disagree, and strongly disagree. Because responses of strongly agree or strongly disagree were infrequent (between 4% and 12% for each item), responses of strongly disagree and strongly agree were classified as disagree and agree, respectively. We considered paying an expense a financial activity and not having enough money to pay for an expense as a financial disability.

Responses were obtained to all 6 items for 1,794 patients and to 5 items for 406 patients. For these 406 patients, the single missing response was imputed as follows. In patients with responses to all 6 items, a linear regression model was constructed for each financial disability item with the other 5 answered items as independent variables; these models were used in subjects with a response missing to a single item to

estimate the value of the missing item.³⁰ After imputation, each participant's response was categorized as no financial disability, moderate financial disability (1–2 financial disabilities), or severe financial disability (3–6 financial disabilities).

The 2 outcomes measured were decline in ability to perform basic ADL during the 90 days after hospital discharge and death during the year after discharge. At discharge and 90 days later, interviewers spoke to the patient or surrogate and asked whether the patient needed assistance from another person in performing each of 5 basic ADL: bathing, dressing, toileting, transferring from bed to chair, and eating.³¹ Activities of daily living decline was defined as needing assistance in more ADL 90 days after discharge than at the time of hospital discharge. The vital status of all patients was determined during the telephone interviews and with the National Death Index, which provided the date of death.

Clinical and demographic data were gathered from medical records and admission interviews. Components of Acute Physiology and Chronic Health Evaluation II score (APACHE II), an illness severity scale,³² and the Charlson Comorbidity Index, a measure of the number and severity of comorbidities,³³ were abstracted from admission medical records by medical record technicians trained for this project. Technicians were blinded to the hypothesis tested in this study and to patients' financial status. Interrater reliability of chart abstraction was assessed by duplicate review of the medical records of 10% of patients in Cleveland (agreement for 19 items in the Charlson Comorbidity Index, 99.6%, and for 17 items in the APACHE II physiology scale, 97.4%) and 3% of patients in Akron (κ statistic > 0.60 for all items in the Charlson Comorbidity Index and the APACHE II scale).

Analytic Strategy

Our analyses address 3 research questions. What proportions of patients reported that they were unable to perform the 6 financial activities at discharge? What patient characteristics were associated with financial disability? Did financial disability predict functional decline and mortality after hospital discharge?

In bivariate analyses, associations of financial disability with patient characteristics and health outcomes were tested using the χ^2 test modified for trend and the log-rank test. The length of survival after discharge was calculated using the Kaplan-Meier method. Logistic regression models were constructed to determine whether the associations of financial disability with decline in ADL 90 days after discharge and death during the year after discharge were independent of age, gender, race, education, marital status, whether the respondent was a surrogate, APACHE II score and Charlson Comorbidity Index score at admission, and ADL function at hospital discharge.

Analyses of patient characteristics and survival were conducted in all 2,200 patients in whom financial disability was measured at discharge. Analyses of decline in ADL function at 90 days after discharge were conducted in 1,540 patients who were independent in 1 or more ADL at discharge and who were alive 90 days after discharge. Of the 2,200 subjects in the primary analytic sample, 660 patients were excluded from analyses of decline in ADL function because they were dependent in all 5 ADL at discharge ($n = 369$), they died prior to the 90 days postdischarge interview ($n = 269$), or they were alive but not interviewed 90 days after hospital discharge ($n = 22$).

RESULTS

The mean age of the 2,200 patients was 80 years, 25% were African Americans, and 64% were female (Table 1). Annual household income was reported to be less than \$10,000 by 23% of patients; 31% of the patients did not report their income. The mean number of independent ADL was 3.4 at hospital discharge.

The proportion of patients without enough money to pay for individual financial activities ranged from 8% who were unable to buy groceries to 45% who were unable to pay for a major emergency (Table 2). The number of financial disabilities

Table 1. Characteristics of 2,200 Patients Discharged from the General Medicine Services of Two Teaching Hospitals

Characteristic	Patients n (%)
Age, y	
70–74	596 (27)
75–79	618 (28)
80–84	474 (22)
85+	513 (23)
Gender	
Female	1,410 (64)
Race*	
White	1,645 (75)
African-American	547 (25)
Education, y*	
< 12	832 (41)
≥ 12	1,219 (59)
Marital status	
Single	316 (15)
Widowed	995 (45)
Married	889 (40)
Annual reported income	
<\$10,000	515 (23)
\$10,000–\$19,999	468 (21)
\$20,000–\$29,999	240 (11)
>\$30,000	297 (14)
Declined to report	680 (31)
Insurance status*	
Medicare/private	1,584 (72)
Medicare	293 (14)
Medicare/Medicaid/other†	236 (11)
APACHE II score*	
5–8	755 (34)
9–11	756 (35)
≥ 12	683 (31)
Charlson Comorbidity Index score	
0–1	981 (45)
2–3	969 (44)
> 3	231 (11)
ADL function on admission	
Independent in all 5 ADL	888 (41)
Dependent in ≥ 1 ADL	1,299 (59)
ADL function on discharge	
Independent in all 5 ADL	1,056 (48)
Dependent in ≥ 1 ADL	1,142 (52)
Mean hospital length of stay, days, ±SD	6.4 ± 5.2

*Data were missing for the following characteristics: race (n=8); education (n=149); APACHE II (n=6); Charlson Comorbidity Index score (n=19); ADL function on admission (n=13); ADL function on discharge (n=2); and insurance status (n=70).

†Other insurance status includes the following: Medicare/Medicaid/private (n=20), private insurance only (n=17), no insurance (n=8), and Medicaid only (n=4).

APACHE II, Acute Physiology and Chronic Health Evaluation II; ADL, activities of daily living; SD, standard deviation.

Table 2. Patients Without Enough Money to Do Six Financial Activities

Financial Activity (Respondents*)	Patients Without Enough Money To Do the Financial Activity %
Buy groceries (n=2,169)	8
Pay for small emergency (n=2,175)	16
Pay bills (n=2,163)	18
Buy medications (n=2,159)	19
Pay medical/dental bills (n=2,104)	26
Pay for major emergency (n=2,024)	45

*The number of patients for whom the patient or a surrogate responded to the item. For 1,794 patients, a patient or surrogate responded to all 6 items. For 406 patients, a patient or surrogate responded to 5 of the 6 items.

ranged from none to 6, with no financial disability reported by 43% of patients, moderate financial disability reported by 36%, and severe financial disability reported by 21% (Fig. 1).

The degree of financial disability differed according to several patient characteristics (Table 3). Greater financial disability was more common among younger patients, women, African Americans, and those with fewer than 12 years of formal education. Among patients reporting income, financial disability was strongly associated with annual income. Nonetheless, nearly a third of patients reporting an annual income over \$30,000 reported having moderate or severe financial disability, and nearly a fifth of patients reporting an annual income of less than \$10,000 reported having no financial disability.

The Relationship of Financial Disability to Functional Decline and Mortality After Hospital Discharge

Among the 1,540 patients discharged independent in 1 or more ADL and alive 90 days after discharge, decline in the number of independent ADL occurred in 286 patients (19%) from the time of discharge to 90 days after discharge. In patients with no, moderate, and severe financial disability, decline in ADL function occurred in 15%, 20%, and 25%, respectively ($P<.001$; Fig. 2). Among the 2,200 patients discharged alive, 597 patients (28%) died during the year after hospital discharge. In patients with no, moderate, and severe financial disability, 1-year mortality rates were 24%, 27%, and 32%, respectively ($P=.002$; Fig. 3).

FIGURE 1. The proportion of patients reporting financial disability.

Table 3. The Relationship of Financial Disability to Patient Characteristics

Characteristic (Patients)	Financial Disability*			P Value
	No	Moderate Patients, %	Severe	
Age, y				<.001
70–74 (n=596)	38	36	26	
75–79 (n=618)	43	37	21	
80–84 (n=474)	46	34	20	
≥85 (n=512)	47	33	20	
Gender				<.001
Female (n=1,410)	40	36	24	
Male (n=790)	49	34	17	
Race				<.001
African-American (n=547)	18	36	46	
White (n=1,645)	52	35	13	
Annual reported income, \$				<.001
<10K (n=515)	18	39	43	
10–20K (n=468)	39	43	18	
20–30K (n=240)	57	35	8	
≥30K (n=297)	68	27	5	
Insurance status				<.001
Medicare/private (n=1,584)	50	37	13	
Medicare (n=293)	35	28	37	
Medicare/Medicaid/other (n=253)	11	32	57	
Education, y				<.001
<12 (n=832)	30	38	32	
≥12 (n=1,219)	53	33	14	
APACHE II score on admission				<.001
5–8 (n=755)	47	35	18	
9–12 (n=756)	42	37	33	
≥12 (n=683)	40	33	27	
Charlson Comorbidity score on admission				.06
0–1 (n=981)	46	35	19	
2–3 (n=969)	40	36	24	
≥3 (n=231)	45	34	21	
ADL at hospital admission				<.001
Independent in 5 ADL (n=888)	51	34	15	
Dependent in ≥1 ADL (n=1,299)	38	36	26	

*Financial disability was classified as none, moderate, or severe for patients reporting 0, 1–2, and 3–6 financial disabilities, respectively. ADL, activities of daily living; APACHE II, Acute Physiology and Chronic Health Evaluation II.

In subgroup analyses, the relationship between financial disability and decline in ADL function during the 90 days after discharge was consistent in men, whites, African Americans, and in patients older and younger than 80 years of age; in

women, however, financial disability was not associated with functional decline ($P=.6$), a relationship that differed ($P=.006$) from that in men. The relationship between financial disability and 1-year mortality was consistent in each of these gender, race, and age subgroups.

In multivariate logistic regression analyses in all adjusting for age, race, gender, marital status, education, whether the respondent was a surrogate, APACHE II score, Charlson Comorbidity score at admission, and ADL function on discharge (Table 4), financial disability remained significantly associated with decline in ADL function ($P=.003$) and with death ($P=.02$). When the multivariate analyses were repeated in persons who answered all 6 financial disability questions (eliminating the 406 persons who did not answer 1 question), financial disability remained significantly associated with decline in ADL function ($P=.01$) but not with death ($P=.11$).

DISCUSSION

We found that financial disability was common among older persons discharged from two teaching hospitals, and that financial disability predicted subsequent functional decline and death. Almost a quarter of patients had severe financial disability, as indicated by reporting insufficient money to pay for 3 or more basic financial activities. After adjusting for sociodemographic characteristics and measures of illness severity and

FIGURE 2. Relationship between financial disability and functional decline 90 days post-hospital discharge ($P<.001$).

FIGURE 3. Kaplan-Meier survival curve for patients with no, moderate, and severe financial disability ($P=.002$).

comorbidity, financial disability remained predictive of decline in ADL function 90 days after hospital discharge and death during the year after discharge. For patients with severe financial disability, the odds of declining in ADL function and of death were 30% to 50% greater than for patients without financial disability.

Financial disability was most common in African Americans, women, persons with low annual household income, and persons with fewer than 12 years of formal education. It is not surprising that being African American or being a woman was associated with financial disability. A disproportionate number of African Americans and women receive fewer years of formal education, work in lower-paying occupations, and earn less money in their lifetime than whites and men, respectively.^{14,19,20,22}

Financial disability was also inversely related to age, a pattern that is consistent with previous observations that demonstrated a direct association between income and age.^{7,34} The inverse relationship between age and income may reflect the cumulative attrition of low-income elders over time^{7,34} and the reported association between increasing age and financial satisfaction.³⁵ We expected and found a strong association between reported financial disability and reported income. Nonetheless, nearly a fifth of respondents reporting an annual household income of less than \$10,000 reported no financial disability, and 5% of respondents reporting an annual household income of greater than \$30,000 per year reported severe financial disability. This finding may indicate that for older adults, income is not a precise measure of a person's ability to pay for basic needs, probably in part because many

Table 4. The Relationship Between Financial Disability and Patient Outcomes and Adjusting for Potential Confounders*

Patient Outcomes	Financial Disability		
	No	Moderate	Severe
	Odds Ratio (95% CI)		
Decline in ADL function 90 days after discharge			
Unadjusted model	1.0 (Reference)	1.36 (1.01 to 1.83)	1.80 (1.29 to 2.51)
Adjusted model	1.0 (Reference)	1.19 (0.86 to 1.65)	1.59 (1.07 to 2.37)
Mortality 1 year after hospital discharge			
Unadjusted model	1.0 (Reference)	1.17 (0.94 to 1.45)	1.48 (1.16 to 1.89)
Adjusted model	1.0 (Reference)	1.10 (0.85 to 1.42)	1.36 (1.00 to 1.87)

*In logistic regression models, moderate financial disability and severe financial disability were entered as dummy variables; age, race, gender, marital status, APACHE II score and Charlson Comorbidity score at admission, education, patient versus surrogate response, and ADL function on discharge were entered as control variables.

In logistic regression models in which financial disability was entered as a single ordinal independent variable (range, 0–6 financial disabilities), financial disability was associated with decline in ADL function ($P=.003$) and with 1-year mortality ($P=.02$).

ADL, activities of daily living; APACHE II, Acute Physiology and Chronic Health.

Evaluation II; CI, confidence interval.

older persons depend on savings, family support, or other resources to meet their financial needs. Thus, financial disability may lead more directly than low income to deprivation and stress, and consequently to poor health.^{16,28,29,36,37}

Our finding that financial disability in older persons discharged from hospital predicts functional decline and death is consistent with substantial evidence that lower income and other markers of lower socioeconomic status predict worse health, disability, and death over the life course in community-based populations.^{6,7,38,39} Few studies, however, have examined the effects of income or socioeconomic status specifically in older persons,^{6,15,28} and previous studies have not examined the effects of income or socioeconomic status in older persons discharged from the hospital. Unlike income or other socioeconomic demographic measures, the financial disability questionnaire directly identifies unmet and relevant basic needs that are associated with adverse health outcomes in older patients discharged from hospital.

The magnitude of the association we observed between financial disability and functional decline and death was substantial and rapidly apparent: for example, by 90 days after hospital discharge for an acute hospitalization, the absolute risk of decline in ADL function was 5% and 10% higher in older persons with moderate and severe financial disability, respectively. Thus, interventions that reduce poor health outcomes in patients with financial disability might have rapid and immediate benefits; this study, however, does not prove such benefits.

Methodological Considerations

Confidence in the validity of our findings is increased by several methodological considerations, which include the prospective cohort design, the large sample size from two hospitals, the degree of statistical significance of the main results, and the consistency of the main findings in stratified and multivariable analyses adjusting for measures of several potentially confounding factors.

Nonetheless, the findings should be interpreted in light of the study's limitations. The associations observed between reported financial disability and health outcomes may have arisen by chance or be explained by confounding bias. Although we measured and adjusted for several potential confounding variables, including the APACHE II score and Charlson Comorbidity Index, we cannot exclude the possibility that the association between financial disability and adverse health outcomes is attributable to unmeasured confounding factors, such as the chronicity or duration of illness, depression, or other factors. Also, our analyses were limited to study patients for whom interviews about financial disability were completed at hospital discharge and to white and African American persons in northeast Ohio; therefore, our findings should not be generalized to other population groups without further testing. Despite these limitations, our findings are consistent with the hypothesis that financial disability has a causal role in hastening functional decline and death.

Implications

Our findings have two major implications. First, physicians, other health providers, hospitals, and health systems should recognize financial disability as an important and potentially

remediable risk factor for bad outcomes after hospitalization.^{13,40} The 6 items concerning financial activities provide a simple screening tool to identify patients with financial disability. Health providers prescribe medications and other therapies that cost many elders dearly,^{41,42} and financial disability may be ameliorated prescribing less costly medications and referring patients to medication assistance programs and community-based services. Comprehensive health care systems, such as the Program for All-inclusive Care for the Elderly (PACE) and essential medical and social services, may blunt the deleterious effects of financial disability.

We recognize that the current health care payment system may have a negative impact on the health and functional status of vulnerable older persons. Many older patients discharged from the hospital face the uncertainty of not having enough financial resources to meet their posthospital needs. While the intensity of our medical care focuses on the acute hospitalization, comparable attention is needed to develop community- and system wide-based resources to assist with basic medical and nonmedical needs of the elderly after their hospitalization.

The study's second major implication is that interventions to modify the adverse effect of financial disability on functional decline and death should be designed and tested. Even with antipoverty programs, Social Security benefits, and Medicare coverage targeted for the elderly, financial disability predicted functional decline and death in older patients discharged from hospital. Because of the strength of our findings and their consistency with previous studies, and because our results do not prove that financial disability caused poor health outcomes, we believe that it is advisable to design and test interventions in older patients with financial disability.^{13,36,40,43} In the absence of evidence that efforts to ameliorate the effects of financial disability are ineffective, it would be prudent to link older patients with financial disabilities to family and social service resources after hospitalization, and to provide close follow-up to promote adherence to optimal therapy and to identify early signs of decline in health.

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