
Disabled Workers' Risk of Hospitalization and Death

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Data from the 1982 New Beneficiary Survey (NBS) were matched with 5 years (1984-88) of Social Security and Medicare data to analyze disabled workers' probability of death and inpatient care. Fifteen percent of the disabled workers died within 18-24 months of initial eligibility; 34 percent died within 5 years. Older disabled workers had higher probabilities of death and hospitalization. Males were two times as likely to die as females, but no more likely to be hospitalized. Black persons also had a higher risk of death but no greater risk of hospitalization than other races. Additional health insurance had no influence on survival, but was differentially associated with inpatient care. Married males were more likely to survive. Physical functioning capacity had no influence on survival or hospitalization. Respiratory, circulatory, and digestive disorders increased the probability of hospitalization and mortality.

INTRODUCTION

This article reports the results of a multiple logistic regression analysis pertaining to the relative risk of death and hospitalization of disabled workers who were interviewed in the 1982 NBS. Compared with a large body of knowledge concerning the elderly, relatively little is known about survival status and patterns of inpatient care received by new disabled-worker beneficiaries of Social Security Disability Insurance (SSDI).

We first provide a brief discussion of the SSDI program's eligibility determination

procedures. This is followed by a presentation of research methods and data sources which include linked NBS, Medicare, and Social Security administrative records. Next, we present a profile of disabled workers and a comparison of 1982 NBS sociodemographic and health characteristics with inpatient status and survival. Following this, research variables are discussed within the context of the Andersen health services utilization model, and relative risk functions of death and hospitalization are computed. Finally, we discuss the implications of the findings for further research and for informing social and health care policy.

We focus on inpatient care because of its rapidly rising costs and because, as noted, very little is known about the acute health care behavior and needs of recently disabled workers. We are interested in alternative predictions of two specific health outcomes: survival status and the use of inpatient services in short-stay hospitals.

SSDI PROGRAM

Most of what is generally known about functionally impaired persons has been obtained from national survey estimates of the non-institutionalized population. However, there are substantial health and demographic differences between persons represented in sample surveys who report functional limitations and impairments and those who receive Federal disability benefits based on medical and clinical evidence in accordance with Social Security program eligibility criteria.

In order to meet SSDI guidelines, disabled-worker applicants must have severe

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functional limitations and impairments expected to last for at least 1 year or result in death. As an illustration of the highly selective nature of the program, in 1981 (the year of NBS sample selection) only 30 percent of all claims submitted to SSA met acceptance criteria (U.S. House of Representatives, Committee on Ways and Means, 1989).

SSDI is part of the Old Age, Survivors, and Disability Insurance program (popularly known as Social Security). SSDI assists primarily the working population who meet both the SSDI definition of disability and insured status requirements. As previously noted, in order to receive benefits, a disabled worker must be unable to engage in any substantial gainful activity by reason of any medically determinable physical or mental impairment expected to result in death or to last for a continuous period of at least 12 months. In addition, an applicant must meet certain insured-status requirements; i.e., be fully and currently insured.¹ In 1982, the year in which the NBS was conducted, there were approximately 2.6 million disabled-worker beneficiaries, representing a rate of 18.3 disabled workers per 1,000 persons 18-64 years of age. Disabled-worker prevalence rates increased during the 1960s and 1970s, declined in the early 1980s, and then gradually increased from 1984 to 1986 (McCoy and Weems, 1989). The number of new awards increased from

297,000 in 1982 to 425,600 in 1989 (Social Security Administration, 1990).

DATA AND METHODS

Data were obtained from the disabled-worker cohort interviewed in the 1982 NBS and from its inpatient record information represented in the Medicare Automated Data Retrieval System (MADRS).² Data pertaining to all deaths that occurred before January 1989 were extracted from the SSA Master Beneficiary Record. An analysis of SSA's death reporting system indicates that it is 90 percent accurate in the short run, and that the remaining cases mainly result in delayed but accurate reporting (U.S. General Accounting Office, 1992). The NBS sample consisted of non-institutionalized persons who had received benefits for at least a month during a 1-year selection period (July 1980-June 1981).³

Multiple logistic regression, which has been shown to be a robust estimator for dichotomous outcomes of the type described here (Cleary and Angel, 1984), was used as the primary procedure to identify statistically significant associations ($p \leq .05$) between hypothesized predictor variables and the health outcomes. Inpatient care was coded to identify whether care was received at any time during the 5-year observation cycle. Because the outcome variables obtained from administrative record data are statistically independent of the NBS sampling design assumptions, standard tests of statistical significance are appropriate for the logit results.

It is interesting to note that 41 percent of the disabled-worker cohort used no Medicare-covered inpatient care during the period of observation. Without any comparative data, it is problematical what this rate of inpatient service non-usage means. It may reflect types of non-life-threatening conditions, a lack of short-stay

¹Those 31 years of age or over must have at least 1 quarter of coverage for each year after age 21, and must have at least 20 quarters of coverage in the last 40 quarters (5 of the last 10 years).

²MADRS is a computerized data file system which covers both Part A and Part B bills from 1984 to the present and includes medical service utilization and billing information for inpatient, skilled nursing, outpatient, home health, hospice, and physician services. Other types of information include reasons for entitlement, diagnostic codes for inpatient episodes, number of admissions, length of stay, surgical indicators, hospital discharge destination, and place and type of services received.

³NBS interviews were conducted from October to December 1982 with 5,198 disabled-worker sample persons. There was a response rate of 88 percent among those who had survived to the time of initial interview.

hospitals in service areas, greater use of military or Department of Veterans Affairs (VA) hospitals by eligible users, or socioeconomic or social barriers to access. It may also reflect greater use of health maintenance organizations (HMOs). As noted later, HMO service use was not identified in the MADRS-linked data.

MADRS served as the data source for fee-for-service (FFS) charges for the calendar years 1984-88. There are no Medicare inpatient data available prior to 1984. All disabled-worker respondents met the 2-year waiting period requirement; that is, they were eligible for Medicare by 1984. Receipt of inpatient care was defined as any FFS charges to the Medicare system, whether reimbursed or not. Services provided by HMOs usually are not included in MADRS. Because less than 4 percent of disabled workers participate in HMOs, we believe that this missing information had minimal effects on the results.

PROFILE OF DISABLED-WORKER BENEFICIARIES

Relative to the pool of disabled persons represented in national surveys, the NBS cohort of disabled workers is more homogeneous in its demographic characteristics. It consists of a relatively greater concentration of persons of blue-collar and lower socioeconomic status. For example, disabled workers were about one-half as likely to have been employed in white collar jobs (28 percent), compared with persons in the civilian labor force (54 percent) (U.S. Bureau of the Census, 1983). The median income of NBS disabled-worker families with a spouse and minor children was about one-half that of a comparable nuclear family in the general population (Packard, 1991). Social Security benefits represented the most important source of income for 40 percent of married

disabled-worker beneficiaries and 65 percent of unmarried beneficiaries. Although three out of four disabled workers had some type of financial asset, the median value of their assets was quite low and comparatively much lower than that of retired workers (Ycas, 1986).

Why are disabled-worker beneficiaries concentrated among the blue-collar, lower socioeconomic status (SES) population? We argue that their lower SES background is explained in part by the eligibility requirements of the SSDI program—applicants must be unable to work in any job in the national economy. Thus, many impaired persons would be less likely to meet requirements of gainful employment if they have physically demanding job histories requiring only limited education and skills than if they have white-collar backgrounds that are generally more transferable in the larger economy (U.S. General Accounting Office, 1989).

PATTERNS OF MORTALITY AND INPATIENT CARE

The NBS cohort had a high initial mortality rate of 148 per 1,000 for males and 149 per 1,000 for females. This represents a loss of about 15 percent of the study sample before interviewing began (a period of about 15-24 months) and a loss of about 5 percent 1 year thereafter (Table 1). These rates sharply contrast with those reported for retired workers, whose rates averaged between 2 and 3 percent a year over the 7-year period from 1982 to 1988 (Iams and McCoy, 1991). Disabled males and females who participated in the NBS were 14 times more likely to die than aged males and females in the first 6 months following sample selection, 8 times more likely in the second 6 months, and 4 times more likely in the third 6 months (Social Security Administration, 1993).

Table 1

Deaths and Death Rates of New Beneficiary Survey Disabled-Worker Beneficiaries, by Total and Gender: 1980-88

Beneficiary Characteristic	Year of Observation ¹							
	1980-88	1980-82	1983	1984	1985	1986	1987	1988
Total								
Died During Period (Thousands)	89.7	38.8	9.4	8.8	8.8	7.2	8.3	8.1
Percent Alive at Beginning of Period	261.5	261.5	206.2	196.4	187.8	179.1	171.9	163.1
Death Rate per 1,000	343.0	148.3	45.5	44.8	46.8	40.2	48.2	49.6
Males								
Died During Period (Thousands)	66.4	27.5	6.7	6.8	6.9	5.8	6.2	6.3
Percent Alive at Beginning of Period	185.8	185.8	146.3	139.5	132.8	126.0	120.5	113.9
Death Rate per 1,000	357.4	148.0	45.8	48.7	51.9	46.0	51.5	55.3
Females								
Died During Period (Thousands)	23.3	11.3	2.7	2.0	1.9	1.4	2.1	1.8
Percent Alive at Beginning of Period	75.7	75.7	59.9	56.9	55.0	53.1	51.4	49.2
Death Rate per 1,000	307.8	149.5	45.1	35.1	34.5	26.3	40.8	36.5

¹Observation year runs from December to December. Number alive at beginning of period includes beneficiaries in current pay status or Medicare-only status in December of preceding year. Number who died during the period includes those who were dead through December of observation year and who were in current pay status the previous year. The New Beneficiary Survey sampled beneficiaries who first received benefits between mid-1980 and mid-1981.

SOURCE: 1982 New Beneficiary Survey matched to Social Security Master Beneficiary Records, 1980-88.

Earlier studies have found that inpatient hospital care and survival status are inter-related—that is, a majority of persons, during the months preceding death, receive inpatient care, and the charges substantially increase (Lubitz and Prihoda, 1984; Scitovsky, 1988). Patterns of inpatient care for NBS disabled workers are shown in Figures 1 and 2. As the figures demonstrate, there is a consistent increasing use of inpatient services among male and female decedents, ending with the highest charges in the year of death. The relationship between inpatient care and mortality is further demonstrated in Figure 3, which shows that both male and female decedents were more likely than survivors to become hospitalized, and that female decedents were more likely than male decedents to have used inpatient services.

Patterns of inpatient care are further demonstrated in Table 2, which shows that about 6 out of every 10 survey participants (59 percent) received inpatient care during the period 1984-88, representing a median per person charge of \$9,374. As previously noted, those who died were much more

likely than those who survived to become hospitalized (76 percent versus 55 percent), and to incur substantially higher charges (median: \$15,866 versus \$7,589).

Other demographic characteristics reflect a population that is predominantly male, "older," and of the white race. A majority of disabled workers are male (72 percent). New disabled-worker beneficiaries as a whole tend to represent the upper range of the age distribution; more than one-half were born before 1926. Thus, at the time of the sample selection in 1980-81, they were between 54 and 64 years of age. It is interesting to note that more than 6 out of every 10 of the decedents (64 percent) were within this age group, compared with one-half of the survivors. Thus, aging processes appear to influence mortality among disabled workers, as has been demonstrated for retired workers (Iams and McCoy, 1991). NBS disabled workers included proportionately more white persons (80 percent), although black persons were somewhat more likely to be represented among decedents (18 percent, compared with 15 percent). About one-half of

Figure 1
Disabled Male Inpatient Service Use, by Survival Status: 1984-88

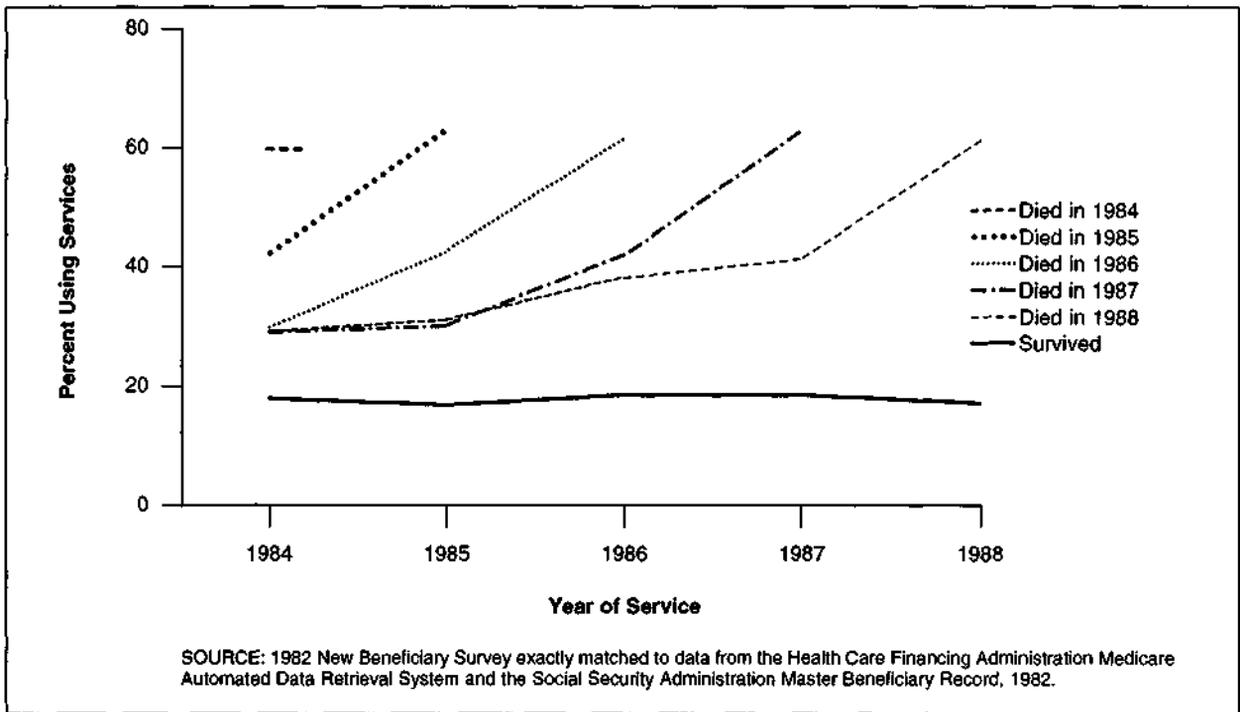


Figure 2
Disabled Female Inpatient Service Use, by Survival Status: 1984-88

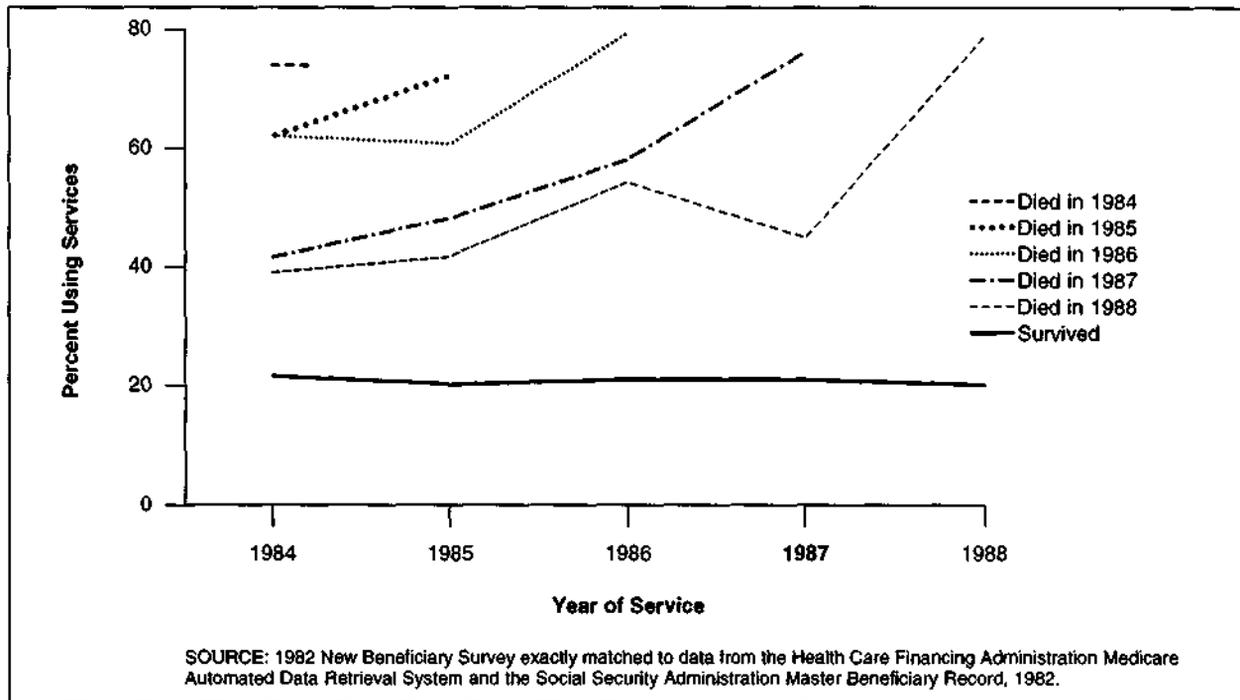
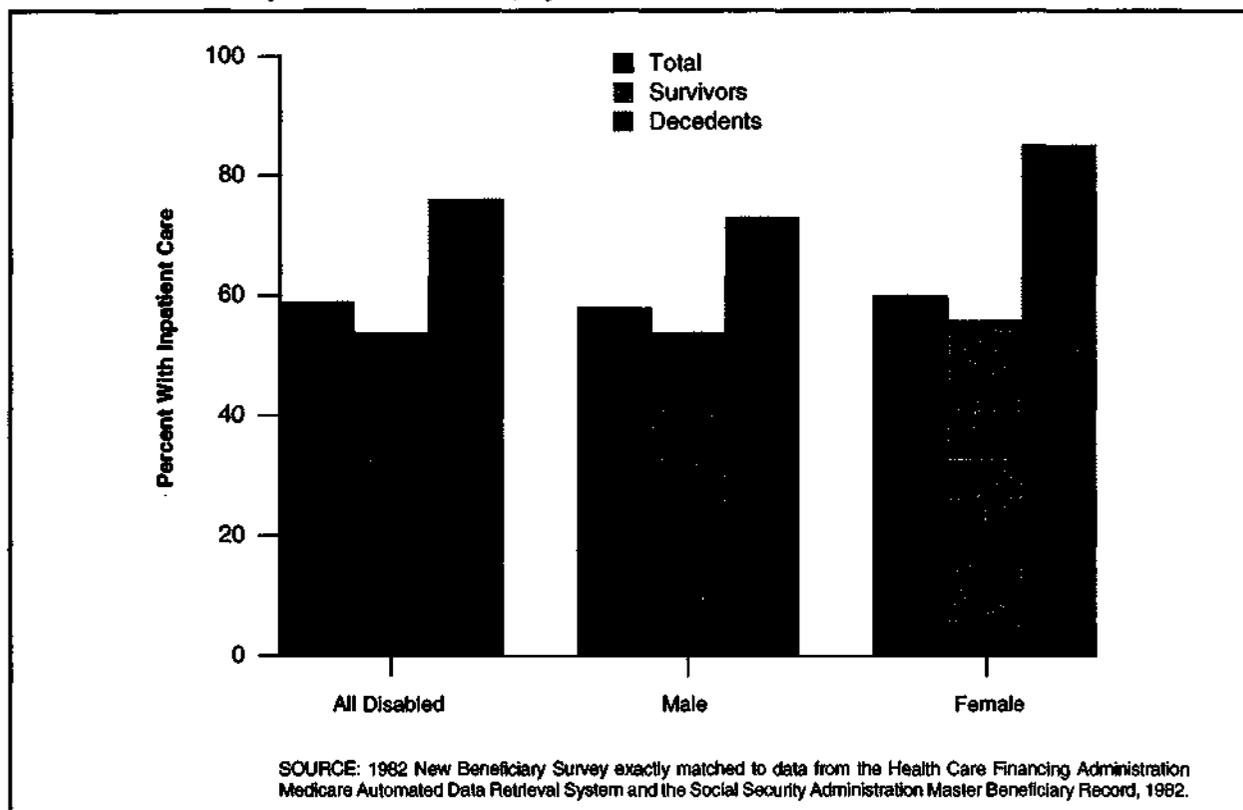


Figure 3
Inpatient Service Use, by Gender and Survival Status: 1984-88



both survivors and decedents (52 percent and 53 percent, respectively) reported private health insurance.

Overall health assessment supports the observation that the program's enrollment criteria accept only those with the most serious and severely limiting conditions. The number of disorders reported by NBS disabled workers (mean: 4.0) contrasts sharply with the number of disorders that have been reported for retired workers (mean: 2.6) (McCoy et al., 1992). Functional status, assessed at the time of interview, identified a high proportion of severely impaired persons (61 percent) who tended to be disproportionately represented by relatively high rates of musculoskeletal (73 percent) and circulatory disorders (66 percent). It is interesting to further note that 37 percent reported digestive disorders and 29 percent

reported respiratory problems. With the exception of musculoskeletal disorders, which tend not to be fatal (Verbrugge, 1989), there was an increase of about 10 percentage points for each of these disorder groups among decedents. The presence of mental conditions, which has become an increasingly important major diagnostic category in recent years, was not reported in the initial NBS data collection.⁴

MODEL SPECIFICATION

We use the behavioral model of health services utilization developed by Andersen (1968), which has been subsequently revised (Aday and Andersen, 1974; Andersen and

⁴Mental conditions, including chronic mental illness, were not reported as a separate category in the baseline NBS. In 1980, disabled-worker beneficiaries represented 10 percent of the SSDI caseload; in 1992, their representation had risen to 26 percent.

Table 2

New Beneficiary Survey Disabled-Worker Survivors and Decedents, by Medicare Service Use, Demographic, and Health Characteristics: 1982

Characteristic	Total	Survivors	Decedents
Medicare Service Use Characteristics			
Beneficiaries (Thousands)	198.0	157.3	40.7
Median Inpatient Charges ¹	\$9,374	\$7,589	\$15,866
Median Income	\$1,630	\$1,627	\$1,653
Median Primary Insurance Amount ²	\$599.87	\$592.21	\$634.98
Mean Number of Disorders	4.08	4.02	4.28
Inpatient Care	59.0	54.7	75.9
Demographic Characteristics			
		Percent	
Male	71.8	69.2	77.6
Female	28.2	30.7	22.4
Born Before 1926	53.3	50.5	64.4
Born 1926-30	16.9	16.8	17.4
Born After 1930	29.8	32.8	18.1
Black Race	15.8	15.3	17.7
White Race	80.3	80.6	79.1
Married	66.5	65.8	69.2
Respondent Only	15.2	14.8	16.8
Private Health Insurance	52.5	52.4	53.1
Education Less Than High School	54.6	53.8	58.3
Health Status			
Severe Limitations	61.5	60.2	66.3
Respiratory Disorders	28.6	26.1	38.5
Circulatory Disorders	65.7	63.6	73.8
Digestive Disorders	37.1	35.2	44.5
Musculoskeletal Disorders	73.5	74.5	70.4

¹1984-88 inpatient charge data derived from the Medicare Automated Data Retrieval System (MADRS). Charges estimated in 1984 dollar equivalents.

²Data derived from the Master Beneficiary Record, 1982.

SOURCE: 1982 New Beneficiary Survey exactly matched to data from the Health Care Financing Administration MADRS and the Social Security Administration Master Beneficiary Record, 1982.

Newman, 1973; Wan, 1989; Wolinsky and Johnson, 1991), as the basic framework for the logistic regression. We are concerned with the prediction of a health outcome occurring within the specified 5-year period: January 1984-December 1988. The focus on these specific years is dictated, as previously noted, by the non-availability of Medicare data subsequent to the 1982 NBS interviews.

Use of health services is defined according to the Andersen rationale as a function of "predisposing, enabling, and need characteristics of the individual." The model has been more recently applied in the study of older adults (Wolinsky and Johnson, 1991) and in the prediction of nursing home placement and death (Wolinsky et al., 1992). In addition to the Andersen framework, further justification

for the selection of variables is supported by a need to more fully understand how personal background and intervening variables mitigate accessibility to care.

ENABLING VARIABLES

Variables believed to directly influence access to care are represented in the model as enabling characteristics. These include income, the value of assets, participation in health insurance plans other than Medicare,⁵ educational attainment, and the presence of a spouse or others in the home. Income was measured two ways: (1) as an equivalence ratio of quarterly income to poverty; and (2)

⁵Participation in HMOs, also considered as an enabling variable, could not be examined because of its exclusion in the linked NBS-MADRS data base.

by Social Security Primary Insurance Amount (PIA). The PIA measure, as used in this analysis, is a function of the level of earnings a disabled worker had under Social Security-covered employment.

Because all disabled-worker sample persons are covered by Medicare after 2 years of SSDI eligibility, auxiliary insurance was introduced to test the effects of combined coverage and interaction effects. We found that private insurance, when tested alone in a previous analysis of insurance coverage, was significantly associated with utilization of inpatient services. In the present analysis, types of auxiliary coverage included private insurance, Medicaid, and (for those with military backgrounds) the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS) and VA benefits. These variables were included to test whether these additional insurance combinations increase a disabled worker's probability of survival and access to inpatient care.

Because low-income persons are often eligible for and recipients of Medicaid, we expect Medicaid to neutralize the negative effects of lower SES on access to inpatient services. Because disabled workers with access to CHAMPUS and VA benefits have additional access to military and VA hospitals, we expect those with such coverage to be less likely to use the inpatient services usually provided in acute-care, short-stay hospitals.

The research literature reports that unmarried persons have higher mortality rates than married persons (Gove, 1973; Hu and Goldman, 1990), and further suggests that marital status mitigates the need for and use of support services (Tissue and McCoy, 1981; McCoy and Edwards, 1981). Having a spouse at home may, for example, shorten or postpone hospital stays, consequently leading to lower inpatient charges. Persons who live alone, on the other hand, may have greater need to use inpatient services

because of poorer health status, limited caregiver support, or other reasons.

PREDISPOSING VARIABLES

Year of Birth

Year of birth was coded to represent the following categories: before 1926; from 1926 to 1930; and after 1930. Our purpose in using these categories, rather than age, as a continuous variable, was to approximate the effects of SSA regulatory policy, which relaxes certain eligibility rules for applicants 50 years of age and 55 years of age or over (Social Security Administration, 1988). Because of these "relaxations," we hypothesized that the youngest age group (those under 50 years of age at the time of sample selection) would be in poorer health than those who were older and, consequently, would be more likely to use inpatient services and have a higher probability of death.

Gender

Prior studies have found that females in the general population have higher morbidity and health service usage, but lower death rates than males (Verbrugge, 1989; Iams and McCoy, 1991). However, females may be less likely to have in-home or other personal and financial support compared with their male counterparts, because females often assume the care-provider role and have lower incomes. Therefore, we hypothesized that disabled-worker females, because of their morbidity profiles, would have higher probabilities of inpatient care. Conversely, we expected disabled-worker males to have lower rates of inpatient care but higher death rates.

Race

The racial mortality differential has been widely reported in the literature. For

example, Keith and Smith (1990) examined 1980 data from the National Center for Health Statistics and found that white persons had substantially lower mortality rates from disease and other medical conditions than black persons. Consequently, we expected black disabled workers to have higher death rates and to be more likely to use inpatient services than white disabled workers (although their lower income status could have a suppressive influence).

Health Need Variables

Health status was assessed by number of disorders reported, functional status (measured by the Functional Capacity Limitation Index [Haber, 1973]),⁶ and by the following disease conditions: circulatory, respiratory, digestive, and musculoskeletal.⁷ As previously noted, mental health status could not be reliably tested because it was not adequately represented in either the NBS or in the diagnostic codes available from the SSA Master Beneficiary Record.

RESULTS

Aging and Predisposing Variables

The effects of aging on mortality are axiomatic and widely known in the research literature and apply to the general population

⁶Functional status is treated as a separate health status dimension based on responses to a series of physical functioning questions. Items include: ability to walk, lift varying weights, stoop, bend, crouch or kneel, reach or grasp, and use the fingers. Concerned with work disability, Haber (1973) proposed an index of Functional Capacity Limitation with these measures providing a rational scale for ranking respondents on the index. The original classification included no limitations, minor limitations (manual or body movement limitations other than walking or using hands), moderate limitations (limits in walking or in using hands, but not both), and severe limitations (limitations in both walking and using hands).

⁷The NBS identified the presence of 14 major disease conditions. The number of diseases is the count of categories with a condition present. Circulatory, digestive, and respiratory conditions are important clusters associated with mortality and with inpatient utilization of services. Musculoskeletal conditions, such as arthritis, are a frequent source of disability, but are rarely fatal.

without regard to underlying morbidity and disability. By 1988, the oldest disabled workers, who were 64 years of age at the time of initial receipt of benefits, were 73 years of age. The hypothesis that younger persons would be more likely to die because of their poorer assumed health status was not supported. Instead, aging processes appear to influence survival among an aging population of disabled persons: Older persons were more likely to die (Table 3). Compared with those in the youngest age category, the oldest group (born before 1926) was more than two times as likely to die (odds ratio: 2.26). Likewise, those born during the period from 1926 to 1930 were also more likely to die (odds ratio: 1.79). The oldest group was also the most likely to be hospitalized (odds ratio: 1.19) (Table 4). Thus, it appears that the effects of aging on death and inpatient care among disabled workers parallel those found for the general population.

Race

Although black persons had higher mortality (odds ratio: 1.39), they were no more likely to be hospitalized than white persons. Intuitively, this suggests that black persons, at the time of eligibility determination, may be more seriously impaired than others. The fact that there were no significant race effects pertaining to inpatient status raises further research and policy issues concerning access to available services.

Gender

Males, as previously noted, had a higher overall death rate than females, although there were no gender differences between the time of sample selection (1980-81) and the interview in 1982 (Table 1). However, mortality rates diverged sharply starting in 1984, increasing for males and decreasing for females through 1986. Higher male

Table 3
Logistic Regression Analysis of New Beneficiary Survey Disabled Workers' Risk of Death,
by Selected Characteristics: 1984-88

Variable	Final Logit	Standard Error	Significance	Odds Ratio
Predisposing				
Born 1926-30	0.580	0.130	0.001	1.786
Born Before 1926	0.798	0.107	0.001	2.226
Male	0.687	0.148	0.001	1.989
Black Race	0.326	0.108	0.01	1.386
Enabling				
Primary Insurance Amount ¹				
Lowest Quartile	-0.145	0.184	—	—
2nd Quartile	-0.123	0.172	—	—
3rd Quartile	-0.285	0.167	—	—
Poverty Ratio ²	0.020	0.025	—	—
Assets	0.001	0.007	—	—
Education:				
0-8 years	-0.048	0.095	—	—
9-11 years	0.019	0.099	—	—
Health Insurance:				
Private	0.008	0.100	—	—
Medicaid	0.036	0.133	—	—
CHAMPUS and VA	0.231	0.144	—	—
Medicaid and Private	-0.003	0.249	—	—
CHAMPUS, VA, and Private	-0.272	0.238	—	—
Marital Status:				
With Spouse	0.390	0.175	0.05	1.477
Single	0.322	0.138	0.05	1.380
Married Male	-0.410	0.187	0.05	0.664
1982 Health				
Number of Disorders	-0.050	0.030	—	—
Severe Limitations	-0.062	0.090	—	—
Moderate Limitations	-0.080	0.096	—	—
Respiratory Disorders	0.552	0.086	0.001	1.737
Circulatory Disorders	0.330	0.099	0.001	1.390
Digestive Disorders	0.452	0.099	0.001	1.571
Musculoskeletal Disorders	-0.304	0.100	0.05	0.738

¹1984-88 inpatient charge data derived from the Medicare Automated Data Retrieval System (MADRS).

²Measured as the ratio of current family income to poverty.

NOTES: -2 log likelihood: intercept—4,639.223; model—4,405.003; Model Chi Square: 232.003. Degrees of Freedom: 26. Deletion/reference variables: birth after 1930, female, highest quartile-PIA, 12 or more years of education; no additional health insurance, unmarried living with others, minor/no limitations. CHAMPUS is the Civilian Health and Medical Plan of the Uniformed Services. VA is Department of Veterans Affairs.

SOURCE: 1982 New Beneficiary Survey exactly matched to data from the Health Care Financing Administration MADRS and the Social Security Administration Master Beneficiary Record, 1982.

death rates were further demonstrated in the logit analysis (Table 3), which shows that males were about two times more likely to die than females (odds ratio 1.99). As shown later, gender and marital status interact: Married males were more likely to survive. However, males were no more likely to be hospitalized than females.

In sum, all predisposing variables (age, gender, and race) were associated with survival status, but only age (older age status)

was significantly related to the likelihood of receiving inpatient care.

Enabling Variables

Economic Resources and Additional Health Insurance

The logistic regression analyses found no relationship between economic resources (i.e., income equivalence ratio, assets, and

Table 4
Logistic Regression Analysis of New Beneficiary Survey Disabled Workers' Risk of Hospitalization, by Selected Characteristics: 1984-88

Variable	Final Logit	Standard Error	Significance	Odds Ratio
Predisposing				
Born 1926-30	-0.045	0.999	—	—
Born Before 1926	0.171	0.080	0.05	1.186
Male				
Black Race	-0.089	0.090	—	—
Enabling				
Primary Insurance Amount ¹				
Lowest Quartile	-0.013	0.157	—	—
2nd Quartile	-0.015	0.149	—	—
3rd Quartile	-0.014	0.145	—	—
Poverty Ratio ²	-0.003	0.021	—	—
Assets	0.000	0.006	—	—
Education:				
0-8 years	-0.004	0.079	—	—
9-11 years	-0.103	0.081	—	—
Health Insurance:				
Private	0.140	0.080	—	—
Medicaid	0.413	0.106	0.001	1.512
CHAMPUS and VA	-0.939	0.127	0.001	0.391
Medicaid and Private	-0.273	0.204	—	—
CHAMPUS, VA, and Private	0.792	0.204	0.001	2.208
Marital Status:				
With Spouse	0.079	0.129	—	—
Single	-0.128	0.108	—	—
Married Male	-0.158	0.146	—	—
1982 Health				
Number of Disorders	0.023	0.025	—	—
Severe Limitations	-0.003	0.074	—	—
Moderate Limitations	-0.038	0.079	—	—
Respiratory Disorders	0.262	0.075	0.001	1.300
Circulatory Disorders	0.393	0.076	0.001	1.481
Digestive Disorders	0.352	0.075	0.001	1.421
Musculoskeletal Disorders	-0.121	0.083	—	—

¹1984-88 inpatient charge data derived from the Medicare Automated Data Retrieval System (MADRS).

²Measured as the ratio of current family income to poverty.

NOTES: -2 log likelihood: intercept—6,192.618; model—5,976.432. Model Chi Square: 216.186. Degrees of Freedom: 26. CHAMPUS is the Civilian Health and Medical Plan of the Uniformed Services. VA is Department of Veterans Affairs.

SOURCE: 1982 New Beneficiary Survey exactly matched to data from the Health Care Financing Administration MADRS and the Social Security Administration Master Beneficiary Record, 1982.

the PIA) and mortality, or between economic resources and inpatient care (Tables 3 and 4). Nor does it appear that additional insurance influences survival status. However, there are substantial effects of insurance coverage on inpatient care. Those who had only Medicaid in addition to their Medicare coverage were more likely to receive inpatient care (odds ratio: 1.51). In addition, those covered by both CHAMPUS or VA and additional private insurance were

more than two times as likely to use inpatient services (odds ratio: 2.21) than those who had no additional insurance. On the other hand, those who had CHAMPUS or VA coverage but no other discretionary coverage were less likely to receive inpatient care covered by Medicare (odds ratio: 0.39). Intuitively, this suggests that disabled workers who were veterans may be more likely to use military and VA hospitals, where such services are available. When private health

insurance is considered singly, along with other combinations of insurance, it had no significant effect on the probability of receiving inpatient care.

Marital Status and Gender

Disabled workers who were married (odds ratio: 1.48), as well as those who were unmarried and lived alone (odds ratio: 1.38), were more likely to die, compared with unmarried disabled workers who lived with others. Married males, on the other hand, were more likely to survive (odds ratio: 0.66). Marital status was unrelated to the probability of receiving inpatient care. These results suggest that further investigation of the interactions among marital status, gender, and living arrangement is needed to clarify the relationship of these variables with survival and inpatient hospital care.

In sum, measures of economic resources failed to be significantly related to any of the health outcomes, including survival and inpatient care. Only the interaction of gender and marital status was positively associated with survival. Coverage by auxiliary insurance was associated with inpatient care, but results depend on the particular types or combinations of insurance programs, with the part played by CHAMPUS and VA emerging as a salient combination. Educational attainment had no discernible influence on survival status or on the receipt of inpatient care. Here again, the homogeneous SES profile of the disabled worker cohort appears to have a generally suppressive influence on variables that have been shown in other studies to be important covariates of health outcomes.

⁸ The analysis used outcome measures developed from merged data obtained from SSA files for the date of death and from Medicare administrative files. This procedure departs from the practice of measuring health outcomes from self-reported survey responses.

Health

Number of disorders was not associated with mortality nor with risk of hospitalization, probably because a simple count of disorders includes a range of limitations and degrees of lethality. Specific disorders, including circulatory, digestive, and respiratory conditions, were significant predictors of mortality (Table 3). Each of these disorders was also found to be associated with inpatient care. Musculoskeletal disorders, on the other hand, were associated with survival (odds ratio: 0.74) rather than mortality, but these types of disorders were not associated with inpatient care.

DISCUSSION

The NBS cohort of disabled workers had a high initial mortality: a loss of 15 percent during the first 18-24 months before interviewing began, and further losses of about 5 percent a year thereafter. Disabled workers who died in the first years of program participation provide a sharp contrast in functional status and disease symptoms with those who died later or who survived. This is an important limitation that is a natural result of studying a population categorically defined with severe disorders and diseases that often manifest sharp trajectories of decline and may lead to early death.

It is important to note that our analysis does not take into consideration mortality experiences of disabled-worker respondents who died before 1982. Thus, during the period of sample selection and the initial 1982 interviews, there is no information available about those who died.⁸ Nor does the analysis include those whose functional status may have resulted in their transfer to long-term care facilities, such as Medicaid-certified institutions, or who became client members of HMOs (which may have

minimized their use of inpatient services covered under Medicare).

We found that several predisposing variables significantly influenced the probability of mortality but had very limited impact on the probability of hospitalization. Age, gender, and race all produced associations with mortality in general agreement with those reported for the general population. The hypothesis that younger disabled workers would be more likely to die was not supported. The finding that married males were more likely to survive is in agreement with other findings, and further suggests that the care provided by their spouses has an additional effect, possibly associated with sociocultural factors indicative of the caregiver roles of females.

The fact that disabled-worker beneficiaries in the oldest group were the most likely to be hospitalized parallels the results expected for retired workers, and further suggests that as the cohort of disabled workers ages, its health outcome patterns converge in similarity with the general aging population. This raises important methodological questions concerning the study of the disabled, because the NBS cohort represents a range of very serious debilitating conditions that manifest rapid decline and death on the one hand, and long-term (but less immediately fatal) impairments on the other.

We had hypothesized that economic resource and SES variables would be enablers of greater potential access to inpatient care. As it turned out, however, our hypothesis was not supported. None of the variables—basic Social Security amount, income, value of assets, or educational attainment—was associated with inpatient care. Feldstein (1988) has suggested that statistical effects of income have declined over time, primarily because a greater part of patients' bills is increasingly being paid by third-party payers. We believe that

another reason for the lack of economic effects is that there is limited variation in income, education, and other SES characteristics of the disabled-worker cohort. The following observation by the Committee on a National Agenda for the Prevention of Disabilities (Institute of Medicine, 1991) typifies the plight of the disabled worker population: "... persons with disabilities and those at risk of disability are disproportionately poor, making it difficult for them to purchase insurance, make required payments, or purchase essential services and equipment for their rehabilitation."

One of the most important findings of our analysis emphasizes the relative importance of auxiliary health insurance as an access mechanism to inpatient care. Although all the disabled-worker beneficiaries had basic coverage provided by Medicare, our findings convincingly show that additional insurance coverage increases the likelihood of inpatient care. Although the RAND Health Insurance Experiment was more concerned with the non-disabled, our findings concerning the influence of additional health insurance generally parallel those found in that investigation (Newhouse, 1987). As previously demonstrated in this article, disabled-worker beneficiaries have very limited financial resources at their disposal. Therefore, auxiliary coverage, such as Medicaid, CHAMPUS, and VA, or private health insurance, increases the probability of receiving additional inpatient care when it is needed. Stated another way, the absence of these forms of additional insurance appears to preclude such care. It is notable that CHAMPUS and VA benefits were indicative of non-use of Medicare-covered inpatient services. This suggests that disabled workers with prior military service experience or service-connected disabilities may be more likely to use military and VA hospitals

rather than acute-care, short-stay hospitals. Research concerning the influence of health insurance coverage on survival status and health service utilization appears to be a promising area for future inquiry.

Our analysis suggests further areas of inquiry concerning the enabling variables that represent the personal care and support milieu of impaired and disabled persons. Variables that represent the types of care available within the household from relatives and others, as well as from the larger community, would be useful in helping to explain both survival and health service outcomes. Future research should also address the effects of supply-side factors, such as availability of community services and health care.

In addition, researchers should investigate geographic differences associated with both the use and cost of inpatient care (Helbing, 1992). Geographic patterns appear to be explained by several factors, including availability and accessibility of medical care resources, sociodemographic patterns, economic resource availability, and differences in the incidence and prevalence of disease. There are also striking geographic patterns of disability prevalence for both SSDI and SSI recipients, which appear to reflect higher rates in economically depressed areas (McCoy, Davis, and Hudson, 1994).

Most disability research is concerned with impaired persons in the general population. The present research has focused on SSDI disabled-worker beneficiaries, a special population that differs strikingly from persons identified in national surveys. In recent years, SSDI beneficiaries have grown in number. More people are applying for, and being awarded, Social Security disability benefits than ever before, and many are remaining on the rolls for longer periods, thus increasing costs to both SSDI and Medicare. Changes in beneficiary characteristics have been

occurring as well. According to a recent U.S. General Accounting Office report (1994), the average age of new beneficiaries is now under 50 years of age, and mental impairment awards to younger workers have risen substantially. When the NBS sample was selected in 1980-81, there were relatively few disabled-worker recipients identified with a mental impairment diagnosis, and the diagnostic information in the record system was generally incomplete. In 1980, beneficiaries with mental impairments accounted for about 10 percent of the SSDI caseload, whereas their share of the 1993 caseload had risen to 26 percent (U.S. General Accounting Office, 1994).

The 1991 New Beneficiary Followup (NBF) promises to be a useful source of information for the study of health outcomes and health services utilization, as well as for investigation of the effects of economic factors and social support. The NBF reinterviewed survivors of the NBS approximately 10 years after their initial receipt of benefits, and replicated much of the information collected in the original baseline interview. The NBF also collected new information on rehabilitation services, proximity to and contacts with children and next of kin, sources of assistance with activities of daily living and instrumental activities of daily living, sources of financial support, and reasons for living with others. The data set has been further enhanced by linkage of Medicare record data from 1984 to 1991, by Social Security benefits received from 1980 to 1990, and by earnings records from 1951 to 1991. The NBS-NBF data system promises to be an extremely useful research source for addressing a wide range of programmatic and policy issues that have important implications for an aging disabled population which faces limited financial resources and problematical opportunities for outside support.

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