

# Mobility Impairments and Use of Screening and Preventive Services

## ABSTRACT

**Objectives.** Primary care for people with disabilities often concentrates on underlying debilitating disorders to the exclusion of preventive health concerns. This study examined use of screening and preventive services among adults with mobility problems (difficulty walking, climbing stairs, or standing for extended periods).

**Methods.** The responses of non-institutionalized adults to the 1994 National Health Interview Survey, including the disability and Healthy People 2000 supplements, were analyzed. Multivariable logistic regressions predicted service use on the basis of mobility level, demographic characteristics, and indicators of health care access.

**Results.** Ten percent of the sample reported some mobility impairment; 3% experienced major problems. People with mobility problems were as likely as others to receive pneumonia and influenza immunizations but were less likely to receive other services. Adjusted odds ratios for women with major mobility difficulties were 0.6 (95% confidence interval [CI]=0.4, 0.9) for the Papanicolaou test and 0.7 (95% CI=0.5, 0.9) for mammography.

**Conclusions.** More attention should be paid to screening and preventive services for people with mobility difficulties. Shortened appointment times, physically inaccessible care sites, and inadequate equipment could further compromise preventive care for this population. (*Am J Public Health.* 2000;90:955–961)

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Over the last decades, vastly improved clinical, social, and supportive services have dramatically lengthened and enhanced the daily lives of people with physical disabilities.<sup>1</sup> Like other people, people with physical impairments can develop the potentially preventable conditions targeted by the US Preventive Services Task Force<sup>2</sup> and the Healthy People 2000 and 2010 National Health Promotion and Disease Prevention Objectives.<sup>3,4</sup> Screening, counseling, and immunizations are therefore essential for people with physical impairments.<sup>5</sup>

Many people with disabilities wish to explore “wellness” and “health promotion” activities.<sup>6–8</sup> Primary care doctors, however, often concentrate narrowly on patients’ underlying debilitating disorders to the exclusion of preventive health concerns.<sup>5–8</sup> Admittedly, many persons with physical disabilities have “narrow margins of health,”<sup>9,10</sup> requiring attention for both chronic sequelae of their underlying conditions and acute, life-threatening problems (e.g., respiratory and urinary tract infections). The physiological and functional consequences of disabling conditions may appropriately preoccupy both patients and physicians. Nevertheless, shortened appointment times, physically inaccessible care sites, and inadequate equipment (e.g., nonadjustable examining tables) can compromise care.<sup>8–12</sup> Justice Department investigations have found persistent problems with physical access to care sites, despite the 1990 passage of the Americans with Disabilities Act.<sup>13</sup>

We examined use of screening and preventive services among adults who have difficulty with walking, climbing stairs, or standing for extended periods. These functions are necessary for completely independent mobility in the community and could affect patients’ abilities to seek services, navigate care sites, and obtain certain tests (e.g., the Papanicolaou test, which requires the patient to get onto an examining table, or mammography, which requires the patient to

stand). We explored the association between mobility problems and use of screening and preventive services, controlling for demographic characteristics and access to insurance and health care.

## Methods

### Database

We examined responses from persons 18 years and older (n=77 437) to the core 1994 National Health Interview Survey (NHIS) conducted by the National Center for Health Statistics (NCHS), along with 3 supplemental surveys: the disability supplement (NHIS-D), including functional limitations and daily activities; the family resources supplement, including health insurance and access to care; and a supplement addressing use of selected Healthy People 2000 services.<sup>14</sup> The NHIS involves face-to-face household interviews of a nationally representative sample of noninstitutionalized civilian US residents. Interviewers obtained proxy responses for adults who were absent from home or unable to answer for themselves. Although all participating households received the disability and family resources supple-

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ments, the Healthy People 2000 questions were asked of only 1 randomly selected adult in half the households. Although the NCHS also conducted the NHIS-D in 1995, Healthy People 2000 questions differed across the 2 years; here we examine the 1994 responses. The disability questionnaires are available on the NCHS Web site ([http://www.cdc.gov/nchs/about/major/nhis\\_dis/nhis\\_dis.htm](http://www.cdc.gov/nchs/about/major/nhis_dis/nhis_dis.htm)).

In obtaining all the results presented here, we considered 1994 NHIS sampling weights; therefore, these results provide nationally representative population estimates. We used SAS-callable SUDAAN (version 7.5; Research Triangle Institute, Research Triangle Park, NC) to conduct all analyses. SUDAAN facilitates the Taylor series linearizations necessary to obtain valid standard errors and statistical tests when applying sampling weights drawn from complex survey samples.

### Predictor Variables

**Level of mobility.** From the NHIS-D, we determined whether respondents reported any difficulty with “walking a quarter of a mile—about 3 city blocks,” “walking up 10 steps without resting,” and/or “standing for about 20 minutes.” Persons who reported difficulty on any question were asked about level of difficulty; possible answers were “some,” “a lot,” or “completely unable.” Other questions asked about use of mobility aids. Whether people considered reliance on assistive devices when they reported functional limitations was unclear: 0.5% reported no difficulty with walking, climbing stairs, or standing, yet said they used mobility aids. Like other

researchers,<sup>15</sup> we reclassified persons who reported no difficulty walking but who used mobility aids as having difficulty walking. Table 1 shows definitions of our mobility variables and population estimates of their prevalence, based on the sample remaining after elimination of 1434 persons (1.9%) who failed to respond to the 3 questions about mobility, level of difficulty, and use of assistive devices. We assigned persons to the highest level for which they qualified.

**Demographic and other characteristics.** Demographic characteristics came from the core NHIS. For all respondents, we used the household income levels imputed by the NCHS. Responses to the family resources supplement provided information on health insurance and whether respondents had a usual source of care. Responses to the Healthy People 2000 supplement (n=19337) provided information on self-reported health status and use of general medical checkups. We included persons with unknown values for given variables in the denominators for rate calculations.

Because of the NHIS-D survey design, we could not determine the specific clinical conditions causing the mobility problems, and we could not identify chronic conditions (e.g., cardiac disease) across all respondents.<sup>14</sup> Although respondents were asked about the cause of reported functional problems, this question was not linked to specific deficits.

### Outcome Variables and Analyses

To explore demographic characteristics by mobility level, we used SUDAAN's direct standardization method to adjust for either

age alone or age and sex. Except where otherwise specified, for age adjustment we employed 5-year categories between 25 and 84 years, and additional categories for 18 through 24 years and 85 years and older. We examined the association of mobility problems, demographic characteristics, and insurance characteristics with reported use of screening and preventive services from the Healthy People 2000 supplement. We used  $\chi^2$  tests to assess bivariable associations. We used multivariable logistic regression to predict service use on the basis of age, sex, race, ethnicity, income category, education, insurance status, having a usual source of care, and mobility level. Because mobility level and self-perceived health status were strongly correlated, we did not include health status in the multivariable regressions. SUDAAN does not calculate *c* statistics, the measure of model discrimination generally used to assess the performance of logistic regression models. Therefore, to examine the effect of mobility level in predicting service use, we looked at the contribution of each variable to the  $R^2$ , by replicating each model, sequentially eliminating individual variables, and examining the resultant  $R^2$  value.

### Results

Ten percent of the respondents (representing an estimated 18.6 million people) reported at least some mobility impairment, with 3% (representing an estimated 5.6 million people) experiencing major problems (Table 1). Persons with mobility problems were older than other respondents, although fairly significant proportions (23.2%–38.3%) were younger than 55 years (Table 2). After adjustment for age, there were more women than men reporting problems; after adjustment for age and sex, there were more Blacks than Whites or Hispanics reporting problems. After adjusting for age and sex, we found that people with mobility problems were less educated and poorer than others but were more likely than others to have a usual source of care; we also found that people with minor and moderate mobility problems were slightly less likely than others to have health insurance but were more likely than others to have seen a doctor within the last year.

As noted above, the NHIS-D asked about the reasons for any functional problem reported, including mobility difficulties. These responses were incomplete: 24.4%, 21.4%, and 20.6% of respondents with minor, moderate, and major mobility problems, respectively, failed to report the reasons for their functional difficulties. Given this large percentage of nonresponses, we could not include causality

**TABLE 1—Number and Percentage Reporting Mobility Problems, Based on Responses to the National Health Interview Survey Disability Supplement, 1994**

Definition of Extent of Mobility Problems <sup>a</sup>	Estimated No., in Millions <sup>b</sup>	% of Population
None: no difficulty with walking, climbing stairs, or standing, and no use of mobility aids	167.42	90.0
Minor: some difficulty with walking or climbing stairs or standing, or use of a cane or crutches <sup>c</sup>	7.78	4.2
Moderate: a lot of difficulty with walking or climbing stairs or standing, or use of a walker <sup>d</sup>	5.19	2.8
Major: inability to perform walking or climbing stairs or standing, or use of a wheelchair or scooter <sup>e</sup>	5.63	3.0

<sup>a</sup>The questions asked about ability to walk a quarter of a mile (about 3 city blocks), to walk up 10 steps without resting, and to stand for about 20 minutes.

<sup>b</sup>Reweighted population estimates for noninstitutionalized civilian US residents.

<sup>c</sup>Of persons defined as having minor problems, 10.5% were so defined only because they used a cane or crutches.

<sup>d</sup>Of persons defined as having moderate problems, 3.8% were so defined only because they used a walker.

<sup>e</sup>Of persons defined as having major problems, 4.7% were so defined only because they used a wheelchair or scooter.

**TABLE 2—Characteristics of Population and Health Care Use, by Extent of Mobility Problems: National Health Interview Survey, 1994**

	Extent of Mobility Problems			
	None	Minor	Moderate	Major
Age, mean (SD), y	42.1 (33.6)	59.4 (19.5)	60.2 (21.6)	66.7 (18.6)
Age <55 y, %	77.5	38.3	37.1	23.2
Proportion of population with given extent of problems, %				
Women <sup>a</sup>	88.1	4.9	3.4	3.6
Men <sup>a</sup>	91.3	3.8	2.4	2.6
Whites <sup>b</sup>	90.1	4.1	2.8	3.1
Blacks <sup>b</sup>	84.2	6.5	4.4	4.8
Hispanics <sup>b</sup>	89.0	4.6	3.2	3.3
<High school education, <sup>b</sup> %	17.8	28.8	36.1	32.5
Household income, % <sup>b</sup>				
<\$15 000	19.8	37.4	44.2	40.4
\$15 000–\$29 999	24.3	27.0	27.4	29.0
\$30 000–\$49 999	25.8	19.6	16.8	16.2
≥\$50 000	30.1	15.9	11.6	14.4
With any health insurance, % <sup>b</sup>	82.2	79.3	78.7	83.9
With usual source of health care, % <sup>b</sup>	82.4	85.4	85.4	93.1
Time since last general checkup, % <sup>b,c,d</sup>				
<1 y	46.4	54.5	51.6	59.3
1–2 y	18.8	14.6	18.5	11.8
2–3 y	8.4	7.0	7.5	5.6
3–4 y	5.1	3.5	4.2	3.2
4+ y	15.6	15.3	12.5	14.2
Never had one	3.4	3.3	2.5	4.2
Self-rating of health in general, % <sup>b,d</sup>				
Excellent	29.9	7.3	3.4	12.6
Very good	33.7	17.5	14.3	5.5
Good	27.7	34.5	27.3	18.1
Fair	6.4	29.3	25.5	29.8
Poor	0.8	10.7	27.9	33.2

<sup>a</sup>Adjusted for age category.

<sup>b</sup>Adjusted for age category and sex.

<sup>c</sup>The question asked about a “general physical examination or routine checkup” with a “medical doctor or other health care professional,” not including “a visit about a specific problem.”

<sup>d</sup>Percentages do not add to 100 because of missing or “don’t know” responses.

in our multivariable models. Among persons with major mobility problems who did respond, however, the 5 most common causes were arthritis and other orthopedic problems involving the lower extremities (23.8%); intervertebral disk disorders, other back problems, and sciatica (7.9%); ischemic heart disease and other cardiac conditions (5.6%); cerebrovascular disease (5.0%); and chronic bronchitis, emphysema, asthma, and other lung conditions (4.0%).

*Rates of Screening and Preventive Services*

Table 3 shows unadjusted rates of Healthy People 2000 service use for people with mobility problems and people without such problems. For many of these services, the rates were relatively low for all respondents.

For roughly one third of these services, there were no statistically significant differences in rates by mobility level. The minimal differences in influenza and pneumonia vaccination rates among persons 65 years and older are particularly noteworthy: 52.7% of persons with major mobility problems reported receiving an influenza vaccination within the previous 12 months, compared with 53.2% of those without mobility problems.

Other services were performed significantly less often among people with mobility problems. For example, tetanus immunization was reported by 53.8% of persons with no mobility difficulties, compared with 35.2% of those with major problems. Among women aged 18 to 75 years who had not undergone hysterectomy, 81.4% of those who had no mobility problems had received a Papanicolaou test within the previous 3 years, com-

pared with 63.3% of those with major problems. Among women older than 50 years, 63.5% of those who had no mobility problems reported having had a mammogram within the previous 2 years, compared with 45.3% of those with major mobility problems.

*Adjusted Rates for Specific Services*

Given the important demographic differences between respondents who reported mobility problems and those who did not, an important question is whether such differences explain discrepancies in service use. We examined this question for 4 services (Table 4): Papanicolaou test and mammography, the performance of which could be affected by the patient’s physical capabilities (the ability to get onto an examining table or stand upright at mammography equipment),<sup>11,12</sup> and screening for smoking and alcohol use, which could be affected by stigmatization and societal perceptions of quality of life for people with disabilities<sup>5,15-21</sup> (health care providers who assume that people with severe mobility problems must have a very poor quality of life may feel that it is not worth counseling them about tobacco and alcohol use—“vices” that could make their lives more tolerable).

For the Papanicolaou test and mammography, adjusting for the demographic and access (insurance, usual care source) characteristics erased the small discrepancies in rates between those without mobility problems and those with minor and moderate difficulties (Table 4). However, women with major mobility problems were significantly less likely than others to report receiving these services, with adjusted odds ratios (ORs) of 0.6 (95% confidence interval [CI]=0.4, 0.9) for the Papanicolaou test and 0.7 (95% CI=0.5, 0.9) for mammography.

The Healthy People 2000 supplement asked about use of cigarettes, snuff, and chewing tobacco. Across mobility categories, similar fractions reported any tobacco use: 27.4%, 28.1%, 30.4%, and 29.0% of persons with no, minor, moderate, and major mobility problems, respectively. Tobacco users were much more likely than nonusers to report being asked during their last checkup whether they used tobacco in any form (73.9% of users vs 48.9% of nonusers). Among tobacco users, 74.8% of those with no mobility problems reported being asked about tobacco use, compared with 62.2% of those with major mobility difficulties. With tobacco use in the multivariable model (Table 4), persons with major mobility problems remained less likely to be questioned about tobacco use, with an adjusted odds ratio of 0.8 (95% CI=0.6, 1.0; *P*=.02). Peo-

**TABLE 3—Percentage of Respondents Who Reported Using Screening and Preventive Services, by Extent of Mobility Problems: National Health Interview Survey Healthy People 2000 Supplement, 1994**

Question <sup>a</sup>	Extent of Mobility Problems				P
	None	Minor	Moderate	Major	
During this last checkup, did you have . . . <sup>b</sup>					
Your blood pressure checked?	96.2	97.1	97.1	96.0	.59
Your cholesterol level checked?	54.7	62.5	62.5	68.2	<.001
Your height checked?	79.3	72.6	75.9	69.3	<.001
Your weight checked?	92.8	93.5	92.8	88.7	.30
A vision test? <sup>c</sup>	23.2	25.6	26.9	21.6	.07
A hearing test? <sup>c</sup>	17.1	20.3	18.5	18.1	.31
A urine test? <sup>c</sup>	65.7	66.2	61.9	57.9	.24
A thyroid function blood test? <sup>c</sup>	34.7	38.7	38.3	37.2	.17
A test to check for blood in the stool? <sup>c</sup>	34.5	34.0	32.3	32.0	.96
During the last 12 months, have you had a flu shot? <sup>d</sup>	53.2	60.8	55.6	52.7	.03
Have you ever had a pneumonia vaccination? <sup>d</sup>	27.7	30.9	29.5	32.3	.15
During the past 10 years, have you had a tetanus shot?	53.8	42.1	41.8	35.2	<.001
Have you had a Pap smear within the past 3 years? <sup>e</sup>	81.4	79.4	79.6	63.3	.003
Have you had a mammogram within the past 2 years? <sup>f</sup>	63.5	58.3	51.5	45.3	<.001
Have you had a breast examination within the past 2 years? <sup>g</sup>	75.7	71.7	65.4	63.9	<.001
Have you discussed with a medical professional the pros and cons of taking estrogen to prevent bone loss after menopause? <sup>h</sup>	81.6	73.9	63.2	71.6	.08
During this last checkup, were you asked about . . . <sup>b</sup>					
Your diet and eating patterns?	43.7	46.8	46.4	47.8	.22
The amount of physical activity or exercise you get?	50.2	49.3	43.9	42.6	.01
Whether you use tobacco in any form?	56.9	40.9	51.0	35.3	<.001
How much and how often you drink alcohol?	46.9	34.7	41.5	28.6	<.001
Whether you use marijuana, cocaine, or other drugs?	28.3	17.9	17.2	15.2	<.001
Sexually transmitted diseases? <sup>i</sup>	26.8	22.2	17.3	14.9	.007
Whether you have difficulty with ADLs? <sup>c,j</sup>	10.1	12.9	18.8	26.8	<.001
Whether you have difficulty with IADLs? <sup>c,k</sup>	10.3	15.1	24.5	25.6	<.001

<sup>a</sup>For ease of listing in this table, some questions have been paraphrased.

<sup>b</sup>Asked only of persons who reported having had a routine physical examination within the last 3 years.

<sup>c</sup>Asked only of persons 65 years or older.

<sup>d</sup>Rates reported here only for those 65 years or older.

<sup>e</sup>Asked only of women aged 18 to 75 years; rates presented here only for those who did not report having had a hysterectomy. Pap smear = Papanicolaou test.

<sup>f</sup>Rates presented here only for women 50 years or older.

<sup>g</sup>Asked only of women 30 years or older.

<sup>h</sup>Rates presented here only for women aged 40 to 60 years who reported experiencing any of the changes or symptoms of menopause.

<sup>i</sup>Asked only of persons younger than 65 years.

<sup>j</sup>ADLs = activities of daily living, defined as "taking care of yourself, including dressing, using the toilet, bathing, eating, or getting around inside of your home without help."

<sup>k</sup>IADLs = instrumental activities of daily living, defined as "doing everyday activities and chores, including preparing your meals, managing your money, using the telephone, doing light housework, and shopping."

ple with moderate mobility problems, however, were much more likely to be asked about tobacco use (OR=1.3; 95% CI=1.1, 1.6;  $P=.007$ ).

In contrast, adjusting for demographic and access characteristics eliminated most differences by mobility category in respondents' reports about being asked during their last checkup how much alcohol they drank and how often (Table 4). However, as with tobacco, people with moderate mobility problems were much more likely than others to be questioned about alcohol use (OR=1.3; 95% CI=1.0, 1.6;  $P=.03$ ).

The  $R^2$  values for the multivariable models were relatively modest, ranging from 6.4 ( $R^2 \times 100$ ) for alcohol questions to 12.9 for mammography (Table 4). The mobility categories contributed only 0.1 to 0.2 to the  $R^2$ .

The single most important predictor was age: rates for each service systematically fell with increasing age. The unanticipated high adjusted rates for the Papanicolaou test and mammography use among Black women (Table 4) are consistent with other results based on the NHIS.<sup>22</sup>

#### Walker and Wheelchair Use

We tried to explore our findings relating to Papanicolaou tests and mammography with more specific indicators of mobility problems: use of walkers and use of wheelchairs (electric or manual) or scooters (for the purpose of analysis, we considered scooters "wheelchairs"). Both walkers and wheelchairs still evoke considerable concern about stigmatization,<sup>17-21</sup> and so they are not

employed by most people without "true" need. However, when we limited the sample to respondents who used these aids, sample sizes shrank considerably, compromising our analyses. For example, in the Papanicolaou test analysis, only 48 respondents used walkers and 41 used wheelchairs. Thus, in fully adjusted analyses (adjusted for all predictors from Table 4 except mobility category), confidence intervals widened, although all figures showed trends toward lower odds ratios for women using mobility aids. The adjusted odds ratios for the Papanicolaou test were 0.5 (95% CI=0.2, 0.9;  $P=.02$ ) for walker users and 0.6 (95% CI=0.3, 1.2;  $P=.15$ ) for wheelchair users. The adjusted odds ratios for mammography were 0.7 (95% CI=0.5, 1.0;  $P=.08$ ) for walker users and 0.4 (95% CI=0.2, 0.7;  $P=.004$ ) for wheelchair users.

**TABLE 4—Adjusted Odds Ratios for Use of Specified Services, by Extent of Mobility Problems and Other Characteristics: National Health Interview Survey Healthy People 2000 Supplement, 1994**

Predictor	Service			
	Papanicolaou Test <sup>a</sup>	Mammogram <sup>b</sup>	Screening for Tobacco Use <sup>c</sup>	Screening for Alcohol Use <sup>d</sup>
	<b>Odds ratio (95% confidence interval)</b>			
Mobility problems				
Minor	1.2 (0.8, 1.6)	1.0 (0.8, 1.4)	0.9 (0.7, 1.1)	1.0 (0.8, 1.2)
Moderate	1.3 (0.8, 2.1)	0.9 (0.6, 1.2)	1.3 (1.1, 1.6)**	1.3 (1.0, 1.6)*
Major	0.6 (0.4, 0.9)**	0.7 (0.5, 0.9)**	0.8 (0.6, 1.0)*	0.9 (0.7, 1.1)
Selected age categories, y <sup>e</sup>				
35–39	1.0 (0.8, 1.3)	...	1.0 (0.8, 1.2)	1.2 (1.0, 1.4)
55–59	0.8 (0.5, 1.1)	1.0 (0.7, 1.3)	0.6 (0.5, 0.8)***	0.8 (0.6, 1.0)*
65–69	0.5 (0.4, 0.7) <sup>†</sup>	0.9 (0.7, 1.2)	0.4 (0.3, 0.5) <sup>†</sup>	0.5 (0.4, 0.6) <sup>†</sup>
75–79	...	0.5 (0.4, 0.7)***	0.3 (0.2, 0.4) <sup>†</sup>	0.3 (0.3, 0.4) <sup>†</sup>
Sex: female	...	...	0.7 (0.7, 0.8) <sup>†</sup>	0.6 (0.6, 0.7) <sup>†</sup>
Race				
Black	1.8 (1.4, 2.3) <sup>†</sup>	1.5 (1.2, 1.9)***	1.1 (0.9, 1.2)	1.1 (1.0, 1.2)
Other non-White	0.6 (0.4, 0.7) <sup>†</sup>	0.8 (0.5, 1.5)	0.8 (0.6, 1.0)*	0.8 (0.7, 1.1)
Hispanic ethnicity	1.2 (0.9, 1.6)	1.1 (0.7, 1.6)	1.1 (0.9, 1.3)	1.1 (1.0, 1.3)
Education ≤ high school	0.6 (0.5, 0.7) <sup>†</sup>	0.6 (0.5, 0.8) <sup>†</sup>	0.8 (0.8, 1.0)**	1.0 (0.9, 1.1)
Household income, \$				
<15 000	0.8 (0.6, 1.0)*	0.6 (0.4, 0.7) <sup>†</sup>	0.9 (0.8, 1.0)*	0.9 (0.8, 1.0)
15 000–29 999	0.9 (0.8, 1.2)	0.7 (0.5, 0.9)**	0.9 (0.8, 1.0)**	0.8 (0.7, 0.9)***
30 000–49 999	0.9 (0.7, 1.1)	0.9 (0.6, 1.1)	0.9 (0.8, 1.0)*	0.9 (0.8, 1.0)**
Current tobacco use	...	...	2.7 (2.4, 3.1) <sup>†</sup>	...
Health insurance	1.9 (1.6, 2.4) <sup>†</sup>	3.7 (2.5, 5.4) <sup>†</sup>	1.0 (0.9, 1.2)	1.0 (0.9, 1.2)
Usual source of care	2.3 (1.9, 2.8) <sup>†</sup>	5.0 (3.5, 7.0) <sup>†</sup>	0.9 (0.8, 1.0)	0.9 (0.8, 1.0)*
	<b>R<sup>2</sup></b>			
Total R <sup>2</sup> × 100 for model	7.2	12.9	11.1	6.4
Contribution to R <sup>2</sup> × 100 of selected variables <sup>†</sup>				
Mobility variables	0.1	0.2	0.1	0.1
Age	2.3	2.0	3.3	3.4
Race	0.7	0.2	0.0	0.0
Education	0.5	0.7	0.1	0.0
Income	0.1	0.7	0.1	0.2
Tobacco use	...	...	3.2	...
Health insurance	0.8	1.8	0.0	0.0
Usual source of care	0.1	3.1	0.0	0.0

<sup>a</sup>Papanicolaou test in last 3 years for women aged 18 to 75 years who did not report having had a hysterectomy.

<sup>b</sup>Mammogram in last 2 years for women 50 years or older.

<sup>c</sup>During last checkup, health care provider asked whether patient used tobacco in any form (asked only of persons who reported having had a routine physical examination within the last 3 years).

<sup>d</sup>During last checkup, health care provider asked patient about quantity and frequency of alcohol use (asked only of persons who reported having had a routine physical examination within the last 3 years).

<sup>e</sup>All relevant age categories (up to 14 categories) were used in the logistic regression, with the youngest category as the reference group.

<sup>†</sup>The contribution to R<sup>2</sup> was evaluated for all variables; the contribution of predictor variables varied across the models.

\*P = .05; \*\*P = .01; \*\*\*P = .001; <sup>†</sup>P < .001. P values are rounded to the nearest level.

**Discussion**

We found that many screening and preventive services are used at lower than desirable rates,<sup>3</sup> regardless of respondents' mobility status. In multivariable models assessing use of 4 specific services (Papanicolaou test, mammography, screening for tobacco use, and screening for alcohol use), age was the most important predictor, with rates falling as age increased. Because, on average, people reporting mobility problems were older than others, practices and perceptions relat-

ing primarily to age—rather than to mobility specifically—could at least partially explain lower service use with worsening mobility.

The finding of few differences in unadjusted influenza and pneumonia vaccination rates was unexpected. Here we looked only at persons 65 years and older, the age group for which the US Preventive Services Task Force recommends universal influenza and pneumonia immunization.<sup>2</sup> Other studies suggest that persons with mobility problems have higher immunization rates than the general population.<sup>23</sup> The US Preventive Services Task Force

especially recommends these 2 vaccinations for people with cardiac and pulmonary disease and diabetes.<sup>2</sup> Although we could not look specifically at rates of these conditions across our mobility categories, we know that people reporting mobility difficulties often identified such conditions as the cause of their impairments. Even after we adjusted for the characteristics listed in Table 4, persons with major mobility problems had odds ratios for immunization similar to those of persons without mobility problems: adjusted odds ratios were 1.1 (95% CI=0.8,

1.4) for influenza and 1.3 (95% CI=1.0, 1.7) for pneumonia vaccinations.

The much lower rates for tetanus vaccinations could reflect perceptions that people with mobility difficulties rarely go outside and are thus at low risk of contracting tetanus. The countervailing argument is that people with mobility problems are more likely to fall, heightening their risk. For other services, the comparable unadjusted rates across mobility categories actually raised concerns. For example, among persons 65 years and older, 23.2% of those without mobility problems reported having had vision tests, compared with 21.6% of those with major mobility problems. However, responses to NHIS-D questions suggest that in this age group, 25.7% of those with major mobility problems had serious difficulty seeing, even when they used glasses or contact lenses, compared with 4.9% of persons without mobility difficulties. Poor vision is a major risk factor for falls and further functional declines<sup>24</sup> and so should be addressed aggressively for people with mobility impairments.

The most notable finding was persistently lower rates of Papanicolaou test and mammography use among women with major mobility impairments, even when we controlled for demographic characteristics and health care access. This finding fits with qualitative and anecdotal reports about barriers to primary and preventive care for people with disabilities.<sup>5-13</sup> For example, one internist, describing her private practice in an upper-middle-class community, observed that while wheelchair users “probably could get into the building, they would not have been able to get into the office, and certainly would not have been able to get into the examining room.”<sup>12</sup> When she moved to a Medicaid health maintenance organization (HMO), she encountered a larger number of patients with disabilities. The experiences of a 45-year-old woman with multiple sclerosis were emblematic. The woman had never had a Papanicolaou test; no health care provider had ever offered her one. When the internist and her assistants tried to move the patient onto the high, nonadjustable examining table, they failed. The patient’s daughter, who was familiar with transferring her mother, performed the maneuver. The internist next ordered a mammogram, but the facility “could not serve her because she could not stand up. I had to figure out where to send her for a mammogram. Then I had to get approval from the HMO system for her to go outside their usual place.”<sup>12</sup> Although anecdotal, such stories reinforce our findings.

Our study has important limitations related to its data source. Respondents may

have forgotten being counseled by their doctors or obtaining specific services. Comparisons between self-reports of resource use and use shown by medical records demonstrate the inaccuracy of patients’ memories. For example, although hospitalization would seem to be a highly memorable event (much more so than receipt of counseling or preventive services), patients systematically underreport hospital admissions.<sup>25</sup> Not surprisingly, patients’ memories are especially faulty if considerable time has elapsed. One study found that people correctly reported the number of nights they had spent as inpatients in the previous year (with roughly 90% reporting 0 nights), but accuracy fell considerably for responses about number of physician visits in the previous year.<sup>26</sup> In contrast, several studies have found that patients accurately recall receiving cancer screening services, including mammography.<sup>27-29</sup> Nevertheless, given that the NHIS asked about preventive and counseling services received within the previous 3 or more years, it is likely that some respondents had faulty recollections. One study found that recent timing was the most important predictor of recall for mammography.<sup>29</sup> The unanswered question is whether people with mobility problems are more likely than others to have memory lapses.

Respondents’ inaccuracy could also compromise our assessments of mobility impairments. Although self-reports provide the only authentic information about persons’ perceptions of their functioning, respondents may either exaggerate<sup>30</sup> or minimize<sup>31</sup> their deficits. Some NHIS-D results suggest underestimation (e.g., by users of mobility aids who report no difficulty walking), although these findings could reflect different interpretations of survey questions. However, producing “true” measures of impairments is challenging: even many doctors are inaccurate in their assessment of functional status.<sup>32-36</sup>

The use of proxies for nonrespondents further complicates the interpretation of findings based on the NHIS. Proxies provided about one third of the responses to the core NHIS. The mean age of self-respondents was 46.4 years, compared with 41.3 years for persons with proxies; men were less likely to respond themselves than were women (38.4% vs 61.6%). Self-respondents were more likely to report the type of mobility problems examined here than were persons with proxy respondents (13.4% vs 6.7%). This makes sense: it may be that self-respondents were at home explicitly because of mobility problems, whereas those without mobility difficulties were unable to respond in person because they were out. For the Healthy People 2000 questions, proxies provided up to 19% of

responses. Interestingly, patterns of responses to these questions were generally similar for self-respondents and proxies. For instance, 56.8% of self-respondents reported mammogram use, compared with 58.8% of proxies. Determining the true effect of proxy responses on reports of mobility problems and rates of service use requires further study.

Finally, information about both the health conditions causing the mobility problems and comorbidities was either limited or altogether unavailable. Obviously, multiple coexisting diseases or serious specific conditions can complicate individual decisions about screening and preventive services, from both the patient’s and the doctor’s perspective.<sup>37</sup> We could not control for such crucial clinical factors in our multivariable analyses.

Despite their limitations, results from the NHIS-D are likely to provide the best information on population disability for the foreseeable future: conducting such nationally representative surveys is expensive and methodologically difficult. It appears that although people with mobility problems in this sample were as likely as others to receive some services (e.g., certain immunizations), they were less likely to receive other services. This disparity remained even after demographic and health care access characteristics were controlled for. Why this occurred—whether the lower rates reflect complicated clinical scenarios, patients’ preferences, physicians’ actions, or problems with physical access—is unclear.

Few studies have examined the preferences of persons with disabilities for preventive services and services that maintain well-being.<sup>6-8</sup> However, inferences from the literature about quality-of-life measurement suggest that there may be discordance between persons’ self-perceptions about their lives and external assessments. This discordance could affect the assumptions of others, including primary care providers, about the value of preventive services to people with mobility problems: “Those in what others may perceive to be ‘poor’ health place a relatively high value on their own health since they have adjusted their lifestyles and expectations to take account of their condition. This may be particularly true of young disabled men and women, since one-quarter of this group of respondents describe their health as ‘poor’ yet value it as ‘good.’”<sup>16(p559)</sup> Such observations imply that people with mobility problems may strongly desire the same interventions to lengthen life and enhance quality of life that are recommended for others.

At a minimum, physicians and other primary care providers should remember the full scope of screening and preventive ser-

vices when serving people with mobility impairments.<sup>37</sup> Certainly, individual circumstances may argue against even such accepted services as mammography and the Papanicolaou test, let alone more controversial interventions (e.g., estrogen replacement therapy).<sup>38</sup> The realities of time pressures, physically inaccessible care sites, and inadequate equipment, such as nonadjustable examining tables, may impede efforts to provide comprehensive care. Nevertheless, many people with even severe mobility impairments will live long lives, and screening and preventive services may help to extend and enhance those lives—as they do the lives of persons without mobility problems. □

## Contributors

L. I. Iezzoni developed the idea for the paper, formulated all analyses, and wrote the paper. E. P. McCarthy performed all analytic programming and interpreted results. R. B. Davis interpreted the findings and ensured that the text properly represented the results. H. Siebens conceptualized the mobility measure and provided clinical insight.

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