Published in final edited form as:

Arch Phys Med Rehabil. 2008 July ; 89(7): 1256–1261. doi:10.1016/j.apmr.2007.11.038.

Managing Activity Difficulties at Home: A Survey of Beneficiaries

Brian J. Dudgeon, PhD, OTR, Jeanne M. Hoffman, PhD, Marcia A. Ciol, PhD, Anne Shumway-Cook, PhD, PT, Kathryn M. Yorkston, PhD, BC-NCD, and Leighton Chan, MD, MPH

Department of Rehabilitation Medicine, University of Washington, Seattle, WA (Dudgeon, Hoffman, Ciol, Shumway-Cook, Yorkston); and Rehabilitation Medicine Department Clinical Research Center, National Institutes of Health, Bethesda, MD (Chan).

Abstract

Objective—To describe assistance from helpers and use assistive technology and environmental modification by community-dwelling people with difficulties in activities of living (ADLs) and instrumental activities of daily (IADLs).

Design—Cross-sectional study using the 2004 Medicare rent Beneficiary Survey.

Setting—Community.

Participants—Nationally representative sample of 14,500 Medicare beneficiaries (mean age, 71.5y; 55% female; currently married; 68% living with others; 84% white).

Interventions—Not applicable.

Main Outcome Measures—Self-reported difficulty with ADLs and IADLs; uses of help, assistive technology, environmental modification.

Results—Difficulties were reported most frequently heavy housework, walking, and shopping; money management, shopping, and light housework were reported as tasks most often needing a helper. Walking, bathing, and toileting were activities most often needing uses of technology. Bathroom modifications were the most reported environmental modification. Results from a regression showed that advancing age was the primary factor associated with increasing use of helpers and assistive technology or both for difficult activities.

Conclusions—Uses of helpers, assistive technology, environmental modification are common but vary by type ADL and/or IADL and age. Focused studies regarding uses of help and access to assistive technology and modification appear needed to support community living. Public education about methods and types of assistance needed and may substitute for or augment from care providers.

Keywords

Disabled persons; Medicare; Rehabilitation

© 2008 by the American Congress of Rehabilitation Medicine and the American Academy of Physical Medicine and Rehabilitation
Reprint requests to Brian J. Dudgeon, PhD, OTR, Rehabilitation Medicine, Box 356490, University of Washington, Seattle, WA 98195-6490, dudgeonb@u.washington.edu..

Presented to the American Congress of Rehabilitation Medicine, October 1, 2005, Chicago, IL.

No commercial party having a direct financial interest in the results of the research supporting this article has or will confer a benefit upon the authors or upon any organization with which the authors are associated.

Difficulties with function affect a large portion of the elderly population in the United States. Recent reports¹ indicate that nearly 14 million Medicare beneficiaries have health-related difficulty in personal ADLs, including walking, transfers, bathing, toileting, dressing, and eating. In addition, difficulties are also commonly reported with IADLs, which include shopping, heavy and light housework, meal preparation, managing money, and telephone use. Although many of these activity limitations have been described, including the sequence in which and for whom difficulties are likely to emerge,²⁻⁴ impact of disability on the provision of health care,⁵⁻⁷ relationship to comorbid illnesses,⁸ and forecasting of further functional decline,⁹ much less attention has been given to ways people deal with these daily living performance challenges.

People may adapt to activity difficulties through avoidance or reducing frequency of performance, as well as by pacing and reordering of activities. They may also modify functional techniques through the use of helpers, assistive technology, and/or environmental modification. Helpers can include people who provide a range of support, from supervision and directing to complete physical assistance. Family members are usually the helpers and are organized in an informal network.¹⁰ Use of adaptive or special equipment is another way that people can compensate for activity difficulty. These assistive technologies include such items as mobility aids, devices for personal care, of and control systems to manage the home.^{11,12} Another way to address difficulties is for people to make environmental changes, such as the removal of physical barriers and the installation of safety devices.^{13,14}

Very few population-based studies have been performed that examine mechanisms used to manage disability in community-living adults. Using the 1994 NHIS-D, Verbrugge and Sevak¹⁵ compared the uses of personal assistance and equipment for personal care and home management difficulties by those aged 55 years and older. They found that personal helpers and assistive technology were often used in combination, with assistive technology use particularly common for mobility-related tasks such as walking and transfers and the use of personal helpers more common for tasks such as eating and dressing. These data are now more than 12 years old, and circumstances and styles of handling difficulties may have changed in the last decade with new and growing cohorts of older adults.

We analyzed the 2004 MCBS to provide a more current description of accommodation practices for difficulties in ADLs and IADLs among Medicare beneficiaries. The current study addressed how community-dwelling Medicare beneficiaries deal with activity difficulties as shown by the proportion who use helpers, assistive technology, and environmental modification. Finally, we describe who the helpers are and explore whether helper and assistive technology use is associated with various sociodemographic variables. Results from these analyses can help inform both clinicians concerned with the functional capacities of older adults and policymakers as they design federal or state assistance programs for those who experience disability as part of community living.

METHODS

The Survey

The MCBS is a national survey of the Medicare population sponsored by the Centers for Medicare & Medicaid Services.¹⁶ The MCBS uses a multistage, stratified sampling design to obtain a nationally representative sample of all Medicare beneficiaries. The United States is separated by counties into 107 primary sampling units and then is further segmented into clusters by postal zip codes. Within each cluster beneficiaries are selected by systematic random sampling by age levels, with oversampling of those ages 85 years and older. All community-dwelling people who were enrolled in the 2004 MCBS were used in analyses, regardless of why they qualified for Medicare.

Beneficiaries participating in the 2004 MCBS survey responded in person (90%) or through proxies (10%) in face-to-face interviews, using guided scripts and computer-assisted scoring. A wide variety of items was included in the interviews, such as health status and functioning, health behaviors, and comorbidities, as well as demographic information such as age, sex, race and ethnicity, income, education level, marital status, and living arrangements. Beneficiaries living in long-term care facilities were excluded from these analyses.

As part of the survey, beneficiaries or proxies were asked to report any health-related difficulty in performing any of 6 ADLs (ie, walking, transferring from a chair or bed, toileting, bathing, dressing, eating), and in performing 6 IADLs (ie, heavy housework, light housework, shopping, meal preparation, managing money, telephone use). All ADL and IADL questions were asked in the form, “Due to health or physical problem, do you have difficulty ... ?” Answers were binary (ie, yes, no). If respondents had difficulties with an item, they were asked if help or supervision was received and about who provided such assistance. Helpers were identified by beneficiaries and a roster of all people providing assistance was developed. Helpers were categorized into 1 of 22 designations, including immediate family, relatives, friends, neighbors, health care providers, and other relationships. When reporting ADL difficulty, beneficiaries were also asked if special equipment was used as part of each ADL task performance. If special equipment was used, we report this as assistive technology use. All beneficiaries were questioned about housing and use of a few specific environmental modifications in their home—entry ramps, bathroom modifications, and special (nonstair) railings.

Data Analysis

Proportion of difficulties with specific ADL and IADL tasks, uses of helpers or assistive technology, and environmental modification among Medicare beneficiaries were estimated using the weights provided by the MCBS sample scheme. Associations between using a helper and age (categorized into 4 age groups) were assessed by chi-square tests for each of the ADL difficulties. To explore the association between use of helpers and personal characteristics, we dichotomized use of helper (yes, no) and performed logistic regressions for survey panels, thus accounting for the weights in the MCBS. Personal characteristics included age group (<65, 65–74, 75–84, >85y), sex, marital status (currently married, not married), living status (with others, alone), race (white, nonwhite), income (\$10,000/y, > \$10,000/y but < \$25,000/y, >\$25,000/y), and education (less than high school, high school graduate or more). These variables were chosen because each has been associated with performance differences or changes with aging.¹⁷⁻¹⁹ For exploratory purposes, the significance level was set at .05. Analyses were performed using SPSS^a for descriptive analyses and Intercooled Stata^b for Windows for analyses using sampling weights.

RESULTS

There were 14,500 community-dwelling people enrolled in the 2004 MCBS, and the data for all of them were used in the analyses. The weighted mean age of the cohort was 71.5 years, with 17.1% less than 65 years, 35.6% between 65 to 74 years, 33.6% between 75 to 84 years, and 13.7% 85 years or older. Fifty-five percent of the cohort was female, with 49.3% currently married and 68.4% living with others. Most respondents (74.1%) lived in a metropolitan area. In addition, 69.7% had a high school education or greater, and 62% reported earning below \$25,000 a year. The majority of the respondents were white (83.7%),

^aSuppliers Version 15; SPSS Inc, 233 S Wacker Dr, 11th Fl, Chicago, IL 60606.

^bVersion 8.0; Stata Corp, 4905 Lakeway Dr, College Station, TX 77845.

followed by blacks (9.9%), with the categories of Asian, native Hawaiian/Pacific Islander, American Indian/ Alaskan native, more than 1 race or ethnicity, and other each being less than 1.8% of the sample.

Table 1 shows the estimated overall percentage and respective CIs of Medicare beneficiaries who reported use of help, assistive technology, both, or neither for difficulties with each of the ADLs and IADLs. Individual ADL and IADL items are ordered by number of respondents endorsing difficulty in the specific task. Difficulty with at least 1 IADL was more common (42.2%) than difficulty with at least 1 ADL (31.3%). IADL difficulties were most commonly reported for doing heavy housework (36.2%) and least commonly reported for using the telephone (8.2%). ADL difficulties were most commonly reported for walking (27.3%) and least commonly reported for eating (2.9%). The extent of ADL and IADL difficulties as expressed in number of ADL or IADL with difficulties was different among the age categories, with those who were 85 years or older or 64 years or younger (who qualify for Medicare because of health or disability challenges) having a greater number of ADL and IADL difficulties, followed by those 75 to 84, and then those 65 to 74 years.

Helpers

Among participants reporting at least 1 ADL difficulty, 33.8% (1539/4556 respondents) reported having at least 1 helper. For these people, help was used more frequently for dressing and bathing and least often used for walking (see table 1). Use of 1 or more helpers was reported by 4942 (80.9%) of the 6108 respondents who reported at least 1 IADL difficulty. For these people, help was more frequently reported for all areas compared with reports for ADL difficulties. However, use of help was most frequently reported for paying bills and shopping and least often used for help with the telephone.

The number and relationship of helpers to respondents was examined. Most respondents in the MCBS had at least 1 helper (53%) for either ADLs or IADLs (table 2). Among respondents who used helpers, 76.7% reported receiving help from 1 person, 16.7% used 2, and 6.5% used 3 to 7 helpers. Table 3 shows the distribution of the relationship between the first and second (when reported) helpers and the respondent. We cannot assume that the first reported helper is necessarily the primary helper, because the MCBS does not ask that the helpers be listed in order of importance of assistance. Among the first reported helper, 72.7% were spouses, daughters, or female relative. Among a second reported helper, 25.7% were daughters, 14.4% were female relatives, and 13.6% were sons. Among all first reported helpers, 65.5% lived with the respondent, whereas only 28.2% of the second reported helpers did so. Female beneficiaries were more often unmarried (62.5%) when compared with male (36.2% unmarried) and were more likely to report use of a helper and a greater number of helpers. Married men reported their spouse as their primary helper 91.5% of the time, and married women reported their spouse as their primary helper 86.9% of the time.

Assistive Technology

Assistive technology was used alone or in conjunction with help by a large proportion (57.7%) of the Medicare beneficiaries who reported ADL limitations (see table 1). Respondents reported some use of assistive technology for ADLs, most commonly for walking, toileting, and bathing. Sole use of assistive technology was most common for walking (43.9%) and toileting (34.9%) and was least often used alone for eating (4.1%) and dressing (3.7%). Help and assistive technology was most often combined for bathing (32.7%) and toileting difficulties (22.5%).

Environmental Modification

All beneficiaries who participated in the MCBS were asked the questions about home modifications, not just those with ADL difficulties. Table 4 shows the weighted estimate of environmental modifications present in the homes of Medicare beneficiaries according to whether they reported no difficulties in ADLs or difficulty in 1 or more ADLs. Those with ADL difficulties had more environmental modifications, which included uses of special ramps, bathroom modification, and special railings. For those with ADL difficulties that are addressed by environmental modification (difficulties with walking, transfer from chair/bed, bathing, toileting), bathroom modifications were the most common environmental modification, reported by more than half of those with difficulties in bathing and toileting. Approximately 10% of beneficiaries reported living in a retirement type of facility; therefore, it is unclear if these modifications were chosen by the beneficiary or were a feature of his/her living environment.

Variables Associated With the Use of Assistive Technology and Helpers

We examined the association between age and the use of helpers and assistive technology (tables not shown). We found that age (in categories: 64, 65–74, 75–84, 85y) was statistically associated with use of helpers and assistive technology for all ADLs (all chi-square tests, $P < .002$). Overall, the percentage of those using a helper and those using assistive technology both increased with age. Specifically, those with difficulties in walking and transfers were more likely to use assistive technology as they aged. For bathing and toileting, general increases in both assistive technology and helpers were seen in older age groups. For dressing and eating a greater use of helpers was seen in older age groups.

Logistic regression of survey data was used to explore the association between various sociodemographic variables and the use of helpers or assistive technology for those who reported difficulty with walking, transferring, and bathing. These 3 ADLs were examined because they had the largest proportion of responses compared with the small proportion of difficulties associated with dressing, toileting, and eating. Explanatory variables included age, sex, marital status, race, education, living situation, and SES. Explanatory variables other than age and SES were dichotomized to allow for a sufficient number of observations in each group defined by combinations of categories of explanatory variables. Although we used a weighted logistic regression, we realized that because of the missing values for SES the sample may not represent the entire population. However, the number of missing values is relatively small (<6%), and the intent of this analysis was exploring associations as opposed to confirming those associations, and we can use these results as a guide for further studies.

For those Medicare beneficiaries who had difficulty with walking, those who were younger ($P < .001$) and married ($P = .009$) were less likely to have a helper or use assistive technology for walking. For those who had difficulty with bathing, older age ($P < .001$), not being married ($P = .001$), and living with someone else ($P < .001$) were associated with higher likelihood of having a helper or using assistive technology. Similarly, for those who had difficulty transferring from a chair or bed, older age ($P < .001$) and living with someone else ($P < .001$) were associated with higher likelihood of having a helper or using assistive technology.

DISCUSSION

A large proportion of Medicare beneficiaries report ADL (31.3%) and IADL (42.2%) difficulties, and many of these people indicate adaptations in their functional performance routines using a helper, assistive technology, or environmental modification. Helpers and/or

assistive technology are used frequently for bathing (78.8%) and least frequently for assistance with eating (41.1%). Helper use is more common for those with IADL difficulties, ranging from 89.9% for help with paying bills to 55.2% for help using the phone. Walking is the most common ADL difficulty and is more likely to be accommodated for by use of assistive technology alone. For toileting, bathing, and transfers, assistive technology use is also common but is often combined with receipt of help as well. Assistive technology use is infrequently reported for dressing and eating, with help alone being the most commonly reported accommodation. Environmental modifications were frequently found in the homes of those with difficulty walking, transferring, bathing, and toileting.

Receiving help to assist with difficulties with IADLs and ADLs is the adaptation used most frequently by Medicare beneficiaries compared with uses of assistive technology or environmental modification. A large portion of Medicare beneficiaries report receiving help, and most (76.7%) of that help is from a single helper. Most assistance provided to these people is by family, friends, and other helpers who are likely to be unpaid. Assistance from one's spouse is most common, followed by other family members, such as daughters and other female relatives.

Advancing age primarily accounts for increasing uses of help and/or assistive technology to manage limitations, and this was consistent in the logistic regression results examining use of a helper or assistive technology for walking, bathing, and transferring. In our exploration of other possible associated variables, we also found that those who lived with others or who were unmarried were more likely to report assistance from a helper or assistive technology. Although females were more likely to self-report ADL and IADL difficulties, sex of the participant did not account for differences in uses of helpers or assistive technology. Accommodation patterns of men and women did not differ greatly when considering age, marital status, and living arrangements. Nevertheless, older women are more likely than older men to be unmarried and living alone, more often necessitating assistance from helpers, other than one's spouse.

Research literature suggests that assistive technology and environmental modification appear to be effective means to compensate for some functional difficulties by many older adults.¹⁴ Freedman et al²⁰ cited increasing use of assistive technology as a reason for the decline in late-life disability, as shown by reductions in both personal care being received and unassisted difficulty being described. Cornman et al²¹ reviewed reports from national surveys and concluded findings similar to ours; 14% to 18% of those 65 years and older make use of one or more assistive devices.

Our findings from the MCBS indicate that mobility challenges appear to be managed through uses of assistive technology, but that assistive technology is not often used for other, perhaps more complex ADLs. For example, independent use of bathing aids is less common, and few are using assistive technology for dressing and eating. Acceptance of assistive technology innovations by potential users who have ADL limitations may be a source of the problem, or adaptations may be occurring in different ways (eg, clothing selections for dressing problems, types of food chosen with eating difficulty). Further and more thorough study of how performance changes are taking place could clarify needs for new approaches to ADL and IADL accommodations.

Verbrugge and Sevak¹⁵ reported on the 1994 phase 1 portion of the NHIS-D. Among 41,225 respondents age 55 or more years, ADL difficulty ranked highest to lowest for bathing, dressing, transfers, getting around inside, toileting, and eating. IADL difficulty ranked highest to lowest for heavy housework, shopping, light housework, meal preparation, money management, and telephone use. Questions about health-related difficulty, assistance from

others being received, and equipment being used were asked in a similar but not identical way. For example, the NHIS-D asked about getting around, whereas the MCBS specifically asked about any difficulty walking. In the MCBS, ADL difficulties of walking and transfers had the highest rating, in contrast to bathing and dressing having the highest difficulty rating in the NHIS-D. Ranking of IADL difficulties were identical in the MCBS and NHIS-D.

Despite differences in question format and age range of survey respondents, trends in patterns of assistance were similar to the study conducted by Verbrugge and Sevak.¹⁵ In both the 1994 NHIS-D and the 2004 MCBS, personal help alone was most likely to be used with dressing and eating difficulties; these being tasks calling for upper-extremity and hand movements. In contrast, equipment use alone was more likely for tasks focusing on lower-extremity movements such as walking, toileting, and transfers. Combined use of equipment and personal help was common for bathing and toileting difficulties.

Interestingly, population-based surveys show that a large number of respondents report difficulty with ADLs and IADLs but do not report use of helpers or assistive technology. For those with difficulty in ADLs, 21.2% (for bathing) to 58.9% (for eating) report no help or assistive technology use, and for those with difficulties in IADLs, 10.1% (paying bills) to 44.8% (using the telephone) report no help. These people may have temporary or minor difficulty and feel no need to change their routines. Alternatively, they may have not discovered accommodations through help, assistive technology, or environmental modification or may have found those strategies to be ineffective.

Activity curtailment and avoidance behaviors have been described,²² and older adults and those with disability having many unmet needs has also been suggested.^{23,24} Further study of how older adults and others with disability discover and use accommodation strategies may help to show the best ways to inform them, either through health care practices or by public health and consumer education. For example, trends toward direct sale of assistive devices and technology to consumers through stores or catalogs necessitate providing instruction and guidance about uses of devices in different ways. Development of instructional resources—including web-based educational materials²⁵—are emerging, but effectiveness of such methods are not often reported or contrasted with traditional clinical and home visit methods.^{26,27}

Although the MCBS survey does not ask about satisfaction or quality of assistance with use of these functional accommodation strategies, others have addressed these questions. Verbrugge and Sevak²⁸ reported that personal help, alone or with equipment, was better at relieving task difficulty symptoms (eg, excessive-time, fatigue, or pain) to perform than if equipment is used alone. Nevertheless, people who exclusively used equipment preferred retaining that strategy and seemed to value independence over physical comfort. Exclusive equipment use may be more efficacious than use of personal assistance and calls for improved technologic advancements (equipment and environmental designs) to both prevent and alleviate dysfunction.¹¹ Agree and Freedman²⁹ described that those reporting exclusive use of assistive devices continue to report some difficulty but do not seem to desire use of helpers, and that exclusive use of equipment is most beneficial to those with less severe limitations.³⁰ Further study about the effectiveness and longevity of accommodation practices as part of community living appears warranted and should be studied longitudinally.

Study Limitations

Our study has limitations in the use of cross-sectional survey methodology to examine associations with use of helper and/or assistive technology and environmental modification, as well as reporting findings that may not apply to non-Medicare beneficiaries. In addition,

survey questions may not fully capture the extent of functional limitations and how differing degrees of difficulty are addressed by people. For example, questions about activity avoidance or curtailment are missing from the survey. In addition, because uses of assistive technology or help for ADLs is identified only when beneficiaries report having difficulty and assistive technology is not asked regarding IADLs, the use of devices and help may be under-estimated. Environmental modifications are frequently reported, but data should be interpreted with caution because of the nature of the survey methods. For example, about 50% of beneficiaries had bathroom modifications when some ADL difficulty was reported, yet 25% had bathroom modifications while conveying no ADL difficulties. Bathroom changes and other housing features such as ramps and special railings may be in place as general features that were not specially designed for the beneficiary.

CONCLUSIONS

This Medicare population-based study draws attention to IADL and ADL challenges experienced by community-dwelling older adults and those with disability. Functioning in the community, managing a home, and caring for oneself at home continue to be increasingly difficult with aging and may be partially managed by uses of helpers and some types of assistive technology and environmental modification. Although the MCBS is a good source of information, satisfaction with accommodations is unclear and some needs may not be being successfully addressed. Specific study about soliciting and training helpers and orientation to existing and new types of assistive technology and environmental modification appears needed to help people and families in managing difficulties being experienced in community living. Public education and awareness about effective accommodation practices may help to supplement or improve on guidance being provided by health care service providers.

Acknowledgments

Supported by the Centers for Disease Control and Prevention (grant no. MM-0625-04/04) and the Intramural Research Program, National Institutes of Health Clinical Center.

List of Abbreviations

ADLs	activities of daily living
CI	confidence interval
IADLs	instrumental activities of daily living
MCBS	Medicare Current Beneficiary Survey
NHIS-D	National Health Interview Survey Disability Supplement
SES	socioeconomic status

References

1. He, W.; Sengupta, M.; Velkoff, VA.; DeBarros, KA.; U.S. Census Bureau. Current population reports, P23-209: 65+ in the United States: 2005. U.S. Government Printing Office; Washington (DC): 2005.
2. Barberger-Gateau P, Rainville C, Letenneur L, Dartigues JF. A hierarchical model of domains of disablement in the elderly: a longitudinal approach. *Disabil Rehabil.* 2000; 22:308–17. [PubMed: 10877484]
3. Dunlop DD, Hughes SL, Manheim LM. Disability in activities of daily living: patterns of change and a hierarchy of disability. *Am J Public Health.* 1997; 87:378–83. [PubMed: 9096537]

4. Gill TM, Kurland B. The burden and patterns of disability in activities of daily living among community-living older persons. *J Gerontol A Biol Sci Med Sci*. 2003; 58:70–5. [PubMed: 12560415]
5. Chan L, Beaver S, MacLehose RF, Jha A, Maciejewski M, Doctor JN. Disability and health care costs in the Medicare population. *Arch Phys Med Rehabil*. 2002; 83:1196–201. [PubMed: 12235597]
6. Jha A, Patrick DL, MacLehose RF, Doctor JN, Chan L. Dissatisfaction with medical services among Medicare beneficiaries with disabilities. *Arch Phys Med Rehabil*. 2002; 83:1335–41. [PubMed: 12370864]
7. Stearns S, Bernard SL, Fasick SB, et al. The economic implications of self-care: the effect of lifestyle, functional adaptations, and medical self-care among a national sample of Medicare beneficiaries. *Am J Public Health*. 2000; 90:1608–12. [PubMed: 11029996]
8. Chan L, Shumway-Cook A, Yorkston KM, Ciol MA, Dudgeon BJ, Hoffman JM. Design and validation of a methodology using the International Classification of Diseases, 8th Revision, to identify secondary conditions in people with disabilities. *Arch Phys Med Rehabil*. 2005; 86:1065–9. [PubMed: 15895361]
9. Covinsky KE, Hilton J, Lindquist K, Dudley RA. Development and validation of an index to predict activity of daily living dependence in community-dwelling elders. *Med Care*. 2006; 44:149–57. [PubMed: 16434914]
10. Houde SC. Predictors of elders' and family caregivers' use of formal home services. *Res Nurs Health*. 1998; 21:533–43. [PubMed: 9839798]
11. Verbrugge LM, Rennert C, Madans JH. The great efficacy of personal and equipment assistance in reducing disability. *Am J Public Health*. 1997; 87:384–92. [PubMed: 9096538]
12. Miskelly F. Assistive technology in elderly care. *Age Ageing*. 2001; 30:455–8. [PubMed: 11742772]
13. Fange A, Iwarsson S. Changes in ADL dependence and aspects of usability following housing adaptation—a longitudinal perspective. *Am J Occup Ther*. 2005; 59:296–304. [PubMed: 15969277]
14. Mann WC, Ottenbacher KJ, Fraas L, Tomita M, Granger CV. Effectiveness of assistive technology and environmental interventions in maintaining independence and reducing home care costs for the frail elderly. A randomized controlled trial. *Arch Fam Med*. 1999; 8:210–7. [PubMed: 10333815]
15. Verbrugge LM, Sevak P. Use, type, and efficacy of assistance for disability. *J Gerontol B Psychol Sci Soc Sci*. 2002; 57:S366–79. [PubMed: 12426445]
16. Adler GS. A profile of the Medicare Current Beneficiary Survey. *Health Care Financ Rev*. 1994; 15:153–63. [PubMed: 10138483]
17. Anderson EM, Brownson RC. Disability and health status: ethnic differences among women in the United States. *J Epidemiol Community Health*. 2000; 54:200–6. [PubMed: 10746114]
18. Grundy E, Glaser K. Socio-demographic differences in the onset and progression of disability in early old age: a longitudinal study. *Age Ageing*. 2000; 29:149–57.
19. Guralnick JM, Land KC, Blazer D, Fillenbaum GG, Branch LG. Educational status and active life expectancy among older blacks and whites. *N Engl J Med*. 1993; 329:110–6. [PubMed: 8510687]
20. Freedman VA, Agree EM, Martin LG, Cornman JC. Trends in the use of assistive technology and personal care for late-life disability, 1992–2001. *Gerontologist*. 2006; 46:124–7. [PubMed: 16452292]
21. Cornman JC, Freedman VA, Agree EM. Measurement of assistive device use: implications for estimates of device use and disability in late life. *Gerontologist*. 2005; 45:347–58. [PubMed: 15933275]
22. Gill TM, Allore HG, Holford TR, Guo Z. Hospitalizations, restricted activity and the development of disability among older adults. *JAMA*. 2004; 292:2115–24. [PubMed: 15523072]
23. LaPlante MP, Kaye HS, Kang T, Harrington C. Unmet need for personal assistance services: estimating the shortfall in hours of help and adverse consequences. *J Gerontol B Psychol Sci Soc Sci*. 2004; 59:S98–108. [PubMed: 15014097]

24. Kennedy J. Unmet and undermet need for activities of daily living and instrumental activities of daily living assistance among adults with disabilities: estimates from the 1994 and 1995 disability follow-back surveys. *Med Care*. 2001; 39:1305–12. [PubMed: 11717572]
25. Ritchie H, Blanck P. The promise of the Internet for disability: a study of on-line services and web site accessibility at centers for independent living. *Behav Sci Law*. 2003; 21:5–26. [PubMed: 12579615]
26. Hastings L, Finlayson M. Factors affecting older adults' use of adaptive equipment: review of the literature. *Am J Occup Ther*. 2001; 55:303–10. [PubMed: 11723971]
27. Nochajski SM, Tomita MR, Mann WC. The use and satisfaction with assistive devices by older adults with cognitive impairments: a pilot intervention study. *Top Geriatr Rehabil*. 1996; 12:20–53.
28. Verbrugge LM, Sevak P. Disability symptoms and the price of self-sufficiency. *J Aging Health*. 2004; 16:688–722. [PubMed: 15448278]
29. Agree EM, Freedman VA. A comparison of assistive technology and personal care in alleviating disability and unmet need. *Gerontologist*. 2003; 43:335–44. [PubMed: 12810897]
30. Agree EM. The influence of personal care and assistive devices on the measurement of disability. *Soc Sci Med*. 1999; 48:427–43. [PubMed: 10075170]

Weighted Estimates of Percentage and 95% CI of Medicare Beneficiaries Who Use Help, Assistive Technology, Both, or Neither, by Type of ADLs and IADLs

Table 1

Difficulty	No. Reporting Difficulties ^{*,†} (%)	Percentage of Participants (95% CI) With Difficulties [‡] Who Use			
		No Help and No Assistive Technology	Help Only	Assistive Technology Only [§]	Help and Assistive Technology
ADL difficulty					
Walking	3959 (27.3)	38.3 (36.1–40.5)	4.0 (3.3–4.7)	43.9 (41.5–46.3)	13.8 (12.2–15.3)
Transfer from chair/bed	2089 (14.4)	44.2 (40.7–47.7)	16.2 (14.1–18.3)	23.5 (20.6–26.3)	16.1 (14.2–18.1)
Bathing	1732 (12.0)	21.2 (18.3–24.1)	23.2 (20.6–25.9)	22.9 (19.9–25.8)	32.7 (30.1–35.3)
Dressing	1182 (8.2)	31.2 (27.3–35.0)	54.6 (51.0–58.2)	3.7 (2.2–5.3)	10.5 (8.5–12.4)
Toileting	877 (6.1)	30.4 (25.1–35.7)	12.2 (9.5–14.8)	34.9 (29.5–40.3)	22.5 (19.2–25.8)
Eating	422 (2.9)	58.9 (53.3–64.6)	26.3 (21.9–30.7)	4.1 (1.7–6.5)	10.7 (6.8–14.5)
IADL difficulty					
Doing heavy housework	5248 (36.2)	22.0 (20.1–23.8)	78.0 (76.2–79.9)		
Shopping	2560 (17.7)	12.1 (10.5–13.7)	87.9 (86.3–89.5)		
Doing light housework	2162 (14.9)	16.4 (14.5–18.4)	83.6 (81.6–85.5)		
Preparing meals	1764 (12.2)	17.8 (15.4–20.2)	82.2 (79.8–84.6)		
Paying bills	1585 (11.0)	10.1 (8.3–11.9)	89.9 (88.1–91.7)		
Using telephone	1187 (8.2)	44.8 (40.4–49.1)	55.2 (50.9–59.6)		

* Percentage based on 14,483 reporting ADLs (17 missing cases).

† Percentage based on 14,484 reporting IADLs (16 missing cases).

‡ Questions about uses of help or assistive technology are only asked if difficulty is reported.

§ Use of assistive technology is not asked regarding IADL performance.

Table 2

Number of Helpers Per Respondent Medicare Beneficiary

No. of Reported Helpers	No. of Beneficiaries	Percentage Among All Respondents	Percentage Among Respondents With Helpers Only
None	6813	47.0	NA
1	5899	40.7	76.7
2	1287	8.9	16.7
3	370	2.6	4.8
4	87	0.6	1.1
5–7	44	0.3	0.6
Total	14,500	100.0	100.0 [*]

NOTE. Proportions calculated without using weights because these results are a description of the sample and not an estimation for the entire population.

Abbreviation: NA, not applicable.

^{*} Does not sum to 100% because of rounding.

Table 3

Percentage of Helpers (first and second helpers only) in Each Category of Relationship Between Beneficiary and Helper (for beneficiaries reporting 1 or more helpers only)

Relationship	Reported First Helper (n=7686)	Reported Second Helper (n=1789)
Spouse	43.3	1.9
Daughter	17.8	25.7
Female relative *	11.6	14.4
Son	7.1	13.6
Male relative †	3.1	7.5
Other relative	1.3	2.6
Nurse/nurse aide	1.2	5.2
Other nonrelatives ‡	14.6	29.1

NOTE. Proportions calculated without using weights because these results are a description of the sample and not an estimation for the entire population.

* Includes mother, sister, daughter-in-law, granddaughter, and niece.

† Includes father, brother, brother-in-law, grandson, and nephew.

‡ Includes partner/roommate, friend/neighbor, boarder, legal/financial officer, guardian, and other nonrelatives.

Weighted Estimates of Proportion and 95% CI of Medicare Beneficiaries With Environmental Modifications at Home, Based on Presence or Absence of ADL Limitation and Specific Tasks

Table 4

Difficulty	No. Reporting Difficulties* (%)	Percentage Among Participants* With Difficulties Whose Residences Have		
		Special Ramps	Bathroom Modifications	Special Railings
No difficulty with ADLs	9927 (68.5)	7.9 (7.3–8.6)	24.0 (22.8–25.2)	1.8 (1.5–2.0)
Difficulty with 1 ADLs (includes >1 of the following: walking, transfers, bathing, and toileting)	4556 (31.5)	16.3 (15.1–17.6)	43.3 (41.3–45.3)	4.4 (3.2–5.1)
Walking	3960 (27.3)	17.1 (15.8–18.4)	43.8 (41.8–45.8)	4.3 (3.7–5.0)
Transfer from chair/bed	2089 (14.4)	19.8 (17.6–21.9)	47.2 (44.4–49.9)	5.7 (4.5–6.8)
Bathing	1732 (11.9)	22.4 (20.1–24.7)	53.2 (49.8–56.6)	6.8 (5.5–8.0)
Toileting	880 (6.1)	23.8 (20.5–27.2)	55.2 (51.2–59.1)	7.7 (6.0–9.4)

* Due to few missing values, percent based on slightly smaller sample than 14,500.