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Study Finds Canes, Crutches and Wheelchairs Greatly Reduce Need for Human Help

Study of the interplay of human and technological assistance for homebound persons with chronic functional impairment

SUMMARY

From 1998 to 2000, researchers at Brown University under the direction of Susan M. Allen, Ph.D. studied how well personal assistance (paid or family) and technological assistance (canes, crutches, walkers and wheelchairs) work for adults with chronic conditions who need help with everyday activities.

They also studied the prevalence of home modifications in a population of wheelchair users, and whether home modifications prevented falls.

The project was part of the Robert Wood Johnson Foundation (RWJF) *Home Care Research Initiative* national program (for more information see Program Results Report).

Key Findings

The researchers found that:

- The use of canes and crutches:
  - Reduced the number of hours of formal and informal care that adults with chronic conditions need per week.
  - Reduced the number of activities of daily living for which people need human help.
  - Lowered out-of-pocket costs for formal helping services (*Journal of Gerontology: Social Sciences*, vol. 56, no. 6, 2001).
- Among wheelchair users, the use of structural modifications (bathroom modifications, widened doorways/hallways, kitchen modifications, railings and easy-open doors) was relatively low (*American Journal of Public Health*, vol. 92, no. 1, 2002).
- The presence of any indoor home modification was associated with less falls involving injury among wheelchair users; using other mobility aids, having multiple

helpers and getting outside every day were associated with more falls involving injury (*American Journal of Public Health*, vol. 92, no. 1, 2002).

Funding

RWJF supported this project through a grant of $107,866.

THE PROBLEM

As the population ages and life expectancy increases, the demand for supportive services to keep people with health problems at home will grow.

By 1998, a substantial body of research (including Kemper [*Health Services Research*], Hanley et al. [*Journal of Health Politics, Policy, and Law*] and Tennstedt et al. [*Journal of Aging and Health*]) showed that the family provided most of the supportive services (informal care) that people needed to stay at home, and that formal (paid) home care services were added when the family could not meet all caregiving needs.

Social trends (e.g., more women working outside the home and decrease in family size) suggest that family caregivers may not be as available in the future. Some research suggests that technological assistance (e.g., canes, crutches, raised toilet seats, railings) may help more with daily tasks than personal assistance, but there is little evidence for whether and how technological assistance and home modifications may change formal and informal care.

THE PROJECT

Researchers at Brown University studied how well personal assistance (paid or family) and technological assistance (canes, crutches, walkers and wheelchairs) work for adults with chronic conditions who need help with everyday activities.

They analyzed a national data set designed to produce previously scarce information about sociodemographic characteristics and medical conditions of people who are disabled—the 1994 and 1995 NHIS-D[1] and its Followback Surveys in 1995 and 1996, respectively. (RWJF partially funded the primary data collection and analysis of the 1994–95 NHIS-D [see Program Results Report on ID#s 019993, 020753, PC340, PC342 and 037554). The 1994 and 1995 NHIS-D surveyed approximately 107,500 people; of these, 25,805 people met disability criteria and responded to the 1995 and 1996 Adult Followback Surveys.

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[1] National Health Interview Survey on Disability Supplement (NHIS-D): The National Health Interview Survey on Disability Supplement and its Adult Followback Survey are ongoing surveys of people with disabilities who are living in the community. They provide information on demographic characteristics of respondents, medical conditions of respondents and use of home care and technological aids by state Medicaid beneficiaries.

The researchers divided the data into Phase 1: the 1994 and 1995 NHIS-D, and Phase 2: the 1995 and 1996 Adult Followback Surveys. They used different portions of the data for analyses related to the project's six objectives:

- *Objective 1:* To identify factors related to the use of technological assistance among older and working-age adults with functional limitations in mobility.
- *Objective 2:* To develop a typology of technological assistance "adequacy" based on type and severity of mobility and ADL[2] (activities of daily living) limitations.
- *Objective 3:* To determine whether the use of adequate technological assistance is associated with lower levels of human assistance, controlling for level of functional limitation and other condition-related factors.
- *Objective 4:* Assuming that technological assistance is a more constant and reliable source of assistance than human help, to test the hypothesis that adults who are disabled who use adequate technological assistance at baseline (NHIS-D) will be more likely than comparable people who do not use such technological assistance to experience positive outcomes at follow-up (the Adult Followback Survey).
- *Objective 5:* To test the hypothesis that people who live alone and use adequate technological assistance at baseline will be more likely than comparable people who live alone and rely on human assistance to continue to live alone at follow-up.
- *Objective 6:* To examine out-of-pocket cost trade-offs in patterns of home care use involving informal care, formal care and technological assistance.

For more information about the samples defined for these analyses, see the Appendix.

FINDINGS

As reported in the *Journal of Gerontology: Social Sciences* (vol. 56, no. 6, 2001), based on 9,230 respondents with limitations in mobility and daily living activities:

- **35 percent of respondents used mobility equipment.** The most commonly used type of equipment was canes (24.4%), followed by walkers (10.8%), wheelchairs (9.4%) and crutches (2.9%).
- **61 percent of respondents received human help.** More than half (55.7%) received only informal help. Few (13.2%) received paid help (5.3% received only paid help, and 7.9% received paid and informal help).
- **The use of canes and crutches reduced the number of hours of formal and informal care needed per week.** The use of canes reduced paid help by

[2] ADL (activities of daily living): Basic daily tasks of life, such as eating, continence, transferring in and out of bed, toileting, dressing and bathing. An ADL scale allows a health professional to establish the levels at which an older adult functions in caring for himself or herself and performing these activities.

approximately one hour and informal care by approximately four hours per week. The use of crutches reduced paid help by approximately two hours and informal care by approximately nine hours per week.

- **The use of canes and crutches reduced the number of activities of daily living (ADL) for which people needed human help.** People were most likely to use canes and crutches in place of human help to get to the toilet and in and out of bed.
- **The use of canes and crutches was associated with lower out-of-pocket costs for formal helping services.** The use of canes reduced out-of-pocket costs by $69 per year. The use of crutches reduced out-of-pocket costs by $72 per year.

As reported in the *American Journal of Public Health* (vol. 92, no. 1, 2002) based on 525 respondents who were 18 years and older, noninstitutionalized and used a wheelchair:

- **37.9 percent of respondents fell at least once in the past 12 months; 46.7 percent of these were injured when they fell.**
- **The use of structural modifications (bathroom modifications, widened doorways/hallways, kitchen modifications, railings and easy-open doors) was relatively low.** Four percent of respondents had all five modifications, and 36.4 percent had none.
- **The presence of any indoor home modification was associated with fewer falls involving injury.**
- **Using other mobility aids, having multiple helpers and getting outside everyday were associated with more falls involving injury.**

As reported to RWJF:

Use of technological assistance, based on 12,814 respondents with at least one mobility problem:

- **People were more likely to use technological assistance if they:**
  - **Were over 65 (nearly twice as likely as younger adults), male, black, had attended at least some college, lived alone and/or were women with higher incomes.**
  - **Had physical/occupational therapy or were seen by a visiting nurse in the past year, or had difficulty bathing or using the toilet.**
  - **Were under the age of 65 and were covered by Medicare, Medicaid or military insurance.**
- **People were less likely to use technological assistance if they were married.**

Outcomes for adults who are disabled who do and do not use adequate technological assistance, based on approximately 7,000 respondents:

- **The percentage of people with substantial mobility problems increased from 42 percent to 59 percent in one year.** In the NHIS-D[3] (Phase I), 42 percent of respondents reported difficulty walking one-quarter mile, climbing 10 steps, and standing or being on their feet for two hours; in the Adult Followback Survey (Phase 2), 59 percent had problems in all three areas.
- **35 percent of the respondents grew more dependent on help with activities they could no longer do alone, and 13 percent became less dependent on help.**
- **People who used technological assistance were more likely than those who did not to need more human help, and to use paid help.**

Outcomes for adults with disability who live alone and use adequate technological assistance, based on approximately 2,900 respondents:

- **85 percent of respondents still lived alone, 11 percent had moved in with others (or others moved in with them), and 3 percent moved into institutions.**
- **Use of technological assistance did not predict whether people would continue to live alone (except for crutches, which are often temporary and may reflect recovery from injury rather than enabling people to remain living alone).**

Limitations

The methodology used to determine changes in mobility changed between the National Health Interview Survey and the Adult Followback Survey. Thus, the results suggesting that use of mobility aids does not protect people with impairment from functional decline should not be considered definitive.

Communications

Researchers published articles about the project in the *Journal of Gerontology: Social Sciences* and the *American Journal of Public Health* and made several presentations to professional groups. A third paper was under review as this report was completed. See the Bibliography for details.

[3] National Health Interview Survey on Disability Supplement (NHIS-D): The National Health Interview Survey on Disability Supplement and its Adult Followback Survey are ongoing surveys of people with disabilities who are living in the community. They provide information on demographic characteristics of respondents, medical conditions of respondents and use of home care and technological aids by state Medicaid beneficiaries.

LESSONS LEARNED

1. **Consider including a truly interdisciplinary research team when conducting policy-oriented research.** The mix of expertise used in the project (health economist, epidemiologist/physical therapist and sociological/health services researcher) proved helpful, as the perspectives of other disciplines encouraged the team to think broadly about the implementation of study objectives. (Principal Investigator)

AFTERWARD

The principal investigator is conducting research to test the degree to which the use of canes, crutches and wheelchairs at home substitutes for human help.

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APPENDIX

Analytic Samples

(Current as of the end date of the program; provided by the program's management; not verified by RWJF.)

- *Objective 1:* To identify factors related to the use of technological assistance among older and working-age adults with functional limitations in mobility.
  - Researchers selected all respondents to the Adult Followback Survey who might be expected to benefit from technological assistance, specifically from mobility aids. This included all respondents who had at least one of three problems moving around: difficulty walking one-quarter mile, difficulty climbing 10 steps and/or difficulty standing or being on one's feet for two hours (12,814 people).
- *Objective 2:* To develop a typology of technological assistance "adequacy" based on type and severity of mobility and ADL[4] limitations.
  - The researchers selected all respondents who were age 18 and over, noninstitutionalized and reported using a wheelchair in the prior two weeks at both Phase 1 and Phase 2 (525 people). They selected the occurrence of injurious falls as the outcome to demonstrate "adequacy."
- *Objective 3:* To determine whether the use of technological assistance is associated with lower levels of human assistance, controlling for level of functional limitation and other condition-related factors.
  - The researchers conducted this analysis on data from respondents to the Adult Followback Survey who were impaired in their mobility and activities of daily living (9,230 people).
- *Objective 4:* Assuming that technological assistance is a more constant and reliable source of assistance than human help, to test the hypothesis that adults with disability who use adequate technological assistance at baseline (NHIS-D[5]) will be more likely than comparable people who do not use such technological assistance to experience positive outcomes at follow-up (the Adult Followback Survey).

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[4] ADL (activities of daily living): Basic daily tasks of life, such as eating, continence, transferring in and out of bed, toileting, dressing and bathing. An ADL scale allows a health professional to establish the levels at which an older adult functions in caring for himself or herself and performing these activities.

[5] National Health Interview Survey on Disability Supplement (NHIS-D): The National Health Interview Survey on Disability Supplement and its Adult Followback Survey are ongoing surveys of people with disabilities who are living in the community. They provide information on demographic characteristics of respondents, medical conditions of respondents and use of home care and technological aids by state Medicaid beneficiaries.

- The researchers conducted this analysis on data from respondents who reported at least one mobility impairment at both Phase 1 and Phase 2 (approximately 7,000 people).

- *Objective 5:* To test the hypothesis that people who live alone and use adequate technological assistance at baseline will be more likely than comparable people who live alone and rely on human assistance to continue to live alone at follow-up.
  - The researchers conducted this analysis on data from 2,900 people with a disability who lived alone at Phase 1, and who they interviewed at Phase 2.

- *Objective 6:* To examine out-of-pocket cost trade-offs in patterns of home care use involving informal care, formal care and technological assistance.
  - The researchers conducted this analysis on data from 12,814 people who might be expected to benefit from technological assistance.

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