Therapeutic Home Adaptations for Older Adults with Disabilities

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Family physicians commonly care for older patients with disabilities. Many of these patients need help maintaining a therapeutic home environment to preserve their comfort and independence. Patients often have little time to decide how to address the limitations of newly-acquired disabilities. Physicians can provide patients with general recommendations in home modification after careful history and assessment. Universal design features, such as one-story living, no-step entries, and wide hallways and doors, are key adaptations for patients with physical disabilities. Home adaptations for patients with dementia include general safety measures such as grab bars and door alarms, and securing potentially hazardous items, such as cleaning supplies and medications. Improved lighting and color contrast, enlarged print materials, and vision aids can assist patients with limited vision. Patients with hearing impairments may benefit from interventions that provide supplemental visual and vibratory cues and alarms. Although funding sources are available, home modification is often a nonreimbursed expense. However, sufficient home modifications may allow the patient and caregivers to safely remain in the home without transitioning to a long-term care facility. (*Am Fam Physician*. 2009;80(9):963-968, 970. Copyright © 2009 American Academy of Family Physicians.)

▶ **Patient information:** A handout on home adaptations, written by the authors of this article, is provided on page 970.

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Family physicians commonly care for patients with disabilities. An estimated 36 million persons, or 14.5 percent of the U.S. population, are affected by a disability. Patients with disabilities may have difficulty performing activities of daily living (ADL), maintaining a safe home environment, and keeping their home accessible for egress. These challenges can lead to a loss of independence. Family physicians play a critical role in helping patients and their families plan for safety and functional convenience.[1]

More than 80 percent of Americans older than 50 years wish to remain in their homes indefinitely, rather than moving to an assisted living or nursing care facility, even in the event of disabling illness.[2] Being at home usually denotes comfort, quality of life, and independence, regardless of age and disability. Home environmental modifications may be needed to mitigate new disability arising from disease or aging. Home modification especially helps the 25 to 50 percent of older persons who experience loss of functional independence after an acute hospital stay, because only two thirds of these patients return to prehospital function within three months of returning home.[3] Family physicians can supervise home health care services that meet patients' needs and preferences.

More than 75 percent of adults 55 years and older moved into their current residence before 2000.[4] Older buildings seldom include features that assist persons with disabilities in performing ADL.[5] Research shows that environmental and technologic interventions in the homes of frail older persons slow functional decline compared with home care without these interventions, and reduce personal care expenditures that would be used for institutional care (e.g., nursing, case worker visits).[6] However, evidence regarding the economic benefits of care in the home environment is still mixed.[7-10]

A Cochrane review found little evidence that changing the home environment prevents injuries; however, it did not show that

SORT: KEY RECOMMENDATIONS FOR PRACTICE

Clinical recommendation	*Evidence rating*	*References*
Home modifications can slow the rate of functional decline in older persons.	B	6
Home modifications can decrease dependency on caregivers for instrumental activities of daily living, reduce caregiver upset, and increase caregiver effectiveness in patients with dementia.	B	12
A multidimensional risk assessment and management program is the most effective intervention to prevent falls in older adults.	B	13

A = consistent, good-quality patient-oriented evidence; B = inconsistent or limited-quality patient-oriented evidence; C = consensus, disease-oriented evidence, usual practice, expert opinion, or case series. For information about the SORT evidence rating system, go to http://www.aafp.org/afpsort.xml.

home modifications were ineffective.[11] The authors note that the studies in the review did not contain enough participants for adequate statistical power. Despite the limited evidence for injury prevention, home modifications appear to decrease dependency on caregivers for instrumental activities of daily living (IADL) and reduce caregiver upset.[12] In general, environmental assessment and home modification appear to be most successful in preventing falls in older adults when conducted as part of multidimensional risk assessment (for factors such as medications, vision, environmental hazards, and orthostatic blood pressure) with an individualized action plan.[13] This article describes general home modification and safety strategies that family physicians can promote to maximize function, preserve independence, and potentially prevent injuries.

The Physician's Role

The medical interview allows the physician to identify specific needs and consider possible solutions. Based on these needs, the physician and patient can propose and prioritize potential home adaptations. The physician can then recommend appropriate resources directly or through a referral. The physician is also responsible for supervising home-based therapies.

Table 1 describes the domains the physician can explore with a patient or caregiver coping with chronic illness or disability.[14] These include assessment of current and possible future impairments, the patient's values and priorities, ADL, IADL, current adaptive measures, potential medication side effects, home services, and social support. Physical therapists, occupational therapists, social workers, and visiting home nurses can also help advise the patient about specific home intervention measures. Performing a home visit will help the physician acquire more first-hand information about the home care environment.[15]

Home Modifications

Planning ahead for hospital discharge after an acute disabling condition can prepare the patient's home for rehabilitation or continuing care. Often, a patient in the hospital cannot return home unless it is deemed adequate for egress and safety. Many transportation and home health services have "zero lift" policies requiring ramps or mechanical lifts if the home does not have an entry without steps.

The modification priorities for individual homes depend on the patient's current and anticipated future medical conditions, environmental restrictions, and resources (see *Online Table A* for a checklist of home renovation priorities). Since the mid-1990s, homes are often built to universal design standards,[16] which attempt to maximize accessibility and function while preserving aesthetics and minimizing the need for future modifications. Key features of universal design include one-story living, no-step entries, wide doorways and hallways, and extra floor space. These features allow easier use of a wheelchair or other assistive devices. They also help the caregiver by providing extra room for assisting the patient throughout the house, especially in the bathroom and bedroom.

Some older persons may decide to move to homes built to universal design standards within communities that are developed specifically to meet the needs of this population. Home modification may allow these patients

Table 1. Priorities, Activities, Social Context, and Support/Coping Coordination for Patients and Families

Priorities

What are your biggest concerns right now?
What is most important to you?
What are your thoughts about going home, having this procedure, your diagnosis?
What might it look like if this situation turned out the best you can imagine?
What could we do to help you and your family with this change in your circumstances?

Areas to assess	*Resources*
Activities of daily living	**Child and family**
How are you doing with:	Child Find
Bathing	Childcare
Communicating	Education and development intervention services
Dressing	Exceptional Family Member Program
Eating	Family-to-family support
Toileting	Parent training and information center
Walking, getting around	Respite program
Writing	**Logistic supports**
How does this (injury, illness, diagnosis, etc.) affect the things you do to care for yourself every day?	Disabled American Veterans
Instrumental activities of daily living	Durable medical goods
What is a typical day like for you?	Meals on Wheels
How does your condition affect the activities you enjoy each day?	Nutrition services
How are you doing with (or how will you manage):	Transportation
Everyday responsibilities	**Nursing services**
Getting together with people	Community health nursing
Managing finances	Home health nursing
Transportation	Hospice
	Visiting Nurse Association
	Physical care/rehabilitation
	Head injury program
	Occupational therapy
	Physical therapy
	Rehabilitation program
	Respiratory therapy
	Skilled nursing facility
	Speech/language therapy
	Spinal cord therapy
	Vocational rehabilitation

Support and coping	*Resources*
How are you doing with this?	**Psychosocial services**
How is your family (e.g., spouse, partner, son, daughter) coping?	Adult day care
Who helps you deal with this?	Alcohol/substance abuse services
Who can you call if you need some help?	Day treatment program
Who can you call if you want to talk with someone?	Patient representative
	Psychiatric nurse liaison
	Psychiatry
	Psychology
	Respite program
	Senior citizen program
	Social work
	Support groups

Table 1 continues

Table 1. Priorities, Activities, Social Context, and Support/Coping Coordination for Patients and Families *(continued)*

Coordination and payment	*Resources*
Who helps you coordinate your (health care, help on a day-to-day basis, etc.)?	**Coordination**
What resources do you have to pay for the services you need?	Care coordinator
What resources do you have to pay for modifications to your home?	Case manager
	Discharge planner
	Hospital administrator
	Military disability counselor
	Primary care physician/medical home
	Social worker
	Payment/health benefits
	Debt assistance officer
	Health benefits advisor
	Medicaid
	Medicare
	Supplemental Security Income/Social Security Disability Income
	TRICARE
	Veterans Administration
Social and family context	
Where do you live?	
Who lives with you?	
What is your family situation?	
Who is a friend or source of support?	
How have your finances been affected by your medical needs?	
What activities do you enjoy doing with other people?	
Communication that builds partnership (PEARLS)	
Partnership: "Let's tackle this together." "We can work together to figure this out."	
Empathy: "You look pretty upset." "I can see that this is a difficult time for you."	
Apology: "I'm sorry this happened."	
Respect: "I appreciate your (courage, decision, action)."	
Legitimization: "Anyone would be (confused, challenged, bothered, upset) by this situation."	
Support: "I'll stick with you as long as necessary."	

NOTE: *This is an expanded version of the table that appeared in the print version of this article.*

Adapted with permission from Hanson J. PASS-C Form (Priorities, Activities, Social context, Support/Coping—Coordination). Advocating for Patients and Families. *Bethesda, Md.: Uniformed Services University; 2008:ii.*

to stay within their homes and neighborhoods, and remain engaged in their existing social networks and activities.[2]

Home modification can prevent or delay transition from community living to assisted living or nursing home care. The cost of home modification (e.g., $3,000 to $7,000 for an access ramp; $5,000 to $15,000 for bathroom modification) may be modest compared with the costs of moving into assisted living or a nursing home (e.g., $32,000 per year for a one-bedroom unit in an assisted living facility; $70,000 per year for a private room in a nursing home).[17]

PATIENTS WITH DEMENTIA

Home modifications for patients with dementia should promote safety for the patient and peace-of-mind for the caregiver. The modifications listed in *Table 2* allow patients with dementia to receive ongoing care in the least restrictive environment possible, and may be implemented as the need arises.[18] Home modifications for patients with dementia are

Table 2. Home Modifications for Patients with Dementia

Bathroom
Install grab rails in tub, shower, and near toilet
Install handheld shower
Install nonskid surfaces on tub or shower
Install tub chair or bench to sit while showering or bathing
Place sign on bathroom door, keep door open
Raise toilet seat or commode to higher level
Remove or reverse inner door locks or keep keys accessible
Remove rugs and electrical appliances
Replace glass shower doors with plastic doors or curtains
Bedroom
Add night-lights
Consider bedside commode
Consider hospital bed
Install room-darkening shades or curtains
Lower bed to floor level if patient is falling out of bed
Remove carpeting if patient has trouble with incontinence
Use baby monitor to monitor activities
Car
Install driver-controlled door locks and window
Notify police of patient's disability
Secure garage door opener out of patient's reach
Take away patient's car keys or disable car
Fire prevention
Add firefighter sticker at bedroom window
Conduct fire drills
Install smoke alarms
Notify fire department of patient's disability and home measures
Remove lighters and matches
Restrict smoking
Use flame-retardant bedding materials
Kitchen
Consider electric stove or install hidden shut-off valves or auto-pilots
Consider locks on cabinets, refrigerators, and freezers
Cover stove burners
Disable garbage disposal
Install locks on oven doors
Lock up sharp objects and glassware
Kitchen *(continued)*
Remove small, nonfood items that could be consumed
Remove stove knobs
Secure garbage out of patient's sight and reach
Unplug or store electrical appliances out of patient's reach
Outdoors
Be aware of danger areas, such as embankments, streams, lakes, and busy streets
Consider fences or hedges around yard
Remove poisonous plants
Secure outdoor equipment
Stairs
Add contrasting color on edge of treads
Consider barriers or gates at top and bottom
Install banisters on both sides
Replace stairs with ramp
General precautions
Childproof electrical outlets
Cover radiators
Cover shiny or reflective surfaces
Install door alarms
Install double key locks
Install scald-proof faucets or reduce water temperature
Install spring-loaded door closers
Keep first-aid kit accessible
Keep legal documents accessible
Lock up cleaning supplies, chemicals, poisons, and medications
Make a list of patient's medications and health conditions
Notify police and emergency medical services of patient's disability
Program emergency phone numbers on speed dial
Provide neighbors with set of house keys
Provide patient with identification card and bracelet
Reduce clutter
Remove free-standing floor and table fans
Remove hazardous furniture (e.g., high-back chairs, pedestal tables, easily moved furniture)
Remove mirrors if they cause delusions or hallucinations
Remove or lock up sharp or breakable objects
Remove or reverse inner door locks or keep keys accessible
Remove small rugs without nonskid backing

Information from reference 18.

associated with improved caregiver effectiveness and less caregiver upset.[12]

PATIENTS WITH LIMITED VISION

Approximately one in three patients has some form of vision reduction by 65 years of age.[19] Loss of vision from common conditions such as cataracts, age-related macular degeneration, glaucoma, and diabetic retinopathy is associated with depression and loss of function. Home modifications for patients with low vision emphasize the promotion of adequate lighting and contrasting colors to identify hazards *(Table 3)*.[20] These modifications are particularly important because patients who experience vision loss late in life may have difficulty coping with this change.

Table 3. Home Modifications for Patients with Vision Loss

Avoid protruding cabinetry hardware
Consider incandescent lighting over fluorescent lighting
Consider yellow or amber lenses to help patients with sensitivity to glare; hats with brims or visors may also be helpful
Ensure that printed materials are high-contrast, low-glare, 16- to 18-point simple (nondecorative) font, with wide letter and line spacing
Install bright lights at exterior doors with motion or sound activation
Install contrasting material on leading edge of stair
Install flush door thresholds to reduce tripping hazards
Install lighted keyholes and doorbells
Install mirror that can be positioned close to patient for grooming
Install single-handle scald-proof faucet
Install strip lighting under cabinets
Install switches with distinctive "on" and "off" positions
Install task lighting in areas such as the bathroom, dressing room, kitchen, and laundry room
Install telephones, thermostats, thermometers, and appliances with large numerals to maximize residual sight
Provide bold-lined paper and bold felt-tip markers to communicate messages and reminders
Use blinds or shades to control light entering room to limit glare
Use contrasting colors to help with object recognition

Information from reference 20.

Table 4. Home Modifications for Patients with Hearing Loss

Activate closed captioning on televisions
Install appropriate furnishings to improve room acoustics (e.g., acoustic tiles, carpeting, furniture, tapestries, wall hangings)
Install doorbells or intercom systems that activate flashing lights or vibrating pager; or wireless doorbells with volume control and multiple receivers (some have flashing lights)
Install doors with vibration sensors that activate when visitors knock
Install security system: hardwiring or plug-in systems for strobes, bed-shakers, etc.
Install smoke detectors and carbon monoxide detectors with flashing strobe light, extra-loud alarm, pillow vibrator, or paging system
Install spring-loaded handles or motion detectors for faucets
Provide assistive devices for television, radio, or stereo (e.g., personal amplifiers, FM and infrared systems)
Provide wristwatches and timers with vibration
Use personal pager system for communication
Use telephones and cell phones with special equipment
Use weather warnings with pager systems or weather radios with sound/strobe/vibration systems

Information from reference 24.

PATIENTS WITH HEARING IMPAIRMENT

Hearing loss affects more than 2 million Americans older than 70 years,[21] and routine screening for hearing loss is recommended by the U.S. Preventive Services Task Force.[22] Hearing loss in older persons is usually progressive and can significantly impair communication, potentially contributing to social isolation and lower quality of life.[23] In addition to hearing aids, home modifications can apply technology to create alarms and notification messages using visual and vibratory alerts *(Table 4)*.[24]

Resources for Home Modifications

Local organizations of the National Association of Area Agencies on Aging (http://www.n4a.org/) and the National Association of Home Builders (NAHB; http://www.nahb.org) provide lists of reputable home remodeling contractors. The National Association of the Remodeling Industry (http://www.nari.org), the AARP, and the NAHB have developed a program for Certified Aging-in-Place Specialists (CAPS). Although most CAPS professionals are remodelers, an increasing number are general contractors, designers, architects, and health care consultants.[25] Additional certification is offered by Certified Environmental Access Consultants.[26]

The resident of the home is responsible for paying for most home modifications. Other options include funding via reverse mortgages or insurance policies (e.g., automobile insurance in cases of auto-related injuries, disability, workers compensation, long-term care, Veterans Affairs benefits). Social workers may help patients research funding options. Patients with Medicare Part B (outpatient) coverage may be eligible for home occupational therapy assessment, treatment, and training in the use of home modifications. Medicare will also pay for some indicated durable medical equipment used in the home, but not the cost of home modification. Medicaid services vary by state, but some patients may qualify for Home and Community Based Services or other waiver programs.

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Author disclosure: Nothing to disclose.

REFERENCES

1. Asch A, Mudrick NR. Disability. In: Edwards RL, ed. *Encyclopedia of Social Work*. Vol 1. 19th ed. Washington, DC: NASW Press; 1995:752-761.
2. Cannuscio C, Block J, Kawachi I. Social capital and successful aging: the role of senior housing. *Ann Intern Med.* 2003;139(5 pt 2):395-399.
3. Inouye SK, Wagner DR, Acampora D, et al. A predictive index for functional decline in hospitalized elderly medical patients. *J Gen Intern Med.* 1993;8(12):645-652.
4. National Association of Home Builders. CAPS connection. 2007. http://www.nahb.org/fileUpload_details.aspx?contentID=84050. Accessed August 17, 2009.
5. Golant SM, LaGreca AJ. Housing quality of U.S. elderly households: does aging in place matter? *Gerontologist*. 1994;34(6):803-814.
6. 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(3):210-217.
7. Marek KD, Popejoy L, Petroski G, Mehr D, Rantz M, Lin WC. Clinical outcomes of aging in place. *Nurs Res.* 2005;54(3):202-211.
8. Shepperd S, Iliffe S. Hospital at home versus in-patient hospital care. *Cochrane Database Syst Rev.* 2005;(3):CD000356.
9. Outpatient Service Trialists. Therapy-based rehabilitation services for stroke patients at home. *Cochrane Database Syst Rev.* 2003;(1):CD002925.
10. Ward D, Severs M, Dean T, Brooks N. Care home versus hospital and own home environments for rehabilitation of older people. *Cochrane Database Syst Rev.* 2003;(2):CD003164.
11. Lyons RA, John A, Brophy S, et al. Modification of the home environment for the reduction of injuries. *Cochrane Database Syst Rev.* 2006;(4):CD003600.
12. Gitlin LN, Corcoran M, Winter L, Boyce A, Hauck WW. A randomized, controlled trial of a home environmental intervention: effect on efficacy and upset in caregivers and on daily function of persons with dementia. *Gerontologist*. 2001;41(1):4-14.
13. Chang JT, Morton SC, Rubenstein LZ, et al. Interventions for the prevention of falls in older adults: systematic review and meta-analysis of randomised clinical trials. *BMJ.* 2004;328(7441):680.
14. Hanson J. *PASS-C Form (Priorities, Activities, Social context, Support/Coping—Coordination). Advocating for Patients and Families*. Bethesda, Md.: Uniformed Services University; 2008.
15. Unwin BK, Jerant AF. The home visit. *Am Fam Physician.* 1999;60(5):1481-1488.
16. East Metro Seniors Agenda for Independent Living (SAIL) Services and the Minnesota Department of Human Services. Practical guide to universal design: convenience, ease, and livability. http://www.tcaging.org/downloads/homedesign.pdf. Accessed May 13, 2009.
17. Yearly long term care costs move above $70,000 in 2006, according to annual benchmark study by Genworth Financial, USA. Med News Today. 2006. http://www.medicalnewstoday.com/articles/40403.php. Published March 28, 2006. Accessed May 14, 2009.
18. U.S. Department of Health and Human Services Public Health Service. National Institutes of Health, National Institute on Aging. Home safety for people with Alzheimer's Disease. NIH Publication Number 02-5179.
19. Pelletier AL, Thomas J, Shaw FR. Vision loss in older persons. *Am Fam Physician.* 2009;79(11):963-970.
20. Stuen C, Offner R. A key to aging in place: vision rehabilitation for older adults. In: Taira ED, Carlson JL, eds. *Aging in Place: Designing, Adapting, and Enhancing the Home Environment*. New York, NY: The Haworth Press, Inc.; 1999:59-77.
21. Yueh B, Shapiro N, MacLean CH, Shekelle PG. Screening and management of adult hearing loss in primary care: scientific review. *JAMA*. 2003;289(15):1976-1985.
22. U.S. Preventive Services Task Force. Screening for hearing impairment in older adults. Agency for Healthcare Research and Quality; 1996. http://www.ahrq.gov/clinic/uspstf/uspshear.htm. Accessed August 17, 2009.
23. Cruickshanks KJ, Tweed TS, Wiley TL, et al. The 5-year incidence and progression of hearing loss: the epidemiology of hearing loss study. *Arch Otolaryngol Head Neck Surg.* 2003;129(10):1041-1046.
24. Minnesota Department of Human Services. Deaf and hard of hearing services. http://www.dhhsd.org. Accessed May 13, 2009.
25. AARP. Certified aging-in-place specialists. http://www.aarp.org/families/home_design/rate_home/a2004-03-23-caps.html. Accessed May 13, 2009.
26. U.S. Rehab. Certified Environmental Access Consultants. http://www.usrehab.com/ceac. Accessed May 13, 2009.