

INTRODUCTION

Home modifications increase the potential for people with disabilities to live independently and often reduce the need for, or enhance the use of assistive devices. For example, a reacher brings objects on shelves within reach of individuals who have reduced range of motion in the upper body. Lower shelving is a home modification that can eliminate the need for a reacher. In some cases, an assistive device can be used in place of a home modification and, in other cases, it cannot. For example, a reacher can only help someone who has the ability to grasp, and the coordination and strength to manipulate the device and carry the object with it.

The scope of home modifications, however, goes beyond assistive technology. Independence could, for example, hinge around being able to maintain a home. An intervention to repair deteriorated structure caused by deferred maintenance or an emergency plumbing repair may be just as important as solving an activity of daily living (ADL) need. There are many services related to maintaining the environment that should be included in the scope of home modifications. Service providers report that there is a great demand for assistance in heavy maintenance like raking leaves or shoveling snow. Thus, home-modification services are best delivered through a team approach in which all the issues related to independent living can be addressed.

The development of the independent-living movement over the last 20 years has highlighted the importance of home modifications as a major aspect of rehabilitation practice. The desire for many people with significant disabilities to live on their own puts a greater burden on the physical environment for support formerly provided by caregivers. In services to the aging, there has been a parallel trend associated with the phenomenon of aging in place and residential demographics. The majority of older people live in their own homes and prefer to remain there. Even those who move to retirement housing and other age-segregated facilities experience age-related losses of function. Home modifications can reduce the need for older people to relocate to dependent-care facilities. In many cases, home modifications

may not substitute entirely for caregiver support, but caregivers as well have needs for environmental interventions that reduce the stress associated with their role.

Three new policy initiatives emphasize the timeliness of this issue of *Technology and Disability*. First, efforts are underway to reform the nation's health-care system in order to control costs. One way to reduce the cost of health care for people with disabilities and the elderly is by providing more independence in the home environment and reducing the need for dependent care. Second, the disability-rights movement has turned its attention to the development of personal-care networks. Home-modification services can be an important component of such programs. More accessible and usable housing will reduce the need and thus the cost of personal-care services as well as help care providers in their work. Third, the amendments to the Fair Housing Law guaranteed the right to make home modifications in multi-family housing. This removed a legal barrier to serving the needs of low-income individuals.

These policy developments, however, have not addressed the gap in the delivery of services. Jon Pynoos, in the lead article of this issue, examines the need and the limitations of the delivery system. He uses data from national surveys to demonstrate that only a small proportion of the households at risk have modifications that support ADLs and help to eliminate accidents. He also reviews the research literature on consumer awareness and affordability. Using two case studies, he illustrates how service providers have developed innovative and effective programs within a delivery system that is less than adequate. Pynoos argues that there is a great need for new policy initiatives that will make it possible to develop a comprehensive approach to delivery of services.

There have been several studies that provide data on the need for home modifications using data on functional limitations and housing conditions, but few studies have addressed the fit between the needs and the existing housing situations of individuals and the impact that modifications have on well being. Bettye Rose

Connell and her associates completed research on the responsiveness of existing housing to the needs of disabled residents. Their article describes the findings of a mail survey of almost 500 people with disabilities. The findings demonstrate that not everyone has the same level or type of need although there are common needs that are shared by people with different types of disability. They also found that home modifications are important in reducing difficulty and dependence.

The bathroom is a focus of many interventions. Although the human factors of bathroom use have been studied in detail for the general population and for people with disabilities, there is almost no research on the use of bathrooms by older people with disabilities and their caregivers. Abir Mullick's article reports on intensive interviews he conducted with older persons with disabilities on their experience using existing bathrooms and bathing products. His work demonstrates how small details in product design can play a significant role in the usability of bathrooms. He presents his findings as a series of guidelines for making modifications to existing bathrooms to improve their safety and usability by both the older person and the caregivers. He argues for a universal-design approach to product development that would make bathing products more responsive to the needs of the older person as well as more user friendly for the general population.

Home modifications can be very modest in scope. For example, Mullick identified the importance of a nonslip surface outside the tub to reduce the danger of slipping when climbing out of a tub or shower. Home modifications can also be relatively large in scope; for example, adding a room, wing, or even a floor to a home. Architect Robert Lynch describes a major renovation and addition designed to accommodate a child who had been injured in a car accident. If resources are available, modifications should address every aspect of living affected by disability, including psychosocial development. The scope of modifications does not have to be limited to the basic functional issues of access alone. In this case, an insurance settlement provided enough money to renovate and expand the house to support early childhood development and also to be adaptable

for adolescence and adult years. Lynch demonstrates how major modifications should consider the needs of the family as a whole and that aesthetic concerns do not have to take a back seat to functional issues.

As a contrast, Harold Kiewel's article describes a community-based program to serve the needs of people with low incomes. In such programs, methods for delivering services efficiently have to be developed to utilize scarce funds in the most appropriate way. Kiewel describes how a demonstration program was started, the type of services offered, and the experience gained in serving their clients. Home-modification programs can follow one of several models of service delivery: social service, health service, advocacy, or construction. This program is a good example of a construction model. It was funded by a state housing finance agency. As the program gained experience with its clients, common needs for environmental intervention were identified. Some innovative design concepts were developed in response. Since public funds were used to make modifications to privately owned structures, a method was developed to ensure that future sales of the property would continue to serve a disabled population.

The need for home modifications is not relegated solely to people who have physical limitations. With the growth of the aging population, home modifications related to the behavioral problems associated with dementia and the needs of caregivers have surfaced as important issues. There is not much information on the range of needs and the effectiveness of interventions for this population. Because dementia causes both physical and mental disability, the needs of people with dementia are not solely related to mental impairments. Two articles in this issue describe current research on this topic.

Olsen, Ehrenkrantz, and Hutchings report on a study of households with caregivers. They examined what modifications had been made in these households and how effective they had been. Modifications focused on controlling wandering and unsupervised access, providing safety in the bathroom and kitchen, modifying furniture, improving access to stairs, and monitoring the whereabouts or activities of the impaired family

member. They concluded that there is a need to plan interventions on an individualized and continuing basis. The needs are highly variable and change as dementia progresses. Case studies are used to illustrate this dynamic process.

Silverstein, Hyde, and Ohta investigated caregivers' responses to recommendations for home modifications made by a rehabilitation professional. Respondents implemented about half of all recommendations. However, their findings suggest that the caregivers sought and received information on home modifications too late in the disease process. There is a need to develop early interventions that can provide more timely assistance to this group.

One reason home-modification needs are not addressed well through policy is that they are generally invisible to most policymakers. Although homelessness and chronic impairments, for example, are exposed in census and health-survey statistics, the full extent of the need for improvements in housing to support independence can only be well understood by detailed investigation in individual households. Census and health-survey data are only useful for estimating the extent of the population at risk. They do not provide information on the specific actions necessary to alleviate problems experienced by individuals. The home-assessment process is, therefore, a key element of service delivery. It serves as the point of contact with the delivery system.

Edward Steinfeld and Scott Shea report on a demonstration project in which about 50 households with an older person who had a disability received comprehensive assessments to identify barriers to independent living related to ADLs, dementia, security, life safety, and construction. Their findings demonstrate that self-report data provided an extremely limited perspective on the

extent of barriers to independent living found in the homes. They found that about 50 percent of the barriers identified were "shelter related," indicating that an assessment approach focused on ADLs or dementia alone would miss a great deal. An analysis of respondents' priorities for eliminating barriers suggests that many barriers identified by professionals are downplayed by residents. The authors present several explanations for the priorities of residents that could help us to understand resistance to making changes in the home.

The final article in this issue, by Julie Overton, describes two sets of resources available to address home-modification needs. The first part of the article describes the sources of funding at the national, state, and local levels to support the delivery of services. The second provides summaries of key reference material on a variety of topics related to this subject: general information, assessment materials, financing information, literature on program development and implementation, catalogs, and other sources of information on products, educational materials and program resources.

This issue was planned to assemble a range of articles with a common focus on home modifications. Contributors were sought who represented many different disciplines and perspectives. They include the fields of planning, gerontology, industrial design, architecture, and the social sciences. The topics discussed in the articles include discussions and analysis of policy issues, case studies of programs and projects, product design guidelines, research on service needs and service-delivery issues, and an overview of available information. All in all, this issue presents a good cross section of current practice and research on this topic.

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