

REPORT BRIEF • JULY 2011

Health Care Comes Home: The Human Factors



In the United States, health care practices and associated medical devices and information technologies are rapidly moving into the home. This transition, which is likely to accelerate in the future, has raised a host of issues. Care recipients and caregivers have particular capabilities and limitations that can shape home health care processes and procedures. Very few homes have been designed for the delivery of health care. Yet the aging of the population, changes in medical practices, and reductions in health care reimbursement are leading to greater reliance on care at home. Medical equipment and technologies that are designed for hospitals and clinics can be ill-suited for use in the home. The physical and social environment can support or detract from home health care. The rapid growth of home health care has and will have wide-ranging consequences.

The safety, quality, and effectiveness of home health care can be informed by many issues

encompassed by the field of *human factors* research and practice—which studies human capabilities and limitations and their interaction with the design of products, processes, systems, and work environments. For that reason, the Agency for Healthcare Research and Quality asked the Board on Human-Systems Integration of the National Research Council to conduct a systematic investigation of the role of human factors in home health care. In response, the multidisciplinary Committee on the Role of Human Factors in Home Healthcare was formed to examine a diverse range of behavioral and human factors issues resulting from the increasing migration of medical devices, technologies, and care practices into the home. Its goal was to lay the groundwork for a thorough integration of hu-

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man factors knowledge and research with the design and implementation of home health care devices, systems, technologies, and practices.

HUMAN FACTORS FOR HOME HEALTH CARE

There are several major areas in which human factors can influence home health care:

- examination of the nature of the care processes, procedures, and therapies as they occur in the home;
- development of systems, medical devices, and information technologies that consider the relevant sensory, behavioral, and cognitive capabilities of care recipients and caregivers;
- the design of the physical home environment to facilitate the delivery of care; and
- the impact of cultural, social, and community factors on home health care and healthy lifestyles.

The committee sought to determine how current and emerging human factors knowledge and methods, as well as future research, could best be applied to improve the safety, effectiveness, cost-effectiveness, and other aspects of the quality of health care in the home. In the first phase of the study, the committee commissioned papers from leading experts on the issues associated with the increasing migration of health care practices and technologies into the home. It held a workshop at which the paper authors presented their work, and invited discussants led the committee members and audience in further probing the state of current human factors knowledge and the need for further research and development. The papers and resultant workshop summary, *Human Factors in Home Health Care: Workshop Summary*, informed the committee's deliberations for its final report, *Health Care Comes Home: The Human Factors*.

There are several themes or issues that interact to influence the effective delivery of health care in the home:

- the diversity of populations receiving and providing health care in the home and its implications for ensuring quality care;
- the largely unmet need to systematically match the design and selection of medical devices and systems for home use to the capabilities and limitations of their users and to the home environment;

- the need to provide training, support, and appropriate documentation to home users of health care equipment and technologies; and
- the need to improve coordination and communication among the various people and organizations involved in health care in the home.

TOWARD IMPROVED HEALTH CARE IN THE HOME

Human factors can help improve health care in the home in four primary areas: health care technologies, caregivers in the home, residential environments for health care, and research and development.

Health Care Technologies

U.S. government regulations that apply to devices and systems used in home health care have the potential to ensure that sound human factors principles are followed in the design and implementation of these technologies. The U.S. Food and Drug Administration and the Office of the National Coordinator for Health Information Technology should collaborate to regulate, certify, and monitor health care applications and systems that integrate medical devices and health information technologies. The agencies should require evidence that manufacturers have followed existing accessibility and usability guidelines and have applied user-centered design and validation methods during development of the product.

The lack of guidance for developers of information technologies, particularly related to the requirements in the home care setting, makes it difficult for developers of personal health records and patient portals to design systems that fully address the needs of consumers. The Office of the National Coordinator for Health Information Technology, in collaboration with the National Institute of Standards and Technology and the Agency for Healthcare Research and Quality, should establish design guidelines and standards for consumer health information technologies related to home-based health care.

The challenges posed by the lack of adequate standards and guidance for the labeling of medical devices are compounded by the burdensome and inflexible approval process of the U.S. Food and Drug Administration (FDA) for changing labeling. The FDA should promote development (by standards development organizations) of new standards based on the most recent human factors research for the labeling

of, and instructional materials for, medical devices designed for home use by lay users. The FDA should also tailor and streamline its approval processes to facilitate and encourage regular improvements of these materials by manufacturers.

Users of medical devices are often unaware of the FDA's adverse event reporting systems or are uneducated about how to report problems. The FDA should improve its adverse event reporting systems to be easier to use, to collect data that are more useful for identifying the root causes of events related to interactions with the device operator, and to develop and promote a more convenient way for lay users as well as professionals to report problems with medical devices.

Caregivers in the Home

Properly preparing individuals to provide care at home depends on targeting efforts appropriately to the background, experience, and knowledge of the caregivers. Relevant professional practice and advocacy groups should develop appropriate certification, credentialing, and/or training standards that will prepare formal caregivers to provide care in the home, develop appropriate informational and training materials for informal caregivers, and provide guidance for all caregivers to work effectively with other people involved.

Residential Environments for Health Care

Financial support through federal assistance for home modifications to remove health hazards and barriers to self-management and health care practice is currently very limited. Federal agencies should collaborate to facilitate adequate and appropriate access to health- and safety-related home modifications, especially for those who cannot afford them. The goal should be to enable persons who need home assessments, home modifications, and training in the use of assessments to obtain those services.

Much existing housing in the United States presents problems for conducting health-related activities. Although homes can be modified, a proactive, preventive, and effective approach would address potential problems in the design phase of new and renovated housing. Federal agencies should take a lead role, along with states and local municipali-

ties, to develop strategies that promote and facilitate increased housing visitability, accessibility, and universal design in all segments of the market. This might include financial incentives, local zoning ordinances, model building codes, new products and designs, and related policies that are developed as appropriate with standards-setting organizations.

Research and Development

Research has shown that coordinating multiple caregivers, support services, agencies, and benefit regulations has positive effects on patient outcomes and costs of care. However, there are a number of known barriers to successful coordination. The Agency for Healthcare Research and Quality should support human factors–based research on barriers to coordination of health care services delivered in the home and support user-centered development and evaluation of programs that may alleviate these barriers.

Little information is readily available to guide physicians in determining the best match between available medical devices and a particular care recipient's needs. The U.S. Food and Drug Administration, in collaboration with device manufacturers, should establish a medical device database for physicians and other providers to use when selecting appropriate devices for people receiving or self-administering health care in the home. Using task analysis and other human factors approaches to populate the medical device database will ensure that it contains information on characteristics of the devices and implications for appropriate care recipient and device operator populations.

Existing surveys, if better designed, could provide the needed data to comprehensively understand the number and attributes of individuals providing health care in the home as well as the environments in which care is delivered. Federal health agencies should coordinate data collection efforts to capture comprehensive information on elements relevant to health care in the home, either in a single survey or in effective use of common elements across surveys. The surveys should collect data on the sociodemographic and health characteristics of individuals receiving care in the home, the sociodemographic attributes of formal and informal caregivers and the

nature of the caregiving they provide, and the attributes of the residential settings in which people receiving care live.

Health care providers lack the tools needed to assess whether particular individuals would be able to perform specific health care tasks at home. Likewise, designers lack information on the task demands associated with medical devices and systems as well as on the human capabilities needed to perform them successfully. The Agency for Healthcare Research and Quality should collaborate with other federal agencies to support development of assessment tools customized for home-based health care, designed to analyze the demands of tasks associated with home-based health care, the operator capabilities required to carry them out, and the relevant capabilities of specific individuals involved in their use.

Improvements to health care in the home hold the promise of providing healthy living, comfort, and effective treatment to care recipients and to contribute to a growing and vital part of health care delivery in the United States. Federal leadership and improved data collection and analysis can help to provide home-based care appropriate to each care recipient and to make the work of caregivers less burdensome. There are also many opportunities for researchers and developers to study and use human factors to support positive change and maximize the promise of successful health care at home.

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Copies of the report, *Health Care Comes Home: The Human Factors*, and of *Human Factors in Home Health Care: Workshop Summary*, are available for sale from the National Academies Press at (888) 624-8373 or (202) 334-3313 (in the Washington, DC, metropolitan area) or via the National Academies Press web page at www.nap.edu. Both reports are also available as a free PDF at www.nap.edu. The study was funded by the U.S. Department of Health and Human Services (HHS), Agency for Healthcare Research and Quality (AHRQ). Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the authors and do not necessarily reflect those of HHS or AHRQ.

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