Enhancing the Functional Status of the Future Elderly

TASK GROUP DESCRIPTION

Background

Disability rates in older persons for both activities of daily living (ADL) and instrumental activities of daily living (IADL) have been falling steadily for more than two decades. Whether these declines will continue or reverse is a major concern of considerable debate as experts argue how the current epidemic of obesity and diabetes among baby boomers and younger cohorts will affect the functional abilities of these generations. Coming decades will likely bring significant technological advances, both medical and nonmedical, that will importantly impact the capacity for the elderly to function. With respect to medical technologies, numerous technologies—from smart prosthetics to distance monitoring devices—will enhance function and independence. However, these technologies are likely to be expensive, and national policies regarding the amount of cost to be absorbed by patients may place many of them out of reach for those in the lowest socioeconomic group, further widening the functional gap between the haves and the have-nots in our society.

Nonmedical technologies, such as striking advances in computerization in the workplace and beyond, may either enhance the capacity of older persons to function or outstrip their capacity to adapt—thus aggravating the digital divide between generations. These nonmedical technologies also can enhance general functional status and independence, as can be seen in the increasing use of the Internet by older persons to pay bills, shop, and communicate with friends and family.

Initial Challenges to Consider

1. Develop projections for future age-specific disability rates by gender, race, and socioeconomic status. These projections should take into account:
   • Various definitions of disability (e.g., ADL, IADL, cognitive function, other definitions and subtypes of disability);
   • Recent trends in disability rates for various age groups;
   • Expected future changes in lifestyle (e.g., diet, exercise, smoking), health care (new approaches to diagnosis and treatment), and health status (e.g., obesity, diabetes) that may influence disability;
   • Changes in medical and related technologies that may compensate for functional impairments; and
   • Advances in nonmedical technologies, in the workplace and beyond, that may enhance or limit function in older persons.
2. Develop new concepts for interventions (e.g., social, medical, technological) that mitigate these trends.

Initial References

Task Group Members

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TASK GROUP SUMMARY

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Defining the Problem
Disability rates in older persons for both activities of daily living (ADL) (e.g., bathing, dressing, and eating) and instrumental activities of daily living (IADL) (e.g., financial management, taking medications, and grocery shopping) have gradually declined over the last two decades. However, with both the baby boomer generation and younger cohorts currently experiencing increases in the prevalence of diabetes and obesity, as well as potentially increasing numbers of survivors living longer with chronic illness, declining disability rates are in jeopardy of coming to a halt and reverting.

Studies to date provide an evidence base for suggesting methods that may sustain function or prevent excess disability (e.g., Freedman et al., 2006). Nevertheless, at the individual level it is recognized that there are many challenges to implementing and maintaining interventions to promote independent living. Thus, although people may be aware of the behaviors that potentially contribute to a long, healthy life (e.g., physical activity and good dietary habits), both in the short and long term, many people nevertheless neglect the long-term consequences of their current lifestyle choices for a number of reasons. These reasons range from the pull of more immediate gains (e.g., plastic surgery) to lack of resources or practical, easy-to-follow knowledge of how to implement and continue programs of change in their lives. To enhance the functional status of the future elderly and ensure that disability rates continue to decrease, appropriate interventions must be developed and people need to be willing to adopt, embrace, and sustain the necessary lifestyle modifications.

The potential for applying existing knowledge with regard to maintaining function in later life is enhanced by the realization that in the coming decades, significant medical and nonmedical technological advances will importantly impact the capacity of the elderly to function independently. With respect to medical technologies, numerous technologies—from smart prosthetics to distance monitoring devices—will enhance function and independence. Existing nonmedical technologies are already increasing in use to enhance function by older persons. This can be seen in the growing use of the Internet by older persons to pay bills, shop, and communicate with friends and family. However, these technologies face several challenges. They need to be proven effective and integrated into the mainstream of functional intervention methods that are already known to be effective. Without this evidence base, their initial costs are unlikely to be covered by traditional medical models of reimbursement. However, to the degree that this new health-sustaining technology is piggy-backed as part of devices in use in everyday life (e.g., phones, televisions, common appliances) and their value translated clearly to the average consumer, the cost issues may not fall into conventional health care models. This is emphasized by the fact that nontraditional health-oriented companies and industries (e.g., Microsoft, Google, Intel, Wal-Mart) are rapidly moving into the health care arena, suggesting that access to these technologies across a wider segment of the socioeconomic spectrum is more likely to become realized. Finally, a unique aspect of employing new technology-enhanced approaches to interventions sustaining function is the potential for the technologies themselves to provide better feedback to the health care system with regard to how people are functioning. Thus, for example, if daily activity is captured unobtrusively and electronically in the home as part of a functional maintenance program, a more real-time record (as opposed to recall or diary methods) of how people are doing day-to-day may be achieved.
Charge to Task Group

This multidisciplinary group comprised 13 individuals trained in fields such as neuroscience, demography, cognitive science, epidemiology, geriatrics, and bioengineering. The group had two predominant challenges. The first was to develop projections for future age-specific disability rates by gender, socioeconomic status, and race, which also required the group to ascertain the data and measures necessary to generate these projections. The second was to identify novel concepts for social, medical, and technological interventions that would be capable of preventing further declines in disability. Consensus was reached that adapting the methods and outcome measures from the intervention studies should be employed to drive the data collection used to project future age-specific disability rates as discussed in the first charge.

The group hoped to formulate interventions that would successfully transform an individual’s thinking from the “living for today” mindset to one that places emphasis on life’s later years as well. To accomplish this the group set out to identify potentially efficacious incentives, which would encourage people to adopt and sustain desirable behaviors with respect to both the short and long term. Consensus among group members was that populations targeted for intervention need incentives in order to take up and continue the desired behavior or lifestyle modification. The group agreed that incentives need to be catered toward the individual, taking into account cultural and economic factors of the targeted population. In addition, the group believed that people would be more likely to begin and maintain a desirable behavior if potential barriers were minimized, which can in part be accomplished by ensuring interventions are cost-effective and attractive to the target population.

Strategy

Prior to discussing specific interventions, the group set out to identify key outcomes to change through the interventions. It was concluded that extensive variability exists in aging and that the ideal outcome for one person may be different from that for another. Therefore, the group determined that the desired outcome should capture this variability. Overall, maximizing functional status across multiple domains (e.g., physical, cognitive, and mental) and well-being as a function of life expectancy was deemed to be the key outcome or goal.

The group next framed important considerations for conducting interventions, such as which populations to target, the role technology should play, and the optimal time for intervention (i.e., intervening upstream vs. downstream). Intervening upstream means intervening at a relatively young age with hopes of changing a widely distributed risk factor by a small amount, accruing benefit across the lifespan but with a large impact at later ages. Because intervening upstream typically targets a wider population (unless specific risk factors are known at young ages), resources and time may be allocated where intervention is unnecessary or ineffective. Intervening downstream, on the other hand, means intervening later in life. The intervention may be more focused and precise; however, it may be too late and too expensive for the intervention to be effective. Since both upstream and downstream interventions have advantages and disadvantages, the group concluded that the point of intervention ought to be case specific and depend on
factors such as the type of intervention employed, the desired outcome, and the target population.

Additional considerations discussed were the feasibility of intervening at different stages within the upstream or downstream construct (e.g., fetal development, preclinical, or clinical), unit or levels of analysis (e.g., cellular biomarker, individual, family, community, societal), and which predictors best explain the variance of outcomes. In addition, emphasis was placed on the need to develop interventions that allow members of the target population to maintain a degree of autonomy, control, and choice. Finally, the group explored the idea of using a combination of interventions and the potential to get multiple desired effects from one intervention. The latter approach has not been typically explored in current functional intervention research.

Since no standard blueprint exists detailing how to effectively combine intervention strategies, identify the exact populations to target, and determine the perfect point in the life course that an intervention should begin, the group decided that testing several integrated, multifactor, multilevel approaches would yield the best results. In addition, smaller-scale interventions that have proved successful in the past should be implemented in more fully realized versions to test their scalability.

Interventions

The group was aware of a recent workshop sponsored by the National Institute on Aging, the National Academies, and the National Research Council (Workshop on Identifying New Interventions to Extend Disability Decline in Elderly Populations, September 14-15, 2006) that explored interventions that may be applied to the aging population. Thus, they were interested in considering not only these methods, which were well known to the task force, but also other opportunities as well. The group came up with more than a dozen potential intervention ideas or concepts, which ranged from social or community-based interventions (e.g., social engagement initiatives and nutritional happy hours) to technology-driven ideas. Moreover, the possibility of establishing a reward system that encourages people to take care of themselves (e.g., a health advantage credit card) was explored.

Among the more biological interventions included a proposal to establish stem cell banks in which an individual’s tissues are stored in case they are needed at a later point in that person’s life. The more cells an individual has on file, the better chance he or she would have of regenerating tissues. A stem cell bank would facilitate new treatments such as cartilage injection instead of joint replacement. This technology and its potential are rapidly evolving; careful tracking of changes in this field relative to its application to prevent disability will be needed to apply over the long term.

Increased pervasiveness of technology in the household was a common theme among discussion of intervention ideas. The concept of harnessing the power of embedded or ubiquitous home computing was reviewed. In this paradigm a person might be monitored at home for subtle health and activity changes over time with, for example, motion-activity sensors assessing physical activity or sleep and when a high-risk trend-line was observed, an intervention might be applied or modified appropriately. One group member suggested a brain “gym” in which there is ongoing brain-based training, which would be largely self-administered and achievable through technological strategies. It was
suggested that intensive computer-based training might eventually sustain the brain to mitigate the effects of pathologies of brain aging and neurodegenerative diseases.

Several group members pointed to the challenges of technology-enhanced interventions. For example, one group member argued that for some applications of technology one needed to take into account the high prevalence of executive control dysfunction in the elderly, which affects an individual’s self-awareness and ability to use technology (although this fact may by itself suggest ways of detecting functional decline).

The group discussed many study designs that would incorporate the interventions reviewed. The concept of focusing on periods or groups at relatively high risk for decline was emphasized for immediate-term studies in order to increase the efficiency of some trials. For example, a study may choose to target intervention within an age group where the disability rate takes off (e.g., eighth decade) to more quickly observe whether the intervention effectively reduces disability or institutionalization. Another approach might be to pick people with one existing major ADL/functional dependency putting them at risk for further loss, and then conduct assessments (e.g., walking speed), to determine whether an intervention may reverse the decline. As noted above, the design of intervention studies must be tailored to the intervention and the outcome measures to be assessed.

A New Initiative

After considering many potential interventions designed to enhance the functional status of the future elderly, the group developed an action plan to move the field forward. Inherent in this plan was the notion that no single approach or method could be advocated at this time. However, there was ample evidence that building on existing interventions, using a holistic or multidimensional approach was most needed. In this context a national initiative to create and test additional interventions was proposed. The 10,000-person initiative, named the Studies of Optimal Functional Interventions in Aging (SOFIA), would call for a national initiative or competition to study in parallel within this population, using standard metrics, how several interventions might best sustain independent function among the elderly. The parallel studies would be complementary and likely be of various lengths, both short term (e.g., three months for testing novel methodologies) and long term covering different periods of risk. Within the studies it would be important that milestones are shown and reported early as well as trajectories of change over the course of the studies (not only simple monotonic outcomes). Technology that inherently measures trajectories of functional change would be embedded in all participants’ homes. The research teams would receive a predetermined amount of money and would target a set or standard population with their intervention(s). This initiative would ideally be funded by a consortium of sources, including but not limited to the U.S. federal government, various industries (e.g., technology and care providers), private foundations, and prize money (possibly awarded by industry).

The Future
The group concluded that a meeting of leaders and stakeholders should be planned to establish ground rules for the aforementioned initiative. At this meeting the following topics (and many others) would likely be discussed:

- Identification of participants and their roles;
- Identification of plans for recruitment and retention;
- Determination of how immediate and long-term benefits and costs will be evaluated;
- Data collection, analysis, sharing, and feedback;
- Optimal timing for intervention;
- Study period and funding cycle;
- Scalability (make sure studies don’t just work for 100 people, but for 1,000); and
- Dissemination and sharing of results.

It is the hope of this group that the results from this initiative will also function as a national assessment of disability change over time, thus helping to develop projections of future age-specific disability rates according to various demographic, economic, and behavioral factors.

Although the current obesity and diabetes epidemics among baby boomers and younger cohorts threaten to increase disability rates in the future elderly, effective interventions applying established and new methodologies and technology have the potential to not only forestall an increase in disability rates but also to improve these trajectories of change for future generations.