INTRODUCTION

The population of individuals over 65 years of age in the United States increased 11-fold from 1900 to 1994. In contrast, the population of individuals under age 65[20] increased in number only 3-fold. It is estimated that the number of individuals aged 65 or older will more than double during the period 1994-2050, from 33.2 million to 80 million.[20] Most older adults have at least one chronic illness; arthritis, hypertension, and heart disease are among the most prevalent.[21] Results from the 1995 National Health Interview Survey indicate that 37% of non-institutionalized older adults experience some activity limitation due to chronic illness, with 11% unable to carry out a major activity of living.[22] Older adults (those 65 and over) in this survey also reported 50% more disability days due to acute and chronic conditions than did those age 45-64 years.

However, disease and disability are not an inevitable consequence of aging. Changes in behavior and lifestyle reduce risk factors that lead to many diseases, and these changes are beneficial even for persons of advanced age. As is the case for younger adults, individuals 65 years or older who pursue a healthy lifestyle have lower morbidity and mortality risk.[23, 24] For example, evidence from the National Health and Nutrition Examination Survey 1971-75 (NHANES I) and the 1982-84 follow-up indicates that both smoking and less recreational physical activity predicted shorter survival time for middle-aged men (45-54 years old) and older men (65-74).[25] For older men, drinking alcohol and low body mass index (BMI) were associated with shorter survival time. Among older women, both less recreational physical activity and low BMI were associated with shorter survival. These results are similar to those from the Alameda study[26] which found that being a non-smoker, having normal weight, and consuming moderate amounts of alcohol were associated with higher levels of functioning at a 19-year follow-up of older adults.

The evidence linking lifestyle to health and functioning is indisputable and continues to grow. The need for systematic and comprehensive approaches to health that identify and address not just essential clinical services, but also lifestyle changes, is becoming even more important. The Institute of Medicine (IOM) recently reviewed and reported on promising social and behavioral strategies, shedding light on interventions that should be part of a comprehensive and systematic approach to health. In its report, *Promoting Health: Intervention Strategies from Social and Behavioral Research,*[1] the IOM made the following recommendations:

- "Interventions to promote the health of older adults should focus on the social, environmental, and behavioral conditions that minimize disability and promote continuing independence and productive activity. Interventions that enhance the social support and self-efficacy of older adults are particularly promising.

- Understanding psychosocial and biobehavioral mechanisms that influence health is critical to better understand and tailor intervention efforts.

- Efforts to develop the next generation of prevention interventions must focus on building relationships with communities.

- Payers of health care should experiment with reimbursement structures to support programs that promote health and prevent disease."

The Health Care Financing Administration (HCFA) is interested in identifying comprehensive and systematic approaches to health, which address both clinical preventive and screening services and behavioral risk factor reduction. These approaches may already use or could incorporate some of the strategies mentioned in the IOM report.[1] HCFA commissioned this report to evaluate the potential effectiveness of health risk appraisal (HRA) as a health promotion tool and to provide evidence-based recommendations regarding the use of HRA in health promotion programs for older adults.

WHAT IS HRA?

We define HRA as a systematic approach to collecting information from individuals that identifies risk factors, provides individualized feedback, and possibly offers interventions to promote health, sustain function, and prevent disease. The preventive orientation of HRA distinguishes it from other assessment tools that focus on an individual's current health or functional status. An important premise underlying the philosophy of HRA is that individuals have the ability to make responsible decisions regarding their lifestyles and are capable of implementing these decisions with the intention of trying to prevent morbidity or forestall mortality.[27] As such, the active involvement of the individual in the HRA process is viewed as an important contributor to its success. The HRA process typically involves four-stages: data collection, data analysis, feedback/ follow-up, and evaluation.

Data Collection. The first stage involves collecting data about an individual. These data tend to be predominantly or entirely based on the individual's self-report. HRAs vary widely in the type and scope of information that is collected. A typical HRA instrument obtains information on demographic characteristics (e.g., sex, age), lifestyle (e.g., smoking, exercise, alcohol consumption, diet), personal medical history, and family medical history. Physiological data (e.g., height, weight, blood pressure, cholesterol levels) are also routinely obtained. Some HRAs collect additional information in domains such as cognitive functioning, readiness to change, mental health and perceived stress, job and life satisfaction, and health-related quality of life. Although our definition of the HRA approach includes both completing the HRA questionnaire and participating in an intervention, it should be noted that the HRA questionnaire itself is sometimes used as a tool for: a) identifying individuals with particular health care needs; b) monitoring health behavior and tracking behavioral changes; c) increasing individuals' awareness of their need to make lifestyle changes; and d) customizing health promotion efforts.

Data Analysis. The second stage in the HRA process involves analyzing the information collected. This analysis may involve estimating the risk of disease or death from various causes for persons sharing the individual's characteristics as well as estimating the reduction in risk that could be achieved if the individual successfully corrected all the modifiable negative lifestyle factors identified by the HRA. Epidemiological and vital statistics data are used as the basis for these calculations. When all categories of health risk are assessed, an overall "risk score" may be assigned. However, many HRAs have moved away from the calculation of risk scores and, for the purposes of feedback to the individual, focus more exclusively on the identification of specific health risks.

Feedback/Follow-up. The third stage in the HRA process involves providing feedback or follow-up interventions to the individual based on the data analysis. This feedback/follow-up involves two components: a) providing the individual with personalized feedback on his/her current health risks; and b) providing the individual with personalized recommendations and/or interventions to modify his/her lifestyle in order to reduce those health risks. Feedback/follow-up can range from mailing the individual a simple report outlining his or her risk profile and providing recommendations to reduce risks, to counseling the individual and providing referrals, to more extensive interventions such as exercise lessons or smoking cessation groups.[28] Feedback/follow-up can be provided one-time or on an ongoing basis over time. The provision of feedback is an essential component of HRA. An underlying assumption of HRA is that the feedback will influence the individual to modify negative health habits in a way that will have a beneficial effect on the individual's physical health and functioning.

Evaluation. The fourth stage involves evaluation to assess the individual's progress in changing the targeted health behaviors and changes to the treatment plan that might be enhance its success.

HISTORY OF HRA

The 1970 publication of Robbins and Hall's seminal book *How to Practice Prospective Medicine* marked the general introduction of Health Hazard Appraisal (now known as Health Risk Appraisal or Health Appraisal) to clinicians and researchers. However, the true beginning of HRA, which predated this publication by more than 20 years, occurred in the late 1940s with Dr. Lewis C. Robbins' work on prevention of cervical cancer and heart disease.[29] Robbins was interested in shifting standard medical practice from its primary focus on disease treatment to a more prospective orientation that would emphasize both treatment *and* prevention. Documenting information on a patient's health hazards would provide the physician with a useful framework for discussing prevention issues with patients and initiating prevention efforts. Over the next two decades, this basic idea progressed from a simple "health hazard chart" for physicians' use to developing a complete HRA that included a patient questionnaire, health risk computation, and feedback strategies.[29]

HRA has been widely used in a variety of settings such as community health promotion programs, universities, worksites, and health maintenance organizations.[30] The initial proliferation, during the 1970s, of HRA instruments and their use has been attributed to a number of factors in addition to the publication of *How to Practice Prospective Medicine*. These factors include results from the classic Alameda County Study[31] which demonstrated the positive health consequences of practicing good health habits, and advocacy for HRA by the Society of Prospective Medicine.[32] Continuing interest in HRA has likely been fueled by the perception of HRA as being a sound scientifically-based instrument, its relatively low cost and ease of implementation, its ability to deal with the combined health effects of multiple risk factors, its capacity to organize and present health promotion information in an appealing framework, and its attraction to consumers who are interested in receiving personalized and specific recommendations for health behavior change and other prevention activities.[33]

USE OF HRA IN OLDER POPULATIONS

The shifting demographics of this country, combined with longer average life expectancy,[34] highlight the importance of focusing on health promotion efforts for older adults.[35] It is clear from recent literature that lifestyle habits have a significant effect on health and functioning.[23-25]

Large cohort studies like MRFIT and the Chicago Health Association Project in Industry showed that nonsmokers with favorable levels of cholesterol and blood pressure (with no history of diabetes, myocardial infarction or ECG abnormalities) have far lower risk of coronary heart disease and greater longevity.[36] This was the case for both young men and middle-aged men and women. Similarly, the Nurses Health Study[37] found that middle-aged women who had a healthy diet, exercised for 1/2 hour per day, consumed alcohol moderately, were not overweight, and did not smoke had an incidence of coronary events that was more than 80% lower than the rest of the study population. Furthermore, "each of these factors independently and significantly predicted risk, even after further adjustment of age, family history, presence or absence of diagnosed hypertension or diagnosed high cholesterol level, and menopausal status."

HRAs originally designed for younger and middle-aged adults may have limited applicability to older adults for several reasons. For example, risk calculations based on younger and middle-aged adults may be inaccurate for older adults. Some HRAs emphasize reduction in premature mortality rates and report outcomes in terms of 10-year mortality risk. HRAs designed for older adults should focus more on lifestyle risk or progression of illness and disability. Several HRA instruments designed for older populations are currently in use or under development.

In this report, we evaluate the effectiveness of HRA as a health promotion tool and provide evidence-based recommendations regarding its use in health promotion programs for older adults.

QUESTIONS PROVIDED BY HCFA

We were given the following questions by the Health Care Financing Administration (HCFA) to address in this evidence report.

1. How good is the evidence that HRA interventions have beneficial effects? Do they have a positive impact on quality of life, health status, health outcomes, and satisfaction?

2. What is the value of different levels of intensity in follow-up (e.g., a self-management book vs. self-management book and nurse follow-up phone calls or community referrals)?

3. What are the key features of HRA surveys and follow-up interventions?

4. Do HRA interventions reduce health care costs by reducing disease and utilization of services?

5. Does the evidence suggest that HRAs should be delivered to the whole population or to selected subsets, such as high-risk individuals?

6. What are special variations of HRAs for the older adult population?

7. What is the role of technology in HRA administration?

8. How have issues of confidentiality and privacy been addressed?

9. Does the integration of social, public health, and medical approaches enhance healthy aging? Does the opportunity to integrate these three approaches exist through HRAs?

The final question was determined to be beyond the scope of this evidence-based report. However, the Institute of Medicine recommends a social environmental approach to health and health interventions which is worth mentioning in this report. HRAs coupled with health promotion programs may offer the opportunity to help link medical and social interventions.