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XV. Geriatrics

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Memory Remediation in Older Adults: A Computerized Interactive System

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Sponsor: VA Rehabilitation Research and Development Service

Purpose—The objective of the current project is to develop an interactive computerized memory task that allows patients to practice specific everyday memory skills. Specific memory skills will be identified for pilot use in two ways. First, memory questionnaires will be examined from normative studies in the literature. Second, skills will be identified through interviews and surveys of VA patients and staff working with older adults on a daily basis. Programs will be developed using the MUMPS language which is designed to train and practice the memory skills through interaction with the computer terminal. The interactive system will then be evaluated, both in terms of its validity of memory improvement and in terms of user compatibility (user response).

Memory assessment for older adults in clinical settings often involves global assessment

batteries (e.g., Wechsler Memory Scale), tests derived from the psychometric perspective which often have limited application when remediation is desired. The current project plans to use “everyday” memories, thereby addressing the specific memory problems as they are identified by either the clinician or the patient.

The project team consists of a cognitive psychologist who has extensive research experience with memory performance in older adults, a VA clinician with experience with geriatric medicine and the VA population, and a mathematician with expertise in computer systems design and programming.

Future Plans—The research team will conduct the necessary pilot work to test feasibility for the project.

Nutrition and Health in the Aging Veteran Population

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Sponsor: Health Services Research and Development Service, Veterans Administration Medical Center Seattle

Purpose—The overall goal of this study is to explore relationships between nutritional status and health in ambulatory geriatric patients. Objectives are to: 1) describe the nutritional status of an elderly, ambulatory veteran population; 2) identify and measure factors associated with inadequate dietary intake, and describe the relationship between these identified correlates of dietary intake and measurable, nutritional status; 3) describe the relationship between nutrition and health status; and 4) develop a statistical model (nutritional prognostica-

tion index) for identifying older persons at additional risk for unscheduled hospital utilization and prolonged hospitalization.

Physiological and social concomitants of advancing age increase the risks of consuming an inadequate diet and developing nutritional deficiencies. Nutritional status may affect health status and utilization of health care facilities; on the other hand, physical, functional, or emotional aspects of health may affect nutritional status. For these reasons, longitudinal assessments of physical, medical, social, and nutri-

tional characteristics will be made.

Progress—Instruments have been pretested and finalized to ensure patient comprehension and acceptability, as well as administrative feasibility. Approximately 10 percent of the patients have been seen for the entry evaluation.

Future Plans—The population will include 275 ambulatory veterans who are 65 years of age and older and who currently use, or are eligible for care at, VA facilities, and whose medical records do not indicate diseases known to cause nutritional debilitation. Nutritional status will be compared with social, environmental, and gerontological variables, and with several measures of health. Changes will be monitored in each variable and in health care utilization over the ensuing 2 years. Patients will be randomly selected, then screened for eligibility. Upon inclusion, patients are interviewed about social and environmental factors that may influence dietary intake; attitudes and knowledge about nutrition; health status (physical, psycho-

logical, and functional, and utilization of health care services); dietary intake; and daily activities. Physical examination includes anthropometrics (triceps, biceps, subscapular, and supriliac skin folds; chest, waist, hip circumferences; tibia and total arm lengths; and body mass index), screens for sensory and motor deficiencies, and a gait assessment. Laboratory examination includes selected measures of protein status (lymphocyte count, transferrin, albumin, creatinine/height index); vitamins (B₁, B₆, C, folate, D); and minerals (calcium, zinc, selenium, potassium, copper, magnesium). Cellular immunity is measured with mumps, candida, and trichophyton skin tests. Home visits assess potential environmental determinants of nutritional status and supplement the interview. Evaluations will be repeated at 1 and 2 year intervals following entry into the study, and 3 months after each hospitalization. Age-matched comparisons will be made between this population and the Health and Nutrition Examination Survey II.

Evaluation of Independent Living Services for the Chronically Ill Elderly

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Sponsor: Health Services Research and Development Service

Purpose—The objective of the study is to evaluate the effectiveness of an Independent Living Program (ILP) model that provides in-home services to chronically ill, previously hospitalized patients from the Geriatric Research, Education and Clinical Center (GRECC) at Little Rock VA Medical Center. Specifically, we will determine if ILP 1) enhances the quality of long-term care; 2) reduces the likelihood that the patient will become institutionalized; and 3) is a more cost-effective substitute for traditional modes of long-term care. Traditional modes of long-term care are characterized by extensive utilization of inpatient care and, for those community-based patients, frequent episodic trips to VA outpatient facilities.

It is hypothesized that patients who receive

ILP services will experience: 1) improved functioning on activities and instrumental activities of daily living; 2) the development of stronger social support systems; and 3) the procurement or adaptation of the physical environment that best addresses the strengths and limitations of the individual when compared to control patients who do not receive these services. Furthermore, patients receiving ILP services will utilize more community (non-VA) services than comparable controls resulting in fewer and shorter admissions to hospitals and nursing homes, fewer VA (non-ILP) outpatient visits and hospital clinic appointments, and more days at home. The realization of the patient's maximum potential for independent living as well as an increased reliance on community

(non-VA) services affected by ILP intervention should produce a cost-savings to the VA that makes the provision of this service both feasible and affordable using the experience of equivalent controls as a benchmark.

Progress—As of June 1986, 47 patients have been enrolled.

Future Plans—Over a 2-year period, a study population of 360 consenting patients discharged to their own homes from the Geriatric Service at the Little Rock VAMC will be randomly assigned to an experimental (ILP) or a control (non-ILP) group. All clients will continue to receive Geriatric Service intervention. Prior to randomization, data reflecting the general status of the patient at admission to the Geriatric Service and prior to the onset of the

acute condition precipitating admission will be gathered. Status following randomization will be assessed at quarterly intervals following discharge from the inpatient Geriatric Service for a 1-year period. Status is defined as: 1) the functional capacity of the client to engage in activities and instrumental activities of daily living; 2) the size, nature, and capability of the client's social support system; and 3) the living arrangement or setting.

Information on the utilization of other (non-ILP) VA and selected community (non-VA) health care services during the followup period will be collected for all clients. The total cost to the VA for health and income benefits received will be calculated as will the cost of community services charged to the client, third-party carriers, or government intermediaries. Target date for completion of the study is June 1989.

Adjustment and Rehabilitation of Chronic Illness Among Older Americans _____

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Sponsor: VA Rehabilitation Research and Development Service

Purpose—Previous research in the benefits of exercise rehabilitation programs for COPD patients has shown that not only do physical functions improve but there may also be improvements in psychological factors such as permeability and adjustment. This study will take that research one step further and explore the benefits from the components of the program, i.e., exercise and nonexercise components, in relation to the benefits gained from the total program. The focus will be to measure changes or psychological and emotional adjustments to variables compared to cognitive functions for these components of the exercise program.

Progress—The subjects for this study are 160 aged veterans. These subjects comprise four groups of 40 each, matched for marital status, education, age, and socioeconomic status.

One group of 40 veterans participates in the total exercise program as it is presently offered at the medical center. The program includes exercise and nonexercise components.

Another group of 40 veterans participates only in the exercise portions of the program, the third group only in the nonexercise portions of the program. The fourth group is a normally aging, community-based group of veterans without COPD.

The study is complete and the data are being analyzed.

Future Plans—All groups will be measured with adjustment and cognitive measures at time intervals matching entrance into the program, 6 weeks later at the end of the in-hospital portion of the program and 3 months after discharge. Measures include anxiety, depression, feelings of control, intellectual function, learning, and memory. It is proposed to determine how the various components of the program contribute to improvement in psychological functioning, how pulmonary patients differ from normally aging veterans in psychological function, and how close to normal function exercise rehabilitation can bring veterans who

are COPD patients.

The Social and Medical Effects of Amputation on Elderly Veterans

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Sponsor: VA Rehabilitation Research and Development Service

Purpose—During 1978, a study of the social and medical effects of amputation was conducted jointly by Portland VA Medical Center and Portland State University. The information gained from this study strongly suggests the need for a followup investigation.

This research project will collect new information on the sample interviewed in 1978, and interviews will also be conducted on the 75 amputees who now fit the criteria of the study. The project will be coordinated between Portland VA Medical Center and the Portland State University Center for Public Health Studies.

Methodology to be used will: 1) update the original 1978 study; 2) survey a new sample of

elderly veteran amputees and their primary care givers; 3) complete a clinical review of patient information on elderly veteran amputees; and 4) complete a report of findings.

The information to be collected includes the following: 1) a profile of the individual's medical status; 2) length of time for the amputation stump to heal; 3) time involved in rehabilitation; 4) prior vascular surgery; 5) complication of surgery; 6) relevant discharge information; 7) length of survival of leg; 8) number of hospitalizations as a result of amputation; and 9) revisions to and replacements of the prosthetic device.

Discharged Elderly Patients from the Memphis VA Medical Center Nursing Home Care Unit (NHCU): A Followup Study

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Sponsor: VA Rehabilitation Research and Development Service

Purpose—Nursing home care focusing on rehabilitation, and the promotion of self-care has been essential in returning selected patients to their usual living arrangements following acute hospitalization. To date, however, there have been few follow-up studies on discharged elderly patients after comprehensive rehabilitation. The primary purpose of this study is to assess post-discharge mortality and to determine current placement of patients discharged from the Memphis VAMC Nursing Home Care Unit (NHCU).

Progress—A review of the inpatient data available on all patients discharged from the NHCU prior to April 20, 1985, was completed as part of the first phase of this two-phase project.

Four hundred seventy patients, 55 years

and older, whose primary diagnoses were not cancer-related, were identified. Preliminary screening showed that 352 patients had been discharged to their usual living arrangements. Patient records were reviewed to locate current phone numbers and identify patients who had died since discharge. Fifty deaths were subsequently recorded, completing phase one of this project. The second phase of this followup study has begun. Postdischarge data is currently being collected by phone interview. Two hundred fifty-five patients with phone numbers available through file and directory information have been identified. To date, 61 of these individuals have been contacted and postdischarge data have been collected. Fifty of these individuals have remained in their discharge location, three have died, and eight have been ad-

mitted to extended care facilities.

A written questionnaire identical to the one used in the phone interview is currently being developed. This written questionnaire

will be mailed to individuals who do not have phones to ensure that all patients who have been discharged to their usual living arrangements may be contacted.

Impact of a Geriatric Assessment and Rehabilitation Unit on Subsequent Health Care Expenditures

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Sponsor: VA Rehabilitation Research and Development Service

Purpose—This study will consist of a randomized controlled trial in which frail, functionally impaired elderly hospitalized patients in danger of nursing home placement will be randomized to a geriatric assessment and rehabilitation unit (GARU) or to usual sources of care in the community. The primary objective of the project is to determine if specialized care on a GARU for high-risk elderly patients can reduce health expenditures by reducing subsequent rates of nursing home placement and repeat hospitalization.

The GARU to be studied is a 10-bed unit which has been in operation for 5 years (169 admissions last year, average length of stay 21 days) at the Regional Rehabilitation Center of the Baptist Memorial Hospital, Memphis, Tennessee. This GARU is one of the few such units available for study in the private sector.

Geriatric assessment and rehabilitation units offer specialized multidisciplinary assessment of patient problems in multiple domains. These include medical problems (medication toxicity, incontinence, transient confusion, immobility, weakness, malnutrition, gait disorders), emotional problems (affective disorders),

functional problems (need for prostheses and appliances, activities of daily living, instrumental activities of daily living), and social problems (arrangements for appropriate level of care, including home support and family counseling).

Patient function will be evaluated with self-assessment measures and through the observations of an assessment team not involved with the patient's care. The analysis will evaluate the impact of the GARU on the intervention group by analyzing differences in these outcomes between the two groups (intervention and control groups). If a GARU can be shown to have a positive impact on health care expenditures or rates of nursing home placement, then reimbursement policies may be changed in order to promote development of such units.

Progress—Beginning July 1985, we field-tested data collection instruments and began patient enrollment July 22, 1985. To date, we have randomized 58 patients followed up with forty five 6-week home visits and five 6-month home visits. At the present rate, we expect the enrollment phase to continue for the next 12 months.

Low Vision Rehabilitation and Age-Related Maculopathy Syndrome

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Sponsor: VA Rehabilitation Research and Development Service

Purpose—For elderly persons who are vision impaired, low vision services are a means for learning to utilize their remaining vision and increase their independence. These services

help to reduce the economic burden on society and help us to fulfill our obligations to the elderly. The goal of the proposed project is to test a protocol for evaluating low vision treatment

of age-related maculopathy syndrome (ARMS). The correlation between the clinical tests used in evaluation and the functional performance of ARMS patients using low vision aids will be measured.

The research plan is to perform clinical evaluations on 30 legally blind geriatric patients with ARMS, to train these patients to use their remaining vision, and to assess performance with one of two low vision aids, either a headborne reading aid or a closed circuit tele-

vision (CCTV). Performance will be evaluated by measuring reading speed and reading duration. Clinical evaluation will include tests of visual acuity, refraction, evaluation of internal and external ocular health, fundus photograph, measurement of visual fields with Goldman perimeter, and measurement of contrast sensitivity using vertical sine wave gratings displayed on a cathode ray tube (Tektronix 606A, P31 phosphor) under computer control.

Bicycle Ergometer With Computer-Controlled Resistance and Video Display

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Sponsor: VA Rehabilitation Research and Development Service

Purpose—We originally proposed to design and construct a bicycle ergometer specifically for geriatric patients. Bicycle ergometers are relatively inexpensive and do not require a large amount of space. However, they have little heuristic value and are not very appealing to elderly patients. We proposed to invent a bicycle ergometer with the following features: 1) footpedal resistance generated by a clutch mechanism and controlled by a microcomputer; 2) pedal resistance correlated with a video game depicting a bicycle travelling along a contour; and 3) game protocol varied depending on the patient's heart rate. We expected that the proposed exercise device would encourage geriatric patients to exercise and thereby promote physical conditioning.

Progress—We first designed and built a steel bike frame suitable for geriatric riders. The frame includes a high-back cushioned seat and a differential gear assembly which provides a 16:1 ratio. The gear assembly mates up to a magnetic particle clutch with a continuous torque resistance of 0 to 180 inch-pounds. We were able to demonstrate IBM-PC control of the clutch using a D/A interface. However, it is apparent that the bike frame is too bulky and the gears are far too noisy. At this time, we have halted the project until we are able to identify some source of support which will permit us to make radical changes in the frame design and the gear assembly.

Geriatric Dentistry Academic Award: Tufts University

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Sponsor: National Institutes of Health

Purpose—It is the specific aim of this program to create a Division of Geriatric Dentistry at Tufts University School of Dental Medicine and to develop a comprehensive interdisciplinary didactic and clinical curriculum. It will be allied with Forsyth Dental Center, the developing Medical Geriatric program, the Human Nutri-

tion Research Center on Aging, the Aging Activities of the Department of Psychiatry and the Veterinary School. This division will present the complexity of aging to undergraduate dental students, graduate dental students, dentists, dental hygienists, and staff.

The interdisciplinary faculty will include

Gerontology, Physical Medicine and Rehabilitation, Nutrition, and Psychiatry. The allied professionals include Social Service, Occupational Therapy, Physical Therapy, and Speech and Hearing.

The geriatric curriculum will be interwoven throughout the 4 years of training. The program includes a special lecture series. The second semester of the second year will include required seminars and clinical assignments in the four-chair geriatric area and the Chelsea Soldier's Home. The program outreach activities include the Hebrew Rehabilitation Center,

community residencies, nursing homes, and bedside dentistry with portable equipment.

Research activities are planned in all phases of Gerontology and Geriatric Dentistry, as well as a strong continuing education program for dentists, postdoctoral students, and staff. Particular emphasis is placed on faculty development in Gerontology and Geriatric Dentistry. The program evaluation will insure our long-term objectives: to train dentists competent in rendering total patient care to this growing segment of our society.

Geriatric Medicine Academic Award: University of Chicago _____

Leif Sorensen

University of Chicago, Chicago, IL 60637

Sponsor: National Institutes of Health

Progress—The Pritzker School of Medicine, University of Chicago, has designated Dr. Leif B. Sorensen, Professor of Medicine, as its candidate for the Geriatric Medicine Academic Award. A program for development and continuous strengthening of teaching and research in gerontology and geriatric medicine is proposed, with the following objectives: 1) to expose all students to gerontology/geriatrics by incorporating topics on aging into the required courses of the preclinical curriculum; 2) to develop an elective course entitled "Introduction to Geriatrics" in the sophomore year; 3) to incorporate segments of geriatric medicine into the major clinical clerkships; 4) to develop a 2-month elective for senior students entitled "Comprehensive Geriatrics"; 5) to establish a Geriatric Outpatient Clinic and an Inpatient Consultation Service as educational and clinical care facili-

ties; 6) to establish an 'Office of Geriatrics' as a center for administrative and educational activities; 7) to provide house staff with opportunities for training in geriatric medicine in the ambulatory setting; 8) to offer a 2-year fellowship training program aimed at promoting careers in academic geriatric medicine; 9) to conduct Grand Rounds and CME courses to increase the awareness of faculty and practitioners to the unique medical and psychosocial problems of the elderly; 10) to foster the development of research programs on aging; 11) to develop promising young faculty interested in committing their careers to geriatrics; 12) to provide an opportunity for the awardee to acquire additional skills with a view toward enriching the curriculum; 13) to facilitate interdepartmental and multidisciplinary teaching and research in the field of aging.

Geriatric Medicine Academic Award: University of North Carolina/Chapel Hill _____

Paul Beck

University of North Carolina at Chapel Hill, Chapel Hill, NC 27514

Sponsor: National Institutes of Health

Purpose—The long-term objective of this Geriatric Medicine Academic Award application is to develop a superior curriculum in aging and

geriatric medicine at the University of North Carolina, Chapel Hill, School of Medicine that will stimulate medical students, house officers,

faculty, and practicing physicians to provide high quality medical care to the elderly and also attract outstanding students and house officers to research in the processes of aging and diseases of the elderly. The specific aims and methods of this curriculum proposal are: 1) to update the standard required curriculum for medical students to insure that they obtain the knowledge of gerontology and skills of communication and physical examination necessary for working with elderly patients; 2) to reinforce the principles of gerontology and geriatric care through clinical problem-solving experiences with case exercises and geriatric patients. Resident's reports, case conferences, medical grand rounds, and interdisciplinary (medical,

nursing, social work, occupational therapy) team consultations will be used as teaching settings; 3) to develop model care sites (at the University teaching hospital, Area Health Education Centers [AHEC's], retirement communities, nursing homes) where geriatric care will be provided in a manner which is conducive to learning; 4) to enhance the competence of the faculty in dealing with the problems of aging, particularly to encourage acquisition of knowledge about geriatric topics that are related to their respective areas of expertise; and 5) to foster research opportunities for students and faculty which will bring about new solutions for common problems of the elderly or better ways of coping with them.

Geriatric Medicine Academic Award - NIA: New York Medical College _____

Steven R. Gambert

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Sponsor: *National Institutes of Health*

Purpose—Changes in demography mandate that health professionals be skilled in all aspects of geriatric health care. Institutions of medical education must assume a leadership role in planning and providing for future needs.

Progress—The New York Medical College is deeply committed to the teaching, research, and clinical aspects of geriatrics and gerontology. Located in Westchester County, an area where the number of elderly far exceeds the national average, New York Medical College has a total enrollment of 760 M.D. candidates and over 300 graduate students. In addition, its affiliated clinical programs provide training in a variety of settings, including New York City.

Preliminary Plans—The New York Medical College proposes to establish a program in Geri-

atric Education with a Program Director and a select Geriatric Education Group, both administratively functioning out of a newly created Center on Aging and Human Development. The program will serve to improve the quality and quantity of existing curricula in geriatrics and to help foster additional research and careers in geriatrics and gerontology.

Future Plans—The institution proposes that Steven R. Gambert, M.D., Professor of Medicine and Director of the Center on Aging and Human Development, serve as Program Director and be designated as Awardee for the Geriatric Medicine Academic Award for a duration of 5 years. The Institution's and the Awardee's plans are outlined as well as those for continued support.

NIA Academic Award: University of North Carolina/Chapel Hill

Mark E. Williams

University of North Carolina at Chapel Hill, Chapel Hill, NC 27514

Sponsor: National Institutes of Health

Purpose—Primary research interests are focused in geriatric functional assessment. The major research objectives are to help define

risk factors for dependency in the elderly, and to develop effective screening tools to identify persons at risk for functional changes.

Sociocultural Mechanisms of Rehabilitation in Old Age

Gaylene Becker

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Sponsor: National Institutes of Health

Purpose—Our objectives are: 1) to investigate the problematic issues suggested by the stroke rehabilitation literature, e.g., the influence of age on decisions about rehabilitation, practitioner/patient communication difficulties, lack of continuity in rehabilitation measures, minimal support to families, and health professionals' insufficient awareness of the influence of lifestyles on methods of coping with illness; 2) to address the major limitation of that literature, e.g., the lack of appropriate attention paid to process in stroke rehabilitation.

We will continue collecting data to test our specific research hypothesis, that patterns of intervention in the rehabilitation of stroke patients will be determined by three factors: 1) age of the patient; 2) physician attitudes toward rehabilitation that affect decision making; and 3) family members' perceived role in the patient's rehabilitation and the nature and extent of their supportive efforts.

We plan to follow the rehabilitation process for 125 Mount Zion Hospital stroke patients and their significant family members for 1 year.

Progress—To date, 48 patients are in the study. We plan to select the remaining 77 patients, conduct initial interviews, 3-month followup and 12-month followup interviews.

Qualitative analysis of first and 3-month followup interviews will continue: description of the range, content, and relationships among sociocultural factors that influence the rehabilitation process. Quantitative analysis of first and 3-month followup interviews will begin: common descriptive statistics will be employed to explore a) means and medians for measures of central tendency; b) standard deviations for measures of dispersion; and c) relationships found among variables.

Does Improvement in Mortality Mean Better Health?

Eileen M. Crimmins

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Sponsor: National Institutes of Health

Purpose—The purpose of this research is to answer the following question: Has the recent reduction in mortality among the older population been accompanied by an improvement in health, or has the mortality decline resulted in an increase in the proportion of the older popu-

lation with poor health and/or other physically disabling conditions?

To answer this question, changes and trends in measures of health available from the National Health Interview Survey from 1969 to 1982 will be examined for age-sex-race groups

of the older population. Change in these measures will be compared to change in mortality rates for similar age-sex-race groups over the same time period. The hypothesis to be tested is that declining mortality will be accompanied by increasing morbidity.

In the next phase of the research, mortality and morbidity measures will be disaggregated by cause. Trends in mortality and morbidity from the 10 major causes of old-age mortality will be compared. While it is likely that the relationship between mortality and morbidity

change will vary by cause, we expect to find that, for the major causes of death in old age, decreased mortality will be accompanied by increased morbidity; for most causes morbidity will have been experienced for a longer time at a given level of activity limitation; but the morbidity will not be as severe after the mortality decline as before. For cancer, the only increasing cause of death among the ten major causes in old age, we expect to find both increasing morbidity and mortality.

Morbidity Risk Assessment in the Elderly

Ben T. Williams

University Park Pathology Association, Urbana, IL 61801

Sponsor: *National Institutes of Health*

Purpose—We plan to design, implement, and test a health risk assessment computer program to generate estimates of the probability of hospitalization, disability, and other undesirable health consequences as a function of medical history, laboratory findings, and health habits. The program, used in conjunction with health examination programs for persons aged 60 and above, will facilitate appropriate screening diagnostic tests and risk reduction interventions. Estimates of health consequences from risk reduction will be used to motivate and reinforce behavior changes.

Phase I is a feasibility study to evaluate existing research regarding the association between health habits and consequences among

the elderly and research on the effectiveness of risk reduction activities in this population. Phase I also includes preliminary analysis of public use datatapes from the National Center for Health Statistics.

Phase II includes further statistical analysis, risk factor quantification, development of program specifications, software production, and instrument testing in a clinical setting.

Phase III is devoted to marketing the program to medical sites where health risk appraisal is commonly used as a health education intervention; the 1984 American Hospital Association questionnaire reported that 17 percent of respondents use health risk appraisal in community outreach programs.

The Lives and Needs of Aging Mentally Retarded Persons

Robert B. Edgerton

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Sponsor: *National Institutes of Health*

Progress—All goals set for Year 1 have been met on schedule. Research personnel have been recruited and trained; data indexing and retrieval systems have been completed; a large core sample pool ($N=289$) of psychometrically retarded adults has been generated; based on personal history and demographic data collec-

tion with this core sample, four subsamples have been selected for intensive data collection (60 black and 60 matched white adults—principally for research on communicative competence, 33 young adults currently enrolled in independent living training programs, and four subsamples).

Future Plans—While longitudinal data collection will continue as planned, all four projects anticipate data collection, analysis, and publication in Year 2. Some major topics for Year 2 data analysis are: a network analysis of the personal support systems of independently living adults; a sociolinguistic comparison of competence in giving directions between men-

tally retarded and normal adults; a study of parental beliefs and attitudes about the socioemotional histories of their mildly retarded adult children; a comparison of mathematical skills evoked by a test instrument versus similar skills exhibited by the same persons in everyday life.

Effects of Aging Upon Communication: Prevalence of Hearing Loss

John C. Cooper

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Sponsor: National Institutes of Health

Purpose—This group of six projects will investigate otologic, epidemiologic, audiologic, neurophysiologic, morphologic, histochemical, and laryngologic aspects of age-related communication disorders, chiefly clinical presbycusis (hearing dysfunction in the elderly), and presbylaryngis (laryngeal dysfunction in old age). From this information we hope to better understand the pathophysiology of these disorders, develop a new diagnostic test, and establish better-defined hypotheses for future studies, thus adding to our ability to prevent, modify, and eventually treat age-related communication dysfunction.

The first two projects examine the epidemiology of clinical presbycusis and its possible relationship to cardiovascular disease by analyzing the extensive HANES I database (project one) and by studying the auditory function of

the Framingham cohort (project two). Project three will examine the validity and reliability of cochlear distortion-products as an objective test of cochlear dysfunction, using noise-damaged cats and presbycusis baboons and humans. Project four will study the electrophysiologic and morphologic changes in elderly baboons with auditory dysfunction compared to young and aged controls. Project five will study the nerve conduction time, stimulus parameters, and strength of the glottic closure reflex as well as muscle tension properties and morphology in young and aged baboons, in order to isolate the pathophysiological changes responsible for aspiration in the elderly. Project six will examine changes in steroid receptors in brain and larynx as a function of age and sex in the baboon.

Perceptual Retention and Age

D. Arenberg

NIA, National Institutes of Health, Bethesda, MD 20892

Sponsor: National Institutes of Health

Purpose—One of the goals of this project is to describe adult age differences and changes in nonverbal memory performance.

Progress—Estimates of score changes due to aging based on regression analyses of 24 years of first-time scores on the Benton Visual Retention Test for men were calculated for 10 birth cohorts. The largest estimates of age change

were found for the two earliest born cohorts (1877-1884 and 1885-1892), moderate estimates of change for the next four cohorts (born between 1893 and 1924), and virtually no change for the four latest born cohorts. These results are consistent with individual measures of change obtained longitudinally; substantial change in nonverbal memory occurs only late in life.

Similar regression analyses were used to compare estimates of age change in eight pairs of birth cohorts over the same period of life.

The pairs of estimates of age change in nonverbal memory were quite similar in magnitude and were highly correlated.

Learned Modification of Visceral Function in Man

B. T. Engel

NIA, National Institutes of Health, Bethesda, MD 20892

Sponsor: National Institutes of Health

Purpose—This project is concerned with the application of behavioral methods and principles to clinical medicine. Subjects are patients selected from various medical clinics, or normal

subjects, who are studied to evaluate potential clinical methods. The main focus of this project is on clinical problems especially relevant to middle-aged or elderly persons.

Audiologic Findings in Aging Down's Syndrome Patients

A. Pikus

National Institutes of Health, Bethesda, MD 20892

Sponsor: National Institutes of Health

Purpose—It is known that over 90 percent of Down's syndrome individuals develop Alzheimer-type dementias as they age. This aging Down's syndrome population is being studied audiologically in comparison with healthy normally aging males and females and in comparison with Alzheimer's patients. Each Down's syndrome patient receives complete audiologic assessments, including baseline and serial measurements of auditory function and electrophysiological studies. Audiologic monitoring of this population is critical for professional and home management, as well as for maintaining

social and vocational development.

Progress—As of May 1, 1985, 25 adult Down's Syndrome patients (18 females, 17 males) have been evaluated audiologically. As this study is ongoing, some preliminary audiologic data was presented at a large meeting of speech and hearing professionals in November 1984. Further analysis of the mixed hearing losses (over 80 percent of this population has some peripheral auditory deficit) will follow completion of data collection.

Modeling Length of Stay for the Hospitalized Elderly

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Sponsor: VA Rehabilitation Research and Development Service

Purpose—It has been well documented that hospitalized elderly have longer lengths of stay than younger patients, even though illnesses of aged individuals are not necessarily more severe. Numerous factors relating to age may play a role in increasing the length of hospital stay for the elderly, for example, premorbid

functional impairment, decreased organ reserves, and slower healing time. However, age factors alone do not account for increased length of stay since length of stay is not uniformly increased. Despite the use of age as a common factor in predicting length of stay (e.g., DRGs), not all elderly have lengths of stay

longer than those of younger patients. In addition, some elderly have longer lengths of stay than others, thus contributing disproportionately to the average for all elderly.

Length of hospital stay has traditionally been considered primarily a function of medical and/or clinical factors. However, biological, social, and clinical research on aging has shown that most elderly hospitalized patients present with problems in multiple domains (medical, social, economic, emotional, functional) which interact in complicated ways to influence health care outcomes. It is this interaction that may be instrumental in increasing the duration of hospitalization for many elderly patients.

The major objective of this study is to develop a means of targeting hospitalized elderly at risk for increased length of stay. This study will attempt to develop a model that is both predictive and amenable to intervention to decrease length of stay. The questions include: 1) What factors or domains, single or in combination, contribute to variation in length of stay for hospitalized older adults? 2) Can subpopulations be identified which account for a large portion of the variance in length of stay in hospitalized elderly? 3) Can a risk index be developed which could predict which patients are at risk for increased length of stay?

The 2-year study will be conducted at the VA Medical Center in Memphis, Tennessee. A

sample of 400 patients over age 60 will be drawn from medical service admissions in 4 diagnostic categories: COPD, MI, CHF, and pneumonia. A sample of 100 patients in each of the four diagnostic categories will be interviewed to obtain demographic, social, psychological, and functional information. Clinical course and medical/physical variables will be obtained through retrospective chart analysis. In addition, severity of illness will be rated at admission and over the course of the hospital stay. From these data, it is hoped that risk factors for increased length of stay will be identified.

Preliminary Results—To date, 130 males ranging in age from 60 to 92 years (mean = 68.5 years) have been identified and enrolled in the study. These patients are predominantly white (68.8 percent) and married (62.6 percent) and have experienced multiple hospital admissions in the past 5 years. Of these patients, 118 have been followed through their hospital course to discharge. The mean length of stay for these patients is 9 days with a standard deviation of 8.6 days. The average length of stay for each diagnostic group varies: COPD (7 days); pneumonia (12 days); CHF (5 days); and MI (18 days).

Future Plans—The project will be completed in September of 1987.

A Geriatric Record and Multidisciplinary Planning System

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Purpose—The GRAMPS project was funded to develop and evaluate a computer-assisted information system for ambulatory geriatric care, which is compatible with the VA Decentralized Hospital Computer Plan. Our aim is to provide a practical system for the primary care physician's office, capable of integrating information over time and across disciplines in a fluid, usable way.

Physician acceptance and usage is essential to the successful introduction of information

systems to primary care. Since the physician is the integrator and formulator of the treatment plan and is responsible for implementing the most expensive interventions affecting patient care and outcome, it follows that information systems must be used daily if they are to fulfill their potential to rationalize and enhance health care and assure that it is cost-effective. Therefore, the information system must perform acceptably in the hands of the average VA physician with minimal training and prepa-

ration. It must effectively communicate patient care information to others and yet allow the non-typist physician to produce a report within the constraints of a clinic encounter. A major challenge of medical information systems development is facilitating rapid capture of medical information in a way that minimally intrudes on the care process, is adequately comprehensive, and flexible enough to deal with a variety of clinical situations.

Ambulatory geriatrics was chosen for development because of its high relevance to the VA's emerging mission, because geriatric clinical strategy is relatively well-defined, and because the benefits from a multidisciplinary geriatric record appear achievable.

Progress—After 14 months of development, the GRAMPS system is approaching these performance standards and progress has been encouraging. A system design, which allows structured manipulation of clinical narrative text promises great flexibility in many areas of medical record keeping. The records generated by

GRAMPS are legible, available on-line and in the chart, and are rapidly updatable. Presently, GRAMPS supports a Physical Exam, a Review of Systems, a Problem List, and problem-oriented Clinic Encounter Notes. Prescriptions, consultation requests and laboratory request slips are generated as by-products of the Clinic Encounter entry.

Future Plans—The system is being evaluated in a 12 month follow-up of 300 Ambulatory Care Clinic patients aged 65 years and older. The care of 150 controls will be managed conventionally, while 150 experimental subjects will be managed with GRAMPS. The study is being conducted in three phases: (1) software development and selection of control subjects, (2) software implementation and enrollment of the study group, and (3) data analysis, system evaluation, software documentation and preparation for export to other VA sites. The study is now in phase 2 and GRAMPS is being used to manage over 100 geriatric cases in the clinic. Phase 3 begins in August, 1987.

Iatrogenic Disease in Hospitalized Elderly Veterans

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Purpose—This prospective longitudinal study was designed to improve understanding the magnitude and variety of adverse events occurring among hospital patients. Predefined criteria for 47 possible complications were developed by a consensus panel. Not all complications were necessarily iatrogenic, but all were judged to be separate from the primary reason that the patient was admitted. All patients over 70 years of age and a random sample of those under 70 who were admitted to the Denver VA Hospital during a 14-month period were enrolled. On admission, a nurse epidemiologist recorded demographic and medical information. Patients were monitored regularly for any evidence of a possible adverse event, change in mental status, or skin condition, or performance of any surgery or other invasive medical

procedure.

These data were reviewed independently by two physicians using the predefined criteria. Complications were classified as major if an intervention was required and minor if not. Agreement was over 90 percent and intraphysician variability was < 5 percent in designating complications.

Results—Twelve hundred and thirty-four patients were enrolled between July 1984 and August 1985. Sixteen hundred and twenty-one adverse events occurred among 479 patients. Of these, 642 complications in 253 patients were major. The percent of patients experiencing a specific type of adverse event was as follows: infection, 13.2 percent; surgical, 9.0 percent; adverse drug reaction, 5.3 percent; psychiatric de-

compensation, 5.7 percent; invasive procedure, 2.5 percent; trauma, 2.0 percent. Patients with greater severity of disease were most likely to have a complication ($r = 0.84$); increasing age was also a strong predictor ($r = 0.74$). In 186 patients, the adverse event was felt to have increased the length of stay.

Other analyses suggest that, for certain categories of adverse events, rates are high at the beginning of the academic year (July) and progressively decline. This suggests that educational interventions may be useful in reducing certain types of adverse events. Subset analysis

of specific types of complications is under way in an effort to detect clinically useful predictors. For example, mild abnormalities on a screening mental-status examination appears to be predictive of falls while in the hospital.

Future Plans—A final expected outcome from the project is development of a useful methodology for continuous surveillance for adverse events. Refinement of our techniques may well lead to a clinically useful program which other institutions can adopt.

Computer-Based Expert System for Geriatric Psychiatry

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Sponsor: VA Rehabilitation Research and Development Service

Purpose—The purpose of this project is to demonstrate the feasibility of a diagnostic system in geriatric psychiatry, with a goal of illuminating steps in the process of apprehending the patient's clinical findings as diagnostically meaningful configurations.

Progress—The program consists of two parts, both implemented in the PROPHET network's modified PL-1 language. The first comprises the acquisition and entry of data in the patient's intake interview. This component of the program consists of 62 independent procedures whose sequence of activation is determined by the circumstances of the patient's referral and the availability of additional information (e.g., from accompanying family members, previously obtained laboratory findings, and the history of past illnesses and treatments).

The second part is the diagnostic program which comprises the four stages described below.

1) Pattern matching. The knowledge base contains lists of symptoms for each of 19 syndromes currently considered by this system, ordered in three arrays as "must have", "may be associated with", and "must not have".

The pattern match concludes with ranking the candidate diagnoses by "degrees of fit"; the

criterion for ranking the representativeness of a syndrome is the number of matching symptoms in the "must have" category reported by the largest number of independent sources. Complaints which remain unmatched are stored for future reference.

2) Integration of knowledge sources, and interactive acquisition of additional patient information. Procedures that interrogate the patient database for information that may be relevant for each of the candidate syndromes generate a trace of their findings. Each of these procedures is an independent condition-action module which communicates messages and can, in turn, activate other knowledge sources. Essentially, the principle of HEARSAY II is followed, with the ranked candidate syndromes serving as the schedulers for the invocation of knowledge sources.

3) Parsing the trace. The completion of the trace for each of the candidate syndromes is followed by the evaluation of the trace in its entirety. As shown in the sample output, the generation of the trace is linked with candidate hypotheses; but information contained in it may also be relevant for other syndromes, or even for the syndromes which were temporarily excluded on the basis of pattern matching and did not, therefore, make the candidate list. The

trace is parsed to classify each entry in the trace as either being a possible antecedent, or a possible consequent manifestation of each of the 19 geriatric syndromes tracked.

4) Summation of the diagnostic process. The purpose is to summarize the state of the diagnostic process at the end of the patient's intake interview. The resulting message to the examiner includes the supporting evidence for the choice of one or each of several equally plausible diagnoses, and specifies unresolved aspects of the diagnostic problem.

Preliminary Results—In 38 of 45 geriatric pa-

tients who underwent intake assessment by this program, at least one of the program-generated diagnoses was identical with the independent clinical judgment. Syndromes were correctly identified in 41 instances. In 17 cases, the program produced alerting evidence for complicating circumstances (e.g., medication use, nutritional deficits associated with prior surgical interventions, past history of head trauma, and the like) which had not been attended to in the independent clinical judgment. Incomplete anamnesis in the intake interview provided the control clinician an incomplete database in six instances.

Falls in the Elderly: A Randomized Study of Intervention and Impacts

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Purpose—Falls and gait disorders among the elderly are extremely common and account for substantial morbidity and mortality. Fall rates for institutionalized elderly have been estimated to range from 400 to 1,500 falls per 1,000 patients per year, and from 10 percent to 15 percent of this group will suffer from serious fall-related complications each year. Falls are also a serious problem for noninstitutionalized elderly. About one-third of the elderly living at home will fall each year and about 1 in 40 of these will be hospitalized. Of those hospitalized after a fall, the mortality rate is extremely high—only about half will be alive a year later.

Previous studies have described the epidemiology of falls and attempted to identify associated risk factors. While recommendations exist for reducing rates of falls, none has been subjected to a rigorous clinical trial. As a result of this uncertainty, patients frequently do not receive careful diagnostic assessment after a fall. In addition, there are major knowledge gaps in both the basic epidemiology and pathophysiology of falls, the utility of specific diagnostic tests, and prognosis. It is clear that any definite study of falls in the elderly must address the multifactorial and interrelated causes

involving the cardiovascular, neurologic, and musculoskeletal systems, as well as environmental factors and the use of drugs.

The purpose of this 3-year study is twofold: 1) to define the epidemiology, etiologies, appropriate diagnostic assessments, and therapeutic interventions for institutionalized and community-living elderly; and 2) to apply sophisticated technology in order to critically evaluate instability and gait disorders (hypothesized as the most relevant predictors of falls). The experimental design has three components: 1) a randomized controlled study of institutionalized and community-living elderly who fall, that assesses the value of a multidimensional diagnostic evaluation and therapeutic intervention; 2) application of specialized diagnostic procedures (e.g., stride analyzer and autonomic nervous system testing) to better define the pathophysiology of falls and determine the utility of special diagnostic testing; and 3) a case-controlled study of institutionalized fallers and nonfallers (utilizing diagnostic approaches previously found to be valuable) to assess the value and risk of therapeutic interventions (e.g., gait training; use of centrally-acting drugs).

Progress—Study patients are recruited from an outpatient general medicine clinic, a 325-bed skilled nursing facility, and a 375-bed board-and-care facility. To be eligible for the study, patients must be 65 years of age or older, ambulatory and not severely demented or medically unstable. Clinic patients are identified through self-reporting of falls at the time of a clinic visit. Institutionalized patients who have fallen are identified by incident reports. Patients who agree to participate in the study are asked to describe their fall, and baseline medical and functional data are collected. Patients are then randomly assigned to either the experimental (intervention) or control (nonintervention) group.

The experimental group is given the assessment protocol by a research nurse practitioner (NP).

The diagnostic protocol performed by the NP consists of: 1) a complete medical history; 2) a detailed "fall history"; 3) a standardized functional status questionnaire validated for institutionalized elderly—Lawton modification of the Katz ADL and IADL scales; 4) a physical examination (including a detailed neurologic and musculoskeletal assessment, mental status and depression testing, postural blood pressure determination, balance and gait assessment); 5) routine blood and urine tests; 6) a standard 12-lead electrocardiogram; 7) a 24-hour ambulatory cardiac (Holter) monitoring; 8) stride analysis using the foot-switch system developed by the Rehabilitation Department at the Rancho Los Amigos Hospital; and 9) an assessment to document environmental hazards. Diagnostic impression and therapeutic recommendations for experimental patients are given to the primary physicians. Patients in the nonintervention control group are followed by the NP using chart abstract and receive only the diagnostic and therapeutic procedures ordered by the patients' own physician.

Followup data are being collected on each patient (both in the intervention and nonintervention groups) for 2 years at 3-month intervals following randomization. Data collected in-

cludes outcome measures of specific therapy, subsequent falls, survival, functional status, and use of medical services.

Preliminary Results—Randomization of community-living elderly into the study began in July 1986. To date, 75 subjects have been enrolled—35 cases and 40 controls. Among community-living elderly screened for the study ($N=714$), 29 percent reported having fallen in the previous 12 months. Of those who had fallen, 37 percent were randomized into the study. (32 percent refused randomization and 31 percent were ineligible because of medical instability or distant living location.) Preliminary analysis of initial descriptive variables collected prior to randomization revealed no statistically significant differences between cases and controls, consistent with random assignment. The mean age for this group is 71 years and 93 percent are male. The most frequent etiologies of falls among these patients were orthopedic problems (32 percent), neurological problems (24 percent), environmental hazards (21 percent), postural hypotension (6 percent), and syncope (5 percent).

Randomization of institutionalized subjects began in October 1986. During the first 6 months of the randomization phase, 487 falls involving 247 patients were reported. Forty-one percent of those who fell were subsequently randomized into the study—51 cases and 50 controls. Twenty-four percent of the patients who fell were not randomized because the fall was reported after our 7-day cutoff point. Another 12 percent were too demented or medically unstable, while 9 percent were unable to ambulate and 14 percent refused randomization. Study patients are predominantly female (80 percent) and have a mean age of 86 years.

Enrollment of patients into the study will continue for another 6 to 9 months. Mortality and dropout rates among study patients have been exceptionally low, and we anticipate completing detailed 2-year followup on the majority of patients.