Withdrawal/Redaction Sheet
(George Bush Library)

Doc. No. / Type	Subject/Title	Date	Restriction	Classification
01. Form	Merit Review Application [redaction] (1 pp.)	4/30/97	C	

Collection:

Record Group: Donated Historical Materials
Office:
Series:
Subseries:
WHORM Cat.:
File Location: [Healthy Aging with Disabilities] [1997]

Pinksheet Number: MB10692
OA/ID Number: 52088-003
Date Closed: 8/17/2016
FOIA/Sys Case #: 2016-2624-S
Re-review Case #:
P-2/P-5 Review Case #:

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FOIA/SYS Case #: 2016-2624-S	**Appeal Case #:**
Re-review Case #:	**Appeal Disposition:**
P-2/P-5 Review Case #:	**Disposition Date:**
AR Case #:	**MR Case #:**
AR Disposition:	**MR Disposition:**
AR Disposition Date:	**MR Disposition Date:**

RESTRICTION CODES

Presidential Records Act - [44 U.S.C. 2204(a)]

P-1 National Security Classified Information [(a)(1) of the PRA]
P-2 Relating to the appointment to Federal office [(a)(2) of the PRA]
P-3 Release would violate a Federal statute [(a)(3) of the PRA]
P-4 Release would disclose trade secrets or confidential commercial or financial information [(a)(4) of the PRA]
P-5 Release would disclose confidential advice between the President and his advisors, or between such advisors [a)(5) of the PRA]
P-6 Release would constitute a clearly unwarranted invasion of personal privacy [(a)(6) of the PRA]

C. Closed in accordance with restrictions contained in donor's deed of gift.

PRM. Removed as a personal record misfile.

Freedom of Information Act - [5 U.S.C. 552(b)]

(b)(1) National security classified information [(b)(1) of the FOIA]
(b)(2) Release would disclose internal personnel rules and practices of an agency [(b)(2) of the FOIA]
(b)(3) Release would violate a Federal statute [(b)(3) of the FOIA]
(b)(4) Release would disclose trade secrets or confidential or financial information [(b)(4) of the FOIA]
(b)(6) Release would constitute a clearly unwarranted invasion of personal privacy [(b)(6) of the FOIA]
(b)(7) Release would disclose information compiled for law enforcement purposes [(b)(7) of the FOIA]
(b)(8) Release would disclose information concerning the regulation of financial institutions [(b)(8) of the FOIA]
(b)(9) Release would disclose geological or geophysical information

VA Department of Veterans Affairs — MERIT REVIEW APPLICATION

1. TAB NO.	2. APPLICATION NO.	3. REVIEW GROUP	4. REVIEW DATE	5. FACILITY NO.
		Center		580

6. LOCATION HEALTH CARE FACILITY (VAMC, OPC, CITY, STATE)	7. SOCIAL SECURITY NO.	8. DATE OF LAST SUBMISSION - MR
VAMC, Houston, TX	A. (C) [redacted] B.	N/A

9. PRINCIPAL INVESTIGATOR(S) (Last Name, First Name, M.I.)	DEGREES	TELEPHONE NO.
A. Sherwood, Arthur M.	Ph.D.	(713) 798-5153
B. Monga, Trilok N.	M.D.	(713) 794-7117

10. PROGRAM TITLE (72 Characters maximum)

Healthy Aging with Disabilities

11. AMOUNT REQUESTED EACH YEAR

$750,000	$750,000	$750,000	$750,000	$750,000	$3,750,000
1ST	2ND	3RD	4TH	5TH	TOTAL

12. VA EMPLOYMENT STATUS
- [B] FULL TIME
- [ ] PART TIME (___/8 TIME)
- [ ] CONSULTING ___ HRS/WEEK
- [ ] ATTENDING ___ HRS/WEEK
- [A] WOC 30 HRS/WEEK

13. VA SALARY SOURCE
- [ ] RESEARCH CC 103
- [ ] RESEARCH CC 104
- [ ] RESEARCH CC105
- [ ] RESEARCH CC106
- [ ] CAREER DEVELOPMENT CC 108
- [B] PATIENT CARE
- [ ] HSR&D
- [A] RR&D
- [ ] OTHER VA

14. TYPE PROGRAM
- [X] NEW
- [ ] ONGOING
- [ ] SUPPLEMENT
- [ ] NO. PROJECTS IN PROGRAM

15. PROGRAM	COST CENTER
822	124

16. PRIMARY RESEARCH PROGRAM AREA	PRIMARY RESEARCH SPECIALTY AREA
A. 62 Spinal Cord Injuries	A. 07 Bioengineering
B. 61 Rehabilitation	B. 59 Rehabilitative Medicine

17. VA HOSPITAL SERVICE AND SECTION

A. Research

B. Physical Medicine and Rehabilitation Service

18. ACADEMIC RANK, DEPARTMENT AND AFFILIATION

A. Associate Professor, Physical Medicine and Rehabilitation, Baylor College of Medicine

B. Professor, Physical Medicine and Rehabilitation, Baylor College of Medicine

19. PROGRAM USE (Each item must have a response)

HUMAN SUBJECTS	[X]	YES	[ ]	NO	INVESTIGATIONAL DRUGS	[ ]	YES	[X]	NO	RADIOISOTOPES	[ ] YES	[X] NO
ANIMAL SUBJECTS	[ ]	YES	[X]	NO	INVESTIGATIONAL DEVICES	[ ]	YES	[X]	NO	BIOHAZARDS	[ ] YES	[X] NO

20. SUMMARY OF RESEARCH/DEVELOPMENT SUPPORT FOR THREE PRIOR YEARS

	TOTAL VA	TOTAL NON-VA	GRAND TOTAL
FY 1994	$69,391	-0-	$69,391
FY 1995	$95,544	-0-	$95,544
FY 1996	$175,013	-0-	$175,013

21. DATE ENTERED ON DUTY VA, OR EXPECTED DATE OF ENTRY VA

A. 1993

B. 1987

SIGNATURE PRINCIPAL INVESTIGATOR(S)	DATE
Arthur M. Sherwood, Ph.D. — Trilok N. Monga, M.D.	4/30/97
SIGNATURE ACOS FOR RESEARCH AND DEVELOPMENT	DATE
Glenn R. Cunningham, M.D. Glenn R. Cunningham	4-30-97

SHERWOOD

PRINCIPAL INVESTIGATOR(S)
A. Sherwood, Arthur M., Ph.D., P.E.
B. Monga, Trilok N., M.D.

TITLE OF PROGRAM PROJECT (Not to exceed 72 character spaces)
Healthy Aging with Disabilities

KEYWORDS (MeSH terms only; minimum three)
aging; spinal cord injuries; skin; aged; disabled; comorbidity

BRIEF STATEMENT OF RESEARCH OBJECTIVES (Do not use continuation sheets)

Research has shown that the previously assumed "natural decline associated with aging" is not necessarily inevitable; increased activity and other health promoting behaviors may prevent and indeed even reverse these effects. Because the disabled veteran faces issues of aging earlier than the non-disabled, the cohort for studies growing out of this proposal will include those over the age of 50 who have disabilities from injuries and chronic diseases.

Houston has a well-established history of distinguished research in the field of rehabilitation medicine. Likewise, individuals, programs and institutions that have focused their efforts on gerontology and geriatrics have established a strong presence in the community of educators, clinical practitioners and researchers. Thus, the Houston VAMC Rehabilitation Research and Development Center is a natural fusion of these two strong disciplines. Establishment of this Center will complement the internationally renowned educational activities and the strong set of existing, community-based research programs.

The proposed Center will conduct research which will lead to the elimination of preventable secondary problems and the reduction of risks for all secondary conditions related to patients' disabilities. Research results will seek to promote early initiation of treatment, to develop more holistic intervention programs, to educate patients and family caregivers, and to develop better assistive devices, including mobility aides. Bringing together an interdisciplinary team of physicians, nurses, therapists, engineers, and educators, the Center will design, implement and evaluate programs for the prevention of complications from common secondary conditions such as pressure ulcers, malnutrition, and mobility limitations. Combining the nucleus of activity within the VAMC with existing intramural and extramural clinical, research and educational activities, we envision new opportunities for research through collaborating agencies which will further serve the community of aging disabled veterans. The research will encompass physical, mental, social and spiritual dimensions in a holistic framework that will result in creation of a model program for the care of these individuals.

Three broad goals will guide the activities of the Center: promotion of excellence in interdisciplinary research focused on the health needs of the aging disabled veteran; providing exemplary research-based practice models for implementation by health care providers to the target population; and developing a center of excellence which creates a learning environment that fosters mentorship, collaboration, and exchange of information for the education of clinical practitioners and patients/families within the target population. These goals will be addressed by 1) solidifying interdisciplinary relationships among investigators and clinicians and establishing new collaborations with local institutions, 2) identifying the unique needs of the target population (veterans over 50 with disabilities), vs. the general aging population; 3) training a cadre of skilled clinicians and educators in geriatrics and rehabilitation research and practice and 4) extending practice initiatives into the community care setting. The Center will solicit, review and fund locally generated research projects consistent with goals and covering physical, mental, social and spiritual aspects of the aging disabled veteran. Projects may be "proof of concept level, seed money level, or full projects. The Center will employ faculty practitioners from area schools to facilitate collaborative research efforts.

Establishment of this Center with the corresponding research infrastructure will lead to enhanced opportunities for collaborative, interdisciplinary research in the Houston VAMC. Center initiatives will lead to new clinical interventions which will decrease the number of secondary complications in the disabled veterans. Enhanced research skills of Center personnel will enable the Center to address an increasing number of important clinical problems. Education programs aimed at the consumer, family caregiver and general public will convey strategies leading to more healthful lifestyles, increased independence and a consequent increased quality of life for the disabled veteran. Dissemination to a clinical audience beyond the HVAMC will propagate these benefits throughout the Veteran's Health Administration (VHA).

Healthy Aging with Disabilities

I. Introduction

Background: Research has shown that the previously assumed "natural decline associated with aging" is not necessarily inevitable; increased activity and other health promoting behaviors may prevent and indeed even reverse these effects [Shock et al., 1984]. Inactivity may result from individual choices in lifestyles as well as from an underlying impairment. Prevailing clinical practice presumes the inevitable decline of these individuals. Because the disabled veteran faces issues of aging earlier than the non-disabled, the cohort for studies growing out of this proposal will include those over the age of 50 who have disabilities from injuries and chronic diseases. Recognized in Healthy People 2000 [1991] as a special population at higher risk for problems as they age, disabled veterans exhibit "accelerated aging". It is time to discard the prejudices of ageism *and* disabilities [Pawlson and Brody, 1988].

Houston has a well-established history of distinguished research in the field of rehabilitation medicine. Likewise, individuals, programs and institutions that have focused their efforts on gerontology and geriatrics have established a strong presence in the community of educators, clinical practitioners and researchers. Thus, the proposed Houston VAMC Rehabilitation Research and Development Center is a natural fusion of these two strong disciplines. Establishment of this Center will enhance clinically-based rehabilitation research to complement the internationally renowned educational activities and the strong set of existing, community-based research programs.

Mission: It is fitting therefore, that the proposed Center, consistent with Healthy People 2000 recommendations, conduct research which will lead to the elimination of preventable secondary problems and the reduction of risks for all secondary conditions related to patients' disabilities. Research results will seek to promote early initiation of treatment, to develop more holistic intervention programs, to educate patients and family caregivers, and to develop better assistive devices, including mobility aides. Bringing together an interdisciplinary team of physicians, nurses, therapists, engineers, and educators, the Center will design, implement and evaluate programs for the prevention of complications from common secondary conditions such as pressure ulcers, malnutrition, and mobility limitations. Combining the nucleus of activity within the VAMC with existing intramural and extramural clinical, research and educational activities, we envision new opportunities for research through collaborating agencies which will further serve the community of aging disabled veterans. The research will encompass physical, mental, social and spiritual dimensions in a holistic framework that will result in creation of a model program for the care of these individuals.

Goals: Three broad goals will guide the activities of the Center:

- to promote excellence in interdisciplinary research focused on the health needs of the aging disabled veteran;
- to provide, through interdisciplinary and collaborative strategies, exemplary research-based practice models for implementation by health care providers to the target population; and
- to develop a center of excellence which creates a learning environment that fosters mentorship, collaboration, and exchange of information for the education of clinical practitioners and patients/families within the target population.

These goals will be addressed by 1) solidifying interdisciplinary relationships among investigators and clinicians and establishing new collaborations with local institutions, 2) identifying the unique needs of the target population (veterans over 50 with disabilities), vs. the general aging population; 3) training a cadre of skilled clinicians and educators in geriatrics and rehabilitation research and practice and 4) extending practice initiatives into the community care setting.

Significance: Establishment of this Center will lead to enhanced opportunities for collaborative, interdisciplinary research in the Houston VAMC. These initiatives will lead to new clinical interventions which will decrease the number of secondary complications in the disabled veterans. Enhanced personal research skills will enable the Center to address an increasing number of important clinical problems. Education programs aimed at the consumer, family caregiver and general public will convey strategies leading to more healthful lifestyles, increased independence and a consequent increased quality of life for the disabled veteran. Dissemination to a clinical audience beyond the HVAMC will propagate these benefits throughout the Veteran's Health Administration (VHA).

II. Background:

Aging in America

In 1995, an estimated 99 million people in the US had chronic conditions characterized by persistent and recurring health consequences lasting for periods of years. 41 million were limited in daily activities by their chronic conditions. 12 million are unable to live independently - most of them are dependent on caregivers for additional help [Hoffman and Rice, 1996]. By 2030 nearly 150 million Americans are projected to have a chronic condition, 42 million will be limited in their ability to go to school, to work, or to live independently. The US is currently spending $470 billion (in 1990 dollars) annually on the direct costs of medical services for persons with chronic conditions, including nursing homes and other institutional care. "The US does not have a coherent approach to caring for people with disabling chronic conditions. As a result, increasing numbers of people live with deteriorated health; others find that the services they need do exist, but are not accessible. Individuals suffer, and society at large pays a toll in lost productivity and avoidable health care expenditures" [ibid.].

It is essential to "distinguish between the true effects of aging and those processes, including disease, that also may appear or become more pronounced with time but are biologically irrelevant to the underlying mechanisms of human aging." [Shock et al., 1984]. "Although the incidence of disease increases with age, aging and disease are not synonymous. Aging is a normal concomitant of the passage of time that takes place in everyone; disease occurs in only a part of the population." [ibid.]. Data from the Baltimore Longitudinal Study of Aging (BLSA) led to the conclusion that there is no one uniform age course for all variables. The evidence is conclusive that there are a variety of changes with age. One pattern is stability, or the absence of any meaningful change with age in important functions or aspects of the person, ranging from resting heart rate to personality characteristics. A second primary pattern is characterized by declines with age that are due not to aging *per se* but to illnesses associated with age. [ibid.]. "Analysis of BLSA longitudinal data indicates that a precipitous drop in any physiological or behavioral function is likely to be a manifestation of a pathological condition. A corollary is the hypothesis that, in variables that remain essentially stable over the adult life span, any significant change may be a manifestation of pathology." [ibid.]. It is the intention of the interventions employed in the Center research to minimize the effects of complications from pathology (disability, decline, chronicity) to allow for normal (healthful) aging to progress. We wish to further identify, develop, and test interventions (in our research) to strengthen physiologic, mental and emotional, and spiritual competence and prevent, delay, or repair concomitant decline (previously accepted as a normal process of aging).

Model: Integration of mind, body and self

In considering the approach to be taken to rehabilitation of the aging veteran with disabilities, it is essential to consider all aspects of the individual as suggested by Covey [1991] and others [Conlin, 1980]. In a medical context, emphasis may be placed primarily on physical needs, which must take precedence, as suggested by Maslow's hierarchy of needs [1970]. However, cognitive dysfunction in the elderly makes evident the requirement to deal with mental dysfunction also. A holistic view of the individual demands consideration of social and spiritual dimensions as well. Described below are issues related to aging with a disability from each of the areas shown in Figure 1.

Figure 1. Dimensions of self

Physical Changes Associated with Aging with a Physical Disability

Most of what is known about aging with a physical disability is based on studies of people with SCI and polio survivors. Findings indicate that the physiological consequences of aging with a disability are more severe than the physiological consequences of aging without a disability. In the general population, there is an increase in medical problems as one ages. However, deterioration of various body systems appears to occur earlier in persons with disabilities than in persons without disabilities [Bedbrook, 1985; Halstead & Rossi, 1987; Krause & Crewe, 1991]. Cardiovascular problems that increase with age in persons with disabilities include hypertension, arteriosclerotic cardiovascular disease, dependent edema and low HDL [Menter & Hudson, 1995; Smith, 1989; Trieschmann, 1987]. Neurological disorders that are more common in the disabled population than in the general population are carpal tunnel syndrome and ulnar nerve atrophy

[Corbet, 1987; Gerhart, 1992; Trieschmann, 1987]. Respiratory problems in persons with disabilities that increase with age are breathing difficulties, reduced vital capacity, reduced forced expiratory volume, reduced inspiratory capacity, reduced negative inspiratory force, and pulmonary insufficiency [Halstead & Rossi, 1987; Menter & Hudson, 1995; Reynolds, 1992; Trieschmann, 1987; Whiteneck, 1993]. Genitourinary consequences include increased bladder cancers, renal disorders, pyelonephritis, kidney stones, bladder resections, incontinence, and increased urinary tract infections [Corbet, 1987; Gerhart, 1992; Mentor & Hudson, 1995; Trieschmann, 1987; Whiteneck, 1993]. Gastrointestinal effects of aging include increased bowel cancers, rectal problems, sluggish bowel action, hemorrhoids, spastic colon, and ulcers [Corbet, 1987; Mentor & Hudson, 1995; Trieschmann, 1987; Whiteneck, 1993]. Problems of the skin include increased pressure ulcers, abscesses, cellulitis, contact dermatitis, changes in regulation of body temperature, and decreased skin tolerance [Mentor & Hudson, 1995; Reynolds, 1992; Trieschmann, 1987; Thiyagorajan & Silver, 1984; Whiteneck, 1993; Whiteneck et al., 1992]. Musculoskeletal consequences of aging with a disability include muscle weakness, muscle pain, joint pain, osteoporosis, fractures, joint degeneration, joint deformity, reduced flexibility, contractures, spasticity, and scoliosis [Corbet, 1987; Gerhart, 1992; Halstead & Rossi, 1987; Hohmann, 1982; Mentor & Hudson, 1995; Reynolds, 1992; Smith, 1989; Trieschmann, 1987; Whiteneck, 1993; Whiteneck, et al, 1992; Young, et al., 1982]. Endocrine and metabolic changes that occur with age are disorders of carbohydrate and lipid metabolism, stasis of body fluids, changes in metabolism of drugs sometimes resulting in adverse drug reactions, abnormal glucose intolerance, and diabetes Mentor & Hudson, 1995; Trieschmann, 1987; Whiteneck, 1993]. The immune system becomes compromised resulting in reduced resistance to infection, increased resistance to antibiotics, and silent sepsis [Reynolds, 1992; Trieschmann, 1987]. Other physiological consequences include reduced endurance or stamina, fatigue, obesity, malnutrition, and autonomic dysreflexia [Corbet, 1987; Gerhart, 1992; Halstead & Rossi, 1987; Menter & Hudson, 1995; Reynolds, 1992; Smith, 1989; Trieschmann, 1987, Whiteneck, 1993].

The physiological changes noted above lead to functional changes. These include decreased mobility [Trieschmann, 1987; Whiteneck, 1993]; decreased ability to do basic activities of daily living such as eating, dressing, and toileting independently; decreased independence in performing instrumental activities of daily living such as cooking, housekeeping, and grocery shopping; less time out of bed; less time out of the home; and a decreased ability to perform work activities [Whiteneck, 1993]. Such changes in function also may mean that a person is no longer able to live independently [Zarb, et al., 1990].

Psychological Changes Associated with Aging with a Disability

Aging with a disability is often associated not only with a decrease in physical independence but also with a decline in psychological independence or a sense of autonomy and control over one's life [Butt & Fitting, 1992; Trieschmann, 1987; Smith, 1989; Whiteneck, et al., 1992; Reynolds, 1992; Zarb, et al., 1990]. Fear, worry, and uncertainty about the future increase [Trieschmann, 1987]. Aging can also be a threat to one's sexuality [Zarb, et al.,1990]. The physiological and functional changes may lead to a loss of self-confidence, self-esteem, and self-reliance [Reynolds, 1992; Trieschmann, 1987]. However, some people who are aging with a disability have a sense of satisfaction about the fact that they were able to survive [Whiteneck, et al, 1992]. Some may achieve self-realization or spiritual growth as well as maturity and wisdom [ibid.]. Some people who are aging with a disability become more satisfied with their lives while others become less satisfied [ibid]. When survival is the only focus in life, the quality of life is diminished. Like younger people, some aging people become irascible, stubborn, angry, egocentric, and they resist change [Trieschmann, 1987]. Although some people become better adjusted with age [Mentor & Hudson, 1995; Whiteneck, 1993], others have reduced emotional strength to deal with daily challenges and they may become depressed [Trieschmann, 1987; Whiteneck, 1993. This, in turn, may lead to a lessening of the will to live and, in some cases, may lead to suicide [Trieschmann, 1987]. At a time when they are most in need of help and assurance, many individuals who are aging with a disability feel that they have been abandoned by the medical community [ibid.].

Social Changes Associated with Aging with a Disability

As the physiological, functional, and psychological changes associated with aging with a disability take their toll, changes begin to occur in the social realm. Social roles begin to change [Mentor & Hudson, 1995; Whiteneck, et al., 1993]. Some people may not be able to continue their role as a wage earner, leading to early retirement [Mentor & Hudson, 1995;

Whiteneck, et al., 1993]. Caregivers may also be aging and become unable to maintain the level of care they had been giving [Whiteneck, 1993]. In some cases, divorce may occur [Trieschmann, 1987]. A loss of mobility as well as psychological changes may lead to isolation. Recreational options may become diminished [Smith, 1989]. The community at large may not be receptive to persons with disabilities leading to segregation and inequality [Whiteneck, 1993].

At a time when income may be decreasing due to retirement or a reduction in work hours, the cost of living may increase. In response to the physiological, functional, and social changes, additional assistive equipment may be needed or existing equipment may need to be repaired or replaced. Additional home modifications may become necessary and there may be a new or increased need for paid personal assistance services. Others may need to pay for nursing home care. The imbalance between income and basic living costs leaves many people who are aging with a disability living in poverty [Berkowitz et al., 1992; Smith, 1989; Trieschmann, 1987, Whiteneck, 1993; Whiteneck et al., 1992].

Spiritual Changes Associated with Aging with a Disability

Consideration of biological, psychological, and social factors of aging is a part of helping older persons to cope with their own aging [Naus, 1978]. However, integration of all these factors into the persons' spiritual context is useful in understanding the individual and particularly their responses to the stresses introduced by personal life experience [Harris and Harris, 1980]. Because of the caregiver's own discomfort dealing with these issues, this dimension is often ignored to the detriment of the patient [Berggen-Thomas and Griggs, 1995]. Spiritual issues and stories may be particularly intense for disabled elderly, although this issue has not been particularly explored. Evidence of the impact all dimensions of the self (Fig 1) have on physiological functioning demands systematic study in the development of improved practice guidelines, which include more extensive assessment of the needs of those aging with disabilities [Bruce et al., 1994].

III. Relevance to VA Population

Need for Research on the Aging Veteran Population with Physical Disabilities

The majority of the research studies cited above have included primarily civilian, rather than veteran samples. There is a need to assess the status of veterans with physical disabilities who are late-middle aged or older. Individuals receiving their medical care at VA medical centers may differ from other populations in a number of yet unknown ways. Such differences may have important implications for service provision in the future. The studies which will be implemented under the auspices of the proposed Center will begin to elucidate the special needs of aging veterans with physical disabilities. The proportion of aged compared to younger veterans is greater than the proportion of aged in the population as a whole, placing even greater emphasis on the need for research into issues of the aging disabled veteran. There will be an increasing number of individuals disabled early in life (e.g., spinal cord injured) who will be members of the future older population [Pawlson and Brody, 1988].

The proposed programs, research, and affiliation collaboration in research projects will complement HVAMC and Veteran's Integrated Service Network (VISN) goals in a number of tangible ways. 1) Provision of new clinical and scientific information for comprehensive care of patients which can be incorporated into clinical guidelines or pathways to provide efficient and cost effective patient care. The anticipated consequences of this effort include decreasing the length of stay of the veteran patient and the concomitant cost. The quality of care will be enhanced by incorporation of research findings into practice which will lead to increased customer satisfaction with the care provided. 2) Utilization and dissemination of research results will be communicated to VAMC staff and extended into community health care settings in order to promote the highest quality continuum of care of the veteran patients. 3) Implementation of guidelines for recognized high volume diagnoses, such as ischemic heart disease, hypertension, COPD, diabetes mellitus, and obesity will be incorporated into our practice guidelines for promoting healthy aging. Research will be conducted to provide clinical guideline variations for the elderly with disabilities. 4) The elderly disabled will participate in all medical center initiatives for prevention of disease, such as influenza, cancer screening, alcohol abuse, etc. especially since our goal is to promote research that enhances "healthful" living styles. 5) As appropriate (see specific research projects below), the Agency on Health Care Policy and Research (AHCPR) clinical practice guidelines will be implemented in our research protocols and

practice setting. 6) Implementation of the Consumer Advocacy Council exemplifies our approach to the goal of customer satisfaction by including consumers of veteran health care services in the advisory structure of the Center.

IV. Operational Plan

A. Center Environment

The Houston Center has been designed to effectively utilize resources available in the community to empower research efforts in the VAMC. Through collaborative partnerships with the various institutions of the Texas Medical Center, we have assembled a team of qualified investigators and collaborators who represent an extensive breadth and depth of experience in geriatrics/gerontology and rehabilitation research and related topics. The structure is based on several premises: 1) the best collaborations grow from mutual interest of individual investigators, 2) multi-institutional collaborations can optimize the performance of *all* through "resource" sharing (expertise, facilities, etc.), 3) clinical outcomes can best be improved through "hands-on" clinical interactions and 4) a mentoring process is the most effective way of enabling young researchers to effectively pursue research goals.

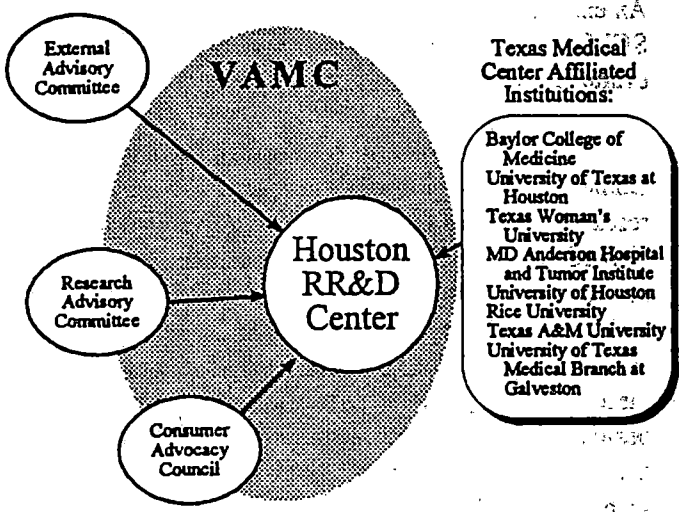

Figure 2. Houston VAMC Rehabilitation R&D Center.

The context in which the proposed Center will operate is outlined in Figure 2. This organization was developed in order to enhance existing and promote new interactions among the various institutions, with specific incentives for collaborative projects. The proposed plan will be implemented during the first six months by the Center co-Directors in conjunction with the Executive Committee. To provide appropriate institutional and community feedback for the Center, three advisory committees will be established, a Research Advisory Committee, a Consumer Advocacy Group, and an External Advisory Committee.

The Research Advisory Committee (RAC) will be comprised of content experts in rehabilitation, geriatrics and gerontology drawn from within the VAMC and from the Houston community at large. The global task of the RAC will be to promote interactions with institutions in the TMC and surrounding community. This committee will meet quarterly to identify areas of investigation and review progress toward the goals of the Center. The initial task of this group will be the formulation of the policies and procedures for reviewing the grants to be funded through the Center, and establishment of the Grant Review Committee. The committee will maintain a roster of affiliated, non-resident members to serve as reviewers for grants submitted for major funding through the Center, and will themselves function as reviewers as appropriate.

The Consumer Advocacy Council will be comprised of interested individuals drawn from the VA population, the elderly persons with disabilities, including a representative of the PVA, and representatives of some target groups (e.g., SCI, stroke, amputations) and primary caregivers of others (traumatic brain injury, Alzheimer's). This group will meet semi-annually, and will review and reflect on Center procedures and progress.

The External Advisory Committee will be comprised of nationally recognized individuals drawn from outside the Houston area to provide suggestions and guidance on overall directions for the Center. The group will meet twice, once in Houston near the beginning, and once linked to a national meeting. Telecommunications will be employed to solicit input (teleconferencing, e-mail, etc.) to make interactions cost-effective. The group will be chaired by Gale Whiteneck, Ph.D., Director of Research of Craig Hospital and Director of a Rehabilitation Research and Development Center on Aging in SCI, The remaining members will be recruited with the assistance of the Chairman.

Finally, the major institutions in the immediate environment of the Texas Medical Center are listed (Figure 2). It is anticipated that many of these will actively participate in Center activities through collaborative research projects, through placement of clinical personnel, and through student projects.

B. Center Structure

The structure of the proposed Center is depicted in Figure 3. The Center will be led by the Medical Director, Trilok Monga, M.D. and the Scientific Director, Arthur Sherwood, Ph.D., working closely together in administering Center activities. Dr. Monga will monitor the clinical relevance and application of research conducted through the Center and Dr. Sherwood will oversee the administrative and scientific matters to capitalize on their complementary strengths and interests. An executive committee, comprised of the Center co-Directors, the Associate Chief Of Staff for Geriatrics, the Chief of the SCI Service and the Administrative Officer of the PM&R Service will meet monthly to deal with emergent problems, evaluate progress and priorities toward Center goals.

1. Clinical Core: At the heart of the RR&D Center is the Clinical Core which forms the foundation from which all research activities will be initiated. A consortium of Houston VAMC (HVAMC) practitioners including medical and nursing services of Geriatrics and Extended Care, Physical Medicine and Rehabilitation, and Spinal Cord Injury (Figure 4) constitutes the Center Clinical Core. The individuals within these combined services have substantial experience in designing and implementing clinically-based research programs and draw upon the strength of existing clinical programs both within the HVAMC and in the Texas Medical Center as a whole.

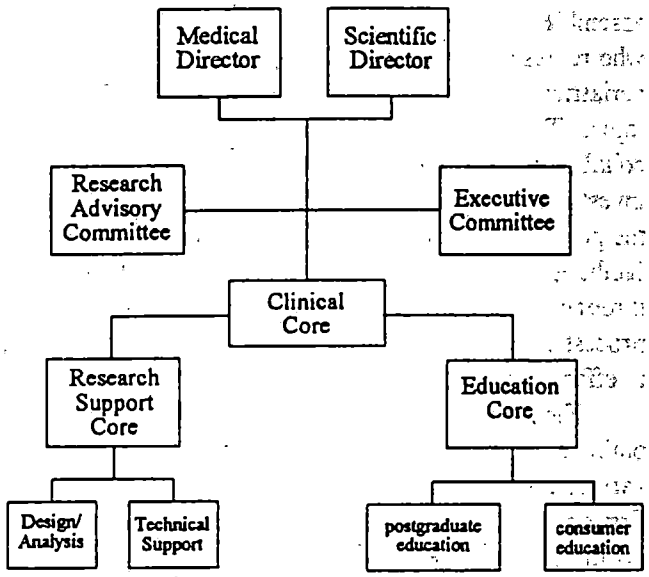

Figure 3. Houston Rehabilitation R&D Center Structure

The Clinical Core will innovate, initiate, execute and evaluate clinical research protocols with the support of the Research Support Core. Primary functions of Clinical Core staff members will be to a) mentor others in the development of research proposals, b) initiate individual research protocols, c) provide input for development of continuing education activities and d) evaluate outcomes from Center activity. Practitioners at all levels of professional development and expertise including staff physicians and residents, professional nurses, physical therapists, occupational therapists, clinical psychologists, social workers, vocational rehabilitation therapists, and others will actively take part in Center programs. Individual staff members have the potential and with the Center's support, will have opportunities to develop expertise in research methods and implementation of projects in individual areas of expertise. Qualified staff members will also serve as preceptors to other health care professionals brought into this environment for either continuing education, training initiatives, and/or research protocol development.

Additionally, the Clinical Core will collaborate with the Education Core to identify needs for continuing education through informal and formal requests for information. The clinical practice educational requirements of the staff and others in training will be identified early so as to promote the goals of the Center and maintain high standards of practice. Dissemination of research results into clinical practice will be a high priority effort of both Clinical Core and Education Core team members.

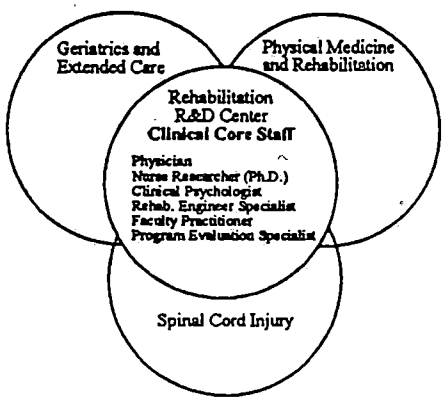

Figure 4. Clinical Core

The Clinical Core activities will be administered by a Nurse Researcher (Dr. Wilson) who, with the support and guidance of the Medical Director, will assure the daily implementation of clinical activities and monitor progress on the various projects. Activity in the three related Services will enhanced by the involvement of a co-Investigator Physician from that Service. In addition to these individuals, a Clinical Psychologist, a Rehabilitation Engineering Specialist and a Program Evaluation Specialist will be part of the Clinical Core Team. The functions of the Clinical Core Team will be to a) promote the development of clinically based research projects b) coordinate research protocol execution with Research Support

Core members, c) provide guidance and identification of clinical preceptors for staff development of expertise in research methods, d) support approved clinical research projects, e) evaluate the utility of interventions developed from ongoing research and f) coordinate the clinical practice of the faculty practitioners.

Faculty practitioners who are recruited for the Clinical Core will work along with their HVAMC counterparts. Their primary functions will be to: a) implement research projects, b) provide patient care as a part of the "discovery process for new idea formulation", c) supervise their academic students who have HVAMC approved projects, d) evaluate procedures and research projects carried out in the Clinical Core, and e) assist staff with dissemination of project results through publication. The process of communication of the Clinical Core is that of dynamic interaction with extension of collaboration to other Core components, Research Support and Education, respectively (Figure 3). Faculty practitioners will participate in scheduled, periodic consultation and evaluation sessions relative to their research experience. They will work collaboratively with the Clinical Core Team to accomplish the overall goals of the Center.

Collaboration with other institutions will be encouraged through identification and placement of faculty practitioners to the Center setting to promote research, practice, and education. Individuals recruited will be qualified educationally and demonstrate expertise in clinical practice. These individuals are envisioned as role models to the staff and will be able to promote research proposal development among VA staff, develop and implement their own research initiatives, and provide direct patient care services to our specialized veteran population as a mechanism to conduct research, evaluate outcomes and identify new research topics. Qualified individuals include Ph.D. level Advanced Practice Nurse (CS or NP) from nursing faculty of the University of Texas Health Science Center or Texas Woman's University (TWU), a Ph.D. physical therapist or occupational therapist from TWU, Schools of Occupational and Physical Therapy, and a Ph.D. dietitian from TWU, Department of Nutrition and Food Sciences in the College of Health Sciences.

Faculty practitioners will be appointed by a formal selection process to the Center and will liaison directly with the Clinical Core team members to assist in creating an infrastructure that encourages research in the delivery of health services. All appointed affiliation practitioners will meet the eligibility requirements for employment in the VHA and will meet practice requirements for clinical privileges and/or scope of practice requirements depending on professional degree, licensure and practice area.

2. Research Support Core: A significant feature of the Center will be the Research Support Core, which is charged with assisting and promoting research in the Center. The majority of research supported through the Center is anticipated to have a clinical focus, but this Core group will familiarize and assist those desiring to work in the Center in all aspects of their work. They will provide assistance in experimental design, in design and implementation of data collection instruments, in acquisition and processing of data, (from surveys to biochemical to electrophysiological), and in analysis of results and report and paper preparation. They will facilitate the necessary approval processes for executing projects. They will assist in establishing necessary linkages to other services within the HVAMC and in the Texas Medical Center as well. Two senior researchers will lead this group, Rabih Darouiche, M.D., and Thomas A. Krouskop, Ph.D., P.E. Their complementary strengths will be used to assure that investigators working through the Center will have access to all necessary support services. They will be supported by a research associate and by a biostatistician. Together with the staff of the Clinical Core, these individuals will have a primary support role for clinicians and researchers working through the Center.

In addition to the support role, an additional primary task will be undertaken by the Research Core in the development of a database to capture information from patients seen through the clinics and admitted to the services for inpatient care. This database will have two basic components: 1) a registry of all patients over 50 years of age with disabling conditions, 2) a sample database containing detailed information on a sample of patients over 50 years of age admitted for inpatient services.

The objective of the registry is to collect basic demographic, social, medical and disability data on every patient seen by the three services in the Center. This data will be used as a resource to identify specific areas for further research and provide patient information for research studies developed by the Center. The objective of the sample database is to collect detailed information on a random sample of disabled individuals who receive care in the services of the Center. A variety of types of information will be maintained, including medical, physical, functional, social situation, type and duration of

disability, general health, ethnicity and quality of life issues. To capture this data, two questionnaires will be developed; a baseline questionnaire and an annual follow-up.

The baseline questionnaire will be designed to capture data from the time of onset of disability to the present. The baseline questionnaire will cover the areas of medical history, present medical status, impairment characteristics, social history, community integration and functional status. This questionnaire will be completed through interview and medical record review. The second questionnaire, an annual follow-up, will differ from the baseline in that it will only cover the time since the last interview. Therefore, the focus of the questionnaire will be on what has changed since the last interview. This will allow a much shorter questionnaire to capture the necessary data. Like the baseline, the annual follow-up questionnaire will be completed through both interview and medical record review. In the later years of the Center, the information will be used to facilitate follow-up studies. Data collected will be coordinated with other similar local and activities. An overview of the sampling procedures to identify subjects for the database are provided in Appendix I.

3. Educational Service Core: Educational activities will be promoted through integration with existing Baylor College of Medicine PM&R personnel who are well-experienced in such activities. A core of personnel provide services such as the production of two quarterly newsletters targeted toward individuals with SCI and traumatic brain injury, videotape and audiotape production, pamphlet and monograph production, workshop and conference planning coordination for professionals and persons with disabilities, two comprehensive databases on audiovisual and written educational resources, assistance with writing research dissemination articles for lay journals/publications, research training and a rehabilitation specific library with a full time librarian with computerized literature search and Internet services.

The educational personnel also provide facilitation of resident, student, post-doctoral fellowship and continuing education services. Educational rotations are offered at seven hospital affiliation sites in the Texas Medical Center providing experiences in inpatient and outpatient settings for individuals in all age ranges who have disabilities from amputation, arthritis, traumatic brain injury, stroke, SCI, burns, cancer, neuromuscular disease, cardiorespiratory disease, to musculoskeletal disorders. The BCM PM&R department, where most of the Center staff hold primary faculty appointments, currently provides such experiences for 35 residents (one of the largest PM&R residency programs in the U.S.), 6 post doctoral research fellows and 4 post-doctoral clinical fellows in PM&R, neuropsychology, electromyography, independent living services, sports medicine, and women with disabilities. Twelve of the residency slots are at the HVAMC, and all residents rotate through the PM&R and SCI Services. Some specific educational activities currently offered include a weekly research education and development seminar, weekly PM&R case conference, weekly grand rounds, EMG educational series, PM&R core journal club, PM&R current journal club, 4 two day courses annually on PM&R topics such as sports medicine, therapeutic injections, prosthetics and orthotics, ethical issues in rehabilitation, a 9 day PM&R Board Review Course, the annual William A Spencer Lectureship and the annual Lewis A Leavitt Lectureship.

The above services will be utilized to disseminate results obtained from the Center's research projects and to develop educational materials that will increase understanding of professionals and consumers and offer interventions in minimizing the effects of aging on individuals with disabilities.

C. Support for Investigator-initiated Projects

The research activities of the Center will be focused on the Center theme and mission. However, within those broad parameters, investigator-initiated research will be encouraged to promote maximum efficiency in utilization of resources, both human and financial. Three types of research activities will be directly supported through the Center budget, ranging from modest amounts of money for a limited time, to substantial support over a period of years for major projects. (Figure 5).

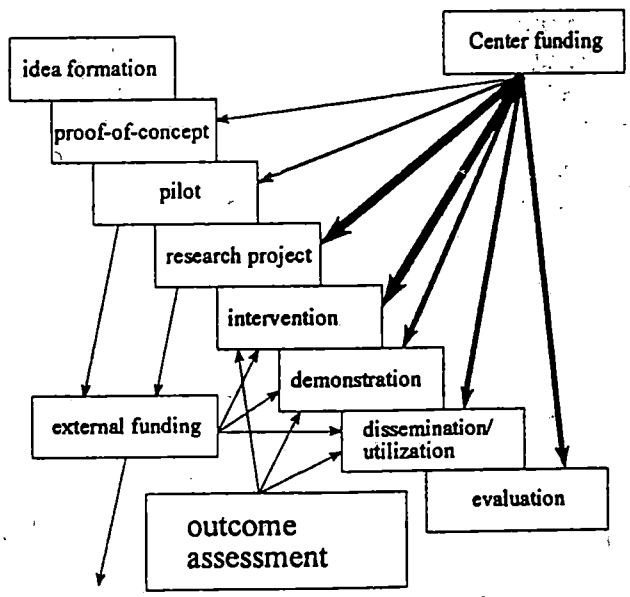

Figure 5. Stages in actualization of an idea. Thickness of the arrows denotes relative Center funding levels devoted to each stage.

Proof-of-concept studies for start-up projects will be funded for a maximum of $1000, to be expended over a maximum of 3 months, with no salary support. These studies will make it possible to test ideas which investigators wish to pursue without expending great effort in proposal writing or significant resources. The intended outcome from such projects would be the submission of proposals for "seed money" projects, the second level of support. Approval for such studies will be made by the co-Directors. Perhaps of greater importance than the financial support offered will be the research support personnel in place in the Research Support Core as well as the staff in the Clinical Core who will provide guidance and support as well as some limited manpower to implement ideas.

Seed money studies would be funded for up to $5000, for up to 6 months, with limited (non-PI) salary support possible. Such projects would be designed to develop full-fledged proposals for VA merit review, for NIH or for NIDRR support, or for Pilot Projects through the RR&D Service.

Finally, a limited number of full projects will be supported through the Center as typified by those selected for inclusion in this proposal. Such projects could be funded for (typically) for a total averaging $50,000 to $60,000 per year for one to two years, with encouragement and assistance for the investigator to seek additional funding.

Seed money and full projects would follow a similar approval process, to be determined by the co-Directors in consultation with the Research Advisory Committee. It is anticipated that the approval process will include a written proposal as well as an oral presentation to an appropriate forum.

IV. Research Activities

Individuals exhibit needs in multiple, interrelated dimensions, all of which must be appropriately addressed in order to achieve the desirable quality of life for those individuals. Some of the identified areas of need for aging disabled persons are in the area of maintenance of function with aging, clinical indicators, quality-of-care measures, nutrition, technology and assistive devices, and role function and psychosocial aspects [Pawlson and Brody, 1988]. The goals identified in Section I (Introduction) are more explicitly addressed in the table of specific objectives summarized in Table I, and detailed in Appendix II. While the areas described below address primarily physical aspects of disability, other dimensions will be actively solicited in future years (Figure 6).

Major research projects to be supported through Center funding will be carefully selected on a competitive basis from interested investigators within the VAMC and from related educational institutions. To be consistent with the premises and goals, contributions will be solicited which respond to one or more of these objectives, and cover all aspects of the aging disabled veteran as depicted in Fig. 1. In preparation for this proposal submission, thirteen such proposals were submitted, representative of the diversity of activity in the Houston area in this field. Future proposals will emphasize different dimensions of self as depicted in Figure 6.

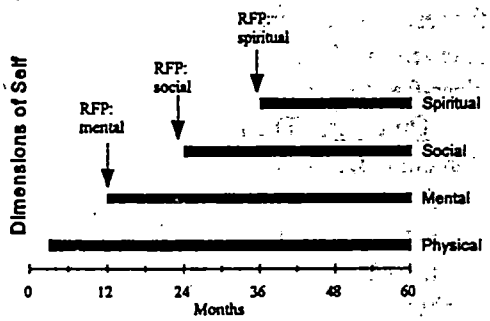

Figure 6. Proposed Timetable for Research Area Initiation
Horizontal bars indicate continued support of the indicated area; sequence follows the hierarchy of need concept. Each new beginning would be emphasized by an RFP.

The projects below are representative of the high level of interest in Houston for this area of investigation. The projects are presented as examples of the expertise readily available, but are not intended here for scientific review, due to space limitations. The first year research projects which focus on the physical dimension, will be initiated within three months of awarding of the grant, subject to negotiations for the level of funding available (negotiated indirect rate, e.g.). The projects described below represent but a small sample of the expertise available to the Center to address these needs. As time progresses through the five year period, the funding applied to such projects will decrease as funding will be diverted to evaluation, education and dissemination and other sources of funding will be found for these projects.

A. Intervention to Reduce Pressure Ulcer Risk (Rodriguez, Rintala, Garber, Markowski)

Background: Pressure ulcers are a very onerous and expensive complication affecting persons with limited mobility, impaired sensation , and/or cognitive dysfunction[1-3]. Persons with a disability and the geriatric population are at high risk for the development of pressure ulcers[4-6]. There is a need to develop stronger motivators to effect behavioral changes that would translate into reduced pressure on the anatomical sites at risk. Previous research has established that men with a SCI whose urinary glucosyl-galactosyl hydroxylysine (glu-gal) excretion exceeds 100 μmoles per day and whose ratio of glu-gal to galactosyl hydroxylysine (gal) is higher than 3.5 are 4.5 times more likely to develop a pressure ulcer within the next 2 to 5 months than persons with lower excretion.[7]

Hypothesis: Providing a numerical value to quantify the degree of individual risk to each subject will strengthen his/her beliefs in susceptibility and will prove to be a greater motivator for adhering to good skin care practices than either standard care or intensive educational interventions.

Objective: The purpose of this study is to test whether the incidence of recurrent pressure ulcers can be decreased by providing feedback to the persons at risk on the results of an individualized, quantitative, objective laboratory-based test. Does this information have a more profound impression on a patient's mind that will lead him/her to alter his/her behavior in ways that will better protect his/her skin? Further, this test can be repeated as needed to reinforce the need to maintain the improved behavior at a relatively modest cost without the need for a clinic visit (the urine sample can be sent through the mail). This study should provide a means of determining the most efficient and cost effective way of reducing incidence of recurrent pressure ulcers.

Expected Outcome: Success rates (Ulcer free time) for each of the groups will be analyzed using survival analysis. Successful completion of this project will demonstrate a significant reduction in the incidence of recurrent pressure ulcers in the population at risk. This will translate into a large savings in the cost of rehabilitation and subsequent hospitalizations since the cost of treating one pressure ulcer has been estimated as high as $60,000.[3] In addition to the monetary benefits, prevention of pressure ulcers would greatly enhance the quality of life of the subjects by increasing their mobility and their opportunities for work and study.

Methods Summary: All persons over the age of 50 with decreased mobility and/or decreased sensation attending the Geriatric, Rehabilitation Medicine, or Spinal Cord Injury outpatient clinics will constitute the sampling frame. The subjects will be divided into three groups. All will collect overnight urine samples which will be assayed for collagen glycosides content using high pressure liquid chromatography with dabsyl chloride as the derivatizing reagent. One group will be told the results of the assay and will be given an assessment of their risk The second group will be given only an educational intervention. The third group will be called to remind them to collect the urine. Survival analysis will be used to compare ulcer-free time between the three groups.

Outcomes. The main outcome measure will be the survival analyses of ulcer free time of the three groups. In 1977, a skin clinic was established at The Institute for Rehabilitation and Research focusing on prevention through a comprehensive clinical and educational program. This program resulted in reducing recurrence rates from 33% to less than 5% in the population studied[10]. We expect that an objective assessment (the glycoside assay) will be just as successful as an educational intervention but at a lower cost since the subject does not have to come to the clinic to receive an assessment. Further, the educational component can be used in conjunction wit the glycoside assay for a synergistic effect.

B. Malnutrition in the Institutionally Disabled Elderly (Wright, Ghusn)

This preliminary study into the phenomenon of malnutrition and its clinical sequelae in the disabled elderly is the first of several steps planned to provide insight into a very wide-spread and serious clinical problem not yet fully understood or systematically investigated. Because of the dearth of research conducted to ascertain the various clinical implications of malnutrition in disabled elderly patients, we neither know the magnitude of the problem nor its consequences in this elderly population. (Not even a validated definition for malnutrition in the elderly disabled exists in the literature at this time.) We are conducting this pilot study to characterize the relationhship of protein, energy, and micronutrient intake to pressure ulcer incidence and healing, immune function, cognitive functioning, ability to perform population specific activities of daily living, and quality of life in disabled elderly persons nresiding in nursing homes.

Hypothesis: Malnutrition is associated with compromised immune, integumentary, functional, and psychobehavioral functioning in the institutionalized disabled elderly.

The first specific aim of this pilot study is to obtain preliminary data needed to:1) estimate the prevalence and describe the progression of malnutrition in a select group of disabled elderly, and 2) ascertain the relationship of identified malnutritive states to selected population-relevant immunologic, integumentary, functional, and psychobehavioral clinical indices.

The second aim is to formulate a definition of malnutrition among institutionalized disabled elderly patients which will be used in a large scale nutritional intervention trial to test the effectiveness of interventions developed to prevent and treat malnutrition and its clinical sequelae in the disabled elderly.

Background and Significance Malnutrition has been reported to prevail in 30 - 85% of the nation's 1.5 million elderly currently residing in nursing homes[1 - 6]. While data on the incidence of malnutrition in disabled veteran nursing home population are unavailable, it is believed that those figures would not be unlike the general population's. Most specific to the disabled, the NHANES I Epidemiologic Follow-up Study [7] identified low caloric intake as a primary factor associated with greater disability. Nutritional deficiencies in any population, however, although frequently not recognized, are common underlying causes of adverse clinical outcomes. Malnutritional states are associated with decreased functional status and quality of life and increased morbidity and mortality in various study populations [8 - 11]. In one study conducted by a Department of Physical Medicine and Rehabilitation in Canada [12] to determine associations between nutritional status and length of stay and functional outcome, data collected led to the conclusion that "malnutrition was the most potentially modifiable variable relating to length of stay and functional outcome in their sample of forty-nine inpatient rehab stroke patients. Such detrimental effects ultimately lead to poor health status despite increased health care services and expenditures.

Because of the dearth of research conducted to ascertain the various clinical implications of malnutrition in any type of nursing home patients, specifically, we know neither the magnitude of the problem nor its consequences in the disabled institutionalized elderly veteran population. It is realized that the problem of malnutrition may indeed be reduced by identifying, preventing, and correcting modifiable causes [8]. But in order to better treat the clinical sequelae of malnutrition while attempting to improve the nutritional intake of nursing home patients admitted to our care, we must gain a greater understanding of the problem, define sensitive, specific, and reliable diagnostic indices, and identify interventions specific to the manifestations of this serious clinical phenomenon.

Diagnosing malnutrition in the institutionalized elderly is a complex task and is not yet within the standard of practice in many acute and long term care settings [1, 12 - 18]. Even when attempted, it is proved a difficult task due to a variety of non-nutritional physiologically related factors. First, anthropometric and bioimpedance measures and biochemical markers employed in nutritional assessments are standardized for adults 25-55 years of age. Second, chronic disease states, individual variations in resting metabolic rate and daily caloric expenditure, poly-pharmaceutical regimes, and the effects of aging on various body systems are all known to confound nutritional status. We wish to develop a better working definition of malnutrition that will be most relevant to our study population to use in a large-scale intervention trial to evaluate selected nutritional interventions on clinical outcomes critical to our patients.

Study Design In a prospective descriptive study, nutritional status of a select group of disabled elderly patients is tracked for one year. Selected clinical outcomes and biochemical indices of immune, integumentary, functional, and psychobehavioral status are examined in light of nutritional status at 1, 6, and 12 months. Characterization of distributions and correlations performed on the data will indicate if malnutrition is associated with decreased immunological, integumentary, functional, and psychobehavioral functioning in the disabled elderly. Which of the commonly recognized indices of malnutrition serve as primary indicators of compromised clinical outcomes in the sample will then be ascertained.

Sample: Subjects (n = 100) are recruited from among the select group of institutionalized disabled veterans. To control for as many non-nutritional physiological intervening variable effects as is feasible, patients will be enrolled into the study only if they are >50 years old and meet minimum health criteria.

Study Procedures Nutritional assessments including consumption studies, anthropometric measurements, biochemistries, and body composition determination by bioelectrical impedance are performed to ascertain the prevalence and progression of malnutrition in the sample. Simultaneously, selected clinical outcomes and biochemical indices of immune, integumentary, functional and psychobehavioral status are examined in light of nutritional status (adequately nourished versus malnourished) at 1, 6, and 12 months (Specific Aim #1). Specific Aim #2 will be accomplished by

ascertaining which of the commonly recognized indices of malnutrition serve as primary indicators of compromised clinical outcomes in the sample.

Statistical Evaluation Analyses of data collected are planned: 1) characterization of distributions of the sample on each nutritional parameter, according to type; centering and variation indices will be performed; 2) the progression of nutritional status over time will be tracked by examining repeated time measurements of each nutritional parameter; 3) the relationship of nutritional status and specified clinical measures will be characterized by repeating the above analytical plan for each clinical index and by examining clinical indices according to assessed nourished versus malnourished status, and 4) specification of estimates necessary for future proposed trial will be made.

C. Developing a clinical algorithm in management of sexual dysfunction in people with disabilities (Monga, Herskowitz, Kerrigan)

Background: Research indicates marked decline in sexual functioning with impaired arousal in patients with physical disabilities (stroke, traumatic brain injury and spinal cord injury).[1-11] For example, Monga et al. reported erectile difficulties in 62% of male stroke patients, and poor vaginal lubrication post-stroke in 71% of female patients.[1] However, most studies ignore the broader aspects of sexuality, such as sexual fantasy, drive and satisfaction. Objective data is lacking to support these problems. Treatment options have not been tested. Recently we used a validated instrument (Derogatis Inventory Sexual Functioning -DISF)[12] to describe sexual functioning in patients with amputations[13], head and neck cancer[14,15] and chronic pain.[16,19] There are no guidelines as to what extent these people should be investigated. We propose a clinical algorithm for managing sexual dysfunction in people with disabilities with specific reference to stroke patients.[17]

Objectives: (1) To develop a clinical algorithm, through the consensus of an expert panel, managing sexual problems in elderly stroke patients. (2) To conduct pilot testing of this clinical algorithm at the HVAMC. (3) To evaluate sexual and psychological functioning of stroke patients managed with this clinical algorithm and compare the findings with those patients managed in a traditional rehabilitation program.

Hypothesis: (1) Patients managed with the use of clinical algorithm will report significantly improved sexual functioning (measured on DISF scale) as compared to the control group (2) Patients treated with appropriate specific interventions, (e.g. vasodilator injection, psychological counseling) will report significant change in coital frequency and satisfaction with sexual functioning.

Expected outcome: Successful completion of the project will: (1) provide a clinical algorithm that could be used in other impairment groups such as TBI and amputees; (2) provide a better understanding of sexual functioning in these patients; (3) provide objective findings regarding etiology and severity of erectile difficulties in male patients with CVA; (3) improve the sexual functioning of these patients and (4) provide outcome measures with treatment interventions such as psychological counseling and vasodilator injections.

Methods Summary: During the first phase of the study, a clinical algorithm will be developed. Stroke patients admitted to Stroke Rehabilitation Program at Houston VA Medical Center will be encouraged to participate in the evaluation of sexual functioning. Patients over 65 years of age with a recent first CVA and cognitive ability to understand the questionnaire will be included. During the second phase patients with other impairments such as traumatic brain injury and amputations will be studied. The proposed Clinical Algorithm will be refined by an expert panel that will consist of Physiatrists, Psychologist, Urologists, and Nurses who are actively involved in the rehabilitation of stroke patients and also participate in management of sexual problems in people with physical disability. The implementation phase of the clinical algorithm will begin with random assignment to two patient groups: (1) patients going through the clinical algorithm (2) patients treated in a traditional rehabilitation program. Evaluation will include (1) recording basic demographic data, medical co-morbidities, medication, alcohol use, neurological and functional deficits(measured by FIM scale). The assessment of sexual and psychological functioning (3) male patients will be studied in the sleep laboratory on two consecutive nights to establish their erectile capability within one week of admission to rehabilitation medicine service and at the time of discharge, and 12 months post discharge. Instruments include: Sexual functioning: Derogatis Inventory of Sexual Functioning (DISF).[16] Five domains of sexual functioning (sexual arousal, behavior, orgasm, drive/relationship and sexual fantasy) are assessed in detail and a total T score for sexual functioning is also obtained.

D. Improving Outcomes for Stroke Patients: A Psychoeducational Program for Family Caregivers (Ostwald, Hickey, Lim)

In the current health care environment, stroke hospitalizations are short, and much of the recovery process occurs in the home. However, the shortened hospitalization results in little or no time to adequately prepare family caregivers to assist with recovery from stroke nor to be prepared for the caregiver role. As a result, caregivers do not have a general understanding of stroke nor the specific disabilities, needs, and interventions related to their family member. In addition, they do not understand the caregiver role, caregiver burden, nor how to maintain their own health [Hickey, 1996]. Clearly, the caregiver is instrumental in promoting recovery; however, the unique aspects of caring for the elderly stroke patient in the recovery phase have been explored in only three studies [McLean et al; 1991; Draper et al., 1992; Hickey, 1996].

The proposed study will provide the family caregiver with detailed and specific information that assures an accurate understanding of the disease affecting the person with stroke. In addition, it provides skill training based on the AHCPR Clinical Guidelines [Gresham et al., 1995] to help caregivers to understand and manage patient symptoms. The entire four-week intervention is designed to 1) improve the functional outcomes of stroke patients who are discharged home with the assistance of a family caregiver and 2), reduce the burden and depression of family caregivers who are caring for stroke patients at home.

Hypotheses: The hypotheses to be tested are: 1). Stroke patients whose caregivers attend the intervention group will demonstrate better functional outcomes that those patients whose caregivers in the control group receive only written educational materials. 2). Stroke patients whose caregivers attend the intervention group will experience fewer emergency room visits and hospitalizations due to avoidable complications (dehydration, pressure sores, etc.) than those whose caregivers in the control group receive only written educational materials. 3). Primary caregivers in the intervention group will demonstrate decreased depression as compared with those in the control group who receive only written educational materials. 4). Primary caregivers in the intervention group will demonstrate decreased burden as compared with those in the control group who receive only written educational materials.

The successful completion of this project will improve the outcomes of stroke patients who are cared for at home by family caregivers while maintaining their own health. The results from this study will provide a cost-effective model for nurses and other health professionals to establish stroke caregiver psychoeducation programs to educate and support family members who find themselves in these roles.

Methods Summary: Patients with stroke and their family caregivers (n = 100) will be recruited from the Houston VAMC, allowing for drop-out. A random assignment experimental design will be used. Family caregivers in the control group will be given the Consumer Version of Clinical Practice Guideline #16, *Recovering After a Stroke*. All patients and caregivers will be assessed prior to discharge and at four additional points after the intervention. The intervention group will attend four sessions of the psychoeducational group. The intervention consists of four structured workshops containing lectures and experiential exercises aimed at helping caregivers to gain management skills and to increase their ability to cope with the day-to-day management of the stroke patient.

Repeated measures ANOVA will be used to test hypotheses one, three and four for Group X Time effects. For hypothesis two, utilization data will be collected from all caregivers and confirmed through hospital records. The two groups will be compared over the year and the cost effectiveness of the intervention will be determined.

If successful, this relatively low-cost intervention could be incorporated into routine care offered to caregivers who are assuming home care for stroke patients. It could be incorporated into the regular offerings of the VA system and managed care organizations. It could also be adapted and tested for other groups of disabled veterans who are discharged home with other conditions.

E. Assessment of Physical Activity Patterns in Individuals with Spinal Cord Injury (Holmes, Frey, Harrison)

There are many methods of assessing physical activity [Paffenbarger, Blair, Lee, and Hyde, 1993]. Currently, the most accurate method for measuring daily energy expenditure in free-living humans uses doubly labeled water [Schoeller and Racette, 1990], involving oral administration and subsequent measurement of elimination of the stable isotopes deuterium and oxygen-18. Only one study has used a questionnaire to study physical activity in people with SCI [Noreau et al., 1993]. Accelerometers have been used extensively in physical activity assessment studies among the able-bodied, but have not been validated in people with SCI.

The objectives of this study are fivefold. First, to validate the use of accelerometry as a measure of physical activity in people with SCI. Second, to assess physical activity patterns in people with spinal cord injury using accelerometry and a previously validated questionnaire (Godin and Shephard, 1985). Third, to examine the differences in physical activity patterns between people with and without SCI. Fourth, to evaluate the effects of aging on physical activity patterns in people with SCI. Fifth, to examine the differences in activity levels among people with high- and low-level injuries.

The hypotheses of this project are as follows: (1) the accelerometer is a valid instrument for measuring physical activity in people with SCI; (2) people with SCI are less active than the non-disabled; (3) physical inactivity increases at an earlier age among people with SCI; and (4) people with high-level SCI are less active than people with low-level SCI.

Expected Outcome: Successful completion of this project will impact rehabilitation by: (1) indicating if people with SCI are less active than the non-disabled; (2) indicating if people with SCI exhibit risk for hypokinetic disease due to physical inactivity; (3) validating a field-based measure of daily physical activity that can be used by rehabilitation specialists; (4) determining the effects of age on physical activity and if interventions need to be developed according to age; and (5) assisting rehabilitation specialists in developing rehabilitation programs that emphasize habitual physical activity, thus possibly preventing future health and psychological problems. This study will provide the baseline data needed to develop future projects aimed at elucidating physical activity patterns in people with SCI and the relationship between physical activity patterns and risk for chronic disease in this population. This research will also assist in the development of physical activity surveillance studies that address individuals with other types of disabilities. This research will be used to solicit funding from government agencies such as the NIH and CDC.

Approximately 30 males with SCI will participate in the validation phase of the project (Phase 1). Approximately 75 subjects will participate in the activity surveillance phase (Phase 2) of the project. Subjects will be divided into the following age groups: 18-30; 31-40; 41-50; 51-65; >65. Five subjects without SCI, five subjects with tetraplegia, and five subjects with paraplegia will be recruited for each age group (75 total). All subjects with SCI must be able to operate a manual wheelchair community distances and be at least six months post-injury.

Methods: Neurological impairment will be assessed using ASIA guidelines. Detailed descriptive statistics will be collected on all subjects. The project will be divided into two phases.

Phase 1: Thirty subjects with SCI will participate in the accelerometry validation study. The current standard for estimating daily energy expenditure is using doubly-labeled water. A control urine sample will be taken before orally administering pre-weighed doses of 2H and 18O. Urine samples will be taken 5 hours, 7, 14, and 21 days after dosing. Isotope concentrations will be measured using mass spectrometry. Subjects will wear Computer Science Application (CSA) accelerometers during the 21 days of energy expenditure measurement. Summed acceleration movement data in activity counts, the intensity of movement per unit time will be accumulated over the 21 days. Correlations between accelerometers and doubly-labeled water will be calculated to determine: (1) the applicability of accelerometers in estimating energy expenditure in this population; and (2) the best anatomical site for wearing the accelerometer.

Phase 2: Approximately 75 subjects (5 without SCI, 5 with tetraplegia, 5 with paraplegia in each of the 5 age groups) will wear a CSA portable accelerometer during waking hours throughout a seven day assessment period. Acceleration data will be collected in 5 second intervals and activity counts averaged over each minute. All subjects will be provided data sheets to record when the device is worn. Activity will also be assessed using a leisure-time physical activity questionnaire previously validated by Godin and Shephard [1985].

The validity of accelerometry as a measure of physical activity will be determined using regression analysis. Differences between activity levels (accelerometer and questionnaire scores) of control and subjects with SCI will be determined using a 5x3 (age group x level of injury) repeated measures ANOVA.

Recommendations for developing physical activity programs in this population will be developed and marketed.

F. Materials and Human Factor Design to Improve Crutches (Holmes, Magee, Krouskop)

Background: Over the past fifty years, there have been monumental advancements in the fields of prosthetics and orthotics. Space age materials and computer aided design techniques have been used to fabricate a new generation of artificial limbs and braces which have improved the functionality of persons who have limb loss, neurological or musculo-skeletal deficiencies. In contrast, the basic design of crutches has been unchanged for millennia. Chronic crutch use has resulted in fatigue, repetitive stress disorders, nerve trauma and osteoarthritis (1,2). Consequently there is a need for a

new crutch design that reduces the loading on the upper extremities of chronic users so that the population of aging crutch users will be better able to retain independence in their mobility.

Objectives: We propose to redesign the crutch so that it supports the wrist in a manner that reduces the likelihood of injury and incorporates shock absorbing elements that reduce the loads responsible for repetitive stress injury to the upper extremity joints.

Hypothesis: The hypotheses that will be tested in this project is whether the forces transferred to the hand and wrist of crutch users can be reduced by designing shock absorbers into the crutch and can the handles used on crutches be designed to reduce the pressure exerted on the carpal tunnel.

Expected Outcome: The results of this project will be increased understanding of the force transfer from the crutch to me shoulder of patients who use crutches and a novel design for a new generation of crutches that are more biomechanically better than current crutches.

Population: Aging veterans who use crutches to assist in ambulation.

Methods: Over a two year period, we propose to explore the utility of space age composite materials, e.g. fiber reinforced plastics, impact absorbing polymers, and non-slip materials to develop a new generation of crutch that can help persons with paraplegia, amputees, post-polio survivors, and other chronic crutch users to increase mobility with decreased risk of damage to the joints of the upper extremity. We will use finite element analysis to evaluate different crutch geometries and develop a design that can support the hand-wrist-forearm complex in a geometry that reduces the risk of carpal tunnel pressures and damage to the wrist joint space. Shock absorbing materials such as filled urethanes and mechanical shock absorbers such as air cylinders will be investigated to design a shock absorbing system that can be incorporated in the crutch frame to reduce the impact loading on the upper extremity. An advisory group of chronic crutch users will be convened to evaluate the designs that are developed during the project before the device is fabricated.

The efficacy of the design will be tested in the motion analysis lab at Texas Woman's University to track the hand, wrist, and forearm movement during ambulation. Only flat surface, indoor walking will be evaluated to minimize the possibility of injury due to falls. Three-axis accelerometers will be attached to both the crutch and the hand of the user to measure the reduction in loading achieved. Anti-skid materials developed in the space program will be examined for use in a new generation of crutch tip that will reduce the likelihood of slip. Tire technology to squeegee water out from under the contact area will be incorporated into the design of new crutch tips which can be used in wet environments and other situations where current crutches tend to become unstable.

Summary

In summary, these projects offer the prospect of significantly impacting the practices of rehabilitation medicine for the management of aging people with disabilities in specific, short-term ways. Successful completion of these projects will be followed by educational activities aimed at patients and family caregivers as well as health care providers to promote widespread dissemination. Each project will be carefully evaluated in terms of meeting its objectives as well as its impact on the clinical management of patients, and will be extensively disseminated when evaluation is completed, as outlined below.

V. Evaluation:

The greatest challenge for this project has to do with efforts to evaluate the impact of the Center's research projects on the lives of aging veterans with disabilities. The success of the Center in preventing secondary problems and reducing the risk of veterans for development of problems related to their disabilities will be addressed in four ways: structure, process, outcome and efficacy (Figure 7). The structure of the Center (Section IV, Figs. 2-4), which involves initial and ongoing internal and external review of proposed research, will assure that the research projects relate directly to the goals of the center and that they are

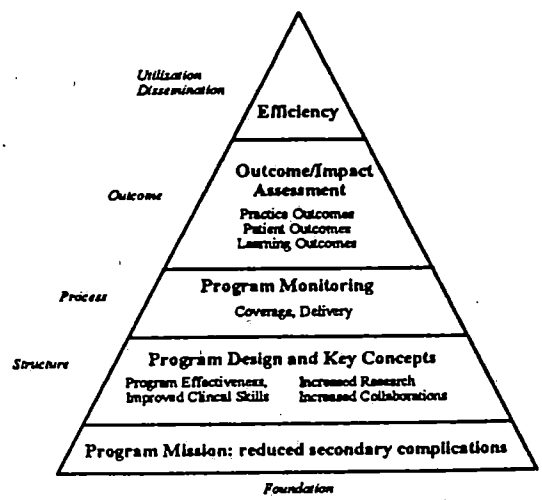

Figure 7. Evaluation Pyramid

methodologically sound. In addition, the structure (Fig 3) will facilitate coordination of activities between the three cores (clinical research and education) and from the beginning, insure that significant findings are incorporated into education and clinical programs within the VA system and disseminated to the community as a whole. The involvement of the three Service Chiefs in the Executive Committee to ensure that quality of personnel is maintained.

The process evaluation will be addressed by the Center's co-directors and clinical and research personnel assigned to evaluation. They will monitor the ongoing activities of the Center, including progress of the individual research projects. Included will be the degree to which the goals and objectives (Table 1) have been addressed. They will review the methods and procedures for each research project with the project directors and will establish time lines for completion of activities. These time lines will then be monitored to detect problems related to subject recruitment, attrition, material acquisition or other methodological issues. The personnel assigned to data management and analysis will work closely with the research committee and with each project director to ensure that the integrity of the data is maintained. The statistician will work with each project to establish a data management system that will be congruent so that data from different projects can be aggregated across common variables. In addition, specific methodological consultation will be available on an as-needed basis.

RESEARCH: eliminate secondary complications
1. Excellence in targeted research
2. Solicit investigator-initiated proposals
3. continuous evaluation of design, cost, and relevance
4. data base on special requirements
5. basis for development of practice guidelines.
6. value to clinical practice
CLINICAL PRACTICE: research based practice models
1. new research collaborations
2. Disseminate research results
3. learning environment
4. Introduce role models
5. results in a continuum of care.
EDUCATION: practitioners and patients/families
1. programs for patients, family caregivers
2. educate a cadre of clinicians
3. publication and/or educational activities
4. programs/learning activities for professionals
5. patient and staff education/demonstration programs

Table 1: Summary of Goals/Objectives
See Appendix II for full text

Outcomes will be evaluated throughout the five-year period of the grant. Focus will be placed on evaluating patient outcomes. Each project will have specific hypotheses or research questions to be addressed that are outcome related. These outcomes will focus on the prevention and reduction of risk of secondary problems related to disability in aging veterans. Specific outcomes may reflect increases in knowledge, changes in attitudes, initiation of new behaviors, development of new assessment techniques or assistive devices. For instance, in the area of mobility, the outcome measures might include distance traveled (ambulation or wheelchair), time out of bed, number of steps taken each day; in the area of psychosocial research, the measures might include life satisfaction scales, depression scales, health beliefs, and locus of control tests. Technology and assistive device utilization measures will include the time that the device is used, the tasks accomplished by using the device, compatibility with use environments and various lifestyles. In addition, the clinical core committee, with the directors, will monitor the practice of staff within the three units involved in the Center. They will monitor the staff to detect improved practice in rehabilitation. In particular, as projects are completed, they will observe for the implementation of new knowledge, attitudes, behaviors, and technologies that increase the quality of life of the veterans and their families. In addition, as information from the projects is disseminated during Years 3 through 5, the educational staff will monitor changes in knowledge and attitudes of those who attend the educational conferences, seminars, etc. that are expected to arise from this Center.

Finally, the efficacy, of each project will be determined. This will involve looking at the outcomes and costs of the each project. The Director of the Center will oversee this process with the assistance of the project directors and consultants who have specific expertise in cost utility analysis. Projects will track such information as cost of developing technology versus the cost of developing secondary complications because of the lack of technology and the cost of an intervention versus the cost of care because of the lack of intervention. For example, the cost of emergency visits and hospital admissions for complications of stroke will be compared for patients and families who receive special home care instructions and those who do not. This information will be of particular importance when determining the impact of the Center on the practice of rehabilitation. If we can show that the projects are efficacious we will have a greater impact on the entire rehabilitation field. This type of information will be included in written reports that detail the experience with the intervention, oral debriefings between the evaluation team and the research team, and formal presentations of the results of the evaluation process to the Clinical Advisory Committee.

The ultimate measure of the success of Center will be improved quality of life for aging veterans with disabilities and their families.

VI. Dissemination:

Information targeted to individuals with SCI and their families will be written for journals and newsletters such as *SCI Life*, *Mainstream*, *EPVA Action*, *Accent on Living*, *Paraplegia News*, *New Mobility Sports and Spokes*, and NCCSCI Dialogue. Similarly other groups will be targeted to receive results of research, including stroke groups, family/caregiver forums, etc. Information that is appropriate for database and computer bulletin board dissemination will be sent to Project Enable, SYNAPSE, Handicap News and Special Needs. A WWW site will be developed by the Rehabilitation Engineering Specialist for immediate dissemination of information to professionals and consumers. This site will be linked to existing related sites (Huffington Center on Aging: http://www.bcm.tmc.edu/hcoa/; UT Houston Center on Aging - http://son1.nur.uth.tmc.edu/coa/coa.htm; and others - http://www.sni.net/rehab/Mets/training.htm, etc.). This will be done similarly to the site developed by the Scientific Director for the Houston Society for Engineering in Medicine and Biology (http://www.hsemb.bcm.tmc.edu/). A recent news article stated that a majority of the 70,000 purchasers of Web-TV are older and use it to find health related information. These newer technologies will be explored to find creative ways of informing and assisting the aging disabled.

Findings directed to rehabilitation professionals will take the form of presentations at professional meetings such as the American Congress of Rehabilitation Medicine, American Spinal Injury Association, American Academy of Physical Medicine and Rehabilitation, American Association of Spinal Cord Injury Psychologists and Social Workers, American Physical Therapy Association, American Occupational Therapy Association, Association of Rehabilitation Nurses, Gerontological Society of America, IEEE Engineering in Medicine and Biology Society, National Association of Rehabilitation Counselors, National Rehabilitation Association, International Rehabilitation Medicine Association and the Rehabilitation Engineering Society of North America. Manuscripts will be sent to appropriate, peer-reviewed journals to include *Journal of Rehabilitation Research and Development*, *Archives of Physical Medicine and Rehabilitation*, *American Journal of Physical Medicine and Rehabilitation*, *Journal of Rehabilitation*, *Journal of Rehabilitation Nursing*, *Journal of Neuroscience*, *Stroke*, *Spinal Cord* and *Rehabilitation Psychology*. In addition, book chapters and edited books will include the findings of the Center's research.

Other forums for dissemination of information will include conferences and teleconferences, workshops and seminars with published proceedings. Specific projects may result in creation of fact sheets, brochures and video tapes (budgeted in the 3rd through 5th years). Consideration will be given to development of a newsletter.

VII. Timetable

Establishment of the Center will take place over a period of 3 months, during which time offices will be set up and administrative staff recruited. The Executive Committee will finalize selection of the Review committee and advisory committees, and finalizing guidelines for grant submission and review and of criteria for recruitment of the faculty practitioners, in collaboration with Clinical Core personnel. A database will be constructed during the first half-year, and data collection activities continued throughout the life of the Center.

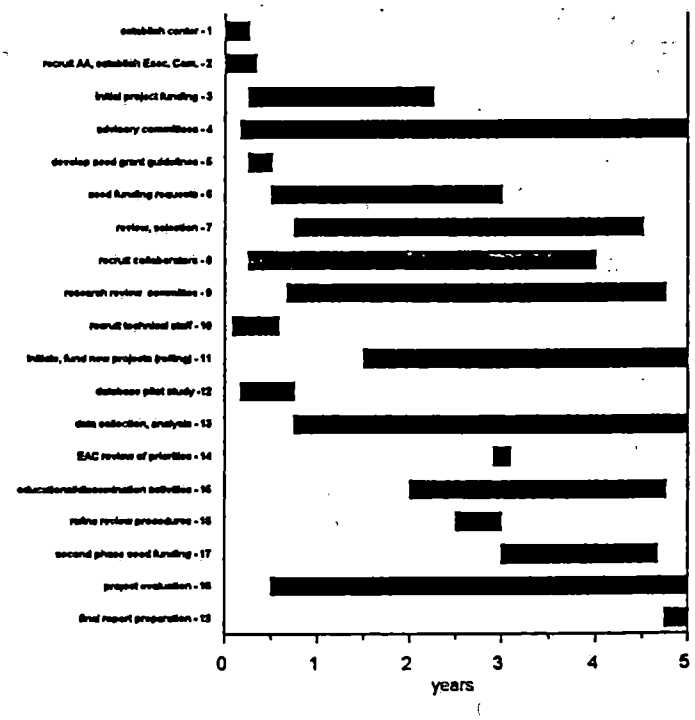

Figure 8. Center Timetable

Additional proposals will be solicited for review beginning in the sixth month and continuing through the end of the third year.

A major review of program policies and practices will take place in the end of the third year by the External Advisory Committee. Following external and internal review, policies will be adjusted as required, and the second phase of funding begun. Evaluation activities will continue throughout virtually the entire 5-year period. Beginning in the fourth year, new education/dissemination staff will be recruited.

Funding of individual projects will be staged in over a 3 month period as sub-contracts are negotiated. Faculty practitioners will be staged in over the first two years to provide an opportunity to assess the effectiveness of the structure as envisioned.

VIII. Resources

A. Clinical Program

1. Physical Medicine and Rehabilitation Service The Physical Medicine and Rehabilitation Service, the largest within VISN 16 and one of the largest within the VHA, provides services to veterans in a 27 county area of Southeast Texas. The Service operates a 40 bed comprehensive rehabilitation inpatient program, inpatient and outpatient consultation services, electromyographic and nerve conduction studies. Comprehensive rehabilitation programs are provided for patients with such diagnoses as stroke, neurological disorders, and musculoskeletal disorders through a physician directed interdisciplinary team consisting of rehabilitation nursing, appropriate therapies, psychologists, and social workers. Treatment delivery is carried out in the various disciplines supervised by the Service including physical therapy, occupational therapy, kinesiotherapy, audiology/speech pathology, and vocational rehabilitation therapy. Specialty programs are offered in cardiac rehabilitation, driver training for the disabled, therapeutic aquatics, pain management, and a sheltered workshop. A Neuromuscular Function Laboratory conducts research on fatigue and postural disturbances. In each treatment setting the patients physical, psychological, social and emotional needs are addressed. Additionally, the service is pursuing accreditation from The Rehabilitation Accreditation Commission. Documentation of compliance criteria is nearing completion and anticipated site survey is April 1998.

In FY 96, 316 different inpatients were managed on the rehabilitation bed unit. The service responded to over 6500 consultation requests and performed 1200 electroneurodiagnostic evaluations. A total of 84,200 therapy treatments were provided with about 30% of these rendered to outpatients.

2. Spinal Cord Injury Service: The VA Medical Center, Houston is the only Center in VISN 16 that provides specialized care for the acute and chronic spinal cord injured veteran. The Service is a component of the Texas/South Central Regional Spinal Cord Injury System, which is a voluntary multi-institutional group of spinal cord injury services at Teaching hospitals in the Houston/Galveston area. The system representing these institutions was developed to respond to the need for early and coordinated referral of the spinal cord injured patient to centers with extensive experience in the treatment and rehabilitation of spinal cord injury.

Major Functions and Levels of Care The VAMC Houston Spinal Cord Injury Service consists of a 40 bed inpatient unit, Outpatient Clinic, Home Care Program, Urodynamics Lab, Brain Motor Control Laboratory and Spinal Cord Injury Research Laboratory. The Service provides intensive medical rehabilitation to acute spinal cord injured veterans, sustaining medical care for chronic spinal cord injured veterans and independent living services to eligible spinal cord injured veterans in the community. The Houston VAMC Spinal Cord Injury Service serves a predominantly male population. In addition to a comprehensive inpatient rehabilitation program including ventilator dependent patients, the Service sponsors a SCI Home Care Program as well as 14 clinics. These include urology, plastic surgery, wheelchair and orthotics, and recreational, vocational and training programs.

In FY 96, the SCI Service had 364 admissions, an occupancy rate of 78%, an average daily census of 29.2.and treated 395 patients, with 1891 outpatients. The average length of stay was 30.2 days, and the population was approximately evenly distributed between those with paraplegia (167) and quadriplegia 9187).

3. Geriatrics and Extended Care Service

The goal of the Geriatrics and Extended Care Service is to utilize the resources of the VAMC, and where appropriate, Baylor College of Medicine's Huffington Center on Aging (HCOA) and other resources within the Texas Medical Center (TMC), to make the Houston VAMC one of the premiere VA centers for the treatment of patients, research and education in geriatrics and gerontology. The Houston VAMC has been the driving force for development of geriatrics and gerontology within the TMC and, if "past is prologue," the HVAMC should continue to be a leading force in geriatrics and gerontology.

The Hospital Based Home Care Program - The HBHC is one of the Geriatrics and Extended Care programs administered by the Department of Veterans Affairs Medical Center. This program delivers primary health care in the home, through a VA Hospital Based Interdisciplinary Team to homebound and often bedridden eligible veterans whose caregivers are capable and willing to assist in their care. The program is designed to meet the long-term care needs of the chronically ill aging veteran population, providing medical care, skilled nursing services, rehabilitation therapy, social work services, and dietetic services with a focus on supporting and teaching the caregiver to care for the patient. In addition, the program offers Respite Care, Caregiver Support Group, and Senior Companion Services

Nursing Home Care Units - The 120 nursing home beds are fully in operation. The average number of admissions is 10 admissions per month with an average occupancy rate of 94.8% as compared to 92.7% for last fiscal year. A new falls program has been implemented in the nursing home care unit.

Education and Research in Long term care The nursing home care unit has been used for training of our geriatric fellows (2 fellows for FY 93-94), physician assistant students (15), and GNP students. A continuing education program was developed for the GEC staff. Topics included: Nutrition and aging, nutrition and wound healing, care of gastric tubes, principles of interdisciplinary care planning, wound care and principles of treatment, drug use in the elderly, dealing with difficult people, enzymatic wound debridement, nutritional assessment in the elderly and dental care in the elderly.

B. Current Research

At present, the Core faculty have seven VA merit review research projects, listed below:

Effects of Medications on Spasticity in Spinal Cord Injury: A Quantitative Study: Priebe/Sherwood; Prevention of Recurrent Pressure Ulcers after Myocutaneous Flap: Holmes; Use of Tretinoin to Prevent Pressure Ulcers in Spinal Cord Injury Patients: Markowski; UTI Prophylaxis Using Bacterial Interference Following SCI: Darouiche; Recurrence of Bacteriuria and Progress to Symptomatic UTI in SCI Patients: Darouiche; Upper Limb Amputee Services: The VA Approach as a Model Service System: Monga; An Objective Indicator of Risk of Developing a Pressure Ulcer: Wilson

C. Affiliations: Interinstitutional Collaboration

Because of the VAMC's strategic location in the Texas Medical Center (TMC) and its proximity to several institutions of higher learning, the opportunities for interinstitutional collaboration are outstanding. The investigators who will be part of the proposed Center have enjoyed many collaborative relationships in the past with the 26 institutions and organizations in the TMC.

1. Baylor College of Medicine (BCM): The VAMC is an affiliated teaching hospital of BCM. Most of the VA personnel are BCM faculty, either in the Department of Physical Medicine and Rehabilitation (PM&R) or the Huffington Center on Aging (HCOA). Baylor has the necessary clinical, educational and research resources necessary to support the proposed work.

a. Physical Medicine and Rehabilitation: The most prominent collaboration is with PM&R and The Institute for Rehabilitation and Research (TIRR). This collaboration draws upon nearly 35 years of effective efforts in addressing the needs of persons with severe disabilities, particularly SCI. The PM&R/TIRR collaboration allows for rapid access to clinicians, academicians, researchers, and educators from a variety of disciplines through an affiliation agreement that, in effect, allows institutional boundaries to be overcome in the completion of mutually agreed upon projects. Recently an agreement between the University of Texas-Houston Medical School's PM&R Department and Baylor's PM&R Department resulted in the creation of an Alliance which effectively merges these two departments, thereby further strengthening the overall efforts.

Furthermore, the staff of the Center will have direct access to resources of the Texas Model Spinal Cord Injury System and the Brain Injury Research and Prevention Center (BIRC), both based at TIRR, as well as the Research and Training Center on Independent Living at TIRR and the Region VI ADA Disability and Business Technical Assistance Center (both operated through TIRR's ILRU Program). The BIRC also Houses the U.S. Department of Education National Institute for Rehabilitation and Research's Rehabilitation Research and Training Center on Interventions in Traumatic Brain Injury.

Access to these resources provides avenues for collaboration with provider organizations, consumer groups, and advocacy organizations throughout the Southwestern United States and nationally.

Educational opportunities are greatly enhanced by virtue of the recently approved Master of Science n Rehabilitation Technology, which seeks to contribute to the education of health care providers better prepared to utilize new technologies in care and treatment of persons with disabilities, and who can contribute to the next generation of technological tools that are needed to better serve our country's population of people with physical disabilities. The program combines didactic, clinical and research phases for a student body drawn from a variety of related backgrounds.

b. Huffington Center on Aging The mission of the Huffington Center on Aging (HCOA) is to improve the condition of older people through the programs of research, education, and training in BCM Departments, Institutes, Divisions and Centers, and other institutions in the Texas Medical Center; to disseminate the knowledge gained by this research and apply it to the care of older people; and to increase the number of academic geriatricians and gerontologists. The HCOA combines vigorous and award-winning basic and clinical research programs to effectively address the needs of the geriatric population. Research teams in cell senescence and geroethics were awarded two prestigious U.S. awards in gerontology. The HCOA was one of seven aging centers in the U.S. awarded grants by the John A. Hartford Foundation for an exciting new initiative to add more geriatric teaching to internal medicine and family practice residencies. The Texas Consortium of Geriatric Education Centers headquartered at Baylor College Medicine continues to be one of the top GECs in the country.

2. University of Texas-Houston Health Science Center: Center on Aging

The Center on Aging at the University of Texas-Houston Health Science Center (UTHHSC) is committed to providing leadership for the initiation, coordination, and facilitation of interdisciplinary aging-related research, education, and community service programs within the UTHHSC, as well as for academic institutions, community agencies and organizations, and the health care service providers throughout Texas. The Center is committed to the following goals: 1) initiate and support interdisciplinary research projects that optimize the well-being of older adults and their caregivers; 2) share research findings and successful educational models that contribute to the improvement of health care provided to older adults; 3) develop and support interdisciplinary professional and continuing education programs that enhance the knowledge and skills of current and future health care providers; and 4) advocate for equal access to high quality and culturally competent health care for all older adults. The Center is a part of the Texas Consortium of Geriatric Education Centers and initiated the formation of a state-wide Alliance of Geriatric Education Centers. The Center has a contract with the Area Agency on Aging to run the federally-mandated Long Term Care Ombudsman Program for all of Harris County. It also houses the Joseph C. Valley, Sr. Memorial Library, a collection of aging-related books, journals, videos and other materials, that is open to the health care professionals of the Houston-area.

D. Facilities and Equipment

The Center's activities will be localized primarily in the PM&R Service and the SCI Service of the Houston VAMC, described above. The Center offices will (initially) be housed in space immediately adjacent to the PM&R In-patient Nursing Unit, in Rooms 2B-152 and 2B-154. These rooms, comprising a total of 400 square feet, will be used to house the Scientific Director and his administrative assistant, and will provide space for faculty practitioners from affiliated institutions. In addition to the clinical facilities described above, the Center will incorporate laboratories already in existence, including the BMCA Laboratory, the Urodynamics Laboratory, the Muscle Function Laboratory and will make use of facilities at other existing laboratories such as the Collagen Research Laboratory at Baylor will be available to support projects within the Center. Major equipment in these laboratories include an isokinetic dynamometer, a postural measurement system, a multichannel EMG system, a 32-channel evoked potential system and a urodynamics flow and pressure measurement system. The Collagen Research Laboratory equipment includes scintillation counter, HPLC chromatograph, electrophoresis equipment, spectrophotometer, refrigerated centrifuge and analytical scales.

In addition, new laboratories, developed through private foundation funding, are being transferred to the VAMC (scheduled for mid-June) which will enable comprehensive sensory examination using both evoked potential (visual, auditory, somatosensory) and sensory quantification techniques, and motor control using EMG amplifiers with a 16 channel inkjet recorder (Siemens Mingograph) and several 16- and 32-channel analog-to-digital computer systems, interconnected in a local area network with a total of 10 gigabytes of hard disk storage and a combination of SGI Unix workstations and pentium-based PCS, along with appropriate mass storage on DAT and CD-ROM.

VIII. Literature Cited

Bedbrook GM (Ed.) (1985). *Lifetime care of the paraplegic patient.* Edinburgh: Churchill Livingstone.

Berggren-Thomas P. Griggs MJ. Spirituality in aging: spiritual need or spiritual journey?. *Journal of Gerontological Nursing* 1995 Mar;21(3):5-10

Berkowitz M, Harvey C, Greene CG, & Wilson, SE (1992). *The economic consequences of traumatic spinal cord injury.* New York: Demos.

Bruce ML. Seeman TE. Merrill SS. Blazer DG. The impact of depressive symptomatology on physical disability: MacArthur Studies of Successful Aging. *American Journal of Public Health* 1994 Nov;84(11):1796-9

Butt L, & Fitting, M (1992). Psychological adaptation. IN: GG Whiteneck, SW Charlifue, KA Gerhart, DP Lammertse, S Manley, RR Menter, & KR Seedroff (Eds). *Aging with spinal cord injury.* New York: Demos.

Conlin MM. Essentials of geriatric care. *Primary Care; Clinics in Office Practice* 1980 Dec;7(4):595-605

Corbet B (1987). *The options group: Perspectives on aging with spinal cord injury.* New York: North American Reinsurance Corporation.

Covey SR. The seven habits of highly effective people. *National Medical-Legal Journal* 1991 2nd Quarter;2(2):8

Gerhart KA (1992). Personal perspectives. In: GG Whiteneck, SW Charlifue, KA Gerhart, DP Lammertse, S Manley, RR Menter, KR Seedroff (Eds). *Aging with spinal cord injury.* New York: Demos.

Halstead LS, Rossi, CD (1987). Post-polio syndrome: Clinical experiences with 132 consecutive outpatients. In: LS Halstead & DO Weichers (Eds). *Research and clinical aspects of the late effects of poliomyelitis.*

Harris R. Harris S. Therapeutic uses of oral history techniques in medicine. *International Journal of Aging & Human Development* 1980-81;12(1):27-34

Healthy People 2000: National Health Promotion and Disease Prevention Objectives Public Health Service, Publication #017-001-00473-1, Government Printing Office: Washington, D.C., 1991.

Hoffman C, Rice D: *Chronic Care in America: A 21st Century Challenge*, Prepared by the Institute for Health and Aging, University of California, San Francisco for The Robert Wood Johnson Foundation, Princeton, New Jersey, August, 1996.

Hohmann GW (1982). The challenge of gerontology in spinal cord injury. Craig Hospital: Fifth annual John S. Young lectureship. Englewood, CO.

Krause J, Crewe N (1991). Chronologic age, time since injury, and the time of measurement: Effect on adjustment after SCI. *Archives of Physical Medicine and Rehabilitation*, 72, 91 -100.

Menter RR, Hudson LM (1995). Effects of age at injury and the aging process. In: SL Stover, JA DeLisa, and GG Whiteneck (Eds). *Spinal cord injury: Clinical outcomes from the model systems.*

Naus P. The elderly as prophets. *Hospital Progress* 1978 May;59(5):66-8, 72

Pawlson LG, Brody SJ: *Rehabilitation and Geriatric Education: Perspectives and Potential*, Conference Report, December 4-7, 1988, Arlington, VA, The Circle, Inc: McLean, VA.

Reynolds GG (1992). Becoming successful health care consumers. In: GG Whiteneck, SW Charlifue, KA Gerhart DP Lammertse, S Manley, RR Menter, & KR Seedroff (Eds). Aging with spinal cord injury. New York: Demos.

Shock NW, Greulich RC, Andres R, Arenberg D, Costa PT, Jr., Lakatta EG, Tobin JD: *Normal Human Aging: The Baltimore Longitudinal Study of Aging (BLSA).* (from the Gerontology Research Center, NIA, NIH). Washington DC: US Government Printing Office, 1984.

Smith I (1989). Aging with spinal cord injury. *Rehab Management*, June/July, 28- 35.

Thiyagorajan C, Silver, JR (1984). Aetiology of pressure sores in patients with spinal cord injury. *British Medical Journal*, 289, 1487-1490.

Trieschmann RB (1987). *Aging with a Disability*. New York: Demos.

Weeks L. Starck P. Liehr P. LaFontaine K. (1996) Graduate nursing education. What are the benefits and costs to hospitals? *Journal of Nursing Administration* 26, 20-30.

Whiteneck GG (1993). A proposal for a rehabilitation research and training center in aging with spinal cord injury. An unpublished research proposal. Englewood, CO: Craig Hospital.

Whiteneck GG, Charlifue, SW, Gerhart KA, Lammertse DP, Manley S, Menter RR, Seedroff KR (Eds.) (1992). *Aging with spinal cord injury*. New York: Demos.

Young JS, Burns PE, Bowen AM, McCutchen R (1982). *Spinal cord injury statistics*. Phoenix, AZ: Good Samaritan Medical Center.

Zarb GJ, Oliver MJ, Silver JR (1990). *Ageing with spinal cord injury: The right to a supportive environment.* London: Thames Polytechnic/Spinal Injuries Association.

Literature Cited by Individual Projects

A. Intervention to Reduce Pressure Ulcer Risk (Rodriguez, Rintala, Garber, Markowski)

1. Richardson RR, Meyer PR (1981) Prevalence and incidence of pressure sores in acute spinal cord injuries. *Paraplegia* 19:235-247
2. Young JS, Burns PE (1981) Pressure sores and the spinal injured. *SCI Digest* 3:11-23
3. Wharton GW, Milani JC, Dean LS (1987) Pressure sore profile: Cost and management. *ASIA Abstracts Digest* 1987: 115-119
4. Rodriguez GP, Claus-Walker J, Kent MC, Garza HM (1989) Collagen metabolite excretion as a predictor of bone- and skin-related complications in spinal cord injury. *Arch Phys Med Rehabil* 70:442-444
5. Daniel RK, Priest DL, Wheatley DC (1981) Etiologic factors in pressure sores: An experimental model. *Arch Phys Med Rehabil* 62:492-498
6. Crenshaw RP, Vistnes LM (1989) A decade of pressure ulcer research: 1977-1987. *J Rehabil Res Dev* 26: 63-74
7. Rodriguez GP, Garber SL (1994) Prospective study of pressure ulcer risk in spinal cord injury patients. *Paraplegia* 32:150-158
8. Yu-Tzu MN, Catanzaro M (1987) Health beliefs and compliance with a skin care regimen. *Rehabil Nurs* 12:13-16
9. Garza HM, Bennett N, Rodriguez GP (1996) An improved rapid method for the isolation, purification and identification of collagen glycosides. *J Chromatography* 732: 385-389

B. Malnutrition in the Institutionally Disabled Elderly (Wright, Ghusn)

1. Abbasi, A. and Rudman, D. (1993). Observations on the prevalence of protein-calorie undernutrition in VA nursing homes. *Journal of the American Geriatrics Society* 41(2):117-121.
2. Lansey, S., et al. (1993). The role of anthropometry in the assessment of malnutrition in the hospitalized frail elderly. *Gerontology* 39:346-353.
3. Kerstetter J., et al. (1992). Malnutrition in the instituthonalized older adult. *Journal of the American Dietetic Association* 92:1109-1116.
4. Mion, L., McDowell, J., and Heaney, L. (1994). Nutritional assessment of the elderly in the ambulatory care setting. *Nurse Practitioner Forum* 5(1):46-51.

5. Keller, H. (1993). Malnutrition in institutionalized elderly: how and why? *Journal of the American Geriatrics Society* 41(11):1212-1218.

6. Nelson, K., Coulston, A., Sucher, K. and Tseng, R. (1993). Prevalence of malnutrition in the elderly admitted to long term care facilities. *Journal of the American Dietetic Association* 93(4):459-461.

7. Hubert HB, Bloch DA, & Fries JF. (1993). Risk factors for physical disability in an aging cohort: the NHANES I Epidemiologic Follow-up Study. *Journal of Rheumatology* 20(3):480-488, March.

8. Abbasi, A. and Rudman, D. (1994). Undernutrition in the nursing home: Prevalence, consequences, causes and prevention. *Nutrition Reviews* 52(4):113-122.

9. Giovanni, B., Franzoni, S., Rozzini, R., Ferrucci, L., Boffelli, S., and Trabucchi, M. (1994). A nutritional index predicting mortality in the nursing home. *Journal of the American Geriatrics Society* 42(11):1167-1172.

10. Sullivan, D., and Walls, R. (1994). Impact of nutritional status on morbidity in a population of geriatric rehabilitation patients. *Journal of the American Geriatrics Society* 42(5):471-477.

11. Thomas, D., Verdery, R., Gardner, L., Kant, A., and Lindsay, J. (1991). A prospective study of outcome from protein-energy malnutrition in nursing home residents. *Journal of Parenteral and Enteral Nutrition* 15(4):400-404.

12. Mowe, M., and Bohmer, T. (1991). The prevalence of undiagnosed protein-calorie undernutrition in a population of hospitalized elderly patients. *Journal of the American Geriatrics Society* 39:1089-1092.

13. Finestone HM, Greene-Finestone LS, Wilson ES, & Teasell RW. (1996). Prolonged length of stay and reduced functional improvement rate in malnourished stroke rehabilitation patients. *Archives of Physical medicine & Rehabilitation* 77(4):340-345. April.

14. Sullivan, D., Moriarty, S., Chernoff, R., and Lipschitz, D. (1989). Patterns of care: An analysis of the quality of nutritional care routinely provided to elderly hospitalized veterans. *Journal of Parenteral and Enteral Nutrition* 13(2):249-254.

15. Roubenoff, R., Roubenoff, R.A., Preto, J., and Balke, W. (1987). Malnutrition among hospitalized patients: A problem of physician awareness. *Archives of Internal Medicine* 147(Aug):1462-1465.

16. Christensen, K., and Gstundtner, K. (1985). Hospital-wide screening improves basis for nutrition intervention. *Journal of the American Dietetic Association* 85:704-706.

17. Mitchell, C. and Lipschitz, D. (1982). Detection of protein-calorie malnutrition in the elderly. *American Journal of Clinical Nutrition* 35 (Feb):398-406.

18. Hill, G., Pickford, I., Young, G., et al. (1977). Malnutrition in surgical patients: An unrecognized problem. *Lancet* 1:689-692.

C. Developing a clinical algorithm in management of sexual dysfunction in people with disabilities (Monga, Herskowitz, Kerrigan)

1. Monga, TN, Lawson, JS, & Inglis, J., (1986). Sexual dysfunction in stroke patients. *Archives Physical Medicine Rehabilitation* 67(1): 19-22.

3. Fugl- Meyer, AR, & Jaasko, L. (1980) Post-stroke hemiplegia and sexual intercourse. *Scandanavian Journal of Rehabilitation Medicine* 7: 158-166.

4. Boldrini, P., Basaglia, N.,& Calanca, M.C., (1991). Sexual changes in hemiparetic patients. *Archives Physical Medicine Rehabilitation* 72, 202-207.

5. Monga, TN, (1993). Sexuality post stroke. In Teasell, R. (ed). Long term consequences of stroke, In *State of the art*, Philadelphia, Hanley and Belfus.

6. Monga, TN, DeForge, DA, Williams, J., & Wolfe, LA, (1988). Cardiovascular responses to acute exercise in patients with cerebrovascular accident. *Archives Physical Medicine Rehabilitation* 69: 937-940

7. Monga, TN, Miller, T., & Biederman, H.J., (1987). Autonomic nervous system dysfunction in stroke patients. *Archives Physical Medicine Rehabilitation* 68: 630.

8. Monga, TN, Monga, M., Raina, MS, & Hardjasudarma, M. (1986). Hypersexuality in stroke. *Archives Physical Medicine Rehabilitation* 67(6): 415-417.

9. Monga, TN, & Ostermann HJ, (1995). Sexuality and sexual adjustment in stroke patients. In: Trilok N. Monga, (ed). *Sexuality and Disability*. Philadelphia, Hanley and Belfus.

10. Monga TN: Sexuality and Disability: Past, Present and Future. Key Note Speech. *Proceedings*, The First Mediterranean Congress of Physical Medicine and Rehabilitation, Herzliya, Israel, pp. 194, 1996.

11. Monga, TN, & Lefebvre KA, (1995). Sexuality an Overview. In: Trilok N. Monga (ed). *Sexuality and Disability*. Philadelphia, Hanley & Belfus, 1995.

12. Derogatis LR: The DISF/DISF-SR Manual. Baltimore (MD): *Clinical Psychometric Research*, 1996.

13. Bodenheimer C, Kerrigan A, Monga TN: Sexual functioning in lower limb amputees. *Proceedings*, The First Mediterranean Congress of Physical Medicine and Rehabilitation, Herzliya, Israel, pp. 200, 1996.

14. Monga U, Monga TN: Sexual and psychologic functioning in head and neck cancer patients. *Proceedings*, The First Mediterranean Congress of Physical Medicine and Rehabilitation, Herzliya, Israel, pp. 204, 1996.

15. Monga U, Tan G, Ostermann HJ, Monga TN: Sexuality in head and neck cancer patients. *Arch Phys Med Rehabil* 1997, 78:298-304.

16. Monga TN, Tan G, Ostermann HJ, Grabois M: Sexual functioning in patients with chronic pain. *Arch Phys Med Rehabil* 77:833, 1996.

17. Kerrigan A, Monga TN, Zabransky R: A proposed critical pathway in management of sexual dysfunction in patients with physical disabilities. *Proceedings*, The First Mediterranean Congress of Physical Medicine and Rehabilitation, Herzliya, Israel, pp. 202, 1996.

18. Zinreich ES, Derogatis LR, Herpst J, et. al., Pretreatment evaluation of sexual function in patients with adenocarcinoma of the prostate. *Int J Radiat Oncol Biol Phys* 1990; 19:1001-1004.

19. Monga TN, Tan G, Ostermann HJ, Grabois M: Sexuality and Psychological Adjustment in Chronic Pain Patients. *Arch Phys Med Rehabil* (submitted for publication).

20 Beck AT: 1970; Depression: causes and treatment. Philadelphia; In Marcella AJ, Sanborn KO, Kamboka V, et al. Inventories of depression among normal population of Japanese, *Chinese Clin Psycol* 30:281-297.

21. Speilberger CD, Gorsuch RL, Lushene RE: 1970; Manual for evaluation questionnaire. Palo Alto, CA; Consulting Psychologist Press.

22. Ware JC, Hirshkowitz M: Characteristics of penile erections during sleep recorded from normal subjects. *J Clin Neurophysiol* 1992; 9:78-87.

23. Kessler WO: Nocturnal penile tumescence. *Urol Clin North Am* 1988; 15:81-86.

D. Improving Outcomes for Stroke Patients: A Psychoeducational Program for Family Caregivers (Ostwald, Hickey, Lim)

1 Draper BM, Poulos, C. J., Cole, A. M. D., Poulos, R. G., & Ehrlich, F. (1992). A comparison of caregivers for elderly stroke and dementia victims. *J Am Geriatr Soc*, 40: 896-901.

2. McLean J, Roper-Hall A, Mayer P, Maih A. (1991). Service needs of stroke survivors and their informal cares: A pilot study. *J Advanced Ntrsing*, 16: 559-564.

3. Hickey, J. V. (1996). Preparation of family caregivers for recovery from stroke: How well are we doing? *J Neurovascular Disease*, I(1): 12-20.

4. Gresham, G. E., Duncan, P. W., Stason, W. B. et al. (1995). *Post-stroke rehabilitation. Clinical Practice guideline*, No. 16. Rockville, MD: U. S. Department of Health and Human Services. Public Health Service, Agency for Health Care Policy and Research. AHCPR Publication No. 95-0662. May 1995.

5. Ostwald, S.K., Hepburn, K., Caron, W., Burns T. Mantell R, Vanloy W, Krasnoff A, Blount K, Reckinger D (1995) Decreased caregiver burden and negative reactinos to disruptoive behaviors in persons with ADRD: Preliminary Report. *The Gerontologist* 35 (Special Issue)

E. Assessment of Physical Activity Patterns in Individuals with Spinal Cord Injury (Holmes, Frey, Harrison)

Assessment of Physical Activity Patterns in Individuals with Spinal Cord Injury

Anson, C.A. & Shepherd, C. (1996). Incidence of secondary complications in spinal cord injury. International Journal of Rehabilitation Research, 19(1), 55-66.

Blair, S.N., Kohl, H.W., Gordon, N.F., Paffenbarger, R.S. Jr. (1992). How much physical activity is good for health? Annual Review of Public Health, 13, 99-126.

Centers for Disease Control and Prevention. (1996). A report of the Surgeon General: Physical activity and health: At-a-glance. Atlanta: CDC.

Centers for Disease Control. (1997). Physical activity and health: A report of the Surgeon General. (on-line), http://www.cdc.gov/nccdphp/sgr/.

Computer Science and Applications, Inc. (1995). Wrist activity monitor technical manual. Available: CSA, 2 Clifford Drive, Shalimar, FL 32579.

Dearwater, S.R., LaPorte, R.E., Robertson, R. J., Brenes, G., Adams, L.L., & Becker, D. (1986). Activity in the spinal cord-injured partient: an epidemiologic analysis of metabolic parameters. Medicine and Science in Sports and Exercise, 18(5), 541-544.

Morgan, W.P. & Costill, D.L. (1996). Selected psychological characteristics and health behaviors of aging marathon runners: A longitudinal study. Behavioural Science, 17(4), 305-312.

National Instituties of Health. (1996). Physical activity and cardiovascular health consesnus statement. Journal of the American Medical Association, 276(3), 241-246.

Noreau, L., R.J. Shephard, Simard, C., Pare, G. , & Pomerleau, P. . (1993). Relationship of impairment and functional ability to habitual activity and fitness following spinal cord injury. International Journal of Rehabilitation Research, 16, 256-275.

Paffenbarger, R.S. Jr., Blair, S.N., Lee, I.M., & Hyde, R.T. (1993). Measurement of physical activity to assess health effects in free-living populations. Medicine and Science in Sports and Exercise, 25(1), 60-70.

Powell, K.E., & Blair, S.N. (1994). The public health burdens of sedentary living habits: theoretical but realistic estimates. Medicine and Science in Sports and Exercise, 26(7): 851- 856.

Riddoch, C.J., & Boreham, C.A.G. (1995). The health-related physical activity of children. Sports Medicine, 19(2), 86-102.

Rimmer, J.H., Braddock, D., & Pitetti, K.H. (1996). Research on physical activity and disability: an emerging national priority. Medicine andScience in Sports and Exercise, 28(8), 1366- 1372.

Schoeller, D.A. & Racette. S.B. (1990). A review of field techniques for the assessment of energy expenditure. Journal of Nutrition, 120, 1492-1495.

Strawbridge, W.J., Cohen, R.D., Shema, S.J., & Kaplan, G.A. (1996). Successful aging: predictors and associated activities. American Journal of Epidemiology, 144(2), 135-141.

U.S. Department of Health and Human Services, Public Health Service. (1991). Healthy People 2000: National health promotion and disease prevention objectives-full report, with commentary (DHHS Publication No.91-50213). Washington, DC: Author.

Williams, E.,Klesges, R.C., Hanson, C.L., & Eck, L.H. (1989). A prospective study of the reliability and convergent validity of three physical activity measures in a field research trial. Journal of Clinical Epidemiology, 42, 1161-1170.

Wong, W.W. (1996). Total energy expenditure of free-living humans can be estimated with the doubly labeled water method. In: Coburn, S.P. & Townsend, D.W. (Eds.), mathematical modeling in experimental nutrition, vitamins, proteins, methods, advances in food and nutrition research (pp. 171-180). San Diego: Academic Press.

Wong, W.W., Lee, L.S., & Klein, P.D. (1992). Deuterium and oxygen-18 measurements of microliter samples of water in physiological fluids to hydrogen gas for 2H/1H isotope ratio measurements. European Journal of Clinical Nutrition, 46, 69-71.

Yamasaki, M., Irizawa, M., Komura, T., Kikuchi, K., Sasaki, H., Kai, K., & Ohdoko, K. (1992). Daily energy expenditure in active and inactive persons with spinal cord injury. Journal of Human Ergology, 21(2), 125-133.

Zhong, Y.G., Levy, E., & Bauman, W.A. (1995). The relationships among serum uric acid, plasma insulin, and serum lipoprotein levels in subjects with spinal cord injury. Hormone & Metabolic Research, 27(6), 283-286.

F. Materials and Human Factor Design to Improve Crutches (Holmes, Magee, Krouskop)

1. Werner R, Waring W, Davidoff G: Risk factors for median mononeuropathy of the wrist in postpoliomyelitis patients, *Arch. Phys Med Rehab* 1989: 70:464-467.

2. Waring WP, Werner RA: Clinical management of carpal tunnel syndrome in patients with long-term sequelae of poliomyelitis, *J Hand Surg.* 1989, 14:865-869.

CURRENT FUNDS AND FIRST YEAR REQUEST FOR PROGRAM [X] /PROJECT [ ]

PRINCIPAL INVESTIGATOR(S)

A. Arthur M. Sherwood, P.E., Ph.D. B. Trilok N. Monga, M.D.

TITLE OF PROGRAM, PROJECT

Healthy Aging with Disabilities

PERSONNEL	ROLE IN PROGRAM	% EFFORT	CURRENT YEAR FUNDS	FIRST YEAR REQUESTED FUNDS
Arthur M. Sherwood, Ph.D., P.E.	Scientific Director	75%		*
Trilok Monga, M.D.	Medical Director	35%		-
Jon Markowski, M.D.	Co-Investigator	10%		-
Robert Luchi, M.D.	Co-Investigator	5%		-
Henry Ostermann, Ph.D.	Administrative Officer	20%		-
TBN (GS-6, Step 5)	Administrative Assistant	100%		$35,200
Clinical Core				
Paulette Wilson, Ph.D., R.N.	Clinical Core Coordinator	30%		-
Peter Lim, M.D.	Co-Investigator	20%		-
Ann Holmes, M.D.	Co-Investigator	20%		-
Husam F. Ghusn, M.D.	Co-Investigator	20%		-
Kevin Magee, Ph.D.	Rehabilitation Eingineering Specialist	50%		*
Susan Robinson-Whalen, Ph.D. (GS13)	Clinical Psychologist	50%		$36,403
Susan Garber, M.A.	Program Evaluation Specialist	30%		
TBN	faculty practitioner	50%		***
TBN	faculty practitioner	50%		***
Research Service Core				
Thomas A. Krouskop, Ph.D., P.E.	Research Service Director	10%		*
Rabih Darouiche, M.D.	Associate Research Service Director	10%		-
Daniel E. Graves, M.S.	Biostatistician	25%		*
(TBN -GS-6)	Research Assistant	50%		$16,000
Education Core				
Karen A. Hart, Ph.D.	Education Director	10%		*
Carol Bodenheimer, M.D.	Associate Education Director	20%		-
(TBN)	Educational Specialist	#		#
		TOTAL		$87,603
CONSULTANT SERVICES				
R. Edward Carter, M.D.				$1,000
David P. Cardus, M.D.				$1,000
external reviewers				$750
Research Methodologist				#
		TOTAL		$2,750
EQUIPMENT (Justify any item over $3000 on VA Form 10-1313-4)				
Pentium 133 mHz, 32 Mb, 4Gb disk computer and software				$3,000
Fax machine				$1,000
HP Laserjet 5				$1,000
		TOTAL		$5,000
SUPPLIES (Itemize)				
office supplies				$1,600
		TOTAL		$1,600
ALL OTHER EXPENSES (Itemize)				
travel				$5,000
* - Subcontract to Baylor				$244,546
*** - Subcontract for faculty practitioners				$50,000
Research Project Contracts				$353,502
		TOTAL		$653,047
TOTAL OPERATING EXPENSES				$750,000

ESTIMATED EXPENSES OF PROGRAM [X] /PROJECT [ ]

DESCRIPTION	$ AMOUNT EACH YEAR				
	1ST	2ND	3RD	4TH	5TH
PERSONNEL	$87,603	$89,355	$91,142	$125,965	$128,484
CONSULTANT SERVICES	$2,750	$3,000	$4,000	$3,000	$1,000
EQUIPMENT	$5,000	$0	$0	$4,000	$0
SUPPLIES	$1,600	$1,600	$1,600	$1,600	$1,600
ALL OTHER EXPENSES	$653,047	$656,045	$653,258	$615,435	$618,916
TOTAL OPERATING EXPENSES	$750,000	$750,000	$750,000	$750,000	$750,000

Explain differences in the operating expenses between years

Personnel expenses are projected to increase at 2%/year. Additional equipment for training is anticipated for the third year. Consultant services which cover external reviews will be reduced in the last year as new projects are reduced. In Year 3, percent effort increases for Hart, and in Year 4, new staff is added and a new computer purchased.

JUSTIFICATION OF ITEMS PAGE 3

Personnel:

(#- Indicates individuals anticipated to begin after the first year. With one exception (Hart), the level of effort from the named individuals below will remain constant throughout the five-year Center grant period.)

Arthur Sherwood, Ph.D., P.E., will serve as the **Scientific Director** of the Center, and will be responsible for the administrative and scientific component of the Center's operation. He has many years' experience working in an interdisciplinary group as Director of Research, and will work closely with all investigators to assure their appropriate integration into the system. In addition, he will provide technical support in data acquisition and analysis as appropriate. Dr. Sherwood will share overall responsibility for management of the Center with the Medical Director. He will devote 3/4 time to the Center, while remaining active in his personal research interests in motor control and surface electromyography. Dr. Sherwood will apply the research methods developed for studies of motor control in SCI to problems of central fatigue, posture and ambulation in aging disabled subjects.

Trilok N. Monga, M.D., Chief of the Physical Medicine and Rehabilitation Service, will serve as the **Medical Director**. Dr. Monga will provide the critical medical direction for assuring that the Clinical core is focused to accomplish the stated goals. He will work closely with the four Service Coordinators (Drs. Lim, Holmes, Ghusn and Wilson in PM&R, SCI, Geriatrics and Nursing, respectively) to provide appropriate medical guidance in Center projects and programs. Dr. Monga will pursue his interests in quality of life issues and muscle physiology as they apply to the aging disabled veterans. He will devote 3/8 time to these efforts. Together, Drs. Sherwood and Monga will ensure the effective integration of the Center into the Houston VAMC structure.

The direct involvement of Janusz Markowski, M.D. (**Co-Investigator**) Chief of the Spinal Cord Injury Service and Robert Luchi, M.D., (**Co-Investigator**) Associate Chief of Staff for Geriatrics in the Executive Committee of the Center will provide the necessary administrative and operational link to assure seamless integration of the Center activities with the three primary Services (PM&R, SCI and Geriatrics/Extended Care). In addition, they will participate in the clinical activities and educational and scientific meetings of the Center. Dr. Markowski is well-recognized and regarded for his expertise in care of the SCI veteran, and has an active, ongoing research program. He will devote 10% of his time to Center activity. Dr. Luchi is an internationally renowned expert in the field of geriatrics and, as head of Geriatrics at Baylor, currently has a number of related, major research efforts ongoing in the field, and will devote 5% of his time to the Center.

Henry Ostermann, Ph.D., the **Administrative Officer** of PM&R, will serve as the recording secretary of the Center Executive Committee, and provide general administrative support as needed in Center activity. He will devote 20% of his time to the Center.

An **Administrative Assistant**, GS-6 level, step 5, will be recruited to provide support full-time to the above individuals in the implementation and daily activities of the center. This AA will assist in report preparation and general administrative issues related to the involvement of outside researchers, including data entry. In addition, support for preparation of papers and presentations developed from Center projects will be provided.

Clinical Core

Paulette Wilson, Ph.D., R.N., **(Clinical Core Co-ordinator)** Associate Chief of Nursing Service for Research and Education, will be responsible for overall coordination of clinical activities with the Center. She will work under the supervision of Dr. Monga as Medical Director, and will assist in implementation of clinical research, education and service programs. She will work directly with the other staff assigned to the Core and the faculty practitioners to ensure their effective integration into the clinical programs of the three Services. She will spend approximately one-third of her time on Center activities.

Three physician coordinators, each representing his/her respective service, will work as **Co-Investigators** to assure effective participation of each Service in the Center activities. Peter Lim, M.D., Assistant Chief of the Physical Medicine and Rehabilitation Service has a particular interest in stroke rehabilitation, which he will pursue in addition to general coordination duties. Ann Holmes, M.D., the Assistant Chief of the Spinal Cord Injury Service, is a capable young investigator physician with current merit-review funding and as a SCI individual herself, has a special interest in promoting further research in SCI. Husam Ghusn, M.D., the Chief of the Extended Care Service, has a particular interest in studies of muscle mass and its response to intervention in the elderly veterans, will coordinate activities with the large Geriatrics and Extended Care Services of the VAMC. Each of these individuals have submitted independent research projects for review and inclusion in Center programs, and each will devote approximately 20% effort to the Center.

Kevin Magee, Ph.D., **Rehabilitation Engineering Specialist**, will provide technical support for Center clinic activities. Dr. Magee's broad background ranging from cognitive science to robotics and computer science makes him an outstanding addition to the center core staff. He has served a three-year post-doctoral fellowship in rehabilitation research where he has become very familiar with the research resources in the Texas Medical Center and particularly Baylor College of Medicine, the University of Texas-Houston Health Science Center and his alma mater, Rice University. He has been actively involved in developing a new Master of Science degree program in Rehabilitation Technology at Baylor and will provide a valuable link between those students interested in applying research results to clinical practice and the proposed Center program. He has also developed very effective linkages with the school of Occupational Therapy at Texas Woman's University and the Harris County Hospital District programs in Rehabilitation Medicine. Dr. Magee will help organize the clinical evaluation of research results. He will design and develop data collection instruments used to evaluate functional outcomes of research results. Dr. Magee will be involved a total of 50% time.

Susan Robinson-Whelen, Ph.D., **Clinical Psychologist**, will be recruited to work 50% time in the Clinical Core. One of the unique characteristics of the veteran's population is the high prevalence of psycho-social problems such as depression and substance abuse. The focus of the HRR&DC is the prevention of secondary complications resulting from physical and cognitive impairment. Many of the interventions to be studied involve patient and family education, biofeedback, and other behavioral modification measures. It is essential that a psychologist be a part of the Core clinical team to effectively identify psychological problems, suggest strategies for dealing with them, implement interventions to address them, and evaluate outcomes in the psychosocial realm. Dr. Robinson-Whelen will also contribute to the development of instruments that measure psychological aspects of disability and aging. She will also work to identify factors which place aging disabled veterans at greater risk of developing secondary problems (depression, e.g.) or hinder their recovery process. She will consult with other researchers and practitioners in the Center to assist with the development and implementation of their research and clinical projects.

Susan Garber, M.A., OTR, FAOTA, who will serve as **Program Evaluation Specialist**, is an experienced clinical researcher with more than 20 years experience in the Department of Physical Medicine and Rehabilitation at Baylor. She will be responsible for designing the database to be implemented during the first year. Ms. Garber will focus on developing appropriate instruments and procedures for evaluating the research results. She will develop procedures to gather data that can be used to measure: (1) the efficacy of the clinical

services provided by professionals who use the research results and (2) consumer satisfaction with services provided. Ms. Garber will devote 30% of her time to Center Core activities.

Two **faculty practitioners** will be recruited in the first year (anticipated in 4th and 10th months) to work in the Center at 50% time. These individuals will spend approximately half of the allotted time providing patient care services to facilitate identification of new research areas, conduct projects and evaluate intervention strategies and research outcomes. The remaining portion of their efforts in the Center will be devoted to development of research programs, interaction with medical staff and supervision of students in the clinical environment. Based on prior experience [Weeks et al., 1996], it is anticipated that these individuals will prove invaluable in accomplishing the clinical practice, research and educational goals of the Center.

Research Service Core

Thomas A. Krouskop, Ph.D., P.E., Director of Rehabilitation Engineering for Baylor College of Medicine, will serve as **Research Service Director**. His vast experience in directing rehabilitation research, particularly through the Rehabilitation Engineering Center activities at Baylor, will be employed in facilitating the research conducted through the Center. Dr. Krouskop will devote 10% of his time to these efforts. He is very familiar with the Texas Medical Center (TMC) environment and will be able to promote interactions and facilitate collaboration. He will provide direction for the personnel assigned to the Research Service Core, as well as research design consultation. He will devote 10% of his time to the Center.

Rabih Darouiche, M.D., Director of the Spinal Cord Injury Research Laboratory of the SCIS, will serve as **Associate Research Service Director**. Dr. Darouiche has extensive experience in research with 18 funded research projects, which will greatly enhance his ability to promote and facilitate research in the Center. Dr. Darouiche is intimately familiar with the clinical laboratory operations and resources available in the VAMC, and will serve as the primary facilitator for Center researchers needing access to clinical laboratories. He will devote 10% of his time to this project.

Daniel Graves, M.S., **Biostatistician**, will serve as the consultant biostatistician for the project. In addition, he will be responsible for the design and maintenance of the database on aging with disabilities, and will carry out quality control on the entered data. He will consult with all investigators in the design of research carried out through the Center, and will assist in analysis as well. He will devote 25% of his time to this project.

Education Service Core

Karen A. Hart, Ph.D., Director of Education of the Department of Physical Medicine and Rehabilitation, Baylor College of Medicine and Vice-President for Education, The Institute for Rehabilitation and Research, will serve as **Education Service Core Director** for the Center. Dr. Hart has extensive experience in the development and implementation of educational programs and strategies for both professionals and (health-care) consumers. She will design and implement educational strategies to disseminate both research designs and results as appropriate growing out of the Center efforts. Because of her strategic location within Baylor and TIRR, she will be able to draw on multiple resources in staff and facilities to make this process efficient. Dr. Hart will work together with Dr. Bodenheimer in the development of educational programs. In the third year, she will increase her involvement to 20% time in order to begin implementation of the educational processes as described in the narrative. In the fourth and fifth years, she will direct the work of the Educational Specialist to be employed half-time through the Center, with the anticipation that the Center will engage in significantly expanded educational programmatic activities during that time.

Carol Bodenheimer, M.D., Staff Physician, PM&R Service, will serve as **Associate Education Service Core Director**. Dr. Bodenheimer is the assistant residency training program director for the Department of PM&R and she recently completed the Master Teacher program and received a fellowship has a strong interest in education of physicians residents, medical students and other allied health professionals She will assure that the educational and dissemination efforts of the Center remain appropriately focused on clinically meaningful themes and topics. She will devote 10% of her time to the Center.

(TBN) **Educational Specialist** (GS-11, Step 5): This individual will be hired to work 50% time in the fourth year to assist Dr. Hart in implementation of the educational activities. The Specialist will provide direct support of educational program presentations, brochure preparation, and similar activities.

Consultants:

R. Edward Carter, M.D., Medical Director, The Institute for Rehabilitation and Research (TIRR), is a distinguished, senior clinician in the field of spinal cord injury with many honors and distinctions. Dr. Carter has agreed to work as a consultant on this project to enable use of his extensive experience, particularly in the areas of respiratory care of SCI, and his growing knowledge of long-term (>20 year) SCI issues.

David Cardus, M.D., likewise is a distinguished member of the Baylor faculty who has agreed to consult in the area of his particular expertise, cardiovascular systems behavior. Dr. Cardus has more than 30 years experience conducting research in issues of cardiovascular function, and has a history of working with the Scientific Director (Sherwood) of more than 25 years.

External reviewers will be recruited by the Research Committee on an *ad-hoc* basis to provide scientific scrutiny of the submitted projects. They will be drawn from outside the Houston metropolitan area, and will provide their critique by mail. They will be reimbursed $75 per review, consistent with local VAMC consultation fees.

(TBN): Research Methodologist. Beginning in the second year, we anticipate recruiting senior-level consultant researchers to provide additional support for analysis of data and report generation. Specific individuals will be chosen according to Center and project needs at the time. It is anticipated that specialists in qualitative research methods and operations research may be utilized.

Equipment:

The listed items will be necessary to set up the Center administrative offices. The Scientific Director, Dr. Sherwood, will provide major items of equipment for laboratories and his personal office. Four thousand dollars is allocated for an additional computer in Year 4 which will be required to permit the productive work of the additional staff recruited in that year.

Supplies:

In addition to routine office operation, supplies will be those needed for brochure preparation, mailings, etc. and for storage media (CD-ROM, magnetic tape, disks).