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NOTICE

The project that is the subject of this report was approved by the Governing Board of the National Research Council, whose members are drawn from the Councils of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine. The members of the committee responsible for the report were chosen for their special competencies and with regard for appropriate balance.

This report has been reviewed by a group other than the authors according to procedures approved by a Report Review Committee consisting of members of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

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Peter E. Dans, M.D.
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INTRODUCTION AND SUMMARY OF RECOMMENDATIONS

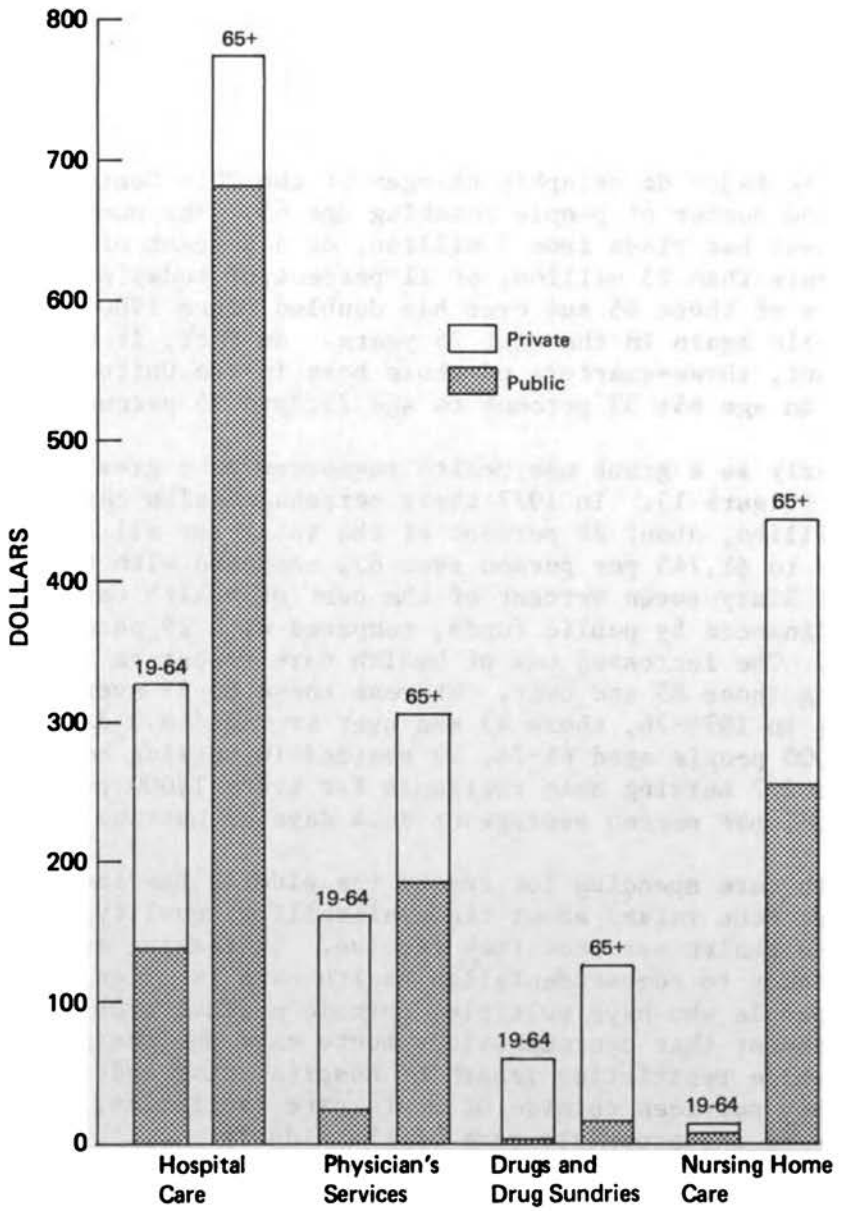
One of the major demographic changes of the 20th Century is the increase in the number of people reaching age 65. The number of Americans 65 and over has risen from 3 million, or 4 percent of the population in 1900, to more than 23 million, or 11 percent of today's population [1]. The percentage of those 85 and over has doubled since 1900 and is projected to double again in the next 75 years. In fact, if mortality rates remain constant, three-quarters of those born in the United States in 1975 will survive to age 65; 53 percent to age 75; and 25 percent to age 85 [2].

The elderly as a group use health resources to a greater extent than other adults (Figure 1). In 1977 their personal health care expenditures were $41.3 billion, about 28 percent of the total for all Americans. This amounted to $1,745 per person over 65, compared with $661 per adult under 65 [3]. Sixty-seven percent of the cost of health care for adults over 65 was financed by public funds, compared with 29 percent for those under 65 [3]. The increased use of health care resources is particularly striking among those 85 and over. Whereas those 65-69 averaged 3 acute hospital days in 1975-76, those 85 and over averaged 8.3 days. In 1973, for every 1,000 people aged 65-74, 12 resided in nursing homes. This compared with 237 nursing home residents for every 1,000 persons 85 and over--an annual per person average of 86.4 days of nursing home care [4].

As health care spending for and by the elderly has increased, many questions have been raised about the availability, quality, and appropriateness of the health services they receive. Increasing specialization with its tendency to compartmentalize health care is often ill-suited to the care of people who have multiple, chronic medical problems. Health care reimbursement that overemphasizes acute care and the performance of procedures, while restricting length of hospital stay and the use of nonmedical support services outside of acute care facilities, also can lead to inadequate or inappropriate care of the elderly.

At congressional committee hearings, concern has been expressed about the ability of many physicians to manage the health problems of the aged [5]. Participants at the 1976 Anglo-American Conference on the Care of the Elderly, sponsored jointly by the Institute of Medicine and the Royal Society of Medicine, also expressed concern, and a

FIGURE 1. PER CAPITA ADULT PERSONAL HEALTH CARE EXPENDITURES FOR SELECTED SERVICES (FY 1977)



SOURCE: Gibson RM, Fisher CR: Age Differences in Health Spending, Fiscal Year 1977. HCFA Health Note, December 1978.

follow-up report on the conference recommended that basic information on aging be emphasized in physician education [6,7].

In September 1977 the National Institute on Aging asked the Institute of Medicine to conduct an investigation of the effectiveness with which knowledge of aging is currently being incorporated in medical education. The following tasks were specifically to be undertaken:

--Define those areas of knowledge and research on aging and human development that are relevant to medical education

--Determine the extent to which such knowledge and research findings are currently incorporated into medical education programs

--Assess different methods for conveying such knowledge to medical students, physicians in residency training, and experienced practitioners

--Review and outline methods for developing faculty resources in aging and human development

--Consider the role of research in the development of medical curriculum, clinical training, and continuing education programs in aging and human development.

Because of the importance of all health professionals in the care of the elderly, the Institute's study committee was constituted to reflect multiple disciplines. However, in accordance with its charge, the committee gave its primary attention to physician education. In the foreseeable future, physicians will continue to manage the care of the elderly and to play a leadership role in devising plans for health maintenance. That the focus of this document is on physician education is not meant to imply that improvements in that area alone will solve all problems of health care for the elderly. Attention also must be given to the training and utilization of non-physician personnel who deliver most of the day-to-day care of the aged, to the availability and quality of health care services, and to developing reimbursement mechanisms with appropriate incentives.

The committee did not try to sharpen definitional distinctions beyond their customary usage in the field; thus there is frequent overlap between the meanings of "geriatrics" and "gerontology" (see appendix). The former usually is understood to connote the clinical aspects of aging, but this is often used as a "shorthand" for the entire field, especially when referring to physician education. The latter term is used primarily to mean the general study of aging, but some authors have employed it more narrowly to describe normal aging or, conversely, expanded it to encompass the entire field, with the use of qualifiers: for example, clinical gerontology and social gerontology.

Opinions vary about the time in human life when aging begins, and thus when the disciplines of geriatrics or gerontology are brought to bear. Some define aging as beginning as early as conception. The chronologic equivalent of "aged" or "elderly" also is largely a matter of perspective. Age 65, while not necessarily a benchmark of biologic old age, has served as a useful convention because it represents a time of transition in employment, income, social status, and self-appraisal. Increased life expectancy has already led to an increase in the mandatory retirement age to 70.

The committee gathered its information from reviews of the literature and from statements by scores of interested groups and individuals invited to present their views to the committee in writing or in testimony at a public meeting in Washington, D.C. on January 12, 1978. A committee consensus developed around the following points: that care of the aged calls for application by the physician of some special knowledge, skills, and attitudes; that these aspects of physician competence should receive appropriate emphasis throughout medical education and in the accreditation and certification procedures; that substantial improvements in teaching about the process of aging and problems of the aged are required at all levels of medical education; and that new opportunities exist for the development of knowledge in aging, but the amount of funding available for research and training appears to be a limiting factor. This served as the basis for the committee's recommendations, which are summarized here and discussed in Chapter 4.

The committee recommends:

--that medical schools include appropriate content on aging in basic and clinical science courses, and favors the establishment of a complementary required course that integrates knowledge about aging and the problems of the elderly;

--that preparation for care of the aged be included in clinical clerkship and in housestaff training programs, as well as in examinations for certification and licensure;

--that nursing homes and other long-term care facilities be included in clinical rotations for medical students and housestaff. Experience with home health programs and other alternatives to institutionalization is also desirable;

--that teaching about aging receive increased emphasis in continuing medical education (CME), and that the Liaison Committee on Continuing Medical Education and its sponsoring organizations support increased geriatric content in CME programs;

--that medical schools develop a cadre of faculty to teach gerontology and geriatrics to medical students and housestaff, and that a) post-residency training or fellowship programs be developed in settings

that have either the necessary leadership in geriatric medicine or have a potential for promptly developing it, and b) that a limited number of career development awards in gerontology and geriatrics be established;

--that a formal practice specialty in geriatrics not be established but that gerontology and geriatrics be recognized as academic disciplines within the relevant medical specialties;

--that efforts to meet the educational needs of medical directors of skilled nursing facilities (SNFs) be assumed jointly by medical schools and SNFs; and,

--that funding be expanded in various aspects of aging research including basic biological and behavioral sciences, clinical medicine, and health services research.

CHAPTER 1

THE BODY OF KNOWLEDGE

To determine the extent of a body of knowledge about aging that is relevant to medical education, the committee reviewed much of the pertinent literature in the biological, behavioral, and social sciences; clinical medicine; and the field of health services. The following descriptions are meant neither to be complete nor to serve as a curriculum, but merely to highlight some of the established and emerging knowledge in these various areas.

BIOLOGY OF AGING

Aging is characterized by time-dependent alterations in the ability of an organism to adapt to environmental change. It is believed to be an integral part of the cycle of growth and development at all levels--molecular, cellular, organ system, and individual. Aging is universal among higher animals, becoming most apparent as reproductive activity diminishes or ceases. Life span is species specific and the maximum for mammals is from 2 to 3 years for the golden hamster, 70 years for the elephant, and about 100 years for man, the longest-lived mammal [1]. Very few human beings now achieve the maximum life span because of the interaction of aging and disease.

Confusion about what constitutes aging has arisen from the failure of much prior research to differentiate those decremental changes that are a function of the passage of time from those that occur with increasing age but are secondary to disease. This does not imply that the scientist engaged in the study of aging is not concerned with pathology. In fact, diseases such as maturity-onset diabetes mellitus provide useful probes for the investigation of mechanisms that govern aging. It does suggest, however, that disorders known to be more frequent with advancing age should not routinely be regarded as part of an "aging syndrome."

The available evidence suggests that heredity is a factor in determining longevity. For instance, identical twins have a more similar life span than do fraternal twins [1]. Senescence appears to be the final phase of a genetic program that directs embryogenesis, post-natal development, puberty, and adulthood--as modified by the cumulative effects of the environment.

In the past decade, investigators have begun to explore the cellular and biochemical bases for age-associated declines in physiologic function in order better to understand the determinants of normal function and to reveal control points at which aging might be slowed. A complete presentation of the research findings that constitute the body of knowledge on the biology of aging is beyond the scope of this report, but some examples of research areas and approaches can be mentioned. The following sections are arranged according to increasing complexity of biologic structure, from the individual cell, through tissue and organ systems, to the whole organism.

The Cell

For many years, biologists believed that, although organisms aged, individual cells were immortal. Support for this belief came from the work of Alexis Carrel who reported that the in vitro proliferative capacity of certain types of somatic cells, such as the chick fibroblast, was infinite [2]. Attempts to confirm this hypothesis failed, and it is now believed that his findings stemmed from errors in laboratory technique. The current view is that phenotypically and karyotypically normal cells have a finite proliferative capacity, which varies greatly among cell types. After a number of population doublings (about 50 for human embryonic diploid fibroblasts), the ability to divide is lost, and the culture dies [3].

The post-mitotic life span of cells also varies greatly. For instance, brain neurons last for the life of the individual, but mucosal cells lining the small intestine have a life span of only a few days [4]. Only transformed and germ cells seem to have infinite proliferative capacity [4].

Many researchers now believe that human diploid fibroblasts, which have limited proliferative capacity, provide a useful in vitro model for study of the cellular processes that occur in the aging organism [5]. This concept is supported primarily by studies showing an inverse correlation between the population-doubling potential of cultured cells and donor age, as well as limited proliferative capacity for normal cells serially transplanted into syngeneic hosts.

Aging of human diploid fibroblasts in culture is accompanied by a variety of morphologic, physiologic, and biochemical changes. Cells become larger and less motile, and contain more glycogen, lipids, and lysosomes. These is greater heterogeneity in the length of the division cycle, prolonged population doubling time, and decline in the rate of DNA strand rejoining and repair [5].

Two general classes of theories have been advanced to explain cellular senescence [3]. The first considers aging as a programmed genetic event due either to the expression of specific aging genes or the exhaustion

of usable genetic information. The second regards senescence as a result of progressive and cumulative environmental damage to organelles, creating errors in information-containing molecules.

Investigations to explore these alternative hypotheses have focused on discovering: a) why normal cells stop dividing and die, although transformed cells proliferate indefinitely; and b) why cells from patients with progeria and Down's syndrome, among other clinical conditions associated with premature aging, have decreased life spans in tissue culture.

Studies of the genetic theory include cell fusion experiments in which nuclei from young or old cells are transferred to cytoplasts of reciprocal age [3]. Early results indicate that senescence is associated primarily with the nucleus, although the cytoplasm may have some regulatory properties. Senescent human diploid cells have been shown to be dominant to the dividing pre-senescent cells but are recessive when fused with some neoplastic cell lines. Evidence to support the error theory has been cited in studies of the accumulation of abnormal proteins in old and young cells [6].

Because cell mortality occurs, it is tempting to conclude that the death of the organism is a function of the death of its constituent cells. Indeed, death or malfunction of cells in critical organs, such as heart or brain, can bring about the demise of the individual. However simple observation indicates that at the time of the death of a given organism, most of its component cells are alive and functioning [4]. In many cases, it appears that suboptimal activity of cells in different organ systems compromises the individual's ability to function, leading to death in ways that are not yet understood.

Tissue and Organ Systems

The changes associated with aging in the extracellular matrix and selected organ systems will be briefly reviewed.

Extracellular Matrix

The major macromolecular components of the extracellular matrix are collagen, elastin, glycoprotein, proteoglycans, and hyaluronic acid. The physical properties and solubility of collagen and elastin change as they age, due to the formation of intermolecular covalent bonds referred to as "cross-links" [7]. Progressive cross-linking of collagen has been postulated to make collagen-rich tissues less elastic and permeable, thereby leading to such changes as inefficient cardiac contraction, less distensible blood vessels, and decreased diffusion of nutrients through the extracellular matrix.

Muscle

Skeletal muscle, like cardiac muscle, is a postmitotic tissue--it cannot replace itself by cell division. Because it is rich in collagen, it becomes less elastic with age. The number and the diameter of muscle fibers also decrease with increasing age. There is an early loss in muscular strength that varies in extent among different muscles [8]. With increasing age this progresses to muscular atrophy, slowness, and decrease in efficiency of motor function. It is sometimes difficult to differentiate alterations in muscle function caused by factors intrinsic to muscle from those that have a neurologic basis or are due to lack of conditioning. Although the onset and extent of decrements in muscle function can be affected by conditioning, they can neither be completely prevented nor completely reversed.

Nervous System

Research in neuroanatomy and neuropathology has begun to distinguish age-related changes in the brain from pathologic ones. Age-dependent anatomic changes include a decrease in the number of cells and nerve fibers in certain portions of the brain, and a slight decrease in brain weight. Studies have shown a loss of neurons varying from 20 to 50 percent in areas of the cerebral cortex taken from aged patients who died without a history of relevant neurologic disease [9,10]. Cell number was also decreased in the locus caeruleus—correlating perhaps with changes in REM sleep. These alterations are unexplained, although the presence of anti-brain antibody in the aged has been postulated and some evidence adduced for its existence [10].

Senile dementia, which is severe in 5 percent and mild to moderate in 10 percent of those 65 and over, has pathologic features distinct from normal aging. These include the presence of dendritic atrophy, neurofibrillary tangles and neuritic or "senile" plaques. The syndrome is characterized by a loss of initiative, decrease in judgment, difficulty in selecting appropriate words, loss of recent memory, difficulty in performing calculations, disorientation, and personality deterioration. More than 95 percent of patients with severe dementia die within 5 years. Half the cases are of the Alzheimer type, which is also seen in patients under 65. Twenty percent of cases are associated with cerebral arteriosclerosis; the remainder result from mixed forms or other causes [10].

Recent research on senile dementia has focused on change in choline acetyltransferase, an enzyme responsible for the production of acetylcholine in cholinergic neurons. Although choline acetyltransferase declines in normal aging, there is a 70 to 90 percent falloff in patients with senile dementia of the Alzheimer type compared with age matched controls. Yet, the receptor for acetylcholine is present in normal quantity, even in the absence of the enzyme. Acetylcholine is one of the major activators of synapses in the limbic system that appear to control functions such as memory. At present, there is no known substitute for acetylcholine that can

effectively cross the blood-brain barrier without marked peripheral side effects. However, these pathologic findings have spurred hopes for the discovery of a pharmacologic means to prevent or ameliorate this group of disorders [10].

There are other age-related changes in neurotransmitter uptake and metabolism. The turnover of catecholamines in the aged hypothalamus (and basal ganglia) is slowed, and the content of dopamine in the neostriatum is reduced [11]. Since phenothiazines appear to inhibit dopamine uptake, these findings may explain the tardive dyskinesia and Parkinsonism-like syndromes seen in some older persons on phenothiazine therapy. In fact Parkinson's disease, which increases with age, has been shown to involve large losses in monoamines, particularly dopamine in the basal ganglia [11].

Pituitary function is regulated by hypothalamic centers acting through neuroendocrine controls. There appears to be an age-related defect in those centers that regulate such cyclic activities as gonadotropin release. Levo-dopa and other drugs that increase hypothalamic catecholamines can reinstate ovarian cycles in old rats [11]. Some experiments with rats have shown prolongation of mean life by the addition of Levo-dopa to their diets [12]. Other studies suggest that in older rats a pituitary product diminishes responsiveness of peripheral tissues to thyroid hormones as measured by oxygen consumption [13]. Although these reports require confirmation, they have led investigators to seek a "pacemaker" for the aging process in the brain-pituitary-endocrine axis. Whatever their role in aging per se, it is clear that research on neurotransmitters can yield important information for effective pharmacologic treatment in the elderly.

Immune System

Another active area of aging research deals with immune mechanisms. Some normal functions begin to decline shortly after sexual maturity, coincident with involution of the thymus. The following changes have been noted: a) increase in lymphocytes containing an abnormal number of chromosomes, b) increase in the blood concentration of immunoglobulins, c) decrease in normal antibodies and increase in immune complexes and abnormal immunoglobulins, d) decrease in the primary antibody response, and e) decrease in cellular immunity [14]. These age-related immune dysfunctions can lead to increased susceptibility to infections and possibly certain kinds of neoplasms.

Autoimmunity generally increases with age, implying that as we age there is a change in the regulatory mechanisms of the immune system that alters the ability to distinguish "self" from "non-self." The autoantibodies that develop may play a role in the pathogenesis of such disorders as pernicious anemia. Studies in animals have shown that increases in autoantibodies and in abnormal immunoglobulins also occur with age and can be decelerated by selective feeding and other environmental changes [15]. Because the changes induced by aging within the immune system appear to be potentially reversible, approaches to lessen the effects of aging and

susceptibility to certain diseases are being sought through immunologic research.

The Whole Organism

Advances in human longevity have been achieved by eliminating the precursors of disease through improvements in sanitation, water purification, nutrition and the like or by helping the organism resist these precursors through the use of vaccines, and antimicrobial agents. The greatest gains have resulted from decreased mortality in early years. Although much research has been directed at the major causes of death in later years, such as cancer and atherosclerosis, the elimination of such diseases, even if possible, would increase the average life span by only 10 to 15 years [16]. More persons would approximate their potential maximum life span, but the maximum would not be extended [17].

Numerous attempts have been made to prolong the maximum life span by altering the rate of aging and the organism's consequent vulnerability to stresses on such homeostatic systems as those regulating core body temperature and acid-base balance. In 1939, it was demonstrated that rats kept on a calorically restricted, but nutritionally balanced, diet until they reached sexual maturity had a 20 to 40 percent extension of life span [18]. It has recently been shown that institution of controlled dietary restriction during early middle age in mice will rejuvenate the immune system and reduce autoimmunity [19]. Reducing body temperature in poikilothermic animals also extends the life span [20]. Although the possible significance of manipulating these environmental factors to confer longevity on man is unclear, they at least suggest that the rate of aging is not immutable.

Only within the past few years have most of the above observations been made. Biologic techniques such as cell fusion now allow isolation of that portion of the cell that carries the pertinent information about the process of cellular aging. The changes in molecules, enzymes, and membranes that occur as cell cultures age may be examined for alterations or flaws of structure and function. Recent experimental evidence demonstrates how cells rid themselves of redundant, "worn-out" proteins and other cellular constitutents [6]. Far from being a simple process, that action now appears to be a very specific, energy-requiring activity of the cell.

The fact that normal diploid cells seem to have a finite life in tissue culture, whereas tranformed cells are immortal, heightens the excitement in the search for the differences between the two that allows the latter to be freed of the cloak of mortality. Similarly, advances in understanding the immune and neuroendocrine systems are helping to elucidate the aging process. Biologic sciences are thus posing important questions about aging, and the techniques for obtaining their solution are becoming available.

PSYCHOSOCIAL ASPECTS OF AGING

Certain misconceptions have characteristically been associated with behavioral and social changes occurring in old age. Notions that old people cannot learn, that they will inevitably become senile, or that sexual activity does (or should) cease, are not uncommon in our society [21]. Research in the behavioral and social sciences is largely responsible for helping to dispel these commonly held beliefs. Although marked changes in performance and role do occur in later life, evidence suggests that impaired learning ability, the onset of senility and other such changes are not always inevitable consequences of living to an old age and can often be prevented or ameliorated.

Knowledge of the individual's early history, for example, may suggest useful intervention or prevention strategies since studies have demonstrated influence of genetics on behavior in later life, and a differing susceptibility to environmental challenge [22,23]. The ability of the older individual to adapt to these changes is also influenced by such factors as health status, economic resources, and availability of formal and informal support systems. Our brief review will focus on recent data in the behavioral and social sciences that have improved understanding of the psychosocial aspects of aging.

The Individual

Cognition and Learning

Alterations in cognition occur with age. Some functions (e.g., those requiring visual-motor coordination, the synthesis of new information by means of the senses, and some non-verbal processes) may begin to decline as early as the mid-20s [24,25]. Verbal processes, or those involving familiar patterns of response, may show little or no change with time. Loss of ability to learn appears to be as closely related to the circumstances under which learning occurs and the pace of learning as to any central nervous system (CNS) deficit.

Changes in peripheral autonomic nervous system (ANS) reactivity in the aged may adversely affect cognitive performance and learning. Studies of free fatty acid (FFA) levels (a measure of ANS end-organ response) have shown that older men of average ability have inhibited verbal responses, accompanied by heightened and persistent FFA levels, as compared with women and young men [26]. Other changes also affect autonomic arousability as well as the speed and efficiency of CNS performance [27]. The increasing asynchrony of ANS and CNS activity in the aged results in a decreased tolerance to acute physiological and social stress [28,29].

Other somatic changes associated with aging can affect cognition and behavior. Declines in vision, hearing, kinesthesis, and other sensory systems, though not in themselves sufficient to cause major health problems,

can lead to constriction of the older person's range of behavior in certain social situations [30-32]. The shift in sleep patterns with age--less stage 4 (and REM) sleep and more light sleep--can also be detrimental. Excessive loss of stage 4 sleep is associated with cognitive dysfunction; a point of particular importance in the aged in view of the tendency of some sedatives to reduce stage 4 sleep [33].

The effect of all these changes can be decreased speed of performance, a tendency to withhold responses especially in ambiguous circumstances, a need for greater assurance, and a fear of failure. To some extent, however, each is subject to modification even in patients with significant brain disease. Among patients with the same severity of brain disease, deficits may be augmented in a cognitively-deprived environment and performance enhanced in an enriched environment [34,35].

Depression

Depression secondary to personal loss is a more extensive problem among the aged than is cognitive deficit secondary to pathologic changes in the brain [36,37]. Various types of patients should be differentiated. One is the young depressive, grown old, for whom depression is a lifelong pattern. Another is the person reacting normally to losses. Data are emerging to indicate that such reactions vary in extent not only according to the individual, but also to whether the loss is anticipated. Late widowhood, although traumatic, may have less effect than the unexpected loss of a child. The sequence of losses is also important, as is the rate of accumulation over time. Cross-national research has confirmed that stresses of varying degrees are additive, and when their clustering causes a given threshold to be exceeded, major medical or psychiatric disorders result in the majority of individuals [38].

Depression may be manifested as cognitive loss and may be confused with (or confounded by) dementing illness. It may manifest itself as exacerbation of pain, fatigue, anorexia or other somatic symptomatology and be overlooked in older persons expected to be ill. Conversely, depression resulting from loss of spouse may be evidenced by unwillingness to leave the house, leading to further losses in mobility and physical functioning. Labelling older persons as chronically sad and socially isolated may mask clinical problems and result in inappropriate care. There are no data indicating that aging per se is responsible for increasing sadness. Rather there is good evidence relating depression to an inability to maintain productive activity and to a feeling of not being needed [21].

Sexual Behavior

Physiologic changes characteristic of the menopause can have a profound impact on sexual function and activity among older women. Postmenopausal changes in vaginal lubrication and atrophy of the vaginal

wall can lead to local irritation, bleeding, and pain with intercourse [39]. Although there does not appear to be a male climacterium analogous to the menopause, changes affecting sexual function do occur. The ability to achieve a full penile erection is delayed and diminished and there is a reduction both in the frequency of ejaculation and the need for ejaculatory release of sexual tension [39]. These physiologic changes are associated with psychological changes, whose degree varies with the individual.

Analyses of sexual behavior in the aged are beginning to appear. In one study of 254 relatively healthy persons over 60, about 80 percent of men and 33 percent of women reported a continuing sexual interest [40]. Among the same group, 70 percent of the men and 20 percent of the women reported being sexually active. The surviving members of the cohort were reinterviewed ten years later. Only one-fourth of males were still active, while the proportion of sexually active women remained the same. Although such studies have helped to alter the prevailing attitudes about sex in the aged, more research is necessary.

Alcoholism and Drug Abuse

Alcoholism is the second most frequent cause for admitting elderly patients to a psychiatric facility [41]. Though most elderly alcoholics were chronic abusers when young, some begin in old age to use alcohol as an antidepressant or tranquilizer [41]. A sizeable proportion of the elderly population use psychotropic drugs: minor tranquilizers or sedatives (11 percent), hypnotics (7 percent), and antidepressants (4 percent) [41]. These can be misused unintentionally (adverse drug interactions), or intentionally (suicide attempts). The elderly account for almost 25 percent of reported suicides--between 5,000 and 8,000 a year [42]. Many suicides may be prevented by early treatment of psychiatric disorders, particularly depression, as well as by encouraging the older person to keep active and involved.

Society

Anthropologic and cross-national studies have enhanced our understanding of aging in industrialized and developing countries. The myth of the "golden age" of former times in which older persons were presumed always to be cared for has been somewhat dispelled. In times of scarce resources, many cultures dealt with their dependent aged in the most expedient ways. In others the aged played important roles as bearers of tradition and mediators with the supernatural in matters of health and welfare. Considerable difference of opinion exists whether the elderly of our highly industrialized society are more or less socially integrated than their predecessors [43]. A number of complex social factors appear to be involved in successful aging.

Societal aspects of aging have been studied most extensively in the family, the basic unit of society. In the transition from a rural to an industrial society, the functions and the structure of the family have changed. Some responsibilities previously considered to be the family's have been assumed by organizations, such as the church, school, welfare and social security offices. The family is beginning to serve more as a "facilitator, mediator, and protector of elderly members" in its negotiations with human services bureaucracies [44]. These changes notwithstanding, research shows that most older people still maintain frequent and regular contacts with other family members. The family remains a major social, economic, and emotional resource for dependent older persons and also provides much of the supportive care for the frail and sick elderly [45].

Thus the common belief that the elderly are usually rejected by the family and placed in institutions for long-term care is unfounded. Only 5 percent of the over-65 group is currently in long-term care facilities [46]. Of the 95 percent of the aged not in institutions, 54 percent live with a spouse, 19 percent live with other persons, and 27 percent live alone [46]. Isolated older individuals are most likely to be institutionalized. They make up the bulk of the 20 percent who will spend some time in a long-term care facility after reaching age 65. In light of these data, intervention strategies should include support of families and the provision of alternate arrangements of community support for the isolated.

Perhaps one of the most significant changes occurring in later life is retirement. Although some look forward to retirement as an opportunity to pursue leisure activities, for others it means simply a considerable reduction in income and activity. Living on a fixed income, the aged become especially vulnerable to economic inflation. Even what might be considered substantial assets can be eroded by large expenditures for health care or other necessities, especially if one lives well beyond age 65.

Adjustment to retirement and other role changes (i.e., life satisfaction or morale) is correlated with continuity of one's lifelong activity patterns, which in turn appears to be dependent on the availability of options for different life styles. Leisure time activities seem to be influenced by income, health status, and the presence of "compatible others" [47]. Older individuals need to plan for retirement and to continue creative and satisfying activities after retirement such as part-time employment, recreation, education, and church-related work. The Older Americans Act has sponsored a number of voluntary and paid programs that provide older persons opportunities to keep active as senior companions, foster grandparents, or community service employees, allowing them to help themselves and one another at the same time.

Studies have shown that environmental factors play an important role in enhancing or impeding the ability of the elderly to function within the community [48]. These factors include proximity to

family and friends, fear for physical safety, and availability of services. Physical factors include type of housing and transportation. Many specially designed communities are being developed. Some older persons prefer age-segregated housing and retirement communities; others function better in communities with different age groups, as for example, where elderly and adolescent age groups support one another. Some older persons balk at leaving familiar communities and become disoriented in retirement communities, even if designed to meet their needs. In a society as complex and heterogeneous as ours, no single solution is likely to meet the needs and preferences of all older people.

Different patterns of health and social services have emerged in other contemporary industrialized countries, and may provide information for improving services in the United States [49-52]. These range from the social support system provided by the "balanced hospital concept" in Great Britain to the overdependency on extrafamilial services in other countries. Preliminary evidence suggests that the problems of the aged in industrial societies are similar [50,53] and that provision of opportunities for successful aging requires collaboration between private and public community resources (medical and social services), and families of older individuals.

Although many physicians will not be involved directly with the study of the cultural and social aspects of aging, those aspects have great relevance to medical education. Social problems are increasingly being defined as medical conditions, and health professionals, especially physicians, are being asked to solve problems for which they have no special knowledge or training [54]. If one defines health in terms of adaptation to biologic, psychologic, and social changes, many problems of the elderly are not amenable to a medical solution alone. Their successful solution depends to a great extent on an understanding of the individual patient within his social and cultural setting and a knowledge of available societal resources.

CLINICAL ASPECTS OF AGING

The majority of old people (including those 75 and over) of all races, sex, geographic location, or socioeconomic status report themselves to be in good to excellent health (Table 1). In the absence of illness, the decline in physiologic function that accompanies aging is not of a magnitude to interfere seriously with activities of daily living. Most older people are able to adapt to their limitations because of the reserve that exists in most organ systems. For example, a loss of as much as half the renal glomerular filtration rate occurs imperceptibly; as little as 60 percent of vital capacity is sufficient for most activities.

Although most physiological changes cannot be reversed, their consequences can be ameliorated. Over 90 percent of the elderly require eyeglasses and 5 percent wear hearing aids--although more need them [46]. Disorientation in unfamiliar environments is heightened by these sensory deficits leading to so-called "sundowning" (a condition characterized

TABLE 1. PERCENT DISTRIBUTION OF ASSESSMENT OF HEALTH STATUS AS REPORTED IN HEALTH INTERVIEWS FOR PERSONS 65 YEARS AND OVER: UNITED STATES, 1975 (Data are based on household interviews of the civilian noninstitutionalized population)

Demographic Characteristic	Health Status			
	Excellent	Good	Fair	Poor
	Percent Distribution			
Total	29	40	22	9
Sex and Age				
Male	28	40	21	9
65-74 years	29	40	22	9
75 years and over	28	40	21	10
Female	29	41	22	8
65-74 years	29	40	22	7
75 years and over	29	39	22	9
Color				
White	29	41	21	8
All others	21	36	27	16
Region				
Northeast	27	44	21	6
North Central	27	43	22	7
South	28	35	24	12
West	35	38	18	8
Residence				
Metropolitan	31	41	20	8
Nonmetropolitan	24	40	25	10
Family Income a/				
Less than $5,000	23	39	25	12
$5,000-$9,999	30	41	21	7
$10,000-$14,999	32	43	20	5
$15,000 or more	39	40	14	6

a/Excludes unknown family income.

NOTE: Figures rounded to nearest total percentage

SOURCE: United States Department of Health, Education, and Welfare, Health Resources Administration: Health United States 1976-1977 (DHEW Publication No. [HRA] 77-1232), 1977

by agitation and confusion toward nightfall). This can often be ameliorated by a night light and the provision of familiar objects. Change in adaptation to darkness, alterations in ability to maintain balance, and decreased physical strength combine to make falls more common [55,56]. Change in sleep patterns may make the individual feel less rested. Loss of ability to taste and smell may alter appreciation of food. Alterations in gastrointestinal motility can lead to constipation and fecal impaction. Prostatic enlargement in men and decreased bladder and urethral supports in women can cause problems with urination.

The ability to cope with these changes varies with the individual. Some people are stoic and underreact to serious symptoms. Others ascribe symptoms produced by disease to aging and do not seek medical assistance. Still others with a "higher bodily concern" may overreact to minimal changes in bowel or bladder function, sight, hearing, ambulation, and memory, and view them as harbingers of death. The majority of the aged are in the first two categories and are likely to come to the regular attention of physicians only late in the development of disease.

Physicians are more familiar with those elderly who are preoccupied with their bodily functions. A survey of one community indicated that one-third of the elderly in the community were so preoccupied [57]. Repetitive complaints, relative to a variety of functional impairments, may result in overtesting, overtreatment, and an unsatisfactory relationship between doctor and patient unless these complaints are seen as part of the patient's reaction to a variety of physical, psychologic, and social changes.

The illness pattern of the elderly differs from that of the young. Those over 65 suffer acute illnesses about half as often as young adults, but when they occur, more days of restricted activity result [58]. Older patients often have multiple functional and chronic problems. Elderly women have higher rates than men for arthritis, diabetes, hypertension, back pain, and visual impairments. Men have higher rates of asthma, chronic bronchitis, hernia, peptic ulcer, and hearing impairment [46].

Chronic conditions are especially frequent among elderly residents of nursing homes. Recent surveys have indicated that 63 percent are deemed to be "senile," 36 percent have heart disease, and 14 percent have diabetes. Orthopedic problems are also high on the list, with a third of the patients confined to bed or chair. About a third are incontinent. Almost half cannot see well enough to read a newspaper. One-third cannot hear a conversation on a telephone, and one-fourth have impaired speech [46].

A special clinical characteristic of the elderly is the increased likelihood of atypical presentation of common disease (apathetic hyperthyroidism, silent myocardial infarction, and afebrile pneumonia). Certain neoplasms, such as lymphatic leukemia and breast cancer, are typically less fulminating in the aged, whereas thyroid carcinoma usually has a more accelerated course. For effective diagnosis and treatment, it is necessary that physicians know about these and other altered clinical pictures.

The term "senile" has been applied to a wide variety of physical and psychological phenomena that occur frequently in the aged, but do not fit neatly into diagnostic categories (e.g., senile dementia, senile emphysema). Belief in the inevitability of "senility" and the consequent overdiagnosis of senile dementia is a serious problem in the care of the aged. Similarly, emphysema appears to be related more to the duration of exposure to environmental agents such as tobacco or air pollutants than to aging. Because the word "senile" has pejorative connotations and tends to cause confusion between disease and primary aging, its use should generally be avoided.

Management

Although often considered to be inflexible, the aged can show surprising resilience in the face of cumulative problems sustained over relatively short periods of time. The average person over 65 has contended with loss of loved ones and friends, retirement from gainful employment, constricted income, worries about children, functional losses, and superimposed arthritis or other chronic complaints, yet many manage to cope without self-pity. This compensation, however, can give way to anxiety and depression in response to further losses. A minimal change may exhaust the margin of reserve and provoke a disproportionate reaction, accounting for the so-called "characteristic fragility" of the aged. This requires expert management by a primary care physician alert to the possibility that a flare-up of one disease may exacerbate another, or that minor triggering events such as dehydration, temperature imbalance, or infection can cause decompensation.

Although most of the problems encountered in the aged are not peculiar to them, medical management of the elderly often differs significantly from that of the young. Age-associated impairments in hearing, mobility, and the rate at which elderly individuals can retrieve items from memory complicate history-taking and physical examination. Communication skills such as the balance of direct and open-ended questions, avoidance of premature closure, and willingness to listen to the patient are essential. Disrobing and getting onto the examining table are more difficult for older patients.

Ability to perform daily functions is of utmost concern to the patient and marginal changes can have disproportionate effects. Thus, history-taking and physical diagnosis in the elderly should emphasize functional assessment as well as be directed toward delineating specific disease states [59]. Because older persons have fewer reserves with which to tolerate the stress of testing, laboratory diagnosis should be approached using the principle of "minimal interference" [60].

The pharmacotherapy of the elderly is an area that must be emphasized in the education of physicians. Changes in enzyme and organ function, multiple pharmacological regimens, and memory deficits all combine to make

pharmacotherapy of the elderly difficult [61,62]. They receive an average of 13 prescriptions annually, (including renewals), increasing the likelihood of adverse drug interactions, especially when more than one physician prescribes for the patient [61]. Drug-induced illness may go undetected because it often mimics conditions stereotypically associated with old age: absentmindedness, apathy, confusion, tremor, anorexia, and anxiety [62].

Following the enactment of Medicare, the surgical rate in those 65 and over doubled from 76 per 1,000 in 1965 to 155 per 1,000 in 1975 [56]. There is considerable debate about how much of this increase is accounted for by a) increase in appropriate procedures after removal of economic barriers; b) improvements in surgical technique and postoperative management making the elderly better candidates for surgery; and c) over-utilization due to economic incentives [63]. Clearly many procedures such as cataract surgery, repair of arthritic joints, and cardiac pacemaker insertion can help patients become less dependent. However, multiple medical problems, decreased tolerance to stress, and reduced average remaining life expectancy alter the risk/benefit equation for surgery in the elderly. Surgical decisions must take into account the individual's functional status, social situation, and personal desires. Older persons often need careful preoperative preparation and intensive post-surgical monitoring. They benefit from longer convalescence (not prolonged and devastating immobility, but a slower return to usual activities with the help of the family or other support systems).

As noted in the previous section, the aged often require more than medical care. Physicians trained almost exclusively in acute care hospitals often have limited experience in the team approach to care of the elderly [64]. Traditionally, nursing has borne the major responsibility for the day-to-day care of the institutionalized and home-bound elderly. Often the aged require the services of a social worker; speech, occupational, or physical therapist; podiatrist; dietician; or dentist. Knowledge of these services can help the physician understand how to use them appropriately, to avoid excessive care, and to minimize dependence.

Another important resource in developing a care plan is the family, which provides 80 percent of home health care and is a major source of comfort [65]. In one recent study, 70 percent of intact families were willing, without outside help, to provide intensive personal care and services to severely disabled persons returning home from the hospital for the first time. Only 38 percent of these same relatives were willing to provide care without social supports after the second hospitalization [66].

Teaching how much intervention is appropriate for the care of the aged is admittedly difficult. This is especially true for the terminally ill patient. The student and trainee may perceive death as failure, and either withdraw from a terminally ill patient or engage in heroic but fruitless measures. Yet, in such instances, palliative and supportive care is often more important than aggressive lifesaving measures. This is an area where qualified faculty are particularly needed to serve as role models.

Prevention

Attention to behavior can contribute to the goal of sustaining good health throughout a long, active life span. Efforts to curb abuse of tobacco, alcohol, and other drugs are to be encouraged at all ages. Epidemiologic studies now indicate that continued programs of endurance-type exercise--walking, jogging, bicycling, swimming--reduce the later incidence of heart attack. Reduction of cholesterol intake, vitamin supplementation and use of high fiber foods have also been proposed as beneficial. Other primary prevention techniques include immunizations, and measures to prevent falls in the home or the accidental ingestion of wrong medications.

Those elderly who have already begun to show signs of disability as a result of chronic disease can also benefit from secondary and tertiary prevention. The capacity of rehabilitative measures to minimize functional disability in the elderly is directly proportional to the promptness with which they are instituted. Elderly patients amenable to rehabilitation have been classified into: a) those with an obvious handicap (hemiplegia, arthritis, fracture, amputation, and neuromuscular disease); b) the chronically ill patient without signs of a manifest disability (chronic cardiac disease, chronic pulmonary disease); and c) those without obvious illness but in whom physical fitness is impaired [67]. At present rehabilitation is largely restricted to patients in the first group, although more in the second group are now receiving appropriate services.

The preventive potential of social interaction and peer availability for the maintenance of mental health in the aged is frequently overlooked. Often the availability of a friend, relative, or acquaintance with similar problems can help the old person to cope with significant personal stress. Moving from one home, institution, or neighborhood to another can be disabling and in the case of cognitvely impaired individuals may be life-shortening. Preparation for the move and emotional support may prevent or alleviate relocation trauma.

Health Services and Financing

Physicians serve as "gatekeepers" for allocation of services to the elderly and the chronically ill. They make decisions regarding admission to or discharge from acute care hospitals or skilled nursing facilities, and certify the need for home health services. Physicians thus should be aware of various aspects of the existing health care system, such as community services, extent and limitations of the funding mechanisms for medical and social services for the aged, and ways in which the system may be modified.

Health and social services available in the community generally include group services such as senior citizen rehabilitation centers, day hospitals, congregate dining facilities, and hospices, as well as individual services

such as foster care, housekeeping, home health services, and meals-on-wheels. To coordinate such existing services and provide funds for needed services not already available, about 560 Area Agencies on Aging (AAAs) have been established under the aegis of the Older Americans Act. Services are designed to assist older persons to remain independent and in some cases provide transportation, housing, and legal services. Preliminary data indicate that AAAs improve delivery of services to the elderly by tapping and pooling existing resources [68]. Their role will be expanded under the reauthorization of the Older Americans Act.

The basic public funding program for acute-care services to the elderly is Medicare. Medicaid and the Veterans Administration are more likely to fund long-term institutional care. Community services, such as home health care, may be funded under Medicaid (Title XIX, Social Security Act), Social Services Amendment (Title XX, Social Security Act), Older Americans Act (Title III), and by the Veterans Administration. The variability in public funding for a variety of services available to the elderly is shown in Figure 1.

Medicare, the landmark medical services funding program for the aged, was designed to assure a basic hospital benefits package that was well-defined at the time [68]. There has been no similar national consensus for a defined package of long-term care and social services, and these have been added piecemeal. Furthermore the medical services program for the elderly is administered nationally, but the long-term care and social services programs are administered locally. The scope of services, extent of funding by county, state, and federal governments, and eligibility requirements differ from community to community. The result is a maze of services that may be duplicative and of variable quality.

Physician reimbursement under Medicare is based on a short-term patient encounter and does not include functional assessment as a benefit. Furthermore, provision of and reimbursement for community services focus on the individual and often do not adequately support the family in its efforts to care for the functionally dependent older person in the home. The net effect is to restrict the physician's capacity to develop or manage a comprehensive treatment plan.

Solutions to most of these problems lie outside the purview of the medical profession. Conformity must be developed among the various programs and reimbursement policies altered to ensure an appropriate mix of services. Physicians cannot be expected to learn the intricacies of each one. Nevertheless, because of their central role in resource allocation, they can do much to provide appropriate services to individual patients.

The committee concludes that there is a body of knowledge in aging and the problems of the aged that is relevant to medical education. It consists of information concerning a) the biological, behavioral, and social changes that are a normal concomitant of aging; b) the role of these changes

in producing functional impairments or in making the individual more vulnerable to environmental factors leading to specific diseases; and c) the health care and social resources most necessary for managing the problems of the aged. Although these areas of information are of special importance to the care of the aged and to research on aging, they do not represent a clearly separable and unique discipline, but are part of all the biological, behavioral, social, and clinical sciences. The committee accords equal importance to the skills and attitudes with which practitioners make use of this body of knowledge. The degree to which medical education now focuses on the information, attitudes, and skills is discussed in Chapter 3.

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CHAPTER 2

RESEARCH AND FACULTY DEVELOPMENT

Training and recruitment of teachers with special competence in the field of aging requires a complementary activity in research related to aging. This chapter describes some promising areas for study and indicates the broad scope of disciplines and techniques that can be employed. A more extensive discussion can be found in a recent comprehensive review of research opportunities published by the National Institute on Aging (NIA) [1-4].

Biomedical Research

Aging-related biomedical research can be based in many scientific disciplines, oriented to most disease states, and applied to almost all biologic processes. It should aim to clarify understanding of the genetically controlled mechanisms that lead to progressive changes in the structure and function of the body and to the way these changes interact with environmental influences to cause disability.

Recent advances in cellular biology allowing *in vitro* cultivation of cells have opened up avenues for investigating the biologic mechanisms that underlie longevity. Techniques now exist for study of replication and repair of DNA, cell membrane changes, enzyme degradation and regulation, and other phenomena associated with aging [5].

Studies in immunology, nutrition, genetics, and neuro-endocrine physiology seem most likely to provide explanations for the increased vulnerability of the aged to certain diseases. For example, an analogy has been drawn between aging and a chronic graft versus host reaction where a number of similar changes occur including amyloid deposition (the most ubiquitous pathologic finding in older mammals), weight loss, skin and hair change, alterations in collagen chemistry, as well as activation of latent virus and other consequences of immune system dysfunction. Thus there is great potential for the interaction of those investigators interested in aging and those interested in discovering the basis of immune disorders.

It has been suggested that pediatric research can illuminate many problems in geriatrics [6]. The existence of a number of genetic diseases of childhood associated with accelerated aging gives further support to this notion. Down's syndrome has been cited as the best human model for study because of the almost universal occurrence of decreased life span, premature graying of hair, amyloidosis, immune changes similar to those in aging, defective DNA repair, an increased prevalence of malignancy, and Alzheimer's disease [7].

Since prevention of some conditions will undoubtedly require intervention in early life, it is important to gain an understanding of the long-term consequences of a variety of incidents that seem individually benign and unimportant, such as diets prescribed for children, childhood infections, and the like [8]. This does not mean that studies should be done only on physiologically young animals or humans since much clinical research done only on younger subjects may not yield results applicable to the aged. Pragmatic reasons for use of younger subjects include the relatively high cost of maintaining old animals for experimental purposes and the greater ease of working with young people in clinical investigation. Yet, if we are to understand the benefits and risks in applying new drugs or other therapies to old people, it will be necessary to organize trials in settings that serve the elderly. Rowe has discussed the advantages and disadvantages of longitudinal and cross-sectional studies as they apply to the aged [9]. Numerous populations in the United States and elsewhere are now being followed longitudinally [10]. These can provide useful new information about the effects of aging on such things as diet, physical activity, sleep patterns, hormone production, and homeostatic regulation. Studies similar to those done for creatinine clearance and glucose tolerance can help to revise our concepts of normal values for older individuals and to distinguish changes that occur with aging from disease states.

Pharmacologic research in such elderly populations could be especially useful. Multiple drug regimens coupled with changes in physiologic and metabolic functions in the elderly provide numerous areas for study, including absorption, metabolism, excretion, toxicity, receptor sensitivity, drug interactions, and allergenicity.

There is need to study how aging affects the expression of a disease. Differences in syndromes, signs, and prognosis are important areas for clinical investigation. Attention is being focused on the identification of treatable brain diseases in the elderly. Recent discovery of the pathologic nature of most cases of senile dementia has opened up new research opportunities [11].

Finally, these populations can be helpful in discovering the reasons for the gap in life expectancy between men and women. There are 13.9 million older women as opposed to 9.5 million older men. If present mortality trends remain constant, this gap will widen. The increasing prevalence of smoking among women and the greater stress among working women pursuing careers may alter these projections [12]. Understanding

the underlying cause for this discrepancy can help to assure that any narrowing of the gap takes place in an upward rather than downward direction.

Behavioral and Social Science Research

Recent gains in life expectancy have created at least two areas of special concern to society. The first arises from the increasing number of older persons who are retired, relatively healthy, and vigorous. Self-fulfillment, use of leisure time, and continuing contributions to the community are issues being examined with respect to this group. The second arises from the increasing proportion of persons over 75 requiring supportive services when they become functionally dependent.

Projection of needs for these groups must take into account the changing characteristics of future cohorts. The present elderly population is relatively unskilled and under-educated, and includes a substantial proportion of immigrants. Future cohorts will be better educated, will expect better medical care, and will be the recipients of improved pension and social security benefits. The role of the family will be modified. Many women will have been employed most of their lives, and will have been influenced by changing concepts of the role of women. More of the elderly will have been widowed or divorced, and there will be fewer children or siblings to care for those who are functionally dependent.

The special problems of minority groups and the economically disadvantaged must also be considered. Evidence indicates that the utilization of long-term care facilities by blacks and other minorities is much lower than for whites. How much of this is due to inaccessibility or unavailability and how much to preference is not clear.

Social and behavioral sciences research into the physical dependency of the aged can improve our understanding of the role of coping mechanisms, as well as family and community supports, in the handling of life's crises. The high correlation between loss of spouse and increased functional dependency deserves special attention.

Health Services Research

Emphasis on health services research is a relatively recent phenomenon. This deals with problems of supply and demand, cost, quality, content, accessibility, efficacy, and efficiency of health services. The goal is to translate advances in biological, behavioral, and social sciences into better organization, delivery, manpower, resources, and financing of health care.

Areas worthy of study include: a) alternatives to care in acute hospitals, b) training of appropriate manpower for the care of the aged, c) adjustment of financing and reimbursement mechanisms to achieve more efficient and effective services, d) upgrading the quality of skilled nursing homes and

long-term care facilities, e) the development of better home health services with special attention to the problems in their delivery to the poor, f) improvement in preventive and rehabilitative services, and g) utilization of alternative approaches to the care of terminally ill patients through such means as hospices. Multidisciplinary efforts are needed to carry out productive research in these areas.

Status of Research Funding

Estimates of the allocation of federal health research dollars (except for construction) are shown in Table 2. Aging ranks at the bottom in total outlays for specific areas, accounting for only 1 percent of the total expenditures. There is almost a thousand-fold difference between the estimated expenditures for research in aging ($42 million) and the outlay for health services for the aged ($41 billion).

Table 3 gives a breakdown of the funding by NIA research and training grants as well as contracts for various scientific areas. Table 4 contains an analysis of NIA's regular research grants. Although more than half the requests were approved in FY 1977, only 42 percent of the competing requests were approved and funded. Previous projections for the following two fiscal years showed a decline in the absolute number and relative percentage of new grant requests that would be both approved and funded. As more of NIA's dollars were encumbered for continuing previously-approved grants, funds for new grants were projected to decline. The FY 1979 budget for NIA activities was increased about 50 percent to $56 million. As seen in Table 4, this altered these projections demonstrating the importance attached to aging by legislators even in view of pressures to decrease governmental expenditures.

Faculty Development for Training and Research

The development of faculty in any discipline depends upon the provision of research and training fellowships during the early postgraduate period, as well as on availability of funds for faculty salaries. Training fellowships have been almost nonexistent in aging-related areas of the biological and clinical sciences.

Under Title IV-A of the Older Americans Act, geriatric training programs are an area eligible for support. During FY 1977, the Administration on Aging (AoA) spent approximately $8 million for career training, planning, and development and quality improvement grants. Most of these grants were to gerontology centers, schools of social work, or multidisciplinary centers in universities. Approximately $615,000 went to medical schools and almost $750,000 to other health professional schools [13].

NIA spent $1.4 million in FY 1977 for predoctoral training in behavioral sciences and postdoctoral training in biological and behavioral sciences. It is currently funding only one physician among its postdoctoral research trainees--presumably because of a lack of applications. NIA estimates that

TABLE 2: FEDERAL OUTLAYS FOR HEALTH RESEARCH
(In millions of dollars)

	1977 actual	1978 estimate	1979 estimate
Cancer	767	796	830
Environmental health	444	493	507
Cardiovascular	306	355	382
Neurological and visual	196	238	263
Metabolic diseases and arthritis	186	226	246
Infectious diseases	190	211	222
Mental health	145	148	169
Child health	86	99	114
Health services research and development	83	66	88
Population and family planning	67	76	87
Pulmonary	63	72	77
Nutrition	50	58	66
Dental	49	57	63
AGING	42	54*	59*
Research facilities	26	22	16
Other research and development	471	568	578
TOTAL	3,171	3,539	3,767

*The comparison of 1978 actual outlays will not be available until January 1979. The 1979 estimate is low in view of the substantial increase by the 95th Congress (see text).

NOTE: Prepared by the Office of Management and Budget in Special Analysis of the President's FY 1979 Budget. For the purposes of this analysis, these categories are mutually exclusive. Assignments are made according to the primary emphasis of the research. Thus the figure does not include funding on research that has a secondary impact on on aging.

TABLE 3. NATIONAL INSTITUTE ON AGING EXTRAMURAL PROGRAM ACTUAL OBLIGATIONS FY 1978
(In thousands of dollars)

	Biology		Clinical		Behavioral		Societal		Multi-Categorical		Total	
	No.	Amount	No.	Amount	No.	Amount	No.	Amount	No.	Amount	No.	Amount
Research Projects	162	$13,234	15	$1,530	37	$2,991	18	$1,400	5	$1,637	237	$20,972
Research Centers	---	---	---	---	---	---	---	---	1	318	1	318
Research Related	6	264	2	271	3	71	2	91	---	148	13	845
Training Grants	29	882	3	138	13	493	5	173	7	699	57	2,385
Contracts and Agreements	12	1,345	3	232	---	---	1	187	1	215	17	1,979
Grand Total	209	$15,725	23	$2,171	53	$3,555	26	$1,851	14	$3,017	325	$26,319

Examples of specific areas which might be included under the broader general areas include the following:

Biology - neuroscience, immunology, genetics and comparative aging, genetics and cellular aging, metabolic studies
Clinical - nutrition, pharmacology
Behavioral - stress and coping, sensory and perceptual change, cognition, learning
Societal - demography, retirement and leisure, socio-cultural and ethnic studies
Multi-Categorical - Duke Center on Aging Core Center Grant

TABLE 4. NIA REGULAR RESEARCH GRANTS

	1977	1978 Actual	1979 a/ Estimate
Amount Expended (Dollars in thousands)			
New Grants	$ 9,214	$ 8,067	$18,023
Non-Competing b/	8,325	13,888	17,180
Total	$17,539	$21,955	$35,203
Number of Grants			
Competing Requests Received	304	463	595
Competing Requests Approved	227	296	393
Competing Requests Approved and Funded	128	85	217
Non-Competing Requests Received and Funded	76	157	221
Total, Funded	204	251	438

a/ FY 79 Appropriation.
b/ Non-competing grants are those previously approved where funding is continued.

0.7 percent of biologists, 1.37 percent of psychologists, and 2.2 percent of social scientists (sociology, anthropology, social work) have had some formal training in the area of aging [14]. NIA has not supported post-doctoral clinical research trainees and estimates that there are very few clinical scientists in the U.S. with training in aging.

Review of the background of faculty engaged in existing programs reveals that they are almost all self-taught. A few clinicians appear to have become interested in geriatrics after having been trained in traditional programs of internal medicine, family medicine, psychiatry, and the like. In some cases, this interest originated from involvement with chronic care or rehabilitation units, and in others it developed through the process of aging with their patients. In the preclinical sciences, the available faculty consists primarily of persons whose research has moved into study of aging-related questions in cellular biology, pathology, genetics, pharmacology, or immunology.

Major deterrents to the development of clinical faculty in geriatrics have been the absence of a career track and the inadequacy of reimbursement for teaching about care of the aged. Correction of the former now seems underway, as evidenced by keen competition among academic institutions for the few well-trained geriatricians. However, the absence of direct support for faculty knowledgeable in aging, as well as indirect support though appropriate reimbursement for the labor-intensive primary care required by the elderly, are major stumbling blocks to development of appropriate role models.

Recent pressures on public institutions to provide service to the elderly are resulting in increased interest by federal, state, and county governments in promoting education in geriatric medicine. Although not meant to be inclusive, the following examples are illustrative. The Veterans Administration (VA), in response to the increasing number of older veterans, has developed a comprehensive extended care program. Recently it has established eight Geriatric Research, Education, and Clinical Centers (GRECCs). An important component of each center is a clinical demonstration ward where applied studies can be conducted and clinical care models can be demonstrated. GRECCs play a major role in the education of the staff in the various VA extended care programs. The VA also has inaugurated geriatric fellowship programs at 12 of its hospitals.

Although the NIA's mandate is strictly for research and not education, research associates at its intramural facility in Baltimore have been a source of medical school faculty. Additionally, NIA has recently inaugurated a geriatric medicine academic award program designed to improve the quality of curricula in geriatrics and to foster research and careers in the field of aging. A few foundations also are considering initiatives to stimulate faculty development in geriatrics.

At the state level, Ohio enacted a law that requires all medical schools supported in whole or in part by the state to create "offices" of geriatric medicine. Funding for such offices may increase opportunities for faculty development.

An example of a successful collaboration between public and private institutions is the affiliation between the University of Rochester Medical Center and Monroe Community Hospital [15]. Public funding for a county chronic care hospital allowed staff recruitment resulting in educational opportunities in aging and chronic illness for students and trainees.

The Royal College of Medicine Fellowships, as well as the Senior International Fellowship Program at the Fogarty Center of NIH, have been available on a limited basis to allow senior faculty to go abroad to study geriatric medicine. Other resources for faculty development and research are the institutes of gerontology that have been developed in several academic centers. Their degree of affiliation with academic health centers, though limited, appears to be growing.

In summary, the committee concludes that the number of faculty knowledgeable in aging is meager. Potential areas of research in aging greatly exceed the pool of competent researchers. Funds for training and research in aging are disproportionately low, which probably accounts for the small number of qualified faculty and researchers actively involved in the field. Measures to enhance both research and education are essential to faculty development in geriatrics.

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CHAPTER 3

INCORPORATION OF KNOWLEDGE OF AGING IN MEDICAL EDUCATION

Because it is easier to standardize and measure the transfer of information than of attitudes or skills, the former is more readily identified in analyzing a curriculum or examination. Even so, information about aging may not be discernible from course labels, and it is quite conceivable that our survey has overlooked some teaching relevant to our inquiry. An extensive evaluation of attitudes and skills of students and teachers is beyond the scope of our study.

Undergraduate Medical Education

One of the early attempts to assess the amount of material on aging in medical school curricula was Freeman's review of the 1969 medical school catalogues [1]. From the course descriptions, which varied markedly in their detail, he tallied the appearance of the terms "geriatrics," "gerontology," "senescence," "senility," and "aging." He found 124 such mentions in 48 out of the 99 medical school catalogues. Preclinical course descriptions contained 27 such citations. Fifteen faculty positions were identified as being in the area of geriatrics and gerontology. Seventeen schools had affiliations with institutions engaged in aging research or care of the aged.

Between 1971 and 1976, the Senate Special Committee on Aging conducted three surveys of U.S. medical schools. In September 1976, it received responses from 87 medical schools to the following questions: (a) Do you have geriatrics as a specialty in your curriculum? (b) Do you have programs in which students, interns, or residents can serve in nursing homes? (c) Do you have programs that help serve nursing homes in some other way? The percent of affirmative responses was 3.6, 40.4, and 56, respectively [2]. The usefulness of these responses to our inquiry is limited. The first question introduces the controversial issue of geriatrics as a specialty. The other two focus more on service than education and also can be answered affirmatively if a nursing home rotation is available, even if few trainees elect it.

Another survey of geriatric education in medical schools was conducted in 1976 by Akpom [3]. A total of 96 of the 110 medical schools surveyed responded to such questions as whether geriatric medicine was taught as a separate subject, and whether the program was mandatory or elective. Review

of the raw data, kindly supplied by the author and the Association of American Medical Colleges (AAMC), reveals lack of uniformity and specificity in the responses, making analysis difficult. Although 79 medical schools said they offered geriatrics as an "elective in one form or another," these often included a few lectures, general patient workup during clinical clerkship, and disease presentations in preclinical courses. Fifteen of the respondents said geriatrics was taught as a separate subject, but in only two schools was it required.

The 1977 annual medical school questionnaire circulated by the Liaison Committee for Medical Education (LCME) included the following inquiries about geriatrics:

a. Does your school have a teaching program in geriatric medicine for undergraduate medical students?
b. Is the geriatric program administered by a discrete administrative unit?
c. 1. Name of unit.
   2. Name of person with the major responsibility for this unit.
   3. Identify whether unit is a department, autonomous division, division within a department or other.
d. Identify clinical facilities utilized in the teaching of geriatric medicine.
e. Identify courses that carry substantial geriatric/gerontologic content.

The responses indicated some differences in interpretation of such terms as "teaching programs," "geriatrics," and "substantial" by the respondents and the results must be analyzed accordingly. Of the 116 medical schools responding to the questionnaires, 71 reported having some course work in aging. However, some schools interpreted content of two to five percent as "substantial." Many affirmative responses appeared to be based on the age range of the patients and on the types of diseases encountered in a particular course, rather than a definable special focus on aging. The courses with content on aging most often identified were clinical clerkships in internal medicine, family practice, and surgery; subjects dealing with psychosocial and behavioral problems; human development courses; and introduction to patient care blocks.

Identifying those courses that devoted special attention to aging was difficult. The AAMC surveys each medical school annually to obtain a listing of required and elective courses for its curriculum directory. In August 1978, 60 of 124 accredited U.S. medical schools and 11 of 16 Canadian schools said they offered courses in "geriatrics" [4]. Using a variety of sources, we were able to identify most but not all of these courses. Half were in geriatric medicine. The remainder were in geriatric psychiatry, gerontology, and the behavioral and community aspects of aging. Almost all the courses in geriatrics were elective, usually of 2-4 weeks duration. Those course directors contacted indicated that the number of students electing these courses was generally low. In a few schools a two-week period within a required course, such as a family

practice clerkship or a growth and development course, was devoted to aging. In two cases, a required course on aging was free-standing. Nursing home rotations were required in 7 schools and elective in 22.

Among the issues discussed by groups concerned with aging, perhaps the most fundamental is whether to integrate teaching about aging into existing courses or to make it free-standing. The need to consider aging in many preclinical and clinical subjects has led some to formulate an integrated approach using an interdisciplinary administrative arrangement for efficient coordination. The resource needs of an integrated curriculum extend from the very basic biological and behavioral sciences through the clinical sciences to social services and nursing. Integration of the behavioral sciences, social services, and nursing with the clinical sciences is just beginning at most medical schools. This deficiency is especially pertinent to the medical problems of the elderly. The integration of the biological and clinical sciences is much more advanced. Yet, even there the committee found that the coordination between certain biological and clinical sciences was suboptimal, for example, in pharmacology as it relates to the aged.

Free-standing courses, which allow a more inclusive approach to aging, are rarely part of the core curriculum. Admittedly the competition for core curriculum time is keen with strong arguments being made for such subjects as nutrition, human sexuality, emergency medicine, primary care, ethics, and medical humanism among others. Thus, courses are mainly electives established by concerned and knowledgeable faculty and administered by individual departments, such as family medicine, internal medicine, or psychiatry. A brief summary of a few such programs will serve to show the range of cooperative intramural and extramural arrangements available.

A program in gerontology recently established at the George Washington University Medical School spans all four years and has or proposes integration with house staff, nursing, and social work programs. Preclinical courses in basic sciences and abnormal human biology stress gerontologic content. A required course, "Issues in Health Care," covers topics such as diagnostic and therapeutic problems of the elderly and a team appproach to the care of the elderly. During the third year, students in the required primary care clerkship spend four hours per week in a nursing home working with a primary care resident under the supervision of a geriatrician. Grand rounds on aging are scheduled at least once a year in medicine, surgery, and gynecology, and more often in psychiatry and primary care rotations. Four- to six-week electives that include clinical problems in aging are offered to fourth-year students by the departments of medicine, neurology, and nuclear medicine, among others. Electives also include geriatric considerations in psychiatry and law. [5]

At the medical school of the University of California, Los Angeles, first-year students in behavioral sciences interview patients at various community facilities, including non-profit and proprietary nursing homes and psychiatric institutions. They also interview non-institutionalized elderly volunteers. During the second year, students can rotate through a

geriatric inpatient service at a Veterans Administration hospital. During the third- and fourth-year clerkships, students may be assigned to the geriatric ward of the VA hospital for the psychiatry clerkship. Electives also are offered in geriatric medicine and psychiatry. In addition, staff members at an affiliated Geriatric Research, Educational, and Clinical Center conduct research seminars on aging for students and faculty [6].

At the University of Washington medical school, four required courses focus special attention on the aging process. A first-year course is devoted entirely to aging and deals with human development from conception through death. Seminars on aging, dying, and death are held in the introductory clinical medicine course. A human behavior course deals with all ranges of human behavior from post-natal development through senescence. A course on medicine, health, and society emphasizes problems facing society, including those associated with an aging population [7].

Some schools, such as the University of Florida School of Medicine, are using recently created primary care programs as a base for teaching geriatric medicine [8]. These programs place more emphasis on ambulatory care, the incorporation of other professionals in the health care team, the use of community resources, and reliance on behavioral sciences in understanding "sickness" and facilitating adherence to treatment reginens. Continuity of care allows observation of clinical progress in the aged, often not demonstrable during short rotations. These programs also allow exposure to well and functionally dependent older persons.

Other schools, such as the University of Rochester and Case Western Reserve University, have made a commitment to the care of the elderly and the chronically ill. In 1968, the University of Rochester affiliated with an understaffed county hospital for the chronically ill and built a strong program devoted to teaching about chronic illness and aging [9]. The program has 26 full-time equivalent faculty (FTE) and 12 FTE house staff positions for all departments and services with allowance for additional outside support [10]. This provides the nucleus for undergraduate and graduate education in geriatrics.

The Case Western Reserve experience contrasts with that at the University of Rochester. A facility built specifically for the aged evolved into a chronic disease unit with subspecialty focus. Although some faculty members remained committed to the problems of the aged, the orientation towards the elderly declined. The school is taking steps to rectify this by reorganizing a county chronic illness service, and reinstating a commitment to research and education in aging and the care of the aged [11].

Attitudes

Because of the importance of attitude in the care of the aged, the committee reviewed the current status of information about medical student perception of aging and the aged. Most surveys have shown that interest in geriatrics and gerontology diminishes over the four year under-

graduate period [12,13]. Reasons for this decrease in interest include a) competition from other subjects as the student enters the clinical years, b) the realization that the elderly have a higher prevalence of chronic and intractable problems that tend to result in less satisfaction for the patient and the student, c) a presumed lack of excitement for the subject matter due to a lower rate of incremental information gain and patient change over time, and d) reinforcement of negative attitudes by some faculty and resident physicians (a manifestation of society's negative attitude--"ageism") [13-15]. Other studies have shown that the development of negative attitudes is not inevitable and that positive attitudes can be fostered by the presence of respected faculty role models [14,16].

An innovative program to help students explore their attitudes toward aging and the aged is being implemented in the Department of Family Medicine at the University of Arizona [17]. Students express words they associate with old age and answer factual questions about the aged to separate myth from reality. Through a game called "Life Cycle" the students are encouraged to see themselves as people who are aging. They are asked to draw a rough floor plan of a home that they lived in as a child and take a person on a tour of that home. They are encouraged to simulate being in a nursing home to determine their own reaction to being institutionalized. Such activities seem to hold promise for helping students to explore and develop their attitudes toward the aged. Whether the effects will be long-term or positive requires study.

Graduate Medical Training

The committee was unable to review all recognized specialty programs for aging content; hence, we cannot assess accurately the amount of teaching about aging included in these programs. However, a useful resource is the recent survey of graduate medical education by the American Geriatrics Society [18], which identified three approaches to conveying knowledge about the aging process and care of the elderly in graduate medical education.

The first approach is designed to give general exposure to all trainees by adding block rotations in long-term care facilities or in geriatric evaluation and placement units to traditional residency programs in various specialties. Of the 753 accredited residency programs in internal medicine and family medicine [19], the committee was able to identify approximately 20 where such rotations are required.

A recent survey of psychiatry residency programs illustrated the difficulty in arriving at accurate and uniform estimates of aging content [20]. One-third of program directors indicated that residents were required to see geriatric patients and said geriatric psychiatry was part of a general training program. However, the number of hours of core curriculum time given to geriatric psychiatry was generally between one and five, and only one-fourth of the programs offered elective rotations in this subject.

Twenty-nine percent of program directors indicated that they would be willing to offer additional didactic material in geriatric psychiatry, but 69 percent rated trainee interest as moderate to very low.

A second approach to graduate teaching in geriatrics resembles fellowship training and combines portions of the standard residency with a year or two spent exclusively in geriatrics. Residents are engaged in the delivery of care in the acute care hospital out-patient department, long-term care facility, and the home. In one of the few existing programs, candidates spend 12 to 24 months in geriatrics after completing 24 to 36 months in a standard internal medicine residency [21]. Similar programs are being developed by the Veterans Administration at six of its facilities. There has been a geriatric psychiatry residency program at the Duke University Medical Center for a number of years. The National Institute of Mental Health is establishing four additional subspecialty-type programs in geriatric psychiatry modeled after child psychiatry.

A third approach is the proposed creation of a board-certified specialty with a residency program in geriatrics. Proponents of this plan contend that the prestige of specialization is necessary to attract physicians. They invoke the experience in the United Kingdom, where a specialty of geriatrics has been developed. Although the specialty approach has been the source of leaders in the field, some observers in the U.K. have begun to raise questions about it [22]. Hospital-staff positions at the junior and intermediate level remain unfilled and a high percentage of geriatric training slots are filled by foreign medical graduates [23]. It appears that many physicians do not wish to consider themselves solely as geriatricians, even though they devote special attention to the care of the aged. In fact, the success of many programs appears to be related to the degree to which they are perceived to be a respected, integral part of an established specialty, such as internal medicine. A recent report of the Working Party of the Royal College of Physicians of London advocated a shift toward appointing to consultant positions physicians trained in general medicine with a "special interest in aging" rather than full-time geriatricians [22].

Furthermore the health care delivery system in the U.K. is not analogous to that of the U.S. Especially important is the distinction between general practitioners and consultants who have hospital admitting privileges. Care of the elderly patient is for the most part in the hands of the general practitioner; the geriatrician acts as consultant and assumes responsibility for the patient under more or less explicit guidelines, usually in a hospital setting.

Proponents of geriatrics as a specialty in the U.S. have argued that it has as much legitimacy as pediatrics, which evolved from general medicine decades ago [24]. However, a practical deterrent to a geriatric practice specialty appears to be defining the population to be served. It is much easier to define entry into a pediatric care system than into a geriatric care system. Even in pediatrics one of the issues being considered by a task

force currently studying the future of the specialty is the question of boundaries between pediatrics and family medicine or internal medicine [25]. Such boundary considerations would be even more complex if geriatrics were a practice specialty. The current consensus among diverse groups that have considered this problem, including the American Geriatrics Society, is against the development of a board-certified specialty [18].

Aging Content in Board Examinations

Another estimate of aging-related content in medical education was obtained by a review of the questions in Parts I, II, and III of the 1977 examination of the National Board of Medical Examiners (NBME).* Although board questions are not absolute correlates of course content, the subjects covered in such a nationally accepted test are likely to reflect the instructional content of these courses. The breakdown of questions considered generally to be aging-related was 4 percent for Part I, 5.6 percent for Part II, and 3.8 percent for Part III. Of approximately 2,000 questions reviewed, only 7 dealt with some aspect of normal aging, 5 were related to professional attitudes, and 92 covered clinical aspects.

To obtain an estimate of what the candidates in various specialties are being influenced to study, the committee asked officers of the specialty boards to review the aging-related content of their examinations. The review was not standardized and was subject to varying interpretations of the term "aging-related content." The responses varied from 1 to 27 percent, according to the strictness of the criteria used. Two responses were particularly illustrative. One board secretary guessed initially that more than half the questions in his examination concerned the aging process because "most of the diseases encountered in the specialty are geriatric problems." But after checking the latest test, he found that only 21 percent of the questions applied to people 50 or over by virtue of mentioning the patient's age or asking about a disease largely limited to the older age group.

After reviewing the American Board of Internal Medicine (ABIM) examination Dr. Daniel Federman concluded that, using the broad criteria outlined above, one-fifth of the questions were aging-related. However, he preferred to use stricter criteria that focused not on the age mentioned in the question or the disease per se, but on whether the question dealt with aging or a particular aspect of care of the aged. His estimate using these criteria was at the low end of the range of responses. He was of the opinion that questions could be developed or modified with little difficulty to address the special features of elderly patients, such as in the use of laboratory tests, pharmacologic management, and the economic and psychosocial aspects of care. Indeed these steps have already been taken in composing the next ABIM certifying examination.

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*This review was conducted at NBME headquarters by a subcommittee, with representatives of the biological, behavioral, and clinical sciences.

Continuing Medical Education

The pool of potential learners of geriatric medicine is greater for continuing medical education (CME) than for undergraduate or graduate education. There are approximately 220,000 practicing physicians in relevant fields of medicine compared with about 57,000 medical students and about 55,000 resident physicians [26-28]. Furthermore, patients grow old with their physician: the average age of patients in a physician's practice increases five years for every ten the physician ages [29]. A recent review of patient demography in internal medicine [30] and family practice [31] indicated that patients 65 and over accounted for about 17 and 28 percent of office visits to family practitioners and internists, respectively. Those 65 and over accounted for 39.9 percent of patients hospitalized by family practitioners and 45.2 percent by internists. It appears then that attention to CME for physicians in practice is essential if there is to be significant short-term improvement in the care of the aged.

Nearly $2 billion is estimated to have been spent in 1976 in dispensing and acquiring CME [32]. The number of course offerings doubled during the period 1961 to 1974, but tripled in the five years between 1973 and 1978 [33]. This rapid growth is due in part to the increasing number of specialty societies, state medical associations, and state boards now mandating CME requirements.

The rapid growth of CME notwithstanding, firm evidence of its efficacy is lacking [34]. Content is determined largely by the teacher rather than the learner. The principal educational mode is the traditional didactic transfer of information in settings ranging from community hospitals to exotic resorts. Although some programs have begun to use evaluative methods, such as pre- and post-tests to measure information gain, none has yet validated the assumption that information acquisition necessarily results in improved patient outcome. Nonetheless, there is little argument that physicians must keep up with medical advances and that CME can play a major role in accomplishing this.

The most useful CME appears to involve assessing the needs of the physician relative to those of the patient [35-37]. A number of experimental programs and studies are underway in which physician/patient panel profiles are determined and attention focused on medical care evaluation to identify learning needs. With regard to physician needs, studies have shown that as physicians age, they tend to become more involved in ambulatory care and correspondingly less in acute hospital care [38]. The skills that appear to be most useful are interviewing, diagnosis, functional assessment, pharmacotherapy, and the management of medical and social resources.

The current status of geriatric CME relative to the needs of practicing physicians and their patients may be indicated by a recent study of 36 geriatric CME programs offered between 1975 and 1977 [39]. Two-thirds of their subject matter consisted of the following areas, in descending order of frequency: neurology (including senile dementia), psychosocial aspects

of health (sexual problems, alcoholism), aspects of comprehensive care (nutrition, prevention), cardiovascular disease, community resources, office practice arrangements, psychiatry, and pharmacology. Practicing physician attendance was small, although sponsors suggested that it may be growing.

The annual issue of JAMA devoted to CME listed 37 geriatrics courses out of a total of 7,330 CME courses [33]. The major sponsors were the American Geriatrics Society (AGS), pharmaceutical companies, and medical schools. Although other organizations such as the American Medical Association, the American College of Physicians, and the American Academy of Family Physicians are very active in CME, a review of their activities revealed that programs devoted to gerontology and geriatrics were sparse.

On the basis of the data examined, the committee concludes that with a few exceptions, education in aging is deficient at all levels of medical education. At the undergraduate level there is no systematic approach to teaching about aging, with the most notable deficiencies in the biology of normal aging and the management of the aged patient, especially in settings other than the acute care hospital. Residency and CME programs also offer very few opportunities for training in aging research and care of the elderly.

During the course of this study the committee learned that this deficiency is a subject of some concern among the representatives of many medical schools and professional organizations, and plans to correct it are underway or at least being discussed. Some schools have established administrative units for geriatrics, including sections or divisions in departments of medicine, family practice, rehabilitation medicine, psychiatry, and community medicine, and institutional consortia or interdisciplinary departmental arrangements. "Offices" of geriatrics have been legislatively mandated in the medical schools in the state of Ohio.

A major impetus for curriculum change may come from students. Medical student interest in aging appears to be on the increase, paralleling the upsurge in interest in primary care. The American Medical Student Association recently published a pamphlet on curriculum development in geriatrics [40] and established a Task Force on Aging. In January 1978, medical students sponsored a regional conference to discuss the development of curriculum programs related to the special health care needs of the elderly [41]. The American College of Physicians, the American Academy of Family Physicians, and the American Society of Internal Medicine adopted and forwarded to this committee positions advocating increased attention to geriatrics [42-44]. The American College of Psychiatry devoted its last annual meeting to psychiatry and aging. All this recent activity suggests a growing awareness of the problem and a willingness to search for the means to solve it.

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CHAPTER 4

RECOMMENDATIONS

The following statements summarize the committee consensus on which its recommendations are based:

--The major goal of medical education is the preparation of qualified physicians to provide medical services to the public, as well as investigators and medical school faculty devoted to education and the advancement of knowledge in biomedical, behavioral, and clinical sciences.

--The number of elderly persons in the United States is increasing, and they require a disproportionately large share of health and medical services.

--Improvement in services for the elderly requires changes in many sectors of health and medical care, but the committee has been asked to consider only physician education.

--There are features of care of the aged that call for the application of special knowledge, skills, and attitudes by the physician.

--These aspects of physician competence should receive appropriate emphasis throughout medical education and in the accreditation and certification procedures.

--Substantial improvements in teaching about the process of aging and problems of the aged are required at all levels of medical education. Some reorientation of current educational programs and provision of additional resources will be needed to achieve the improvements.

--New opportunities exist for the development of knowledge in aging and problems of the aged, but the amount of funding for research and training appears to be a limiting factor.

Advances in medical technology during the past quarter century have increased specialization in the practice of medicine. Medical schools have responded to this trend by reducing the teaching of general principles of

medicine to a "core curriculum," and increasing elective opportunities for students to begin specialist preparation before graduation. Clinical medicine in teaching hospitals reflects the technologic advances, and a high proportion of patients receive tertiary care. A similar trend is seen in community hospitals affiliated with medical schools, where members of the attending staff are largely board-certified specialists.

The present emphasis on tertiary care is defended on the grounds that all physicians, even those engaged in primary care, must be familiar with diagnostic and therapeutic procedures that may be required by their patients in a specialist setting. There also is substance to the argument that a beginner can be introduced more easily to the study of medicine by observing advanced forms and treatments of disease. The fine discrimination necessary to distinguish between trivial and sinister complaints can be acquired later.

It can be argued that medical students already have an opportunity to become acquainted with the problems of elderly patients, because the proportion of patients aged 65 and over is high in teaching hospitals. The committee believes, however, that the present system of undergraduate medical education--consisting of short rotations through hospital divisions populated by gravely ill people--does not provide adequate exposure to many of the medical problems graduates will have to manage in almost every field of practice. We refer here to the continuing care of patients with multiple, chronic, progressive disabilities that interact with one another as well as with concomitant economic and psychosocial handicaps. Optimal management of the elderly patient requires that the physician recognize the many factors affecting the patient's welfare, and be able to draw on appropriate community services that can help the patient achieve an independent and productive old age. This approach to patient care should be introduced during undergraduate medical education, and not be postponed on the assumption that physicians will acquire it through later experience.

The committee recommends that medical schools include appropriate content on aging in basic and clinical science courses and favors the establishment of a complementary required course that integrates knowledge about aging and the problems of the elderly. Our information indicates that education about medical and health problems of the aged is not receiving enough emphasis in most American medical schools. The committee believes that more attention is necessary to: a) increase understanding of the age-related biological, behavioral, and social changes, and of their interactions with environmental and other factors in the maintenance of health and the development of disease; b) demonstrate the appropriate attitudes and managerial skills needed to care for the aged, including an appreciation of the role of prevention and rehabilitation; c) acquaint students with the various health and social services appropriate to the care of the aged; and d) elucidate the economics of health care for the elderly and the role of various reimbursement mechanisms and regulations.

The committee noted that all medical schools require students to take courses in pediatrics to learn the special nature of the care of children. Although the majority of medical school graduates will take care of a substantial number of elderly patients, very few schools require special course work in geriatrics, probably under the mistaken assumption that the appropriate content is covered in the required clinical clerkships.

The structure and placement of a required course in geriatrics would depend upon the organizational and educational philosophy of the individual medical school. For purposes of illustration, the appendix contains an outline of content for a course that could be offered at the time clinical studies begin. To some extent these topics may be covered elsewhere, but the committee believes their importance is sufficient to justify the emphasis of a separate course and would provide a worthwhile counterbalance to the concentration on acute episodic illnesses that characterizes most clinical teaching at present.

Most of the teachers needed for such a course are already members of medical school faculties. The principal task is to develop agreement among the faculty of the subject's importance to nearly all branches of medical practice, and then to assure that primary responsibility is assumed for teaching it. This could be accomplished in a variety of ways including assumption of responsibility by a single department or by an interdepartmental steering committee. A number of interdisciplinary teaching units in gerontology and geriatrics are being or have been established in schools of medicine. The funding and development of such units is essential to achieving the goals of increased education, research, and service.

For the most part, information about aging receives very little attention in textbooks, and, in some instances, reference to the elderly may be virtually nonexistent. Editors or authors of textbooks in medical fields that include the care of older individuals should give attention to the special aspects and manifestations of illness in the elderly and new knowledge about aging.

The committee recommends that preparation for care of the aged be included in clinical clerkships and in housestaff training programs, as well as in examinations for certification and licensure. Although specifics will vary from specialty to specialty, the essential components of such training are teachers who have special interest in aging as it relates to the specialty and experience by the trainee in the full range of settings in which care of the elderly occurs. Because of the interactions between psychological, social, and physiological factors in diseases of old people, the committee believes that medical student and resident physician training should occur in multidisciplinary settings of care with adequate staffing in nursing, social work, and the rehabilitative specialties, and where other specialist-consultants are available.

On the basis of its review the committee also concluded that information on aging and the problems of the aged should receive increased attention from the various panels that make up examination questions for the National Board

of Medical Examiners and certification boards of relevant specialties and subspecialties. This will require, in some cases, the inclusion of neglected areas and in others only a change in emphasis.

The committee recommends that nursing homes and other long-term care facilities be included in clinical rotations for medical students and house-staff. Experience with home health programs and other alternatives to institutionalization is also desirable. In order for rotations in long-term care facilities to be of value, those institutions selected for educational affiliation must be of high quality and appropriately staffed to reflect the increased educational demands. Reimbursement policies do not allow for clinical teaching in these settings. Neither the upgrading of quality, the educational costs, nor the reimbursement changes are within the power or financial capabilities of medical schools. Changes by third party payers in reimbursement mechanisms plus additional funding will be required to meet these objectives. However, in view of the recent concerns about the large expenditures for long-term care, the committee believes that a relatively small amount of additional funding would greatly enhance the overall benefits of the already large investment.

Additionally, exposure to programs such as home health care and geriatric day care centers would provide an opportunity for the medical student and house staff to participate in team care of the older person and to observe alternatives to institutionalization. One way to achieve this is through an increase in preceptorships with primary care physicians such as family practitioners and internists who provide the bulk of the medical care to the aged.

The committee recommends that teaching about aging receive increased emphasis in continuing medical education (CME), and that the Liaison Committee on Continuing Medical Education and its sponsoring organizations support increased geriatric content in CME programs. Although an increase in the quantity of geriatric CME programs is desirable, the achievement of qualitative gains is even more important. This requires recognition of the importance of geriatrics by professional societies and the physicians they serve, and an increase in knowledgeable professionals of high caliber who can design programs to meet the needs of physicians and their patients.

Program content should be adapted to individual physician needs, by means of feedback after medical audit, as part of individually structured programs, in case review conferences, or in didactic sessions. Particular attention should be given to: a) translation of new research findings into care of the aged; b) performance of functional assessments; c) use of diagnostic testing in the elderly; d) management of common clinical problems (decubitus ulcers, incontinence, pain, depression, dementia, grief); e) pharmacotherapy; f) approach to the terminally ill; g) how to work with other health professionals in caring for the aged; and h) appropriate use of long-term care facilities and community resources. Plans to extend activities of Professional Standards Review Organizations into ambulatory and long-term care settings can be beneficial in highlighting some of these areas. Improved hospital audits for accreditation, and the mandating of

CME for relicensure or recertification of physicians increase the potential of CME in directing more attention to aging. The committee hopes that the ACP, AMA, ASIM, AAFP, and other organizations will work with the American Geriatrics Society, the Gerontological Society, and other appropriate groups to develop suitable materials for CME. Because medical school faculty are involved in many CME programs, efforts to strengthen the teaching of aging at undergraduate and graduate levels will also have important implications for improving CME.

The committee recommends that medical schools develop a cadre of faculty to teach gerontology and geriatrics to medical students and housestaff, and that a) post-residency training or fellowship programs be developed in settings that have either the necessary leadership in geriatric medicine or have a potential for promptly developing it, and b) that a limited number of career development awards in gerontology and geriatrics be established. The committee recognizes a need to train a relatively small number of physicians for teaching, research, and specialized patient care consultation. A few centers with expertise in aging, which would help facilitate faculty development, already exist here and abroad, and others are being formed. Some have established 1-2 year fellowship programs, research traineeships, and short-term residencies. Such training programs are or could be funded through NIA; the Bureau of Health Manpower of the Health Resources Administration of the Department of Health, Education, and Welfare; Administation on Aging; National Institute of General Medical Sciences (M.D./Ph.D. Program); the Fogarty International Center; the Veterans Administration, and a few private foundations. Support of both the centers and the fellowships is severely limited and increased funding is essential to meet the need. The establishment of a clearinghouse to inventory the existing research and education programs would be helpful.

Recently established primary care and family medicine residency and fellowship programs also can provide an excellent base from which to focus on geriatrics. Creation of career development awards in geriatrics and gerontology would help to assure that positions for those knowledgeable about aging are available in medical schools and affiliated institutions.

The committee suggests the funding of seminars and workshops on aging and problems of the aged at academic health centers and affiliated institutions. These would afford knowledgeable gerontologists and geriatricians the opportunity to meet with students, housestaff, and faculty, possibly stimulating some to develop a special interest in the subject.

The committee recommends against the establishment of a formal practice specialty in geriatrics, but favors the recognition of gerontology and geriatrics as academic disciplines within the relevant medical specialties. The committee agrees with the American Geriatrics Society and other groups that have recommended against a board-certified specialty. It believes that the care of the aged should be the responsibility of appropriately trained primary care physicians. Furthermore, the committee is concerned that if geriatrics were to be a practice specialty, pressure for tens of thousands of such specialists would occur.

This could draw attention, energy, and resources away from the needed improvements in the numbers and training of those nurses, nurse practitioners, and allied health personnel who are so essential to the day-to-day care of the aged. Furthermore, it might suggest a medical solution to a largely social problem for which community groups in concert with the aged and their families can provide a large measure of the necessary services.

The committee is aware, however, that development and recognition of geriatrics within various disciplines is necessary to advance research and education in aging and to train leaders in the field. Precedents include such disciplines as clinical pharmacology and genetics, which have remained as areas of concentration for a small number of faculty members, rather than becoming specialties or subspecialties with board certification. It urges that relevant medical specialty organizations take steps to assure the development and recognition of special competence in geriatrics within their disciplines.

The committee recommends that efforts to meet the education needs of medical directors of skilled nursing facilities (SNFs) be assumed jointly by medical schools and SNFs. When Congress mandated the requirement for such medical directors as a condition for Medicare reimbursement, there was no ready supply of well-trained individuals. While the interest in these positions seems to be high, a number of problems remain unresolved. These include appropriate training and the degree of clinical responsibility to be assumed by the directors for the patients residing in such facilities. Appropriate training of these directors could enhance the quality of care, and provide another source of faculty knowledgeable in geriatrics.

The committee recommends that funding be expanded in various aspects of aging research, including basic biological and behavioral sciences, clinical medicine, and health services research. The recent upsurge in interest in aging research has not been accompanied by a comparable increase in funding. Research in aging plays an essential role in increasing the fund of knowledge and in attracting qualified faculty to the field. NIA can help academic health centers to develop programs of aging research to minimize duplication and take advantage of particular institutional strengths. The committee does not feel it is appropriate to suggest priorities for research funding among those areas it considered in Chapter 2. However, it does endorse attempts to allocate funding based on such considerations as burden of illness (the extent of personal, social, and economic costs caused by the problems in question); the existence of scientific opportunities for increasing our understanding of the questions raised; the availability of adequate resources and qualified researchers; and the need to maintain a stable research program while retaining flexibility to exploit new areas of opportunity.

Although the need for improvement in knowledge of aging and the care of the aged is great, the committee is encouraged by the finding that interest in aging and the aged is increasing in medical schools, universities, and professional societies, as well as society at large. The efforts of those already active in the field, in addition to the positive reception by those who had not been previously aware of the issues, leads the committee to reject the development of crash programs. Instead, the committee believes that prudent steps of the type recommended here will provide the basis for meeting the health care needs of the growing elderly population.

APPENDIX A

SELECTED DEFINITIONS OF RELEVANT TERMS

GERIATRICS AND GERIATRIC MEDICINE

Geriatrics is the "branch of general medicine concerned with the clinical preventative, remedial, and social aspects of illness in the elderly." [British Geriatrics Society].

Geriatrics is the "clinical side of aging." [Freeman JT: A survey of geriatric education: catalogues of U.S. medical schools. Journal of the American Geriatrics Society 19:746-762, 1971].

GERONTOLOGY

Gerontology is "a branch of knowledge dealing with aging and the problems of the aged." [Webster's New Collegiate Dictionary].

Gerontology is "the study of aging processes--from Greek "geron", old man--originating in the biological sciences and expanding more recently into the social and behavioral sciences." [United States Department of Health, Education, and Welfare, Health Resources Administration: Working with Older People--A Guide to Practice. (DHEW Publication No. HRA 74-3117) 1974].

Gerontology denotes "the scientific study of aging in all of its aspects--clinical, biological, historical and sociological." [American Medical Student Association: Curriculum Development in Geriatric Medicine, January 1976].

ELDERLY

Functionally Dependent Elderly. The functionally dependent elderly are those individuals over 65 whose illnesses, impairments, or social problems have become disabling, reducing their ability to carry out independently the customary activities of daily life. [Institute of Medicine: The Elderly and Functional Dependency. Washington, DC, June 1977].

Frail Elderly. By frailty is meant "reduction of physical and emotional capacities and loss of a social support system to the extent that the individual becomes immobilized and unable to maintain a household or social contacts without continuing assistance from others." [Federal Council on the Aging: Report on National Policy for the Frail Elderly. Washington, DC, 1976].

Young-Old. "Persons in their 60s and 70s who are relatively healthy and vigorous, a large number of whom are retired, who seek for meaningful ways to use their time, either in self-fulfillment or in the community participation, and who represent a great resource of talent for society." [United States Department of Health, Education, and Welfare, Public Health Service: Our Future Selves: A Research Plan Toward Understanding Aging. (DHEW Publication No. 77-1096), 1976].

Old-Old. "Persons in their mid-70s, 80s, and 90s, an increasing minority of whom remain vigorous and active, but a majority of whom need a wide range of supportive and restorative health services and social services." [United States Department of Health, Education, and Welfare, Public Health Service: Our Future Selves: A Research Plan Toward Understanding Aging. (DHEW Publication No. 77-1096), 1976].

LONG-TERM CARE FACILITIES USED PREDOMINANTLY BY THE ELDERLY

Although the terms "nursing home" and "long-term care facilities" are commonly used interchangeably, there are important distinctions in staffing, reimbursement and services provided.

1. Domiciliary Care Facility: a nonmedical residential institution providing room, board, laundry, some form of personal care, and, in some cases, recreational and social services. Most commonly licensed by state departments of social services, these facilities usually are not allowed to provide medical care as part of the direct services of the institution. They are not eligible for reimbursement through either medicaid or medicare, but in several states they do receive public funds through special state supplements to the Supplemental Security Income (SSI) program. [1]

2. Intermediate Care Facility: an institution recognized under the medicaid program which is licensed under state law to provide on a regular basis, health-related care and services to individuals who do not require the degree of care or treatment which a hospital or skilled nursing facility is designed to provide, but who because of their mental or physical condition require care and services (above the level of room and board) which can be made available to them only through institutional facilties. Public institutions for care of the mentally retarded or people with related conditions are also included. The distinction between "health-related care and services" and "room and board" has often proven difficult to make but is important because ICFs are subject to quite different regulation and coverage than institutions which do not provide health-related care and services. [1]

3. Skilled Nursing Facility (SNF): under medicare and medicaid, an institution (or a distinct part of an institution) which has in effect a transfer agreement with one or more participating hospitals and which is primarily engaged in providing skilled nursing care and related services for patients who require medical or nursing care, or rehabilitation services for injured, disabled or sick persons. Its formal policies are developed with the

advice of a group consisting of one or more physicians and registered nurses. A physician or registered nurse is responsible for the execution of such policies. The health care of every patient must be under the supervision of a physician, and a physician must be available to furnish necessary medical care in case of an emergency. They must maintain medical records on all patients and provide 24-hour nursing service with at least one registered professional nurse employed full time. It must carry on an effective program of independent medical review of the patients (including medical evaluation of each patient's need for SNF care). [1]

HOME HEALTH CARE

Home Health Care: health services rendered to an individual as needed in the home. Such services are provided to aged, disabled, or sick or convalescent individuals who do not need institutional care. The services may be provided by a visiting nurse association, home health agency, hospital or other organized community group. They may be quite specialized or comprehensive (nursing services, speech, physical, occupational and rehabilitation therapy, homemaker services, and social services). Under medicare, such services must be provided by a home health agency. Under medicaid, states may, but do not have to, restrict coverage of home health care to services provided by home health agencies. [1]

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[1] Definitions modified from A Discursive Dictionary of Health Care, Subcommittee on Health and the Environment, Committee on Interstate and Foreign Commerce, U.S. House of Representatives, February 1976.

APPENDIX B

OUTLINE OF CONTENT ON AGING AND PROBLEMS OF THE AGED

SUGGESTIONS FOR A FREE-STANDING COURSE

Didactic Information

(1) Biology of aging. This portion would include the current knowledge about the biology of aging, as well as some of the major research questions in the field.

(2) Human development. This should encompass more than embryology, neonatology, and child development and cover the continuum of human life through adolescence, various stages of adult life, and into advanced age.

(3) Behavioral and social sciences. Information should include alterations in intelligence and cognition, recognizing manifestations of depression and grief, and information on organic brain syndromes with an emphasis on the diagnosis and management of reversible conditions. Special attention should be given to help medical students understand the social and cultural context of growing old in America, especially role transitions and attitudes toward aging. This would involve exploring student attitudes to their own aging and that of others, as well as helping separate myth from reality in such areas as human sexuality and aging.

(4) Demography and economics of health care for the aged. The student should become aware of the demands of the aging population on health care delivery systems and should become familiar with the principal features of Medicare, Medicaid, and other third-party insurance plans, and with various plans for national health insurance as they relate to the elderly.

Clinical Information

(1) Distinctive features of medical care of the aged. The few disorders seen almost exclusively in people over 65 years of age, such as polymyalgia, carcinoma of the prostate, accidental hypothermia, hip fracture, and hypersosmolar coma, are likely to be dealt with in our present system of teaching. Nevertheless, an expert in the management of geriatric patients can teach the students how to perform functional assessments, to recognize atypical presentations of common diseases, and to determine realistic management goals for the various disorders which affect older people, for whom the aim may be to aid the individual to cope rather than to achieve a cure. A vigorous diagnostic work-up or an aggressive surgical procedure that might be appropriate to the care

of the middle-aged patient may carry more potential for harm than for benefit in an older person. Such teachers can also illustrate the importance of assuring the adequacy and appropriateness of the setting to which the elderly patient will be transferred after being discharged from the acute care hospital. Reinforcement of these principles is the responsiblity of teachers in all clinical discipines.

(2) Team approach to care of the elderly. The medical problems of the aged are often complicated by psychosocial and economic factors. The physician often serves as the leader in a team effort, and therefore must be able to work effectively with other professionals and to marshall diverse resources.

(a) Nursing. Nurses, nurse-practitioners, and nurses aides are the major providers of day-to-day care of the aged. They can teach valuable lessons to doctors-in-training about working with older people, whether in nursing homes, in hospitals, or in the patient's home.

(b) Social services and welfare. Social workers provide a link with the patient's family and can perform evaluations and assessment of the patient's environment. They are also knowledgeable about available community health resources.

(c) Rehabilitation and physical medicine. The recent enthusiasm for the core curriculum has caused these subjects to be relegated to elective status. Currently medical students may learn very little about what can be achieved over a period of time in assisting patients with various mental or physical handicaps by good rehabilitation services. Such experience is important in developing a positive therapeutic attitude and an appreciation of the value of even marginal functional improvement, which may permit the disabled to cope.

(3) Other institutional settings and home health care services. Physicians should be familiar with health care available in other than the acute care hospital. Information should be included on alternative housing arrangements and services provided in senior citizen housing developments and on various kinds of long-term care facilities. There are also many community services available, including transportation, meals-on-wheels, homemaker, shopping, escort, and visiting nurse services which enable elderly people to remain out of institutions. Students should be taught how to help patients and their families make judicious use of available resources in order to minimize intrusion and encourage independence.

(4) Preventive medicine for the aged. In addition to the usual preventive measures applicable to the young, the elderly can benefit from attention to their special problems. Falls, which constitute a major cause of disability in the aged, can often be avoided by attention to floor coverings, rails along walls, night lights in bathrooms, and assists to walking (canes and walkers). Agents to prevent infection such as the polyvalent pneumoccocal or influenza vaccines may have special value for certain older patients.

Suggestions for Content to be Integrated in Major Core Courses

The report has discussed at length material which might be incorporated into specific preclinical and clinical courses. The committee feels that the decision about what information is presented depends ultimately on the discretion of the instructor. As an example of how aging information might be incorporated into a basic science course, in this case pathology, the committee decided to include the following list of educational objectives that a student would be expected to fulfill.*

PATHOLOGY

1. Define and use in proper context:

aging	osteoporosis
arteriosclerosis	progeria
atrophy	senile amyloidosis
dystrophic calcification	senile cataract
hyalinization	senile elastosis
lipofuscin	senile keratosis
medial calcific sclerosis	senile dementia (Alzheimer's)

2. Discuss the retardation of aging in experimental animals.
3. Indicate the postulated actions in the cross-linkage theory for aging.
4. Contrast the percent of body weight composed of collagen in the young adult with the percent in the aged.
5. Indicate the morphological evidence for waste-product theory of aging.
6. Give evidence to support the genetic-mutation theory of aging.
7. Contrast the occurrence of autoimmune diseases in the young and the elderly.
8. List cellular alterations which indicate aging.
9. Indicate the epithelial changes in the skin which are seen in aging.
10. Discuss the role of elastin and collagen fibers in wrinkling of the skin.
11. Discuss the alterations in the dermal appendages with age.
12. Explain the mechanisms involved in graying of hair.
13. List four morphological evidences of aging in the heart.
14. Contrast the degree of coronary atherosclerosis in extremely elderly persons (80 years) with that of patient 10 to 15 years younger.
15. Discuss the changes in the aorta with aging.
16. Contrast the defense mechanisms to bacterial pneumonia in an infant, a young adult and an elderly person.
17. Discuss the relationship of amyloidosis to aging.
18. Contrast the incidence of neoplasms above and below the age of 50, 70, and 90.
19. List the conditions in the gastrointestinal system which are more common in the elderly.

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*Provided by the Association of Pathology Chairmen

20. Discuss aging changes in vessels other than the aorta.
21. List four non-vascular but age-related diseases in man.
22. Indicate the morphologic changes that occur in the central nervous system as a result of aging including those that are physiologic and those that are pathologic.
23. Discuss the finite lifespan of human and animal cells cultured in vitro in relationship to the life span of the donor.