Caring for the Older Patient, Part I: The Relationship of Theory to Practice

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This is the first article of a four-part series on gerontology and its applications to the care of elderly patients in nuclear medicine. The series includes discussions about the theories of aging, approaches to meeting the special needs of the elderly and ethical dilemmas in caring for the elderly. It also reviews anatomical and physiological changes associated with aging and the role of nuclear medicine studies in caring for the elderly. Upon completion of this article, the reader should be able to: (a) describe the aging U.S. population by citing demographic data; (b) identify the theories of aging and distinguish their major characteristics; (c) differentiate a gerontologic approach from a geriatric approach in caring for the elderly; and (d) recognize factors important to the delivery of effective care for the elderly.

Key Words: aged; aging; geriatrics; gerontology; theories

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There are multiple references within the *JCAHO Accreditation Manual for Hospitals* referring to appropriate care for specific patient age groups and to meeting the age-specific needs of such groups. JCAHO standards also direct hospitals to consider the special needs and behaviors of specific age groups when defining the qualifications and performance of the staff members who will care for these groups (*1*). The elderly make up one of the age-specific groups referred to in the manual as well as the fastest growing segment of the U.S. population (*2*). Increasing life expectancy and improved treatment of illness and injury have led to a dramatic increase in the number of people living beyond 65 yr. To meet the special needs of the elderly, nuclear medicine technologists must know the facts about the population they are serving.

FACTS ABOUT THE OLDER POPULATION

Like any diverse group, the elderly present a wide spectrum of characteristics. Much of the misinformation about the elderly is based on stereotypes that do not accurately reflect the group as a whole. For purposes of study and discussion, however, some definitions of segments of this population are helpful. Older individuals are considered to be those who are 65 yr of age or older. Within this larger group are the young-old, individuals ranging in age from 60–79 yr. In general, this group of people is relatively healthy and the most functionally independent. The old-old, ages 80–99 yr, have the most chronic health problems, resulting in difficulty in performing routine day-to-day activities (*3*). Individuals in the older population are sometimes categorized as able elderly, those who are functionally independent, or frail elderly, those who are in poor health and require assistance with activities such as personal hygiene and household chores. Frail elderly tend to be part of the old-old group while able elderly belong to the young-old group (*4*).

In the mid 1980s, there were twice as many children in the U.S. as older people. That proportion is reversing, however. By about 2030, these two groups will be equal in size. Each will comprise about 20% of the total U.S. population (*4*). Currently people over 65 yr of age constitute about 13% of the U.S. population. People over the age of 75 are the most rapidly growing segment of our population (*3*). With more people reaching their senior years and living longer after 65, the elderly population is becoming an older age group. Thanks to better health care, health promotion and improved public health, mortality has declined. Life expectancy is now 74.9 yr, an increase of more than 20 yr since the 1920s (*5*).

Most older people live with a spouse or other family member in the geographic area where they have spent most of their lives. While half of women over 65 yr are widows, most men in that age group have living spouses because women have a longer life expectancy and men tend to marry women younger than themselves. Fewer than one-third of older people live alone or have no family; most have family ties (*5*).

Older people generally live on fixed incomes. Social security is the main means of support for many; less than 20% receive income from private pensions. While the median net worth of older adults is almost twice the national average, many elders have difficulty meeting day-to-day expenses. Their net worth is

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often attributable to the appreciated value of their homes rather than cash reserves. Consequently, many people become poorer as they grow older. Poorer older adults may neglect preventive health care and delay access to acute care if health insurance coverage is minimal or nonexistent (*6*).

Although aging is a normal process that is progressive and irreversible, with the growing number of elderly comes an increasing number of individuals with chronic illness or long-term disability. Chronic conditions are four times more prevalent in the older population than in other age-groups. Almost 80% of older adults have at least one chronic health problem such as hypertension, hearing and visual impairments, and diabetes, and many cope with multiple chronic conditions. The three leading causes of death among adults 65 yr and older are heart disease, cancer and cerebrovascular disease. Although acute conditions occur less frequently in later life, older adults experience higher rates of complications and death from such conditions. The frail elderly and old-old adults compose the segment of the older population most at risk for physical and mental impairment (*3*).

It is estimated that the elderly use more than 70% of available health care services and occupy over 50% of available hospital beds. Older adults over 65 yr of age spend three times as many days in the hospital as younger groups, and 30 times as many days in nursing homes or rehabilitation facilities (*4*). Medicare pays 93% of the cost of hospital care for older adults. Although most people entering nursing homes have private insurance, their benefits are exhausted after about a year, and they require government assistance to continue their care. Medicaid covers a significant portion of the cost of long-term care. In relationship to the percentage of older adults, it may seem that a disproportionate percentage of public funds is being spent on this group (*5*). As in all areas of health care, the challenge in caring for the elderly will be to meet increasing demand for services in a time of decreasing revenues.

THEORIES OF AGING

There is nothing as practical as a good theory. The function of theory is to bring explanations to data and, ideally, to provide guidelines for action. The first aging theorist was probably Hippocrates, who theorized that the major factor in aging was the loss of body heat; both Aristotle and Galen developed similar theories later (*7*).

One of the paradoxes of biologic, physiologic, social and psychological theories of aging is that they have shown both diversity and homogeneity in the aging process (*8*). Just as nature versus nurture is a controversial construct in determining the intelligence and abilities of schoolchildren, the effects of biology, psychological changes and social expectations of the aged on the older population is unclear. The theories discussed here should not be considered in isolation, but as part of an elaborate mosaic designed to explain a phenomenon that has interested humans for millennia—the aging process.

Biologic and Physiologic Theories

The biologic changes of aging are obvious from an external standpoint. What has baffled scientists is why biologic aging occurs, and there are several theories to explain why organisms age. Each has some validity and, as in many scientific endeavors, it is difficult to determine whether one is measuring cause or effect. Hippocrates' theorizing that the loss of body heat was a causative factor in aging may have been the first example of this dilemma. He was certainly describing an effect (lowered body temperature), but fell short in locating the cause of aging.

It is also possible that aging is the result of more than one cause; thus multiple theories might explain why we age. Table 1 summarizes some of the biologic and physiologic theories of aging. This article does not attempt to summarize all theories of biologic and physiologic aging. Also, some theories cross over into others and not all authors categorize these theories in the same manner.

Biologic Theories

There are two types of biologic theories: genetic and nongenetic. Several respected scientists adhere to genetic theories of aging. These all hold aging as a preset and predetermined phenomenon. Comfort proposed, in his general genetic theory, that genes have a set "program" that limits the organism's life span (*9*). Thus, in humans, 120 yr might be the maximum possible age no matter what intervention we propose. In fact, some wags proposed that funding for basic aging research ceased when it was determined that there was no cure for aging.

Hayflick (*10*) proposed a similar theory when he demonstrated that normal human cells had a limited life span in a culture. Although Weissman had theorized in 1891 that cell division was finite, Carrel had proposed that cell cultures, given the correct medium, would be immortal (*11,12*). Of course, this "only if" aspect of Carrel's theory made it practically untestable, but a leading source of dogma in cytogerontology (*13*).

Finding that human cells reproduced 50 times ($\pm$10) in medium, Hayflick's calculations indicated a maximum human life span of 110–120 yr. This is sometimes called the Hayflick Limit. Other similar theories include the somatic mutation theory, which suggests that aging is caused by increasing numbers of mutated cells taking the place of normal cells, and the error theory, which holds that aging is due to increasing numbers of errors perpetuated in DNA or messenger RNA molecules.

Of the nongenetic theories, a common-sense, but untested theory, is the wear-and-tear theory, which holds human aging as mechanistic–that just like a car or any other machine, the human body wears out with use (*14*).

The best-accepted nongenetic theories are two similar theories: metabolic waste theory and collagen theory. Both propose that the body retains injurious or unusable substances. One metabolic waste theory is the clinker theory, which combines variations of the somatic mutation, cross-linkage and free radical theories discussed here (*15*). Collagen, with age, becomes thicker, less elastic and less soluble; it also tends to mass and replace existing tissues (*16*). Changes in the structure of collagen with age are, in part, responsible for arteriosclerosis and the so-called "hardening of the arteries." Another inert

TABLE 1
Summary of Biologic and Physiologic Theories of Aging

Theory	Description	Possible interventions
General genetic	Genes have a set program that limit the life span	Genetic engineering (?)
Hayflick limit	Cells are limited in their number of divisions; this limits human life spans	Theorized that hypothermia and diet might delay cell divisions (but number of divisions remains fixed)
Somatic mutation	Aging caused by increased number of mutations	
Error	Aging due to increased number of errors perpetuated in DNA or mRNA	
Wear-and-tear	Mechanistic; body wears out like any other machine	Increased use of prosthetics and harvested organs
Metabolic waste	Retention of injurious substances	
Collagen	Changes in collagen; masses and replaces functioning cellular components	
Free radical	Free radicals alter the cell (DNA target)	Increase consumption of antioxidants (eg., vitamins A, C, E); decrease intake of foods that may increase free radical formation
Cross-linkage	Normally separated molecular structures bound together through chemical reactions or exposure to radiation	Caloric restrictions may delay the aging process
Physiologic (immune)	Immune system's decreased capacity causes aging	Immunoengineering or replacement/rejuvenation of immune system

product that may accumulate in the cells of the body is lipofucsin; it may displace functioning cellular components.

One currently popular nongenetic theory is the free radical theory (*17*). Like genetic theories, it proposes changes in the DNA as the cause of aging. Unlike genetic theories, it does not recognize these changes as inevitable. Instead it proposes that free radicals alter the cell and cause aging. Many individuals take substances such as antioxidants in the hope that the aging process can be retarded.

The free radical theory may be of interest to nuclear medicine technologists as it is based on radiation chemistry. When Harman first postulated this theory, it was based on the observation, made in fruit flies, that in addition to other responses such as mutations, a nonspecific life span shortening was observed in the fruit flies. The causative agent was thought to be free radical formation, which now is recognized by most scientists as the cause of damage to cells from ionizing radiation. What weakens this theory is the fact that nonspecific life span shortening has never been documented in humans (*18*). This may be due to our cells having the capacity for repair; we may also simply not have enough information in humans, lacking good longitudinal data (*19*). A recent review by the Radiation Effects Research Foundation (RERF), based on the longitudinal cohort studies of the Adult Health Studies (AHS) and Life Span Study (LSS) did not alter earlier conclusions that observed life span shortening was associated primarily with cancer induction than a nonspecific cause. However, there was a suggestion of possible radiation-induced atherosclerotic disease and acceleration of aging in the T cell related immune system (*20*).

Bjorksten's cross-linkage theory proposes that normally separated molecular structures are bound together through chemical reactions or exposure to other agents such as radiation (*21*). This leads to bonds that cause an increase in cell rigidity and instability.

Physiologic Theories

Not well accepted today, physiologic theories propose that aging occurs due to the breakdown of a single organ system. For example, some have suggested that the pituitary gland or the thyroid may cause changes that lead to aging. Others believe that the immune system, which is lessened in capacity with age, may cause aging. This theory tends to focus on function of the thymus gland as the causative agent. The thymus shrinks with age; the body's capability for T-cell differentiation decreases with age as well. Thus, the body may misidentify old irregular cells as foreign bodies and attack them. Advocates believe that this theory has the potential to explain the increased incidence of conditions such as cancer, maturity-onset diabetes, arthritis and senile dementia. Critics contend that this theory explains the how of at least one of the aging processes, but not why.

New Research

Aging theories are continually being modified. For example, recent evidence that telomeres shorten with age has led to speculation as to whether this is a potential cause or only an effect of aging, or perhaps even that telomere shortening is an evolutionary neutral event. Hayflick believes that telomere shortening may be part of the biologic clock that sets aging (*22*). Immortal (e.g., cancer) cells contain an agent known as telomerase that allows them to make more telomeres. Could this agent stop aging? Some current research is looking at this, although the outcomes are as of yet unclear.

TABLE 2
Summary of Social Theories of Aging

Theory	Description	Implications for patient care
Social exchange	Social behavior involves doing what is valued and rewarded by society	Patient may be expected to assume certain roles (eg., sick role)
Disengagement	Aging brings a progressive social disengagement in preparation for death	As in social exchange, certain roles expected; patient withdrawal expected, especially with advanced age
Activity	Successful aging requires activity and involvement in society	Encourages patient to remain involved and active
Continuity	Believes that the inner self is a constant despite outside appearances	Encourages an individual approach to each person; patient probably views self at 70 yr not much different than at 20 yr

SOCIAL AND PSYCHOLOGICAL THEORIES

Although the social and psychological theories could fill a book of their own, it is important for the technologist who wants to meet the needs of the elder patient to realize the whole construct of the older person (*23*).

Social Theories

One thing that sociology has brought to aging is that age is not, as people might believe intuitively, a good predictor of social behavior. The aged are no less diverse than the young, and compartmentalizing them into convenient boxes is inappropriate. The following assumptions are held for social theories of aging:

1. Stratification by age is necessary for the organization of society.
2. Social structures determine an individual's rights and responsibilities.
3. Aging cannot be fully explained by the use of biologic or physiologic theories alone.
4. Social expectations may remain constant and may change during the course of a lifetime.
5. New social expectations (e.g., the sick role) will lead to changes in identity (*3*).

There are four well-accepted social theories of aging: the social exchange theory, disengagement theory, activity theory and continuity theory (Table 2). In the social exchange theory, social behavior involves doing what is valued and rewarded by society. With increased age may come decreased resources, increased dependency, fewer roles and less power. What remains contested in this theory is the effect of changes in roles, such as the loss of the parent role and the usual subsequent assumption of the grandparent role.

The disengagement theory, proposed by Cumming and Henry in the 1950s, holds that aging brings a progressive social disengagement in preparation for death that is mutual and acceptable to both the individual and society (*24*). It holds a ring of truth, but has been challenged since other theorists have found that the degree of disengagement is highly person-specific. As with many theories, Tallmer and Kutner challenged whether it measured cause or effect, or was necessarily age specific: "it is not age which produces disengagement... but the impact of physical and social stress which may be expected to increase with age" (*25*). The theory also may not hold as true today, with increased admonitions for elders to remain active, as it did in the 1950s.

An opposing theory was formed in the 1960s based on competing work begun in the 1950s by Havighurst and Albrecht, the activity theory (*26*). This theory holds that successful aging depends on maintaining a high activity level and that life satisfaction is related to life involvement. Thus, the successful elder may be the one who rejects the disengagement normally expected of him or her. This theory may be critiqued on similar grounds to disengagement as it does not consider the diversity of the older population. Some individuals may choose disengagement as they age, and should be allowed that option if they so choose.

The continuity theory assumes that individual patterns or roles remain constant throughout the life span (*27*). The inner self is the same regardless of outside changes. This theory is attractive. Many individuals do not think of themselves as an "older person," but as "John Smith."

Psychological Theories

Understanding the psychology of aging requires an understanding of human intelligence and age-related changes as well as an understanding of human development throughout the life cycle.

Aging and Intelligence. What happens to our intellectual abilities as we age? Many individuals assume that most or many individuals lose their intellectual capacities with age and that, eventually, all old people become senile. Although conditions such as Alzheimer's disease increase with age, most individuals, even those past age 85, are not senile or otherwise incapacitated intellectually.

Many of the early studies of aging and intelligence were flawed due to methodology (*28*). When older people were compared with younger people, there were apparently great differences in intelligence with age. However, researchers failed to realize that what they were actually comparing was Generation A (e.g., 20-yr-olds) versus Generation B (e.g., 70-yr-olds). One obvious difference between the two groups was their level of intellectual attainment.

TABLE 3
Summary of Developmental Theories of Aging

Theory	Description	Implications for patient care
Maslow's hierarchy of human needs	All people strive toward self-actualization through various stages	Stage patient is in will determine the important tasks for them; these are not necessarily age-specific
Jung's theory of individualism	Stages include old age, where one turns inward to reflect for answers	Inner direction may mean that external factors of health are less important to patient; motivation (eg., compliance) may have to come from within
Course of human life	Old age is a time for rest and review of one's life	Patient may view old age as a reward and expect commensurate treatment
Erikson's eight stages of life	Ego must resolve a crisis in each stage; in old age this would involve a looking back at life and accepting death (ego integrity versus despair)	Anxieties about issues such as death may be of extreme importance to the patient and exacerbated due to the unknown that accompanies diagnostic testing An elder who has successfully resolved the crisis will be comfortable in speaking about death; the technologist should not negate or ignore such discussions

Over the years, longitudinal studies have brought better data. The following discussion is based on information from the Seattle Longitudinal Study, which has followed adults over a 35-yr period, and is still being conducted at 7-yr intervals (*29,30*). Intelligence seems to increase with age to a point, then remains constant until extreme old age or disease sets in. In fact, Horn's research indicated that intelligence increased well into what many would consider the beginning of old age (61 yr of age) (*31*).

This, however, should be qualified. Although crystallized intelligence increases and then remains constant, there are some decreases in fluid intelligence with age. Crystallized intelligence is "processing of perceiving relationships, educing correlates, maintaining span of immediate awareness in reasoning, abstracting, concept formation and problem solving," whereas fluid intelligence reflects "relatively advanced education and acculturation either in the fundamentals (contents) of the problem or in the operations that must be performed on the fundamentals" (*32*). Thus, fluid intelligence might represent a child's ability to learn new tasks quickly, such as programming a VCR, whereas crystallized intelligence requires experience in order to engage in the problem-solving process, such as the management of people in the work setting, or other tasks difficult for novices due to the structure required, such as writing journal articles.

Studies have shown that older people certainly can learn, even in very old age. What differentiates them from the young is not so much ability to learn, but time. It takes the elderly (age 50 yr plus) longer to learn new things but, once learned, they are learned well. Short-term memory decreases to a small extent; much of this is reflected in the well-known need of the elderly to take longer amounts of time to bring the information needed forward. Memory changes are highly influenced by environment, and it is also recognized that memory changes can be minimized with various techniques to enhance memory, known popularly as "use it or lose it."

Developmental Theories. There are several theories that describe the development of humans across the life span (Table 3). Maslow's hierarchy of human needs theory states that all people strive towards self-actualization; once a stage is achieved, the person works on achieving the next stage (*33*). Jung's theory of individualism proposed several stages, including old age (*34*). In old age, according to Jung, a person turns inward to reflect for answers from within, rather than from society.

Buhler proposed a course of human life theory in which a person in middle and old age tries to first review his life: looking over what has been accomplished, evaluating what was or was not accomplished, and finally integrating these into his life plan (*35*). Buhler felt that many older people saw retirement as a time to rest from achieving life goals. Interestingly, Butler has noted that the reason why some older people, in reviewing the events of their past, tell the story somewhat differently than it really happened, is due to a need for life to have been experienced "as they would have" based on their current views (*36*).

Probably the best accepted theory of development and aging is Erikson's eight stages of life theory (*37*). In each stage the ego must resolve a crisis by mastering it. In middle age (ages 40–65 yr) the adult is concerned with establishing and guiding the next generation (crisis: generativity versus self-absorption or stagnation). In old age (65 yr plus; ego integrity versus despair), the older adult should be able to look back and feel satisfied with life and, eventually, accept death.

Erikson's theory was the basis of an important longitudinal study, the results of which were published in 1978. Gail Sheehy's best-seller, *Passages*, was a controversial reporting of that study, in that the researchers felt she had reported their data before they were ready to do so (*38*). In that study Levinson et al. (*39*) noted that:

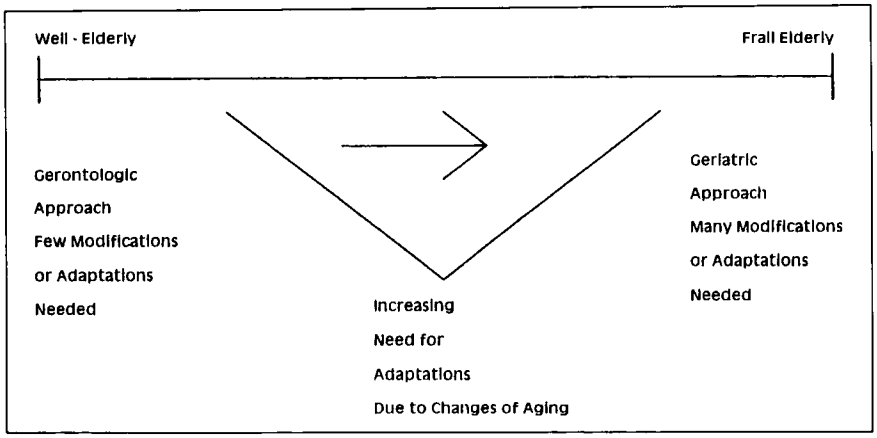

FIGURE 1. The continuum of approaches to the care of the elderly patient. Reprinted from: Dowd SB, Durick D. Addressing the needs of elderly radiology patients. *Radiol Technol* 1995; 66: 300.

> The most useful starting point is to consider the *choices* a person makes and how he deals with their consequences. The important choices in adult life have to do with work, family, friendships and love relationships of various kinds, where to live, leisure, involvement in religious, political and community life, immediate and long-term goals.

This book established a rich mosaic for the aging process. Although certainly there were some similarities in aging, each individual described in the study had dealt with choices in a different way and was, thus, a very different person than others in the study.

Peck expanded Erikson's view of old age into three stages: ego differentiation versus work role preoccupation, body transcendence versus body preoccupation and ego transcendence versus ego preoccupation (*40*). Thus, Peck viewed retirement, changes in the body with age and acceptance of death as three separate crises to be resolved by the elder.

GERONTOLOGIC VERSUS GERIATRIC APPROACHES TO THE PATIENT

Although aging has been of interest to writers, philosophers and scientists throughout the ages, it is only within recent history that gerontology and geriatrics have been recognized as specific disciplines (*41*). Nascher is the physician commonly given credit for coining the term geriatrics in 1909 from the Greek roots geron for "old man" and iatrike from "surgery, medicine, or the treatment of" (*42*). The theoretical construct for the medical view of the aged probably stems from Cannon's view of homeostasis over the life span (*43*). Cannon felt that changes with age in the regulatory abilities of the body to maintain homeostasis forced an adaptation or negative consequences, such as death. A recent review by Goldstein et al. (*44*) for family physicians noted that the "essential feature" of aging "may be a decline in homeostatic reserve—that is, a reduction in the body's ability to make restitution when its systems are disturbed".

Commonly, gerontology has been used to refer to the study of aging, whereas geriatrics refers to the medical treatment of the aged. Thus a physician treating the elderly might be referred to as a geriatrician.

However, one thing that the study of the aged showed over the 60 yr since its inception was that there was no convenient way to categorize the elderly; whether by disease or other factors. In fact, the biomedicalization of treatment of the aged (e.g., as originally proposed by Cannon) has been roundly criticized since it encourages a view of the elderly as diseased, rather than viewing aging as normal (*45*).

Most elderly have some chronic conditions, however, these are a normal part of the aging process, are not of the same intensity in all individuals and, in fact, some individuals never seem to suffer from the diseases of aging. There are also several qualities that appear to increase with age through late adulthood, lessening only with severe advanced age or disease.

Also gerontology, being multidisciplinary in approach, recognizes that individuals do not age biologically only, they age biologically, socially, politically, psychologically and religiously, to name but a few aspects. Providers of services to the elderly need to recognize the whole person in the equation, just as a patient is not a "gallbladder" or "the thallium scan."

In recognition of this problem, several authors and researchers have proposed multifaceted approaches to this problem. It has been suggested that there are three indexes of aging that can be evaluated: biological age, psychological age and social age (*44,45*). There are 80-yr-old marathon runners who may, biologically, be as fit as a 40-yr-old. Similarly, a 90-yr-old may be "bedridden with severe arthritis," but still "quite alert and talkative, keep abreast of current events, behave assertively, and have sound reasoning skills" that surpass those of a 20-yr-old (*46*). Too often the assumption is made that physical illness necessarily translates into mental deficits.

Also, it is not unknown for an older individual to identify with a younger generation and take on the mannerisms, dress and other mores of that culture. It has been suggested that these factors can be measured and a functional age determined. This concept, however, lacks practical implementation (*47,48*).

In recognition of this deficit, Dowd and Durick (*49*) proposed that health care professionals adopt a gerontologic approach to the well elderly and a geriatric approach to the frail elderly, as well as recognize that many elderly were neither fully well nor frail, but might require a combination of the above approaches (Fig. 1).

Although this argument may appear to be wholly semantic in nature (what does it matter *what* we call the older patient or the way we deliver care, so long as it is delivered competently and respectfully?), it is not. Whorf (*50*) posited some years ago that language was a shaper of reality, as well as the reflection of it. If we use the term geriatric to refer to all patients 65 yr and older, we are also prone to treat them all the same–as a disease rather than a person. Aging is no more a disease than pregnancy is a disease. Aging is normal and pregnancy is normal. Both bring changes to the soma (body); some are permanent and others are transitory. The aged should be viewed as diseased no more than the pregnant woman.

Case Study

Consider two hospitals in the same city. Hospital A is a 500-bed teaching hospital, and sees a number of acute and chronic patients. Due to the existence of a large outpatient clinic near the hospital, there are few outpatients. There are several chronic care wards in the hospital, and a good deal of research is being performed.

Hospital B is located in the suburbs of this city. In fact, it is located in one of the older suburbs. It has no specialized outpatient clinic, so patients may present from physician's offices or the floors or, in some cases, from an adjoining long-term care facility that houses many residents of the community.

How will each hospital approach its older patients? Hospital A will probably have to make many adaptations to frail elderly patients; there will be few healthy older patients. Since research is conducted in this hospital, steps will have to be taken to preserve the autonomy of the patients who may be subjects of research studies.

Hospital B will have a good number of healthy older patients, some with several chronic problems but still able to function, whereas some patients from the long-term care facility will require great adaptation.

Subsequent articles in this series will be more specific in the discussion of adapting patient care, as well as nuclear medicine procedures to the range of older patients seen now, and in the future.

EFFECTIVE PATIENT CARE OF THE ELDERLY

Effective care for any group of patients entails being responsive to both their physical and emotional needs. After all, every patient wants, and deserves, to be seen as an individual with unique needs. As noted earlier, the elderly comprise a diverse group of individuals with special needs related to the normal aging process as well as to age-related disorders. Consequently, their care spans a continuum from requiring only minor adaptations and modifications to requiring major ones, depending on the health status of the individual. Accordingly, nuclear medicine technologists must be prepared to assess and respond appropriately to this broad range of needs. Technologists must be educated about the elderly and the special needs of this group. Likewise, elderly patients must be educated about the nuclear medicine procedures they are to undergo.

Educating the Patient

Most patients, regardless of their age, are not familiar with nuclear medicine or the procedures that are performed in this specialty. A patient who understands the examination and why it has been ordered is more likely to comply with the requirements of the study; patient compliance may affect the technical quality of the results. Some nuclear medicine departments have implemented a system where patients are contacted the day before an examination to confirm the appointment in nuclear medicine, review any preparations required and answer patients' questions (*51*). While such systems were implemented as a cost-saving measure, other positive outcomes were realized also. Patients were in better compliance with the examination requirements, such as discontinuing medications appropriately, and potential problems were identified and addressed, such as conflicts in scheduling and contraindications to examination preparation. This last problem, contraindications to exam preparation, is an important one for the elderly population. Many nuclear medicine tests require that the patient fast; however, approximately 50% of the elderly have a problem with glucose intolerance (*5*). A consistent daily food intake along with insulin or an oral hypoglycemic medication is the means by which this condition is controlled. When patients must fast or alter their diet or activity pattern in other ways, the dosage of an antidiabetic drug must be adjusted. The way in which drugs are absorbed, metabolized, excreted and their biological and therapeutic effects are different in older adults. Careful monitoring and drug dosage adjustment are important to minimize risks to this population of patients. The next article in this series will cover this topic in more detail.

Similarly, dehydration is another serious problem in the elderly that may stem from examination requirements. Normal aging changes affect an elderly person's adaptive responses. With age, these responses are slower. In the case of regulating water balance, an elderly person's response to the restriction of fluids is inadequate, leading to a fluid imbalance. The effects of dehydration may cause the patient to exhibit symptoms mistaken for senility (*52*).

While it is important to communicate with all patients to give information and reassurance, it is equally important to ask what information the patient wants. For some patients, anxiety may be related more to uncertainty about the physical sensations they may experience during a procedure. Hence, providing information about what patients will feel may offer the most comfort and reassurance. Nevertheless, elderly patients must also receive sufficient information about other aspects of the examinations as well to make informed consent for the procedure.

Older adults are more likely to have begun working at an early age and, therefore, may have a minimal education. Also, many have been out of the work force for a decade or more. Concepts and devices, such as computers and voice mail, that are familiar to people who continue to work may be unknown to older adults. Individuals with less education are more likely to be anxious about medical diagnostic procedures which typically take place in a highly technical environment (*53*). Therefore, the

technologist should explain the procedure in simple terms that will not confuse the patient or increase anxiety. The elderly process information at a slower rate and are more easily distracted by irrelevant information and stimuli. A patient who hesitates in answering or registers a blank facial expression may actually be concentrating intently on the communication taking place (*54*). Also, elderly who live in relative isolation from others have a less verbal lifestyle that may make obtaining information or acknowledgment of understanding difficult (*55*).

The manner in which information is conveyed is as significant as the information itself. Older patients are aware of the negative stereotyping associated with their age-group. Certain patients may no longer feel valued and may feel powerless in one or more aspects of their lives because of age-related changes (*56*). The technologist can demonstrate appreciation of the elderly patient as an individual by using interpersonal techniques such as speaking to the patient at eye level, introducing himself, identifying the technologist's role in the patient's care, using the patient's last name, speaking slowly and distinctly, and listening carefully to the patient's responses. The interaction between the technologist and an elderly patient should proceed in an unhurried manner. Signs of the technologist's impatience, such as anticipating a patient's answers, completing the patient's sentences or not allowing the patient adequate time to formulate an answer to a question, may frustrate or confuse the patient (*54*).

Another point to consider in communicating with elderly patients is their perception of medical personnel. Elderly people were raised to believe that certain authority figures, such as doctors, teachers and police, should not be questioned. The elderly may continue to view medical personnel as experts whose judgements or suggestions should be accepted without question or comment. This benevolent power that health care professionals have over patients should be used constructively to enhance the therapeutic nature of their interactions to benefit the patient. Elderly patients who may already feel devalued may easily be manipulated if this power is used inappropriately (*57*).

Educating the Technologist

Since technologists have the education and experience in performing nuclear medicine examinations, technologists should be responsible for educating the patient. To do this effectively, however, technologists must have a positive attitude about the population they are serving, as well as the technical skills appropriate to meet the special needs of this age group. Technical skills include patient assessment and adapting the nuclear medicine department and procedures for the elderly patient. Assessment of medication use, mobility, cognitive function and sensory changes (hearing, vision) are a few areas that directly affect the patient's ability to cooperate and the nuclear medicine examination itself. In-service education for technologists should include patient assessment. A checklist for use in the nuclear medicine department when evaluating elderly patients could be developed based on the in-service session and the dimensions being assessed that are most relevant to nuclear medicine. Departmental and procedural adaptations will be discussed in the next article in this series.

TABLE 4
Guidelines for In-Service Education in Caring for the Healthy Elderly*

I. Basic treatment strategies for all patients
  A. Patient autonomy
  B. Patient's bill of rights
II. Normal changes due to aging
  A. Vision
  B. Hearing
  C. Balance/coordination
  D. Temperature
  E. Skin
  F. Lungs/respiration
III. Patient education
  A. Basic preparations
    1. Adaptations for older patients
      a. Fluid intake
      b. Diabetic patients
  B. Examination
    1. Patient history/informed consent
    2. Patient instructions
    3. Postprocedural instruction
IV. Adaptation of patient care for the elderly
  A. Physical adaptations
  B. Customer service for the elderly

*Modified from Dowd and Durick (*49*).

Attitudes and impressions about aging, both positive and negative, are based on personal experience with the elderly. These too may be addressed in an in-service format. Knowledge about normal changes due to aging can provide information that may offset negative feelings when the basis for certain behaviors is explained. For example, hearing deficits can be a source of frustration to both the elderly patient and the technologist who are trying to communicate. Loss of hearing in both high- and low-frequency ranges occurs as a normal part of aging. Techniques such as facing the patient, letting the patient see the technologist's lips and using nonverbal as well as verbal communication can improve the communication and decrease the frustration of both parties (*56*). Likewise, simulations may be used to heighten awareness about sensory and mobility changes. For instance, in-service participants could be instructed to complete a series of routine tasks from a wheelchair, or read the label on a prescription bottle with impaired vision (*58*). The occupational and physical therapy departments of the hospital would be good resources in staging such simulations. Table 4 outlines a set of guidelines for in-service education about caring for the healthy elderly. Subsequent in-service sessions could focus on the frail elderly or on ethical issues associated with caring for the elderly, to name just a few topics related to elder care.

We are all traveling down the path of aging. From a personal perspective, it may be reason enough to study the elderly just to understand where we are headed and what we will meet along the way. As professionals, we are obligated to practice holistically, to hone our affective skills as diligently as we

pursue technical skills. Only then will we be able to deliver care to the whole person and to address the special needs of all age groups. Many other health care professions, most notably nursing and occupational and physical therapy, have recognized their role in the treatment of the elderly. Nuclear medicine technologists also need to acknowledge their role in the care of this group and educate themselves to meet the special needs of their elderly patients.

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