

GERINOTES

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PRESIDENT'S MESSAGE: RESILIENCE PART 1

William H. Staples, PT, DHS, DPT, GCS, CEEAA



I am going to admit that at the time of writing this column, a week after the Boston Marathon that I am still angry, and writing this column may be my way of venting. Innocent runners, family members, and fans have been killed or severely injured for no justifiable reason. As a long-time member of the 'running community,' I have taken this affront to peace personally. I had planned to write about resilience and older adults, but that will wait until the next issue. Many members of your Board of Directors are runners.

Running or walking a full marathon or even a half-marathon can be a humbling experience. Running impacts people in profound ways. The impact it has on people extends way beyond the physical. Running can act as a catalyst for accomplishing other goals. The impossible becomes plausible, if not entirely possible. Not often do runners get placed into the limelight, much like physical therapists. We are generally a quiet bunch who dutifully do our training or our job, modestly shrugging our shoulders when others marvel, and find inner satisfaction from our accomplishments. Most participants do not run a race to win it. That is left for the elite athletes. More important for most runners is their personal finish time and their placement within their specific gender and age group; and some runners just hope to finish. Running a marathon, a half, or a 10K or 5K is not just running that distance to the finish line. Running a long race takes months or even years of preparation, running miles and miles on roads and trails in the heat or cold, dry or wet conditions at all hours of the day, without crowds or fanfare. There are inherent risks in running these distances. Encountering delirium that comes from hitting the

wall after "only" 22 miles can be mentally devastating. There are the cramps that will not vanish, blistered feet that sting with every step, a piriformis screaming to stop the torture, the depleted quads or calves that plead for a chair, and pains from parts of your body you didn't know could hurt. I know I've had every one of those. The realization that you didn't train hard enough, or are not as fit as you had hoped, and might fail in your quest may run through your mind. A goal of personal achievement is what stands between the runner and the ultimate finish line, or a physical therapist successfully rehabbing a patient.

Over the past decade, the number of older runners participating in the Boston Marathon has more than quadrupled. A record 596 runners age 65 and older registered for April's race, 47 of whom were age 75 and older! These are very impressive numbers, indeed. For those of you who do not know, in order to qualify for Boston, a premier event, you have to show you are already in excellent condition. In other words, you have to run a marathon in a certain time to then qualify to run the Boston Marathon. Times to qualify for this year's marathon were:

60-64 years - 3hrs 55min - 4hrs 25min
65-69 years - 4hrs 10min - 4hrs 40min
70-74 years - 4hrs 25min - 4hrs 55min
75-79 years - 4hrs 40min - 5hrs 10min
80 & up - 4hrs 55min - 5hrs 25min

These are finish times you can't just decide to run one day to get off the couch and do. This takes dedication. Honestly, I hope I'm still walking unassisted and unaided at age 80!

Webster's online dictionary defines resilience as "1. The capability of a strained body to recover its size and shape after deformation caused especially by compressive stress, and 2. An ability to recover from or adjust easily to misfortune or change."¹

When something goes wrong, do you tend to bounce back or fall apart? As a runner being resilient is a must. To

age well you must also be resilient. Long hours of training inevitably produce injury requiring rest. Years of living may also lead to development of illnesses or disabilities. Most people generally can adapt well over time to life-changing situations and stressful conditions. What enables them to do so? It involves resilience, an ongoing process that requires time and effort and engages people in taking a number of steps. Being resilient does not mean that a person doesn't experience difficulty or distress. "Resilience is the result of successful adaptation to diversity."² Emotional pain and sadness are common in people who have suffered major adversity or trauma in their lives. In fact, the road to resilience is likely to involve considerable emotional distress. As physical therapists working with older adults, we see that on most days. Resilience is the ability to roll with the punches. When stress, adversity, or trauma strikes, you still experience anger, grief, and pain, but you are able to keep functioning both physically and psychologically. Resilience is not about toughing it out, being stoic, or going it alone. In fact, being able to reach out to others for support is a key component of being resilient. We can fill that role with our patients.

The next issue's column will look at ways we can help build resilience both for ourselves and our patients. For now, I hope for resilience for all the victims and families of the tragedy in Boston.

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EDITOR'S MESSAGE

Melanie Sponholz, MSPT, GCS, CCEP, CHC



“Not appropriate for services. Unable to follow instruction or retain information.” Have you ever come across this note in the medical record of a

person with dementia? Have you ever seen this explanation of why rehabilitation services were not provided for a person with cognitive impairment? Have you ever been the writer of this note? This is not a reprimand or a renunciation of those who have written this note in their careers as PTs. I think we have all seen or written something along those lines. The important question is, “why?” How do we send physical therapists out of our academic programs and our clinical affiliations who do not understand how to treat patients with dementia, or other cognitive impairment? Maybe it is too easy to compartmentalize this topic as “geriatric.” However, looking at the growing older adult population, we need to realize that this is not a niche area of practice. The majority of clinicians, working in settings from acute care to orthopedic outpatient, will treat older adults. Consequently, the vast majority of clinicians will also treat patients with some degree of dementia. According to the Center for Disease Control, between 25% and 50% of all people will exhibit signs of Alzheimer disease by the age of 85. And while there are already 5.3 million Americans with a diagnosis of Alzheimer disease, that number is projected to more than double by 2050, as the population ages. It is so important that we raise awareness among educators and clinical instructors about the importance of learning to treat this population.

It is for this reason that I was so pleased to receive Jennifer Bottomley’s submission of her students’ papers that

are included in this issue. The papers are from students at the University of Indianapolis. Dr. Bottomley is an adjunct faculty there and teaches a course in Assessment and Intervention for Geriatric Clients with Multiple Diagnoses. Just from the title of this course, it is clear what a valuable perspective Dr. Bottomley provides her students. Too often we teach in silos--ortho, neuro, cardiopulmonary--when, especially in the aging adult population, diagnoses in these areas are rarely seen in isolation. The complicated medical history is one of the most challenging aspects of working with older adults. Each diagnosis impacts the others, as does the polypharmacy that usually comes along with the picture. Including dementia in the list “multiple diagnoses” is key, since interventions for other diagnoses will certainly be impacted by cognitive decline. The 4 student papers in this issue provide a spotlight on the progressive nature of Dr. Bottomley’s course, as well as valuable information on treating clients with dementia.

As evidenced by these papers, Dr. Bottomley’s course is built on the importance of understanding the totality of an older adult’s health picture. This holistic approach continues within each diagnosis, including Alzheimers, to include a review of the multiple physical, psychosocial, and environmental impacts of the disease, as well as the multiple avenues of intervention, from pharmaceutical to dietary. As we teach students about working with clients with dementia, or formulate our own interventions for patients, this all-encompassing approach will serve our patients well. Thinking of our treatment philosophy and intervention in the context of the multidisciplinary team approach is important. So too it is important to look beyond the medical diagnoses at hand to include psycho-social impacts on the patient and their caregivers. If we ever experience frustration at trying to accomplish a goal

with a client with dementia, we must remember how amplified that frustration is for the caregivers who must assist with the accomplishment of every daily task, every day. This perspective must inform interventions, from designing home exercise programs to making environmental modifications, to make rehabilitation successful and meaningful.

Another feature of these student papers that I found encouraging was the inclusion of occupational therapy and speech and language pathology in the discussion of rehabilitation for older adults with dementia. It is important that we, as physical therapists, understand the benefits of, and indications for, the other disciplines. Including discussions of other disciplines in PT education is a wonderful way to make sure that patients get the right combination of therapy to reach their goals. I worked on a team to develop a training that used a videotaped interview and PT evaluation of an older adult to spur brainstorming about what PT goals might be and what indicators were seen for referral to other disciplines. The development team included representatives from PT, OT, and SLP, and we started by writing down indicators that we observed for each discipline, including our own. Without fail, the number of indicators observed by each discipline for the other disciplines was far lower than those documented by those other disciplines. For instance, I came up with 3 indicators to refer for a SLP evaluation, while my SLP colleagues listed 8!

Overall, I think these papers are thought provoking and informative. A big “thank you” goes to Jennifer for bringing them to us, and for the editing and development she contributed. She has been a great contributor to *GeriNotes* in my time as an Editor, and it is a privilege to learn from her and to count her as a friend.

MEDICAL GRADE HONEY IN WOUND CARE: A REVIEW

Cathryn (Kayla) Wilson, SPT and Meri Goehring, PT, PhD, GCS

SIGNIFICANCE OF TOPIC

Wounds found in the older adult population can be of various etiology, but the most common are pressure wounds, venous or arterial ulcers, and neuropathic ulcers. This article will review some of the current information regarding the use of honey in wound care.

Aging skin is more susceptible to wounds due to decreased water content, decreased tensile strength, decreased integrity between the dermis and epidermis, drying of the skin, loss of subcutaneous tissue and vascularity, and diminished stability of small blood vessels.¹ Approximately 70% of all pressure ulcers occur in the geriatric population.^{1,2} Wound healing is a complex process with no two wounds or patients being the same.³ Wound healing should be measured as objectively as possible, but subjective measures are common.⁴ Wound dressings are often designed to focus on antibacterial properties, exudate absorption, debridement, and/or providing a moist wound environment.⁵ There is no single dressing that is appropriate for the management of all wounds or all stages of a single wound throughout its course of healing.⁶ The clinician has the responsibility of choosing the most appropriate dressing for the wound and requires a knowledge of properties that the dressing offers.

Wound infections are common and can lead to increased costs, morbidity, and mortality.⁶ Chronic wounds present an extreme costly and time consuming challenge to treat if they are to heal. Chronic wounds account for at least \$1 billion per year in the United States and \$7 billion per year worldwide in health care costs.⁷ The cost to heal a single pressure ulcer can range from \$400 to \$40,000.⁷

Due to the vast variability of wounds, high quality evidence produced by random controlled trials is difficult to obtain and clinically apply. However, there is some information on the use of honey in wound care.

USE OF HONEY THROUGHOUT HISTORY

Honey has had a long history of medicinal uses throughout history.^{5,8-12}

Honey has been used by the Chinese, ancient Greeks, Judeo-Christian-Islamic traditions, eastern African tribes and American Indians during the past 4000 years.⁸ The use of honey for medicinal purposes greatly decreased upon the development of antibiotics but has more recently been regaining popularity with the prevalence of antibiotic resistant bacteria. Bacterial resistance has developed to every commonly employed antibiotic.⁶

Honey Production

Honey is derived from bees collecting different plant nectars. Not all honeys contain the same properties and antibacterial benefits.¹³ Weather, climatic conditions, flower source, processing, and processing methods can all have an effect on the clinical impact of the honey.¹⁰ Leptospermum derived honey, called manuka honey, has been found to have the overall best antimicrobial activity because of its phytochemicals and plant derived components. It has been reported to have nonperoxide-based activity.^{9,10,13,14} Nonperoxide-based activity honey is not as common as other types of honey.⁹ Manuka honey has been used in many studies and marketed as medical grade honey.

Medical grade manuka (MGH) honey is grown from a specific resource and harvested and processed purely for that purpose. The manuka plant is a rapid growing, hardy plant and is native to New Zealand. The manuka resource of New Zealand is in plentiful supply, allowing for potential future growth of medical grade honey supplies. Medical grade manuka harvesting requires strict beekeeper conformance with harvest and apiary management standards. This includes hive site location and hive management. The beekeeper must use appropriate hive materials and have correct maintenance procedures. The components of the hives and their foundations must be considered, along with pest and disease management. During harvesting, smoker fuel is controlled and the bee removal process is designed in such a way that there is minimal contamination from both the equipment used and the bees themselves. Hygiene throughout

the honey harvesting and transportation process is a critical factor.¹⁵

Medical grade manuka is sold as an alginate, single use dressing hydrocolloid, and 100% honey in a tube. Not all honey products contain the same percentage of honey, and the strength of the honey may vary in each product.¹⁰ Medical grade manuka is gamma radiated and processed under strict quality control standards.^{5,10,14-16} Only MGH should be used in wound care. Manuka honey is labeled with a grade of its antimicrobial activity. The honey is given a unique manuka factor (UMF) value equal to the percent concentration of phenol. The greater the UMF, the greater the antimicrobial activity the honey is to contain. Honey that is suitable to be used in wound care is also given a CE mark, which indicates that it has met health and safety standards of the European Directives on Medical Devices.⁵ The United States Food and Drug Administration has approved MGH to be used for a wide variety of medical conditions ranging from minor abrasions, full and partial thickness wounds, pressure ulcers, burns, donor sites, surgical wounds, leg ulcers, lacerations, foot and vaginal infections, infected and necrotic wounds, and traumatic wounds.¹¹

Benefits of Honey

Studies have suggested that honey reduces inflammation, swelling, pain, odor, promotes debridement, granulation, and epithelization.^{5,8,9,11,13-17} Decreased wound healing time, decreased treatment cost, and improved quality of life for patients are also suggested benefits cited by many articles.^{8,14}

Honey has been found to have antibacterial properties that reduce bio-burden production. Honey has been shown to have activity against many bacteria and multi-resistant strains including *Escherichia coli*, *Pseudomonas aeruginosa*, *Staph aureus*, *Acintobacter*, *Stenotrophomonas*, and antibacterial resistant strains such as methicillin-resistant *Staph aureus* and vancomycin-resistant *Enterococcus*.^{2,9-11,14-16} It has also been reported that fungal wound pathogens and protozoa are inhibited by honey.⁹

Some honeys have been reported to have greater antimicrobial properties when diluted by exudates due to hydrogen peroxide production that results from glucose oxidase contacting catalase in the wound. Hydrogen peroxide is not usually used in wound care due to the risk of damaging healthy tissue. However, the amount produced in the honey is about 1,000 times lower than the typical 3% solution commonly available.^{5,10,14} Hydrogen peroxide is used as a sterilizing agent and has been used to sterilize honey in the honeycomb.⁵

Honey also has a role in wound physiology. Honey has the ability to lower the pH of the chronic wound bed, which is correlated with better healing outcomes.¹¹ The pH of honey is acidic and is reported to be anywhere from 3.2-4.5.^{4,6,17,19} Honey has been found to inhibit bacteria growth in wounds that usually have elevated alkaline wound beds recorded at 7.15-8.9.^{2,4} Lower wound pH may reduce protease activity, increase fibroblast activity, increase oxygen release, affect angiogenesis, and affect bacterial toxicity.^{2,4} Honey has been reported to improve wound epithelialization due to the acidic pH because more oxygen is released from hemoglobin located in the wound bed.¹⁴

Other benefits of using honey in wound care include the promotion of autolytic debridement and decreased odor. Because bacteria prefer sugar to protein, lactic acid will be produced instead of malodorous drainage.^{5,6,10,14} Also, the number of inflammatory cells found in honey-treated wounds have been found to be reduced.^{10,14} In addition, decreased inflammation has been shown in animal studies and studies regarding burn healing as the honey can act as an antioxidant.^{5,14,18} High osmolarity is also a widely claimed benefit of honey used in wound care.¹⁴ It is proposed that honey can draw water and lymph from deeper tissues and help to cleanse the wound bed, aid in debridement, and promote a moist healing environment due to its high sugar content and low water activity.^{2,5-6} The lower water content has also been reported to retard bacteria reproduction but exudates may dilute the effects of honey.¹³ Sugar in the honey may also provide nutrients for the healing wound.

CURRENT RESEARCH

There is a significant amount of informational literature on the use of honey in wound care. However, there

is a need for additional high quality randomized control trials.

A meta-analysis as well as a recent literature review provides interesting information regarding the use of honey in wound care. The meta-analysis by Jull et al¹⁸ reports that the honey trials considered were at high or unclear risk of bias. Through the analysis, Jull et al¹⁸ reports that in acute wounds, honey delays healing in partial-and full-thickness burns. In chronic wounds it was concluded that honey does not significantly increase the healing in venous leg ulcers when combined with compression. Additionally, honey may delay healing in cutaneous insect bites when used in combination with some dressings. Jull et al¹⁸ concluded that uncertainty about the replicability and applicability of the evidence is a large concern and goes on to further conclude that there is a lack of sufficient evidence to guide clinical decision making in other types of wounds. Jull and colleagues¹⁸ do not support the use of honey dressings for routine wound care until sufficient evidence is available.

In contrast, in a literature review by Molen, it is argued that the body of evidence for wound care products in general is not strong.¹⁴ Additionally, Molen points out that honey has not been marketed like other wound care products. Finally, Molen argues that the lack of evidence of honey use in wound care does not provide an excuse why honey should not be incorporated into wound care practice. Molan suggests that honey should be considered as an option for use in wound care and that honey products should be standardized so that clinicians can expect consistent results.¹⁴

CLINICAL APPLICATION

For honey to be most effective, the wound bed should be covered in medical grade honey or a honey infused medical dressing. Frequent dressing changes and reapplication may be indicated. Alginate based dressings help maintain the level of honey in the wound bed as well as provide an absorbent dressing for the exudate. The amount of exudate may initially increase but should then decrease. Honey has been shown to be effective even diluted 10-fold.⁵

It has been suggested that honey could be particularly helpful when conventional antimicrobials have failed. Honey has also been recommended for the use in wound sinuses and cavities. Honey can be inserted using an aseptic technique

and excess or residue can be flushed out with water because honey is water-soluble. Burns, split thickness skin grafts, and prophylactic use in wound beds are also possible applications of honey use.

ADDITIONAL CONSIDERATIONS

Patients seem to be open to using a natural source in wound healing. Patients may feel more comfortable when they have an understanding of how the product works, where it came from, and why it is being used in their treatment.⁵

Patients who are sensitive or allergic to honey or bees should not use honey based wound healing products.^{5,10} The surrounding periwound should also be monitored as maceration has occasionally been observed.¹⁰ Also, transient pain on application has been reported. Blood sugar levels should be monitored in patients with diabetes when using honey-based products. Evidence suggesting honey's usefulness in debriding hard eschar is limited. Tissue type and preparation of honey may be key factors in speed of debridement. Hydrogel or hydrocolloid dressings may be more effective dressing choices for debridement.¹⁰

The costs of honey dressings may be more expensive. But this does not determine the cost effectiveness for honey wound care dressings as an overall analysis needs to take into account the amount of time to be treated with honey dressings.

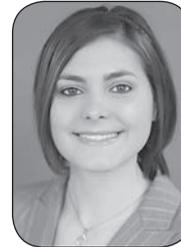
CONCLUSION

Honey is a naturally derived, historically rich product that has many proposed benefits within and outside of wound care. There have been a gamut of research and studies conducted looking at the usefulness of honey in wound care but less specifically in the geriatric population. As with many other wound care products, the body of evidence and support of its use should continue to be studied. Randomized controlled trials are needed to more fully understand the mechanism of action and clinical benefits of using honey in wound care. Honey may gain more popularity as the need for wound treatments against antibiotic resistant bacteria such as MRSA becomes more prevalent and for the possible use prophylactically in the wound bed to prevent infection.^{5,9,16}

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GUEST EDITOR: STUDENT PERSPECTIVES ON ALZHEIMER DISEASE

Jennifer M Bottomley, PT, MS, PhD

Alzheimer disease (AD), like fog, is silent and slow. Unfortunately, it doesn't move on. As the fog thickens, those suffering from Alzheimers do not recognize the world in which they live. They lose touch with their past and are unable to recognize those that they have loved in their lives. The world becomes a state of constant confusion, a living labyrinth.

Striking with cruel randomness across an increasingly elderly population, AD afflicts more and more older adults every year, most of them over the age of 65. They may range from a former President to a neighbor next door, but the ailment is always the same: it clutters the brain with tiny bits of protein, slowly robbing victims of their mental power until they are no longer able to do even the simplest chores or recognize their closest friends and kin. So far, medical science has been stymied, unable to treat the disease or slow its fatal progression. However, recent research is encouraging. Strategies to prevent or delay the onset of symptoms, as well as to prevent the decline into the advanced stage of AD are being explored. While these strategies do not yet exist in a proven and clinically applicable form, the science is progressing rapidly. There may yet be a light at the end of that long, dark tunnel called Alzheimers.

Rehabilitation of the patient with dementia of the Alzheimer's type requires specific evaluation, treatment, communication, and approach strategies for successful outcomes. Current literature has shown that physical therapy is effective with this population. Several of my students at the University of Indianapolis, in a class assignment for a geriatric course on the medically complex frail elderly patient/client, explored the topic of AD in comprehensive ways. I am pleased to be able to share their insightful articles with you.

The burden of caring for patients with a slow progressive dementia can be overwhelming at times. The more that

health care professionals can learn about Alzheimer disease and work together as a team, the more they will be able to be effective in helping families and caregivers and decrease some of that burden of care. The physical therapist can play a very important role in helping the patient be as optimally healthy and function to the maximum degree possible within the context of the ominous diagnosis: Alzheimer disease.

Dr Bottomley is an adjunct faculty at the University of Indianapolis and



teaches a course in Assessment and Intervention for Geriatric Clients with Multiple Diagnoses. She is the President of the International Physical Therapists working with Older

People (IPTOP), a subgroup of WCPT and Clinical Director of Rehab Services for HEARTH (Homes for Elders At Risk Through Homes) in Boston, MA. She teaches at Simmons College in Boston and runs clinics for the Homeless in Boston.



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ALZHEIMER DISEASE

Henna Gosar, SPT
Jennifer M. Bottomley, PT, MS, PhD

INTRODUCTION

Alzheimer disease (AD) is the most common (50%–60%)¹ form of dementia in North America. Alzheimer disease is a form of progressive dementia that, to date, has no cure. It is a difficult diagnosis to address from a physical and occupational therapy perspective, and yet, there is much that we can do to enhance the quality of life by maximizing functional abilities and preventing falls and injury. It is the intention of this paper to discuss the etiology of this disease, look at potential causal factors, discuss the influence of nutrition, and address the functional implications of AD.

Alzheimer disease is characterized by deficits in multiple areas of cognition. There is dysfunctional intracellular and extracellular biochemical process that results in neuron death, preventing communication between the various parts of the brain.² Over time, cognitive function is completely lost.

The prevalence rates of AD have increased exponentially in America even after correcting for increasing longevity. Currently, 5.2 million Americans have AD. The occurrence of AD is estimated to increase further by 2050, with the prevalence being 11 to 16 million. More than 33% women and 20% men aged above 65 will develop dementia. Alzheimer disease is often undiagnosed until it has progressed to debilitating stages. A study shows that fewer than 50% of patients with AD are currently diagnosed with the same. Alzheimer disease evolves gradually over many years and physiological changes in the brain occur a decade or more before noticeable symptoms.³

The exact cause of AD is not fully understood. Alzheimer disease most likely does not have a single causative factor but multiple causes. Research done by the German neuro-pathologist Alois Alzheimer showed two markers present in people with AD—amyloid clumps and tau neurofibrillary tangles.⁴ Both the clumps and tau are found in the natural aging process, but they are

found in excess in AD. The presence of the amyloid clumps and the tau protein cause cell death playing a significant role in the disease process.⁵ Another significant finding in the disease is loss of nerve cells in the hippocampus, the area responsible for memory. Studies show hippocampal atrophy is the starting point of AD and most people with hippocampal atrophy develop AD. Some contributing factors associated with the development of AD are hypertension, diabetes mellitus, hyperlipidemia, seizures, affective disturbances, and stress. Hypertension can potentially damage the hippocampus because of ischemia caused by atherosclerosis and cerebral amyloid angiopathy. Diabetes can cause vascular and nonvascular lesions in the hippocampus reducing the threshold for hippocampal damage. Abnormal lipid metabolism could alter the progression of the disease. Repetitive seizures can cause neurotransmission dysfunction and cytoskeletal abnormalities.⁶

The clinical features of the disease have also been associated with cholinergic dysfunction due to a reduction of the activity of the enzyme choline acetyltransferase. This is caused by glutamate or aspartate which in-turn produce excessive nitric oxide inflammatory molecules. This excitotoxicity causes the presence and subsequent accumulation of the tangles classically associated with AD. The occurrence of AD can also be related to gene contribution. These 3 genes include: chromosome 21, responsible for the breakdown of amyloid precursor proteins; chromosome 1, commonly seen in early onset AD and called the pre-senile 1 gene; defects in chromosome 14, also common in presenile dementias and called the pre-senile 2 gene, and lastly chromosome 19, associated with later onset AD and responsible for cholesterol metabolism. These gene defects, though rare, are thought to cause early onset AD with the exception of chromosome 19.

Early onset AD is rare and only 2% of the population suffers from early on-

set AD. Early onset AD usually occurs between 40 to 70 years of life. However, genes do not play an important role in late onset AD. The APoE gene (#19) contributes only slightly to late onset AD. There are a few other genes identified in relationship to late onset AD but their clinical significance has not yet been determined.⁶

Other factors that may contribute to the disease are heavy metal toxicity, oxidative/free radical damage, inflammation and inflammatory cytokines, viral infection, low mitochondrial function, and nutritional deficiency (vitamin B12).

RISK FACTORS

Age is one of the biggest risk factors for AD. The risk doubles every 5 years after the age of 65. Other nonmodifiable risk factors include having a first degree relative with AD, Down's syndrome, gene mutations, and head trauma. Exposure to certain elements like metals, infections, and toxins also pose a risk towards development of AD. Cardiovascular risk factors: hypertension, obesity, dyslipidemia, insulin resistance, smoking, and inactivity increase the possibility of the person getting AD. Depression and certain life choices like poor diet and alcoholism can also contribute to the development of AD.⁷

STAGES OF ALZHEIMER DISEASE

It is shown that the changes in the brain occur a decade or more before the actual symptoms of changes in behavior and cognition are seen. The disease is thus divided into 3 stages: The preclinical stage, mild cognitive impairment, and dementia due to AD. In the preclinical stage, symptoms such as memory loss are absent. However, the disease process has already started in the brain. At this stage a person cannot be diagnosed with AD since there is no physical problem to diagnose, but with the help of biomarkers a person can be identified to be in the preclinical stage

of AD. Some of the biomarker tests measure the beta amyloid accumulation in the brain, tau protein levels in spinal fluid and imaging techniques to detect the shrinking of the brain.⁸

The mild cognitive impairment stage is the stage midway between normal forgetfulness and full blown dementia. Within 5 years most people with mild cognitive impairment develop AD. A quarter of them regain normal cognitive functioning and the rest remain stable. Biomarker tests can be helpful in predicting the course of the disease from this stage. There are no specific tests to confirm a person is in the mild cognitive impairment stage, however, a few guidelines have been suggested.

First: deterioration in thinking capacity that is noticeable to the person or people around. Second: impairment in memory, attention, language, or the ability to plan. Third: the ability to function independently and the absence of classic signs of dementia. A person is said to be in the third stage of the disease, dementia due to Alzheimers, when the person is no longer able to function independently. In this stage there are deficits in memory, executive functioning, visual spatial ability, language and behavior, and personality.⁷

SIGNS AND SYMPTOMS

Generally the early signs and symptoms of AD are mistaken for normal aging. Here it becomes necessary to mention that healthy older adults may show some decline in cognition occurring in areas of visual memory, visual spatial memory, verbal memory, immediate memory, or the ability to name objects. However, the ability to make new memories or executive functioning is not affected in normal aging. Besides healthy older adults do not have problems with activities of daily living. Patients with AD show functional, cognitive, and behavioral changes. Decline in cognitive functions affecting daily living, forgetting recent events and getting lost in familiar places, missing appointments, difficulty in driving and selecting clothing, and problems at work are related to AD. Loss of memory is the most prominent change in cognitive function but other cues of cognitive decline are misplacing objects, difficulty in finding words, etc. Behavioral changes in AD include changes in personality, depres-

sion, and social withdrawal. Besides, these symptoms others include aphasia, apraxia, agnosia, and disturbed executive functioning.⁸

The Alzheimer Association has formed the 10 warning signs of AD based on the above signs and symptoms. This makes it easier for the health care provider as well as the care taker to screen a patient. Thus these 10 warning signs can help in the early diagnosis of the disease.

The first sign is memory loss that disrupts daily living. As mentioned earlier in normal aging the cognitive decline never interferes with activities of daily living. In AD, loss of short term memory and forgetting learned tasks is usual. Patients with AD usually forget important dates, events, etc. thus over relying on memory clues like diaries or electronic devices.

The second warning sign is challenges in planning or problem solving. Intelligence is never affected in normal aging. However, AD patients find it difficult to do simple tasks like making a plan or doing simple calculations or performing operational skills that they've done all their lives and now have difficulty even knowing where to begin.

The third warning sign is difficulty completing familiar tasks at home, at work, or at leisure. People with Alzheimers find it difficult to complete activities of daily living. They can't remember familiar tasks, schedules, and roads.

The fourth warning sign is confusion with time or place. People with Alzheimers are disoriented. They do not remember days, seasons, and years. At times they cannot place events in the order that they have occurred. They can also get confused about the spatial orientation. They do not know where they are or forget where they want to go.

The fifth warning sign is that they have trouble understanding visual images and spatial relationships. Loss of vision is very common in the elderly hence it might be difficult to judge when a patient has reading difficulties. But patients with AD have other perceptual problems as well. They not only find it difficult to read or discriminate colors, they also have problems in judging distances, ie, they may pass a mirror and think someone else is in the room.

The sixth warning sign of AD is new problems with words in speak-

ing or writing. People with Alzheimers may have trouble following conversations. They may stop in the middle of a conversation and have no idea how to continue or they may repeat themselves. They forget words. All this makes it very difficult for people with AD to socialize and can also lead to these people feeling lonely and depressed.

The seventh warning sign is misplacing things and losing the ability to retrace steps. A person with AD might keep his things in an inappropriate place and forget about it. Impaired short-term memory prevents someone with AD from retracing his or her steps, which makes finding misplaced objects very challenging. Such events might happen occasionally initially, but become more frequent with time.

The eighth warning sign is decreased or poor judgment. People with Alzheimers may experience changes in judgment. They find it difficult to make judgments, often putting their safety in jeopardy. Dealings with money can get difficult for them. As the disease progresses, they find it difficult to groom themselves. Some of them become functionally incontinent of both bladder and bowel making them dependent on someone all the time.

The ninth warning sign is withdrawal from work or social activities. A person with Alzheimers may start to remove themselves from hobbies, social activities, work projects, or sports. This is seen because of the various other changes that are observed in them. It is difficult for them to remember simple things, they cannot make proper judgment, they find it difficult to carry on conversations, and thus they become socially awkward.

The tenth warning sign is changes in mood and personality. The mood and personalities of people with Alzheimers can change. They can become confused, suspicious, depressed, fearful, or anxious.⁹

DIAGNOSIS

Usually the diagnosis of AD is done by documenting mental decline. The mental decline is calculated using the Mini Mental State Exam (MMSE). This is a widely used tool to test cognitive function. It includes tests for memory or recall, orientation, attention, language, and visual-spatial skills. The maximum

score on the MMSE is 30, and a score of below 24 indicates cognitive decline. On an average, people with AD who are not receiving treatment lose two to 4 points every year on the MMSE. By the time the mental decline can be documented, it is obvious that the individual has already had brain damage. Thus researchers are trying to discover a way to detect AD before the symptoms appear.

Biomarkers also called biological markers seem to be the most promising methods of detecting the disease early before devastating harm has been done. A thorough examination of the biomarkers is not only an indicator of the disease; it can also predict the disease. Biomarkers include proteins in blood or spinal fluid, genetic variations or brain changes detectable by imaging. The biomarkers have to be validated to be used as a definite predictor of the disease. The validation of biomarkers for AD has not been done as yet, but researchers are working on it.

The most important technique for detection is brain imaging which includes the magnetic resonance imaging (MRI) and computed tomography (CT). The first change that can be noticed in a brain image of a person with AD is the structural difference. In structural imaging it can be seen that brains of patients with AD show a significant atrophy compared to normal individuals of the same age, but this atrophy has not been measured and there are no set values to predict the presence of AD in a patient depending upon the volumetric changes.

Functional imaging with positron emission tomography (PET) and other methods can also be used to view the functional activities of the brain. It is suggested that those with Alzheimers typically have reduced brain cell activity in certain regions. For example, AD is often associated with reduced use of glucose (sugar) in brain areas important in memory, learning, and problem solving. However, no standards have yet to be developed.¹⁰

TREATMENT

The main goal is to manage the symptoms and slow the disease process. It is also important to maintain optimum physiological status and reduce the risk of complications, and provide education and emotional support.

Medical Management of Alzheimer Disease

Acetylcholinesterase Inhibitors (AChEIs)

AChEIs are usually the drugs of choice. They inhibit the action of acetylcholinesterase (AChE), thus ACh can work for a longer period of time. They also interact with cholinergic receptors and potassium ion channels, and affect the uptake, synthesis, and release of neurotransmitters. AChEIs include *donepezil (Aricept)*, *rivastigmine (Exelon)*, *galantamine (Razadyne)*, and *tacrine (Cognex)*.

Acetylcholinesterase inhibitors often have short term efficacy, severe side effects and are very expensive.^{11,12}

Insulin can be used as it could improve energy production and cellular functions. Insulin can also reduce cell death. However, insulin must be administered nasally to prevent insulin changes in non-brain areas. Immunization is often ineffective as clearing of beta-amyloid is not always accompanied by symptom reduction.

Memantine could cause some neurotoxicity and other side effects, and the cost of administration is quite high. A NMDA antagonist, Memantine is presumed to reduce cell damage by decreasing excitotoxicity resulting from over activation of NMDA glutamate receptors during synaptic transmission. NMDA antagonists, such as memantine, have generally been regarded as neuroprotective, but they have also demonstrated neurotoxic properties that diminish memory, neuron death, and even produce psychotic episodes.

Antihypertensive Drugs

Antihypertensive drugs have potential for AD therapy, as hypertension is a major contributor in hippocampal atrophy. *Angiotensin converting enzyme (ACE) inhibitors* reduce inflammation and mental decline. When ACE inhibitors that cross the blood-brain barrier like *perindopril* or *captopril* are used, the cognitive decline is even lesser.

Anti-inflammatory Drugs

Nonsteroidal anti-inflammatory drugs (NSAIDs) can be useful in the prevention of AD. However, their effectiveness in the treatment of AD is limited.

Etanercept (Enbrel®)

Etanercept has recently generated interest because it produced dramatic cognitive improvement. Alzheimers brains have elevated levels of the cytokine tumor necrosis factor-alpha (TNF- α), which is reduced by Etanercept.

Immunization: Beta Amyloid has been used by injecting AD patients with a synthetic form of β A called AN1792. Although this reduces β A, the effect on AD is unclear. Some people respond to immunization with a slowing of disease progression even after 4.6 years.

Antipsychotics and Sedatives

Antipsychotics and sedatives have accelerated the progression of AD, defined as an increase of one or more points in the Global Deterioration Scale. Other medications that may be prescribed are *trazodone hydrochloride (Desyrel)* for depression and insomnia; *benzodiazepines or buspirone* for anxiety and restlessness; *risperidone (Risperdal)* for delusions and hallucinations; and *carbamazepine (Tegretol)*, *trazodone*, or *valproic acid (Depakote)* to reduce aggression/agitation.⁷

Nutrition

Nutrition plays an important role in the prevention of age related memory deficits. Diseases of aging are primarily caused by chronic imbalances and dysregulation of normal pathways important for functional roles. Since the main risk factor is age itself, it is not possible to find a pharmacological drug to cure these problems. Nutritional adjustments are one of the best ways to control the problems of aging.

Overeating and increased saturated fats can increase the presence of AD. Diets typically high in N6 fatty acid, lineolic acid, and reduced levels of omega-3 fatty acids can increase the risk of AD. Docosahexaenoic acid has 12 neuro protective effects: anti-inflammatory, potentiation of insulin, increased brain derived neurotrophic factor, antioxidant, anti-apoptotic, promotion of neuro genesis, increased expression of glucose transporter, amelioration of impaired coupling between blood flow and glucose utilization, integral membrane component, increased G-protein coupling, activation of peroxisome proliferator, and protection against oligomer-induced synaptic marker loss. Diets

with increased omega-3 fatty acid and reduced omega-6 fatty acids, high saturated and trans fats, can reduce the risk of AD.¹³

The best current evidence suggests that heart-healthy eating patterns, such as the Mediterranean diet, also may help protect the brain. A Mediterranean diet includes relatively little red meat and emphasizes whole grains, fruits and vegetables, fish and shellfish, and nuts, olive oil, and other healthy fats.

PHYSICAL THERAPY IMPLICATIONS

Studies show that physical therapy can be as important as mental activity for people with AD.¹⁴ Late in the disease people tend to lose the ability to perform simple daily tasks. Keeping the body moving also keeps the brain active and forestalls the loss of function. Research shows that physical activity is very important to prevent further cognitive decline in patients with AD. At the same time, it also shows that compliance with an exercise program is very low. It is difficult for a person with AD to follow instructions and stick to a structured program. Conversations and continuous motivation play an important role in the treatment of AD. It can improve compliance and also be more effective in preventing the cognitive decline.¹⁵

Physical activity can also improve memory.¹⁶ Considering that stress, inactivity, and dyslipidemia can contribute to AD, regular exercise may delay the onset of dementia in Alzheimers. It can also prevent the progression of the disease from mild cognitive impairment to full blown AD.

In early stages of AD, it is important to focus on mobility and keeping people active in their home and community setting. A study shows community involvement in patients with AD reduces cognitive decline. Socialization assists in maintaining higher cognitive functioning. In later stages the main goal of physical therapy is to keep the patients as independent as possible for as long as possible, assisting caregivers in proper transfers, bed mobility, ambulation, addressing urinary incontinence, and preventing falls and pressure sores.¹⁷

Visual, verbal, and tactile cueing are helpful when working with people with AD. A study done on patients with AD in nursing homes shows that conver-

sational ambulation is very effective in improving function in patients with AD. Mirroring, task breakdown, and chaining are other helpful techniques that can be used. Even though patients with AD rarely lose their ability to walk, coordination and balance should be assessed regularly and treated if required.¹⁸

THE CAREGIVER

Alzheimer disease is a disease where the patient requires varying degrees of assistance depending on the stage of AD he is at. The assistance starts initially with needing memory cues to complete the activities of daily living to complete dependence. This requires the caregiver of the patient to make various changes in his or her way of living to accommodate the requirements of the patient with AD. Along with having the responsibility of taking care of the person with AD, the caregiver is also losing his or her spouse, significant other, or parent. This makes the whole process very sad and difficult for the caregivers. Coping strategies are different for different people.

It has been found that caregivers experience grief due to loss in quality of relationship, well-being, intimacy, health status, and communication. These losses make them feel like the person dies twice: once when the person with dementia is unable to fulfill their roles, and secondly when the person really dies. The emotion of grief is different from depression and it has been found that depression is reduced by anti-psychotics but the grief persists. Personal growth is evident as a process of becoming more caring and connected to others, reassessing priorities, and understanding the real meaning of life. It was also found that grief increased as the severity of the disease increased. The spouses of the person with dementia experienced more grief and loneliness compared to the adult child, whereas the adult child experienced sacrifice, burden, loneliness, and rejection. Personal growth was seen more in the adult child.

Health professionals should take into consideration that family members of the person with dementia go through a lot of physical and psychological strain that may sometimes require a professional intervention. The best way to handle this is screen the family members and use a combination of education, pharmacotherapy, and psychotherapy.¹⁹

SUMMARY

Alzheimer disease is an incurable disease and very difficult to cope with. Drugs used for the treatment of AD have not proved to be very useful in the long run.^{7,16,20} One reason for the failure of drugs could be that drugs are usually started in the later stages of the disease. Research needs to be done to determine the effectiveness of the drugs in the early stages of the disease.

Early screening and detection will provide great value in the management of AD. A healthy lifestyle can help in preventing AD. Physical activity has proven to play an important role in the prevention and treatment of AD. Along with medical care and therapy, it is very essential to be understanding and empathetic towards patients suffering with AD and their caregivers.

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PROMOTING CLIENT QUALITY OF LIFE: CHARACTERISTICS OF SUCCESSFUL DEMENTIA CARE

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BACKGROUND

Dementias, including Alzheimer disease, are the leading cause of disability for older adults in the United States, affecting over 5 million people age 65 and older. By the year 2025, this number is expected to increase 40% to over 7 million people affected. Alzheimer disease is the sixth leading cause of death in older adults, with the number of Alzheimer-related deaths increasing 68% from 2000 to 2010.¹ The documented incidence of Alzheimer disease rises to 50% among individuals residing in long-term care settings.²

Individuals diagnosed with Alzheimer disease or another progressive dementia will continue to decline over the course of their disease. Typical progression of dementia breaks into 7 stages.³ Stages Two through Four encompass very mild to moderate cognitive decline, affecting the ability to perform instrumental activities of daily living (IADLs). Stage Five, moderately severe cognitive decline, begins to include a noted change in function related to basic self care, or activities of daily living (ADLs). For example, individuals in Stage Five may require help with dressing in appropriate clothing for the weather. As an individual moves into Stage Six, severe cognitive decline, further ADL decline is noted, including help with the basics of dressing and toileting, often compounded by increased issues with incontinence. Sleep patterns may be interrupted, with day/night cycles reversed, and behavioral and personality changes make the care demands of these individuals increasingly difficult for family members to manage. By Stage Seven, very severe cognitive decline, individuals progress to requiring: total care with ADL tasks, assist with mobility and positioning, changes in diet to safely accommodate changes in swallowing ability, and caregiver antici-

pation of wants and needs due to limited communication and comprehension.

The direct cost of care for individuals with Alzheimers is estimated to climb to \$203 billion in 2013, with \$142 billion billed to Medicare and Medicaid. Family members and caregivers are often unpaid, and may live some distance away, increasing their out-of-pocket expenses to sometimes double those of local caregivers.¹ While many families attempt to care for their loved one in their home as long as possible, there often comes a point at which the care demands grow beyond the abilities of the family caregiver(s), and placement is sought within a long-term care setting. Choosing a facility for permanent placement of a family member can be challenging at best, and many factors play a role in that decision. The journey from requiring no assistance to requiring full assistance may encompass years, and a variety of compensatory strategies and resources can be used to enable an individual with dementia to remain as independent as possible for as long as they can.

According to the AOTA Occupational Therapy Practice Framework, 2nd edition, occupational therapy as a profession supports “health and participation in life through engagement in occupation.”⁴ The domain of occupational therapy practice encompasses an individual’s performance of *occupations*, or everyday activities, sorted into “areas of occupation”—ADL, IADL, rest and sleep, education, work, play, leisure, and social participation. Individuals with dementia often struggle to maintain their ability to participate in occupations that contribute to their quality of life, their health and wellness, and their own and their caregivers’ satisfaction.⁵ Occupational areas most affected by dementia are the areas of ADLs, IADLs, rest and sleep, leisure, and social participation.⁶

MILD TO MODERATE DEMENTIA: CONSIDERATIONS FOR INTERVENTION

Early stages of cognitive decline are often managed within the home environment, with the support of a spouse, family member, or caregiver. Concerns expressed by the individual with dementia can range from worry over loss of ability to perform basic self care to concern over increased social isolation.^{7,8} In response to prior research that explored the concept of “meaningful activity” for individuals with dementia from the perspective and observations of caregiver and family, the 2007 study by Phinney and associates⁹ sought to examine what personally constitutes “meaningful activity” for the client with early (mild to moderate) dementia residing in the home.

Participants identified involvement with a wide variety of meaningful activity, including leisure activities, household chores, work-related activities, and social involvements. Three themes emerged when evaluating why the activities were meaningful to the participants: (1) the activity provoked feelings of enjoyment and pleasure, (2) the activity provided a sense of connection and belonging, and (3) the activity enabled the client to retain feelings of autonomy and personal identity. The results of this study provide support to the theory that participation in personally meaningful activity, of many types, enables individuals with mild to moderate dementia to feel enjoyment, engagement with their world, and a continued sense of autonomy.⁹

Participation in meaningful activity (as identified by the client) promoted feelings of satisfaction, a sense of connection to one’s world, and a continued “sense of self” despite ongoing changes affecting health and wellness. Perceptions of the participants indicated that performance of their individual choices

of activity led to an overall feeling of well-being and improved quality of life.

Ability for older adults to actively participate in meaningful occupations may be compromised by factors other than cognitive decline during the early stages of dementia. One such factor that can significantly impact function in the home is *polymedicine*, the use of medications for the treatment of multiple co-morbidities. Although polymedicine would be expected in a majority of older adults as a natural consequence of age-related pathologic changes, prior research has suggested a correlation between the number of medications used by older adults and their risk for adverse drug reactions and for hospitalization.^{10,11} Classen et al examined the relationship between the number of medications, functional independence with ADL and IADL performance, and self-perceived quality of life in frail, home-based older adults.¹²

Participants in the Classen study on average were prescribed and using 5.4 prescription medications for an average of 8.1 chronic conditions. Statistical significance was found between number of medications and FIM-Cognitive and IADL scores, although not with the FIM-Motor score. Age and male gender were also associated with decreased cognitive scores. A significant positive relationship was noted between recent days of illness and number of medications, indicating that adults with multiple medications are often inherently sicker. However, overall quality of life and life satisfaction were above average across the majority of participants.¹²

This study provided additional information regarding the overall functional status of frail older adults as it relates to polymedicine, taking into consideration health status and variables such as age, gender, and education level. It highlighted certain subgroups (eg, oldest-old adults, older men with increased number of medications) as client populations that may benefit from additional interventions, particularly for medication management. Based on the detrimental effects polymedicine was observed to have on the participants, the consequences of polymedicine for individuals with dementia would most likely be magnified. Functional decline related to co-morbidities expected in clients with many medications would provide

further challenges for the individual with dementia and his or her caregiver, as they are already starting from a point of functional decline. Advocating for beneficial services, such as occupational, physical, and speech therapies, would be critical to establish and promote individualized compensatory strategies to address both the decline in cognition and the decline in IADL performance.

Awareness of progressing cognitive decline may also have a psychological impact on individuals with early dementia, as a heightened perception and insight into their diagnosis and their anticipated loss of function may actually negatively impact their current abilities. Increased awareness of one's current disease process may lead to negative outcomes, such as hopelessness, depression, and increased suicide risk.

Emmerson et al explored the effects of increased insight into mental illness, as defined by awareness of their diagnosis and the need for treatment, in a population of older adults with schizophrenia. The authors previously found that cognitive-behavioral social skills training (CBSST), provided by a psychologist, positively influenced everyday functioning and coping skills in this population.¹³ Their 2009 study found that participants with high levels of insight benefitted from CBSST, as measured by better every day functioning with the CBSST than with treatment as usual. Hopelessness was also higher in the group with better insight, but it was lower by half in the group receiving CBSST than in the group receiving treatment as usual.

Older adult populations may demonstrate cognitive impairment related to dementia, mental illness, or a combination of multiple medical issues. These individuals, as noted previously, may benefit from interventions focused on improving or maintaining the current level of function for activities with personal meaning to the client. Insight, as measured by awareness of limitations and deficits, can significantly impact intervention planning, compliance, and outcomes for rehabilitation. The potential exists that focused intervention strategies, in conjunction with an interdisciplinary approach incorporating cognitive behavioral strategies, may improve overall functioning and long-term success with these clients.

At times, acute medical needs may arise that are unrelated to dementia, such as co-morbid diagnoses (pneumonia, congestive heart failure, infection, cardiac issues, gastrointestinal complications) or accidental injuries (falls, fractures, muscle strain/sprain, etc.). The ability of the older adult with mild to moderate dementia to successfully recover and rehabilitate to their prior level of function will be moderated by their cognitive ability during and immediately following the acute medical decline.

Inherent with some acute conditions (or their treatment) is the possibility of increased confusion and decreased cognition as a result of the physical or physiological changes caused by the condition. For example, elderly adults who sustain a hip fracture have a high risk of increased confusion following surgical intervention and resultant hospitalization. Acute postoperative confusion with these clients has been shown to increase their potential for postoperative complications and their need for discharge to nursing homes due to continued need for functional assistance. This confusion is highly prevalent in the first few days following surgery.¹⁵

A study by Milisen et al examined older adults immediately following surgical hip repair, and sought to differentiate the variation and severity of decline with specific neurocognitive skills (memory, linguistic ability, concentration, and psychomotor executive skills), and to relate postoperative functional ability with ADL to cognitive status.¹⁶ Participants with no cognitive impairment and moderate cognitive impairment demonstrated little change in overall cognitive functioning and physical ADL ability over the 5-day assessment period. However, participants with severe cognitive impairment noted an initial decline in cognitive functioning on postoperative day one, and persistent decrease in memory over the entire period. Improvement in ADL performance occurred in the nonimpaired group and severely impaired group over the 5-day period, but the moderately impaired group had little change in ADL performance. As a significant negative change was seen immediately postoperatively, and improvement noted between days 3 and 5, the researchers proposed that: (1) cognition-related interventions may be key parts of the initial and ongoing

assessment of these clients, and (2) the fourth postoperative day may be a critical time for rehabilitation efforts to succeed in clients who are post-hip fracture with cognitive impairment.¹⁶

Effective assessment of elderly clients with dementia after any acute admitting diagnosis begins with a thorough evaluation of cognitive functioning. Assessment of cognition, memory, safety awareness, cognitive-linguistic skills, communication, and procedural memory provides critical information used to shape the rehabilitation plan of care and select intervention strategies specific to the client's cognitive and physical status. As noted by the authors, physical recovery following a serious injury such as hip fracture can be greatly affected by cognitive functioning and decline. Rehabilitation professionals play an important role in both mitigating new declines in cognitive functioning as well as promoting optimal physical recovery within the limitations of the client's cognitive ability.

Following an acute hospitalization, individuals with dementia demonstrate additional medical complexity, as they require care to address both their prior needs related to their dementia and their current needs related to the new illness or injury; often, these coalesce into a whole new level of functional impairment. These clients are often referred for therapy upon admission to a skilled nursing facility for skilled nursing care and rehabilitation. As noted previously, comprehensive assessment of these individuals begins with thorough evaluation of cognitive functioning.

The concept of *reactivation* within the provision of occupational therapy services can be defined as accessing latent cognitive abilities to compliment the functional activity-based interventions being provided. A study by Bach et al¹⁷ specifically sought to examine the effects of provision of functional rehabilitation in conjunction with reactivation occupational therapy, versus provision of functional rehabilitation alone. Study participants were newly admitted to a long-term care setting, had a diagnosis of slight to moderate dementia, and exhibited chronic cognitive impairment for a duration of 6 months or more.¹⁷

A control group received functional rehabilitation through occupational therapy, physical therapy, and speech

therapy services for a duration of 24 weeks. The study group received the same functional rehabilitation program, as well as an additional occupational therapy program with two small group sessions per week focused on memory training, manual/creative activities, and self-management, with specific themes provided each week to guide the programming. Multiple assessment tools were used to measure cognitive performance, psychosocial functioning, emotional balance, and subjective well-being. After 12 weeks of combined interventions, the study group demonstrated a significant improvement with attention, concentration, visual and numerical memory, associative power, visuo-motor coordination, and passive acquisition and recall of information. After 24 weeks, the study group continued to demonstrate significantly higher levels of cognitive performance, improvement in symptoms and subjectively rated well-being, as well as a decrease in depressive symptoms.¹⁷

Small, focused interventions including meaningful and relevant activities appeared to improve overall cognitive functioning, and helped maximize functional gains from the traditional rehabilitation program. Use of reactivation strategies may not only help with traditional rehab clients (post-hospitalization), but may also be applicable to long-term care clients to help prevent loss of function and learned dependence. As cited from other studies, the selection of appropriate activities would be critical for the effectiveness of interventions; activities without personal meaning or significance to the client performing them are often not associated with improvements in client participation, engagement, or function.

SEVERE TO END STAGE DEMENTIA: CONSIDERATIONS FOR INTERVENTION

Occupational therapy within a typical geriatric population focuses primarily on restoration of function through improved autonomy with task performance, as well as the prevention of secondary sequelae of disease or illness, including physical or mental decline. Services have been underutilized based on the extent of functional deficits one finds in nursing home residents, as noted by Berg et al,¹⁸ who further clarified

that cognitive status impacted participation with occupational therapy services, as individuals with poor cognition were less likely to receive therapy than individuals with good cognition and poor ADL function.

Dunal and associates¹⁹ found that two variables correlated with increased intensity of occupational therapy services: having a pressure relieving device for the chair, and being active more than one third of the time. Their analysis also revealed that occupational therapists spent approximately 60% of their time providing *indirect care*, advocating on behalf of the client without the client being present. Cognitive deficits were identified as a limiting factor for residents to receive occupational therapy services, perhaps due to the mistaken perception that individuals with limited cognitive ability are unable to participate in or benefit from therapy services.¹⁹ Medicare Transmittal AB-01-135, "Medical Review of Services for Beneficiaries with Dementia," states that "throughout the course of the disease, beneficiaries with dementia may benefit from pharmacologic, physical, occupational, speech-language, and other therapies."²⁰ Although Medicare recognizes the need for continued services throughout the dementia process, often the interpretation of which services specifically meet this need can vary drastically. Provision of services from occupational, physical, and speech therapies may improve the functionality of residents through direct and indirect interventions focused on individual performance and/or strategies to support that performance.

As an individual with dementia moves into the later stages of the disease, subtle changes in personality, behavior, cognitive ability, and self-awareness slowly begin to affect the individual's ability to function without significant assistance for basic care. Once care becomes too challenging or burdensome for family or community caregivers, placement is often sought within a care setting that provides 24-hour assistance. This can include assisted living communities, long-term care facilities or specialized dementia care units, specifically designed to meet the needs of clients with dementia. The effectiveness of these environments and the measure of their success has been much examined, with a variety of factors identified

as positively or negatively impacting care provision with the severe dementia population.

Quality of life is a considered a key indicator for overall success within a long-term dementia care setting. As measured by the “Alzheimer Disease Related Quality of Life” instrument (ADRQL), quality of life encompasses areas of social interaction, awareness of self, feelings and mood, enjoyment of activities, and response to surroundings. Assessment of these factors is accomplished through observation of behaviors as a client interacts with his or her environment. In a study by Missotten et al,²¹ the ADRQL was used to measure quality of life in the frail elderly across 3 groups: those with dementia, those with mild cognitive impairment, and controls (with normal cognitive functioning). Quality of life scores were positively associated with higher cognitive functioning scores, and negatively associated with dependency and later stages of dementia. Overall, quality of life measured significantly lower for clients with dementia compared to those with MCI and the control group; although scores themselves were not indicative that quality of life as a whole is poor for individuals with dementia.²¹ This assessment tool did not look at physical or cognitive functioning directly, but may be useful as a measure of quality of life following therapy intervention. It may also give an objective measure of the success of environmental modifications and caregiver education.

If quality of life is considered a key indicator of success, the question must be asked: “How do we optimize quality of life within the dementia long-term care setting?” Individuals with severe dementia can be radically affected by small changes with their routine, caregivers, physical/medical status, and presence or absence of family support. Routine and structure are key to maximizing comfort and stability. Measuring quality of life with these individuals shifts from self-reported quality of life to observable measures. Time use, in particular, has been studied as a key to measuring quality of life with long-term care residents with severe dementia.

Two quality of life (QoL) indicators, daily time use and emotional well-being, were explored across routine activity situations in the study by Hooper and associates.²² Activity situations were de-

finied as recurring and distinct periods of time during a typical day for a resident within a long-term care dementia program. These situations affect the experience of each dementia resident within their specific environment, based on the physical, social, and interpersonal stimuli they experience. The ability of one’s environment to elicit or suppress various behaviors is termed *environmental press*. For this study, environmental press was assessed via observing the participants’ use of time and apparent affect over 4 nonconsecutive study days, 12 hours each day within both a traditional nursing home environment and a smaller, private home-like environment.²²

Optimal quality of life indicators during the various observed activity situations included: engaged gaze in the gaze domain, standing or walking in the position and walking domain, participation in the conversation domain, and interest and pleasure in the apparent affect domain. Meals and snacks were associated with the highest number of QoL indicators (all but conversation) within both settings. In the home-like setting, ADL participation was associated with two QoL indicators (ADLs were not observed at the traditional setting). Downtime, or time during the day that was unstructured and unscheduled, was the only activity situation in both settings that was associated with standing and walking. Activity groups (presented by staff members) within both settings were highly varied in content and level of interaction from the participants, and neither settings’ groups created a significant environmental press towards the optimal indicators in the 4 observed domains. Television was not associated with any QoL indicators, although it comprised between one and 2.5 hours of the participants’ daily time use.²²

Daily time use for two specific individuals, one from each setting, was studied more closely and presented in case study format. Both participants had large portions of their day spent disengaged or asleep (40%), with smaller amounts of time spent participating in eating/drinking activities, structured activity groups, walking, conversing with other residents and/or staff members, or simply actively observing their surroundings. Both individuals demonstrated the capability to participate and perform tasks with higher levels of engagement;

however, these occurred as brief periods of engagement throughout the day.²²

Similarly, the study by Morgan-Brown et al²³ explored time use of long-term care residents with dementia in Ireland, again within two separate dementia care settings (traditional and home-like). Time use for these residents was divided into 3 basic categories: *interactive occupation*, defined as “active, observable behavioural interaction with the environment or with a task;” *social engagement*, defined as “behaviourally observable verbal or non-verbal interactions with another person(s);” and *passive behaviours*, defined as either “non-engagement” (eyes open but no observable interaction occurring), or “eyes closed.”²³

The purpose of this study was to establish a baseline assessment of resident time use within a more traditional setting, to compare with subsequent assessment of resident time use following renovations providing a more home-like atmosphere. Interactive occupation and social engagement were used as standalone outcome measures. Contrary to the study by Hooper et al,²² the researchers did not attempt to attribute emotional states or state of well-being/ill-being to the residents observed.

Observations were gathered solely from a large communal living area within each unit, to respect the privacy of individual bedroom and hallway spaces. Time of day observed was kept to spans between meals and after dinner, to differentiate occupational engagement from scheduled activity defined by ADL participation and meals. The current physical environment in both nursing homes seemed to discourage natural grouping of residents for occupational or social engagement, as chairs were placed around the wall, and the living rooms as a whole was ‘stimulus-poor,’ with limited items or activities available to encourage interaction. The television was particularly noted as providing inappropriate stimuli and was not able to be adjusted (volume or channel) by residents themselves. Staff social interaction seemed limited to provision of care, and limited activity resources were present for staff to promote occupational engagement with the residents.²³

Study results indicated that the percentage of time spent in non-engaged and eyes closed behaviors was 69.1%

and 69.2% within each setting; time spent in social engagement was 9.9% and 4.0%; and time spent in interactive occupation was 17.73% and 15.88%. Periods of agitation were observed and recorded as time spent outside of the 3 research categories, and comprised 1.83% and 8.53% within the two settings.²³ Noted periods of higher engagement correlated with provision of appropriate items to stimulate conversation or interest; and with interactions with caregivers and family members beyond the basics of care provision.

Analysis of time use for residents of long-term dementia care settings within both studies indicated that a lack of programming and social/interpersonal interaction may have a detrimental effect on the ability of residents with dementia to interact successfully in their environment. While most participants spent a disproportionate amount of their day disengaged from others or from any recognizable activity, they did demonstrate the ability to rise to the occasion and engage more successfully in activity and social interaction with others when given the opportunity. Thus, another key indicator for a successful dementia care unit centers on the interactions between caregivers and residents, the structure of the scheduled activities and opportunities for meaningful social engagement provided, and the physical environment overall as supportive of these interactions.

ENVIRONMENTAL CONSIDERATIONS

Disturbances of behavior displayed by clients with dementia are proposed as a consequence of decline in frontal lobe executive functioning, leading to over- or under-stimulation caused by the environment.²⁴ The Progressively Lowered Stress Threshold Model proposed that declining ability to adapt to external stimuli as dementia progresses must be addressed with an environment where the demands are lowered to a level where they are congruent with the individual's ability to adapt to them.²⁵ Thus, changes or modifications to the environment (both physical and social) may result in a better match between the demands of the environment and the abilities of the client with dementia, and a subsequent decrease in disruptive behaviors.

Morgan and Stewart²⁶ gathered qualitative information via interview to examine perceptions of staff and family

caregivers about the dynamics between clients with dementia and their environment. Participants were selected and interviewed 3 months after transfer from a high-density dementia care unit of 69 residents to a newly constructed low-density dementia care unit with 20 residents, including a change from multiple-occupancy rooms to private rooms. Likewise, staff members were selected based on employment for at least one year on the old unit prior to the move.²⁶

From analysis of the interviews conducted emerged 5 recurrent themes: the importance of stimulation and meaningful activity, the importance of human contact; the need for safety and supervision, the benefits of individualized care, and the need for flexibility among caregivers.²⁶ There was some disagreement regarding the appropriateness of stimulation and activity in the new unit; with fewer residents and fewer caregivers, there was less inherent activity at any given time on the unit. Although there seemed less likelihood for overstimulation, residents at times were noted to become more irritable and prone to conflict if left with too little stimulation. In addition, multiple interviewees noted their concerns related to the elimination of an activity aide, who provided structured activities 7 days a week for residents on the old unit, and was certified to provide personal care as needed within the unit. This position was replaced with a recreation therapist, who provided different hours, no direct personal care, and was not as constant and familiar a presence on the unit as the activity assistant had been. Human contact was highlighted as a basic need, identified as interactions between residents and caregivers, residents and family, and residents and other residents. Overall, this interpersonal contact was seen as positive, as long as it was provided at levels tolerable to the resident.²⁶

Bedrooms were seen as more isolated in the new unit, and residents seemed to congregate in areas of higher traffic, seeking out human contact and interaction on their own, whether intentionally or unintentionally. Safety and supervision were perceived to be positively affected by the frequent opportunity for interaction with staff and family, but the larger physical dimensions of the unit posed some concerns for staff that felt it was more difficult to observe and monitor residents within the larger

unit. Individualized care appropriate to the resident's preferences, abilities, and needs was a high priority for family and staff caregivers. Recognition of individual tolerances for activity and inactivity played a large role in determining how to best structure routine and schedule for individual residents. Flexibility of staff was noted as integral to effectively manage the various situations that arise daily within a special care unit for residents with dementia, such as situations involving agitated or upset residents.²⁶

As noted in all 3 studies, quality of life is impacted by the social and physical environment provided to individuals with severe dementia within a dementia care setting. Time use fluctuated between meaningful interactions, with people or activities, and full disengagement with total lack of interactions. The social environment provided opportunities for personal interaction with staff, caregivers, activity personnel, and family; when structured in ways to avoid overstimulation and to generate interest, residents with dementia were more likely to participate. Conversely, when staff interactions revolve solely around provision of care, residents disengage and allow the assisted task to occur with little to no active participation.

The physical environment was also noted to play a large role in optimizing active participation and appropriate safety and stimulation for residents with dementia. While attempts were being made in several of the facilities observed to improve the design and functionality of the home-like units, these changes were at times made in a way to hinder the social interactions that play an equal role in quality of life for dementia residents.

SUMMARY

The needs of individuals with dementia will fluctuate as the disease progresses and functional independence declines. Cognitive changes will affect a need for increased supervision, assistance, and ultimately for total care. As rehabilitation professionals are expected to perform holistic assessment of prior, current, and potential levels of function, they are uniquely suited to evaluate the client with dementia. By promoting activities and strategies that are individualized and specific, they may mitigate some of the learned dependence and functional loss common to clients with dementia. This loss is often attributed to

progression of the disease and neurologic changes, but as seen with several of the referenced studies, may actually be a product of the environmental and social factors within the environment.

Occupational therapists in particular are trained to provide evaluation of prior occupations; current cognitive, psychosocial, and physical functioning; and analysis of the individual, caregivers, and environment to maximize occupational performance. As such, occupational therapists are well suited to provide both individualized interventions, and broader consultative recommendations for special care dementia units as a whole, that promote active engagement of the residents in cognitively and socially appropriate opportunities throughout the resident's daily routine. Regardless of setting, by focusing on maintaining the individual's highest level of functional independence for as long as possible, and shifting to provision of compensatory strategy training, caregiver education, and environmental modification to meet the individual's needs and abilities as their dementia progresses, we can provide our clients, friends, and family with the dignity and quality of life they deserve.

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PHYSICAL ACTIVITY IN INDIVIDUALS WITH ALZHEIMER DISEASE

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Alzheimer disease (AD) is a progressive neurodegenerative disease that has several stages. The various stages seen in AD are Early Stage (I), Middle stage (II), Late stage (III), and Terminal stage (IV). The disease process starts with memory problems, and progresses to the inability to perform complex daily activities, and eventually to complete bed bound disability at the terminal stage. As the disease progresses from early stage, cognitive and functional decline increases. In later stages individuals have difficulty in performing basic activities of daily living (ADLs) like bathing, grooming, etc. These individuals present with psychosocial symptoms like behavioral disturbances, anxiety, and depression. Along with cognitive decline, physical functioning is decreased in these individuals characterized by mobility, transfer, gait, and balance deficits. Mobility impairments result in secondary complications such as contractures, bed sores, etc. These secondary complications further inhibit mobility and a vicious circle is formed. Alzheimer disease is most often seen in the older adult population. Along with the disease process observed in AD, there are several physiological changes observed in the elderly population in musculoskeletal, cardiovascular, pulmonary, and neuromuscular systems. These physiological changes coupled with cognitive and functional decline observed in AD, increase the functional deficits observed in these individuals. There is decrease in muscle mass and bone mineral density observed in elderly individuals. There is also a decrease in lubrication of articular cartilage resulting in arthritic changes and a decrease in joint mobility. Thus, when there is a decrease in physical activity as is often observed in AD, there is further decrease in joint mobility and these individuals are susceptible to contractures. There is also an increased incidence of falls in these individuals due to impaired

balance, joint mobility, and decline in physical functioning. Thus, physical activity is extremely important. Due to the cognitive involvement coupled with the effects of physiological aging and functional decline observed in individuals with AD, maintaining functional capacities becomes even more important.

It has been often observed, however, that elderly individuals with AD are not encouraged to participate in an exercise program. Medical illness, decreased vision and hearing, and several physiological changes observed in the elderly obstruct these individuals from participating in physical activity, in addition to the perception that gains would be minimal due to cognitive changes. It has been observed that therapists often accept the functional decline observed in elderly as “normal,” failing to address issues of balance, strength, flexibility, and functional activities.

There are many benefits of exercise training in elderly individuals. Not only is there improvement in the musculoskeletal system, but there is improvement in cardiac functioning and cognition. It is important to initiate physical activity in elderly individuals with AD as early in the disease process as possible.

There is no curative treatment for AD and increasing health care burden necessitates the need to find preventive interventions to prevent the progression of disease. There are very few studies that have identified beneficial effects of physical activity in individuals with AD. It has been thought that early initiation of physical activity can delay the progression of the disease.¹ The subject of this article is physical activity in individuals with AD. This paper aims to analyze the importance and beneficial effects of physical activity in individuals with AD and look at research pertinent to establishing better functional outcomes in our older cognitively impaired adult population.

In addition to Alzheimer disease, older individuals often have co-morbidities (ie, diabetes, hypertension, stroke, and osteoporosis) that are complicated by the loss of cognitive function. With multiple diagnoses come multiple medications for these co-morbidities. Physiological changes related to aging, associated co-morbidities and polypharmacy collectively results in exacerbated functional decline in these individuals. The result is to increase the susceptibility of falls in this population. Physical activity has been observed to prevent this functional decline and prevent the incidence of falls in older adults in general. This fact can be extrapolated to the older individual with AD. Despite an understanding of the benefits of activity and exercise, only a small proportion of the elderly US population engage in any type of physical activity.

It is important to understand factors that motivate and those that act as barriers to activity and exercise in older adults. A qualitative study aimed at identifying the factors that influence participation in physical activity was completed.² A focus group interview method was used in understanding these factors in the community dwelling elderly population. After considering individual's current physical activity level, physically active and physically inactive individuals were identified. Individual's current level of physical activity was assessed using a Center for Disease Control and Prevention (CDC) behavioral risk factor surveillance survey questionnaire.² Phenomenological approach of data analysis used in this study provided insight into an individual's perception about physical activity. The themes that emerged observed that both the groups understood the importance of physical activity and perceived a physically active individual as a healthy and happy person. However, the physically inactive group expressed fear of injuries, lack of

time, and existing medical conditions as important barriers to activity and exercise. It was also observed that individuals with existing medical conditions and having mobility deficits, including mild to moderate cognitive problems, feared engaging in physical activity for fear of injuring themselves. Other factors included cost and location of the exercise program, which influenced participation. Elderly individuals preferred exercise programs that were easily accessible. It is important to remember these factors while formulating an exercise program. Individual's *impairments, goals, and associated co-morbidities* should be evaluated and activity-exercise programs formulated accordingly. An individualized program tailored to the needs of patients will help in ensuring compliance to an exercise program.² Applying these principles to the AD population – activity needs to be enjoyable and not frustrate the AD participant. Activities such as walking outdoors in a garden, functional activities that use and validate past life experiences, and dancing and group interactive exercises may result in better participation and compliance. Additionally, providing many opportunities for activity and exercise will facilitate a more consistent acquiescence with activity and greatly improve function.

Along with the consideration of individual needs, it is important to consider the caregiver role in management of elderly individuals with AD. Caregivers are present with AD individuals for most of the time and are in a better position to inform the therapist about the difficulties experienced by the patients in performing daily activities. Psychological, physical, cognitive, and several other factors hamper physical mobility in these individuals. Decreased physical activity further hampers functional mobility and increases caregiver burden.

As a side note, it is also an imperative that the caregiver be physically fit in order to provide adequate and safe management of the AD individual. This is a topic for further discussion in another paper, yet an important consideration for the physical therapist working in the home and community settings of care.

A qualitative study by Cedervall and Åberg³ analyzed couples' perspective notions about physical activity. This study identified factors influencing physical activity from both individual's and their

caregiver's perspective. In this study, personal interview and participant observation were used to understand the person's perspective. Individuals were observed during physical activities like walking, shopping, swimming, etc. It was found that couples found engaging in physical activity to be a mechanism for relieving their stress. Caregivers are under stress due to continuous care demanded from individuals with AD. It was observed that caregivers found physical activity to be important in improving their health and keeping them active and fit, and relieving some of the stress of 24/7 caregiving. It was observed that mobility and cognitive impairment resulted in safety issues that limited AD individuals from engaging in regular physical activity. Caregivers adopted various adaptation strategies to ensure safety. Caregiver training plays an important role in the rehabilitation process.

Along with considering factors motivating to individuals with AD, it is important to encourage caregiver participation in physical activity programs to increase compliance of individuals with AD in the rehabilitation process. It is also important to assist in developing adaptation strategies that can be adopted by caregivers.³ Caregivers play an important role in the decision making process. Success of a home exercise program depends on the level of assistance and encouragement provided by the caregivers.

After identifying factors that motivate and act as barriers to physical activity, it is important to understand the beneficial effects of physical activity. Physical activity could result in delaying or stalling the progression of AD. A randomized control trial study designed to determine the beneficial effects of physical activity in older adults, who are at risk of dementia, was done by Rubenfire.⁴ Individuals in this study were grouped into subjects who were engaged in physical activity and a control group receiving typical care approaches, without specific exercise programs. The individuals who engaged in the physical activity group participated in a 24-week, home-based exercise program. The exercise program focused on mobility, strength, endurance, and balance training. Individuals were encouraged to engage in outdoor activities like walking and swimming. These individuals were assessed after 6, 12, and 18 months. It was observed

that subjects in the physical activity group improved in their ability to perform functional activities as assessed by strength and flexibility measures, number of steps (speed of walking) per minute, balance, and ADL measures. It was observed that these effects were maintained after 18 months of the start of intervention. An important limitation of this study was that the researcher did not consider co-morbidities. The subjects in the physical activity group were individuals with mild cognitive impairment (MCI). It was observed from this study that subjects with MCI who engaged in regular physical activity improved cognition as well as physical functioning. It was earlier stated that physical activity prevents functional decline; however, its beneficial effects on cognition were not identified. Thus, it could be implicated that early recruitment of individuals with mild cognitive impairment prevents progression of disease.⁴

Although it was observed in the previous study that physical activity in individuals with MCI result in improvement in cognitive functioning, this study had several methodological limitations. Also, non-exercise physical activity was not considered in this study. Non-exercise physical activity is an important aspect to be considered in elderly individuals. The elderly engage most of their time in non-exercise, ADL type physical activity. Non-exercise physical activity considered in this study was in the form of various social and cognitive activities practiced during the day by an individual. Hence, it is important to inquire about ADL, and ADLs should be considered part of the physical activity program.⁵ Patients should be encouraged to perform their ADLs and also engage in an exercise program. When assessing their total physical activity, non-exercise physical activity should always be considered. Some of the other limitations identified in this study were the disproportionate number of female subjects and an inability of the measurement tools used to discriminate between the various physical, social, and cognitive activities that occurred in addition to exercise and intentional physical activity. As observed in previous studies, this study further strengthened the idea of the importance of physical activity in preventing cognitive decline in elderly individuals. Individuals who had a greater number of total daily physical

activity hours showed improved physical functioning and enhanced safety and balance.⁵

Physical activity is important for improving physical and cognitive functioning in individuals with AD. It has been observed that diet also plays an important role in management of individuals with AD, and prevents progression of cognitive decline. It was shown that individuals who engaged in physical activity for 2-week periods and received a Mediterranean diet, improved in physical functioning. Perhaps it would be advisable to refer patients to a dietician and to consider nutritional aspects when prescribing activity and exercise. Nutrition plays an important role in strengthening bone and muscles, as well as maintaining the health of all other body systems.⁶

It is important to understand factors predicting the functional decline in AD patients/clients and to initiate an early physical activity program. Lower extremity function has been observed to correlate with functional decline in elderly individuals. A study compared lower extremity function in MCI individuals with AD, and cognitively intact age-matched controls. It was observed that individuals with MCI and AD had decreased lower extremity function when compared to cognitively intact age-matched controls as assessed by decreased walking speed and functional mobility.⁷ Persons with MCI and AD need to be screened for lower extremity function periodically. Understanding that lower extremity weakness plays such an important role in maintaining function will promote early screening and intervention and assist in formulating an exercise program that addresses lower extremity function. Maintaining functional strength in the lower extremities enhances mobility and slows the progress of diseases. This research further highlights the importance of initiation of physical activity early in the disease process to address decreased lower extremity function and thus prevent progression of the disease.⁷

Though it is observed that lower extremity function is decreased in individuals with MCI and AD,⁷ these individuals are often excluded from rehabilitation programs. It was thought that AD and cognitively impaired persons were inappropriate for therapy due to their inability to retain the information

or learn. It was determined that they would not benefit from physical activity. However, research reveals that both cognitively impaired and cognitively intact individuals benefited from strength and endurance training.⁸ Recent empirical data concluded that strength and endurance training, initiated in subjects with cognitive impairment, can benefit from exercise interventions and realize an improvement in quality of life. Strength and endurance training should be initiated early and not neglected in this population.⁸

To reiterate, previous studies have identified the importance of role of caregiver in the management of individuals with AD. Caregivers can act as motivators to physical activity and further improve adherence of individuals with AD to an exercise program. Individuals with AD present with various behavioral disturbances. In a recent study, two groups were considered.⁹ In group 1, individuals with AD received exercise training, and their caregivers received behavioral management training. Whereas group 2 individuals with AD received only exercise training. It was observed that combined exercise training of individuals and behavior management training to their caregivers showed improvement. Thus, it can be concluded that caregiver training is an important aspect in the rehabilitation program. Earlier studies have also identified beneficial effects of caregiver participation in the rehabilitation program. This study considered an important aspect of behavioral management in AD.⁹ Individuals with AD often present with behavioral problems and these influence their participation in exercise programs. Individuals observed to be depressed have responded poorly to an exercise program as they lack motivation. Behavioral training provided to caregivers appears to improve participation and performance of individuals with AD in an activity and exercise program.⁹

Individuals with AD have deficits in functional mobility such as transfers and walking. The amount of assistance required in functional mobility, such as transfers, is often correlated with the destination after discharge. Whether a person is discharged home, to a nursing home or long-term care facility, often is determined by assistance required in managing ADL. A study looking at

function in AD subjects randomized study participants into an activity specific training group, a walking group, and a social conversation group. Exercises in an activity specific group focused primarily on activities like transfers. It involved practicing components of transfer activities such as sit to stand. Ambulation was included as well in the activity specific training program. Individuals in the supervised walking group ambulated, with or without an assistive device, gradually increasing duration of time. The conversation group engaged in conversations for about 30 minutes about topics of interest. It was observed that individuals in the activity specific group improved on transfer scores, whereas individuals in the walking and conversation group did not improve in ability to transfer. The ability to ambulate was similar in activity-specific and walking programs, however, remained unchanged in the conversation group. Thus, it is important to include activity-specific training as part of a rehabilitation program and not only walking.¹⁰ This research concluded that, along with walking activity, specific training like transfer training should also be practiced to improve ADLs in individuals with AD. If individuals are trained for transfers and bed mobility along with walking, then they may be discharged home and will require less physical assistance from their caregiver.¹⁰

Earlier research has proved the beneficial effects of exercise on function, cognition, depression, and improved quality of life. Along with these beneficial effects, exercise also helps in improving mobility and reducing the incidence of falls. However, benefits of a community-based exercise program have not been studied. In a study conducted by Vreugdenhil and colleagues,¹¹ individuals with AD were randomized into two groups. Group 1 received a home exercise program along with standard treatment care. Group 2 received only standard treatment care without exercise. Group 2 was provided with an exercise program at the end of 4 weeks. Group 1 received a 4-month exercise intervention program that included walking, strength, and balance training. It was observed that the exercise group improved on all outcome measures such as function, cognition, ADL functioning, lower body strength, and balance.¹¹ It can be

implicated that a community exercise program, based on this study, is a way to improve physical activity along with improving quality of life in individuals with AD. Engagement in a community exercise program also facilitates social interaction. Community-based exercise programs further facilitate compliance in exercise programs. Along with individualized programs, community exercise programs have the potential of improving overall function and social interaction.¹¹

CONCLUSION

Physical therapists play an important role in the management of individuals with AD. There is still limiting evidence confirming the effect of physical activity in preventing the progression of disease. However, as can be observed from studies described above, physical activity plays a significant role in maintaining mobility in these AD clients/patients and in assisting caregivers. It can thus be concluded that treatment intervention should initially begin with a thorough evaluation of impairments of the patient, his or her goals, factors affecting motivation, and barriers to physical activity. It is also vital to consider level of caregiver assistance. Caregivers play an important role in the rehabilitation program and should be included in formulating an exercise program.^{2,3} Stress levels experienced by caregivers require assessment and behavioral management training, described above, initiated to decrease this burden.⁹ Along with physical activity, these individuals can benefit from referral to a dietician as a combination of proper diet and physical activity has found to result in better outcomes than physical activity alone.⁶

Inability of individuals with AD to learn and recall exercises should not warrant deterring them from strength and endurance training. Strength and endurance training has been found to be quite beneficial when initiated early in the treatment process.⁸

Activity-specific exercise programs containing transfer training and other ADLs, when initiated along with a walking intervention have been observed to have better functional outcomes than walking alone.¹⁰ In order to predict the functional decline, lower extremity function should be periodically assessed. As observed in a study, lower extrem-

ity function correlate with functional decline.⁷ Non-exercise physical activity can be considered along with physical activity as part of a holistic approach to exercise in the AD patient/client.⁵ Lastly, a community-based exercise program can be initiated in early stages of AD as community programs facilitate socialization. Social withdrawal is observed in later stages of the disease. Initiation of a community-based exercise program can help facilitate social interaction and help in decreasing social isolation. Additionally, individuals with AD have associated depression, anxiety, and fears. These result in decline in quality of life. It has been observed that by engaging in physical activity there is improvement in well-being in people with AD. Physical activity not only results in improved physical and cognitive functioning but also enhances functional well-being.¹¹

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ALZHEIMER DISEASE

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INTRODUCTION

In people age 70 years old, Alzheimer disease (AD) is considered as fourth main cause of death that constitutes 10% of deaths after myocardial infarction, cancer, and stroke.¹ In middle and old aged people, it occurs as a progressive form of dementia. Alzheimer disease is a degenerative disorder of nerves and neural structures that is characterized by dementia of nonvascular origin.^{2,3} Due to damage of cholinergic nerves of hippocampal and cortical areas, there is irreversible and progressive memory and severe impaired cognitive function.⁴

INCIDENCE AND LIFE TIME RISK

With age it is believed that the estimated annual incidence of AD appears to increase dramatically. In people aged 65 to 74 years old, the incidence rate of developing AD in a one year period is approximately 53 new cases per 1,000 people. This has been increased in older people aged 75 to 84, where the incidence rate is higher with 170 new cases per 1,000 people and is highest in frail elder people age over 85, with an incidence rate of 231 new cases per 1,000 people. In the United States by the year 2050, it has been predicted that the annual incidence of Alzheimers and other dementias would be double in number because of an increase in the number of older people over 65 years of age. According to Hebert et al, "every 68 seconds, someone in America develops Alzheimers" and "by mid-century, someone in America will develop the disease every 33 seconds."⁵ The lifetime risk of Alzheimers in women was nearly one in 5 (17.2%) and for men it was nearly one in 10 (9.1%) indicating higher risk in women.⁶

PREVALENCE

In 2012 it was estimated that about 5.4 million Americans of all ages are suffering with AD in which almost 5.2 million people are aged 65 or older and

almost 200,000 people have younger-onset Alzheimers, ie, less than 65 years of age.⁷ The prevalence rate was 13% in people aged 65 or older (one in 8) and in people aged 85 or older it was 45%. Out of all the people suffering with AD, only 4% are under age 65, 6% are aged 65 to 74, 44% are aged 75 to 84, and 46% are aged 85 or older. The prevalence rates of AD were more in US women in which almost two-thirds of Americans suffering with Alzheimers are women. Out of 5.2 million patients 65 years of age or older who are suffering with AD, 3.4 million are women and only 1.8 million are men.⁸ Studies showed that when compared to older whites, African-Americans are prone to AD two times more⁹ and Hispanics are about one and one-half times more prone to have AD.¹⁰

ETIOLOGY

To explain the actual physiology of AD causes, 5 theories have been proposed. They are: (1) Chemical Theory, (2) Genetic Theory, (3) Autoimmune Theory, (4) Slow Virus Theory, and (5) Blood Vessel Theory.¹¹

- **Chemical Theory:** AD is associated with deficiency of neurotransmitters that causes impairment in intellectual abilities and behavior, due to increased accumulation of toxic chemicals like metal ions such as aluminum or lead that gets deposited in brain tissues.
- **Genetic Theory:** This theory states that the cause of AD of early onset is due to mutation on chromosome 14 that accounts for almost 10% of AD and due to mutation on chromosome 12 that causes AD of late onset.
- **Autoimmune Theory:** AD is due to an autoimmune attack producing an excess amount of antibodies in the brain tissue.
- **Slow Virus Theory:** In few cases it has been found that a slow acting virus is the causative factor of AD that attacks the neuronal tissues.

- **Blood Vessel Theory:** This theory suggests that any pathophysiological changes in the blood vessels causes damage to cholinergic nerves of hippocampal and cortical areas and thus leads to AD.

Three hypotheses are established to explain the etiological factors of AD. They are:

1. **Cholinergic Hypothesis:** This hypothesis suggests that in cortical and basal ganglia, neuronal circuits gets damaged due to decreased production of neurotransmitter Acetylcholine that causes AD.¹²⁻¹⁴
2. **Amyloid Hypothesis:** According to this hypothesis, Amyloid precursor protein (APP) is trigger point and causes AD in some patients. This theory states that when APP binds and sticks through the neuronal membrane, Chaperone enzymes are produced within the tissues that cut the APP into fragments of protein, including beta-amyloid. These fragments of β -amyloid proteins act as the precursors and forms clumps to produce senile plaques in substantia nigra. Thus these plaques cause the neuronal dysfunction along with cognitive impairments in the hippocampus and other areas of the cerebral cortex and causes AD.^{15,16}
3. **Tau Hypothesis:** This hypothesis states that internally neurons have some supporting structures that are made up of microtubules. These microtubules are dependent on a protein called Tau, which helps them to be stabilized. Due to some pathophysiological process, the Tau collapses the microtubules and other proteins of neural structures and turns them into a clump of senile plaques and neurofibrillary tangles, which hinders with the normal function of the neurons and causes AD.¹⁷⁻²⁰

RISK FACTORS

Family History

Studies show that people who have a family history of Alzheimers have a higher risk of developing AD than those who do not have a first-degree relative with AD.²¹⁻²³ These studies also state that people who have more than one first-degree relative with AD are more likely and are at higher risk of developing AD.²⁴

Apolipoprotein E-ε4 (APOE-ε4)

Apolipoprotein E (APOE) is a gene that is responsible for cholesterol levels in the blood stream. This gene has 3 forms such as ε2, ε3, and ε4. Each individual has one of these 3 forms of APOE genes that are inherited from their parents. Studies indicate that all individuals who inherit APOE-ε4 gene are more likely to develop AD at an earlier age than those who inherit the other two forms (ε2 or ε3). It is also been suggested that people who inherit more than one APOE-ε4 gene, then the risk of developing AD is even higher.^{25,26}

Mild Cognitive Impairment

New criteria and guidelines for the diagnosis of AD state that mild cognitive impairment (MCI) is actually an early symptom of AD. Though individuals who have MCI can perform their activities of daily living (ADLs) effectively, they have difficulties in learning and thinking capabilities in a very mild form but often measurable. Individuals with MCI, particularly with cognitive and memory problems, have a high risk of developing Alzheimers and other type of dementias. Drug-induced MCI is generally reversible and some forms of MCI do not deteriorate and remains stable and in few cases cognitive levels come back to a premorbid state. However, in individuals with severe cognitive dysfunction, a clear diagnosis and appropriate treatment is very essential.²⁷⁻³⁰

Cardiovascular Disease Risk Factors

There are numerous studies which indicate that in mid 40s and 50s cardiovascular disease risk factors, like hyperlipidemia, type II diabetes mellitus, smoking, physical inactivity, obesity with BMI (body mass index) more than 30 are more likely to develop AD and other dementias.³¹⁻⁴¹

Insomnia

In 2011, a study was conducted to determine the relationship between insomnia and AD, as they found that the evidence regarding lack of sleep and risk of developing AD was unclear. From a pool of 655 normal people, 346 subjects who were normal cognitively were selected and classified to two groups: AD group (n=25) and normal group (n=321). They were evaluated for a period of 7.7 years. The results of the study showed that there is a significant relationship between the AD and presence or absence of insomnia [odds ratio (OR) 52.39, 95% confidence interval (CI) 51.03–5.55]. The researchers also found that AD patients suffering with insomnia tend to develop dementia very soon (chi-square = 3.94, p = .047). Although the study included many validity threats, researchers concluded that insomnia could be a potential risk factor for developing AD.⁴²

Head Trauma and Traumatic Brain Injury

Individuals with head trauma and traumatic brain injury (TBI) are more likely to develop AD. The risk of developing AD is two times greater for those who sustain moderate head injuries, and this risk has increased to 4.5 times in individuals with severe head injuries.^{43,44} Because of repeated head injuries in players like football players, boxers, and combat veterans, they are more prone and are more likely to develop dementia, cognitive dysfunction of late onset, and accumulation and deposition of tau tangles that ultimately leads to AD.⁴⁵⁻⁵⁰

SIGNS & SYMPTOMS

The warning signs⁵¹ of Alzheimer disease include the following:

- memory loss that hinder function and ADLs;
- difficulty in judgment, planning, and problem solving;
- difficulty in accomplishing regular tasks at home, at work, or at leisure;
- disorientation with time and place;
- loss of spatial relationships and difficulty in understanding visual images; and
- inability of speaking or writing.

Once the AD is established, the normal brain functions get disrupted with the following symptoms¹¹:

1. **Sleep patterns:** Normal sleep is a main problem in AD patients as they develop abnormal sleep patterns. They become nocturnal, wandering during the night, and sleep during day time. These abnormal sleep-awake cycle patterns can be treated with serotonin and dopamine optimization.
2. **Anger and aggression:** This is another main issue to be dealt with some Alzheimer patients. They often exhibit increased aggression, inappropriate anger, mood swings, and outbursts. Anxiolytic agents with serotonin and dopamine are used to treat these symptoms.
3. **Agitation:** Increased and inappropriate physical and/or psychological agitation occurs with some AD patients. Antianxiety agents combined with anti-Alzheimer drug therapy can check these issues.
4. **Depression:** Depression is a common symptom in Alzheimer's patients, which may present in the form of an agitated depression. Though antidepressive agents are available, drugs that effectively control depression are not available for patients with AD.
5. **Anxiety:** Abnormal increase in anxiety levels is common in Alzheimer's patients. This can be controlled by serotonin and dopamine guided by neurotransmitter testing as indicted.
6. **Psychotic state:** In a few cases, AD patients present with delusions and hallucinations that can be treated with antipsychotic agents or neuroleptic agents along with anti-Alzheimer drug therapy.
7. **Restless Leg Syndrome:** Due to sleep apnea most AD patients develop sleep disturbances, such as RLS, that cause exacerbation of cognitive problems.
8. **Endothelial dysfunction⁵²:** In the year 2007 a case control study was conducted to test the hypothesis that endothelial dysfunction occurs in individuals with AD, and thus AD is a vascular disease. Flow-mediated dilation (FMD) was the main outcome measure used for assessing endothelial dysfunction. The results of the study showed that there was no significant difference between the groups in findings of laboratory tests. The AD group showed signifi-

cant decreases in FMD values ($3.4 \pm 1.7\%$) than the control group ($8.4 \pm 3.3\%$) indicating severe dysfunction of endothelial tissues ($p < .001$). The results also showed that there exists a strong correlation between FMD and AD ($\beta = 0.5$, $t = 4.49$, 95% confidence interval = 1.99–5.25, $p < .001$). Thus the authors concluded that in patients with AD, the endothelial function gets impaired and plays a role in its pathogenesis.

Apart from these symptoms some patients also develop **amnesia** (short- and long-term memory loss), **aphasia**, **agnosia**, and **apraxia**.⁵³

STAGES OF ALZHEIMER DISEASE⁵⁴⁻⁵⁸

- **Stage I:** Also called pre-dementia, this stage starts in first two months and is characterized by mild cognitive impairments like decreased attentiveness, poor planning, loss of abstract thinking, and mild semantic memory loss.
- **Stage II:** This stage is called early-dementia, with moderate cognitive impairments that can occur up to 20 years after initial diagnosis. This stage is characterized by dysfunction in learning capabilities, memory loss, difficulty in accomplishing fine motor tasks, language problems, episodic memory, comprehending, and vocabulary problems.
- **Stage III:** Also known as moderate-dementia, this stage continues for a period of one to 5 years. During this stage, patients present with moderate cognitive impairments, such as progressive deterioration, increased problems with vocabulary and memory, wandering, sundowning, acognosia, and urinary incontinence.
- **Stage IV:** This stage is considered as advanced-dementia and can last for a period of 10 years or more. In this stage most patients become completely bedridden and dependent. Along with the other symptoms, patients also present with gastrointestinal problems, including ulcer formation and respiratory conditions, such as pneumonia, that are often fatal.

DIAGNOSIS

There are a few steps in diagnosing AD based on biochemical and genetic tools.⁵⁸ They include a detailed patient history, taking appropriate information

from family and friends regarding the subject; various physical and neurological examinations; and a few lab tests. To understand the patient's behavior, neuropsychological tests can be used. In initial stages, PET scans are used, followed by other imaging tools like CT scan, magnetic resonance imaging (MRI), and neuronal amplitude measurements, to confirm the diagnosis.⁵⁹

Olfactory 'Stress Test'

In a study the authors postulated that olfactory 'stress test' (OST) can be used as a screening tool for diagnosing early AD. Fifty-six elderly individuals were recruited into this study and were categorized into probable AD ($n = 14$, AD), 13 cognitive impairment no dementia ($n = 13$, CI), cognitively intact ($n = 29$, NC-normal control). Using 40 items, the University of Pennsylvania Smell Identification Test (UPSIT) Performance of the subjects on first 20 items of the Test (UPSIT) before administering 1 mg of intranasal atropine was compared with the performance of the remaining 20 items of the test. The results showed that there existed a strong correlation between them ($r = 0.57$, $p < 0.001$; $r = 0.53$, $p < 0.001$) indicating underlying AD pathology. The results also suggested that more negative AE ($p = 0.014$) indicates, presence of Apolipoprotein E genotype that causes AD. Thus the researchers confirmed that, OST atropine test can be used as an inexpensive screening tool for diagnosing early AD.⁶⁰

Frontal Assessment Battery Test

In a cross sectional study frontal assessment battery (FAB) test is used to differentiate the amnesic-mild cognitive impairments (A-MCI) from early-stage Alzheimer disease (EAD) by evaluating executive dysfunction. The FAB test total score range is 18-0 with 6 components with a maximum score of 3 for each component. In the study the researchers compared the total and subtest scores of FAD with mini-mental state examination (MMSE) subtest scores to assess the influence of cognitive function on executive function. The results showed that two groups differed from each other not only in FAB total and subtest scores of go/no-go and conflicting instructions, but also in MMSE total and subtest scores of orientation,

memory delayed recall, and attention and calculation. There was a significant decrease in the scores of interference performances (go/no-go and conflicting instructions) in the EAD group. Thus authors concluded that based on these FAB scores, A-MCI and EAD can be easily differentiated.⁶¹

TREATMENT

Drug Therapy

In Alzheimer type dementia, for improving the cognitive function, anticholinergic drugs like Rivastigmine, Physostigmine, Neostigmine, and Pyridostigmine are currently used. But because of their systemic effects and their short half-life, their use in clinical practice is limited. Other drugs, including Aminoacridines, Tacrine, Velnacrine and Donepezil, are also believed to inhibit both acetyl cholinesterase and butyryl cholinesterase enzymes and help in preventing the symptoms of AD.^{62, 63} In AD, due to over stimulation of N-methyl-D-Aspartate (NMDA), severe excitotoxic effects are produced on nerve cells that accelerate the degenerative processes at a higher rate. In these cases Memantine (dimethyl adamantine) is used, which acts as an NMDA receptor inhibitor.⁶⁴

In AD the degenerative process of neuronal tissues due to free radical attack causes cognitive impairments. To prevent the accumulation of free radicals, antioxidant drugs like vitamin E (tocopherol), monoamino oxidase inhibitor (selegiline), phenolics (curcumin), tannins (gallic acid), and polyphenolics (ferulic acid) can be used.^{64,65} Certain vaccines are also used to treat the cognitive impairments in AD. The stimulation of immune system by vaccines produces antibodies that cease the action of pathogens during the pathophysiology of AD. β -amyloid injection is used in recent days to dissolve the plaques in the brain tissue that cause the symptoms of AD. Other vaccines like AN-1792 that is given intramuscularly and a modified form of amyloid protein administered through nasal route are also widely used.⁶⁶

HERBAL TREATMENT

It was believed that saffron helps in inhibiting the accumulation of amyloid β (AB) in the human brain and thus helps in treating AD. Therefore, Akhondzadeh et al conducted a randomized controlled trial to check the efficacy

of *Crocus sativus* (saffron), an herbal medicine, for treating AD. Based on some inclusion and exclusion criteria, 46 patients with AD were randomized to intervention group (n=23) or placebo group (n=23). The intervention group was given 30 mg of saffron twice daily, and the placebo group was given 2 placebo pills. The MMSE, AD Assessment Scale-cognitive subscale (ADAS-cog), and Clinical Dementia Rating scale-sums of boxes (CDR-SB), were used as outcome measures to assess the cognitive and clinical profiles. The results of the study showed that there were no statistical significant differences between the intervention and placebo group on ADAS-cog at baseline, but at week 16 there was significant difference ($t = 4.16$, d.f. = 44, $p < 0.0001$). Similarly, CDR-SB showed no significant difference at base line but showed significant differences at 16 weeks ($t = 4.55$, d.f. = 44, $p < 0.0001$). Therefore researchers stated that saffron could be effective in treating mild to moderate AD.⁶⁷

In 2009, to determine whether vascular care helps in slowing down the progression of dementia in patients with AD with lesions in cerebrovasculature, Richard et al conducted a two-year follow up RCT. One hundred thirty patients with AD and cerebrovascular lesions were the subjects of the study. Half of them received standard care (SC), and the other half received vascular care (VC) that included acetylsalicylic acid (38 to 100 mg), pyridoxine (50 mg), and folic acid (0.5mg per day). Pravastatin (40 mg) was given if the patient's total cholesterol was more than 5.0 mmol/L. Reduced salt intake and increased exercise, diuretics, beta-blockers, and a calcium antagonist were prescribed if patients were hypertensive. Activities of daily living and an 11-item Interview for Deterioration in Daily Activities in Dementia (IDDD) were the primary outcome measures. The MMSE and a 25-item Revised Memory and Behavioral Problems Checklist (RMBPC) were the other secondary outcome measures. The results of the study proved that patients in both vascular and standard care did not improve and equally declined in the scores of IDDD (13.7 vs. 11.0 points; difference 2.7, 95% confidence interval =-3.1-8.6). The scores of MMSE or RMBPC also showed no treatment effect for both the groups.

Authors concluded that vascular care could not slow the dementia progression in patients with AD with lesions in cerebrovasculature.⁶⁸

TREATMENT FOR SLEEP APNEA

To determine if treating obstructive sleep apnea (OSA) with continuous positive airway pressure (CPAP) improves the cognitive function in patients with AD, a RCT was conducted by Ancoli-Israel et al. Fifty-two subjects were randomized into either therapeutic CPAP (tCPAP; n=27) or placebo CPAP (pCPAP; n=25) groups. The results of the study showed that there was no improvement in cognition in subjects of 3-week tCPAP or pCPAP. However, after 3 weeks, when pre- and posttreatment neuropsychological test scores were compared, significant improvement in cognition was observed. Thus authors proved that treatment of OSA with CPAP is beneficial in improving cognitive functions, and therefore CPAP should be suggested for OSA patients with AD.⁶⁹

EXERCISE THERAPY

Rolland et al conducted a RCT in 2007 to determine the effectiveness of an exercise program in improving the ability to perform ADLs, decreasing psychological disturbances, and improving nutritional status, and thereby physical performance. Out of 134 subjects, 67 subjects were assigned to the exercise program and 67 to routine medical care. For the exercise group, aerobics, strength, flexibility, and balance training exercises were given for one hour per session, two times a week. The results of the study showed that there was no difference between groups in behavioral disturbance, depression, and status of nutrition. In subjects of exercise group, there was a slower decline in ADL mean change when compared to the medical care group. In longer follow up, the exercise group showed better results on 6-meter walking speed test. Thus the authors proved their hypothesis that in nursing home residents with AD, an exercise program for one hour two times a week helps them in increasing their ability to perform their ADLs more effectively.⁷⁰

COMBINATION OF THERAPIES

A RCT in 2011 sought to find the efficacy of 3 therapies--day time physical

activities (walking), light therapy (light exposure), and a combination intervention (walking, light, and guided sleep education)--for improving sleep in persons suffering with AD. One hundred thirty two subjects who were eligible were randomized to a walking group (n=32); light group (n=34); combination walking, light, and guided sleep education (Nighttime Insomnia Treatment and Education in Alzheimer's disease; NITE-AD) (n=33); or contact control group (n=33). The walking group received supervision during self-paced walking for half an hour every day. The subjects of light group were exposed to a Sunray light box one hour every day before bedtime, and decreased light exposure while sleeping. The NITE-AD received both the interventions in alternate sessions, along with eliminating the factors that cause nocturnal arousals and education to their caregivers. The Micro-Mini Motion logger actigraph was used as an assessment tool for measuring the sleep-awake cycle. The Sleep Disorders Inventory (SDI) was also used as subjective outcome measure to rate the distress of the caregiver, its frequency and severity. When compared to the control group, at posttest all other groups showed improvement in total wake time, walking ($p = .05$), light ($p = .04$), and combination treatment ($p = .01$). No significant differences were observed between the groups on SDI scores. Thus the researchers concluded that if subjects were adherent to the interventions, then all walking, light exposure, and combination interventions were effective for treating insomnia in AD patients.⁷¹

COMMUNITY BASED EXERCISE PROGRAM

This RCT conducted in 2010 aimed to find whether community-based home exercise program helps the AD patients with dementia in improving physical and cognitive functions along with ADL independence. Forty subjects along with their caregivers were randomized to either the treatment group (n = 20) or the control group (n = 20). The exercises prescribed for the treatment group were based on "Home Support Exercise Program" for the frail elderly, developed by the Canadian Centre for Activity and Aging, which includes 30 minutes of walking followed by 10 exercises for

both strength and balance. The results of the study showed that at 4-months follow-up, subjects of the treatment group (exercise group) had high Mini Mental State Examination scores by 2.6 points ($p < 0.001$) indicating improved cognition and 2.9 seconds faster on Timed Up and Go ($p = 0.004$), indicating increased mobility and increased instrumental activities of daily living scores by 1.6 ($p = 0.007$). Thus the authors proved and concluded that community-based home exercise program helps the AD patients with dementia in improving physical and cognitive functions along with ADL independence.⁷²

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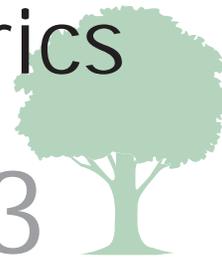
Sudheer Madhurthi is a student at the University of Indianapolis currently pursuing his Masters in Health Sciences. He completed the bachelor's degree



from Apollo College of Physiotherapy, Hyderabad, India. While working as physical therapist for one year in Nature Cure Hospitals, Hyderabad, he has secured awards in Interstate level poster presentation for presenting "Benign Paroxysmal Positional Vertigo" and "Shoulder Impingement Syndrome."

CALL FOR NOMINATIONS

Section on Geriatrics AWARDS 2013



Student Research Award

Recognize outstanding research-related activity completed by entry-level physical therapy students.

Clinical Educator Award

Recognize physical therapists or physical therapist assistants for outstanding work as a clinical educator in geriatrics health care setting.

Fellowship for Geriatric Research

Recognize physical therapists pursuing research in geriatrics which may be conducted as part of a formal academic program or a mentor ship.

Excellence in Geriatric Research Award

Honor research published in peer-reviewed journals based on clarity of writing, applicability of content to clinical geriatric physical therapy, and potential impact on both physical therapy and other disciplines.

Adopt-A-Doc Award

Recognize outstanding doctoral students committed to geriatric physical therapy, provide support to doctoral students interested in pursuing faculty positions in physical therapy education, and facilitate the completion of the doctoral degree.

Clinical Excellence In Geriatrics Award

Recognize a physical therapist for outstanding clinical practice in geriatric health care settings.

Distinguished Educator Award

Recognize a Section on Geriatrics member for excellence in teaching.

Outstanding Physical Therapist Assistant Award

Recognize a physical therapist assistant who has significantly impacted physical therapy care in geriatric practice settings.

Lynn Phillippi Advocacy for Older Adults Award

Recognize projects or programs in clinical practice, educational, or administrative settings which provide strong models of effective advocacy for older adults by challenging and changing ageism.

Volunteers in Action Community Service Award

Recognize the exceptional contribution of a physical therapist or physical therapist assistant in community service for older adults.

Joan Mills Award

Presented to a Section on Geriatrics member who has given outstanding service to the Section.

Nominations are due November 1, 2013 and all awards will be presented at the Section Membership Meeting at CSM in February of 2014.

For additional information on the criteria and selection process for section awards, please visit the Section on Geriatrics website at www.geriaticspt.org or contact the office by email at karen.curran@geriaticspt.org or by phone at 866/586-8247.



CERTIFIED EXERCISE EXPERTS FOR AGING ADULTS CONGRATULATIONS GRADUATES!

Danille Parker, PT, DPT, GCS, CEEAA

The SOG Certified Experts for Aging Adults (CEEAA) program, co-chaired by Marilyn Moffat, PT, DPT, PhD, GCS, CSCS, CEEAA, FAPTA, and Karen Kemmis, PT, DPT, MS, GCS, CDE, CPRP, CEEAA, continues to be a huge success. Since 2009, over 600 therapists have successfully completed the 3-course series, including the written and practical examinations to proudly use CEEAA after their name. The SOG would like to congratulate the following individuals who have completed the series in 2012 and early 2013.

Therapists with the CEEAA credential demonstrate expert clinical decision-making skills in: examining the aging adult in multiple areas; designing and applying efficient and effective exercise prescriptions; and using the best evidence for exercise interventions for all aging adults. Some of the top reasons, as stated by graduates, to obtain your CEEAA certification are to:

- Learn, practice, and use tests and measures with strong psychometric properties that scientifically measure outcomes in the areas of aerobic capacity, anthropometric characteristics, attention and cognition, gait and locomotion, balance, motor function, muscle performance, posture, range of motion, sensory integrity, and vestibular function.
- Expand your understanding of, frequency, intensity, time, and type for exercise prescription based on science so that you know how to challenge your patients/clients to preclude them from sliding down the slippery slope of aging.
- Learn how to determine appropriate and safe intensity for all categories of exercise for your patients/clients regardless of diagnosis and practice setting.
- Practice and learn how to teach hundreds of different aerobic conditioning/endurance, balance, body mechanics and postural stabilization, flexibility, gait and locomotion, and muscle performance training exercises that can be modified for any aging adult.
- Have the latest evidence for how and why exercise helps with many conditions, including: cancer, cardiovascular, endocrine, musculoskeletal, neuromuscular, cognitive, obesity, pulmonary, and renal diseases, disorders, and conditions.
- Have the knowledge and the assurance that physical therapists are the professionals who are the key in improving the health and fitness of our aging population.

Still considering taking the CEEAA course series? See what your PT peers are saying about the CEEAA courses to help you decide:

- “This is by far the most beneficial course series of my professional career. Everything is applicable and relevant and so clinically oriented. I was able to return to the clinic and apply the information immediately.”
- “Best Con-Ed course series I have taken. Very excited to be part of this profession again.”
- “This has been the best course. There is so much useful information. I wish every PT who works with the elderly could take this course. We would change many lives.”
- “The comprehensive and exhaustive attention to evidence is incredible. The overall seriousness and enthusiasm of the team lends an air of urgency to the call for PTs to “GET WITH IT” in evaluating practice standards in our geriatric population.”
- “If this certification course hasn’t increased my practice standards, nothing will.”

The process to attain the CEEAA is to complete formal didactic education, and to participate in supervised and mentored skills development, home-based reflection, and critical thinking. Three courses of two days address 3 different and increasingly complex aspects of exercise design and delivery. The 3 courses are designed to build on each other; however, Courses 1 and 2 can be taken out of sequence. If you have taken part of the series but not completed, please contact the Section office at 866-586-8247 for information on how to complete your certification.

We have had ***sold out*** crowds, so don’t wait to sign up! We look forward to seeing you at any of the 2013 or 2014 scheduled series!

If your site is interested in hosting this series, please contact Danille Parker, chair of the Regional Course Committee at Danille.parker@marquette.edu or 414-288-3179.

NEW JERSEY GRADUATES

July 2012

Thank you to Fox Rehabilitation



CONGRATULATIONS GRADUATES

Akemi Kaku, PT, CEEAA
Rosario Michelle Acervo, PT, CEEAA
Ramon Aranigo, PT, CEEAA
Natalia Ashley, PT, DPT, GCS, CEEAA
Clare Charnak, PT, CEEAA
Florence Corcoran, PT, CEEAA
Ryan L. Cummings, PT, OCS, CEEAA
Judith D'Annunzio, PT, OCS, CEEAA
Carla Dinowitz, PT, CEEAA
Christine DiOrio, PT, CEEAA
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Marie Kelly, PT, CEEAA
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Susan Valerino, PT, CEEAA
Sandra Waas, PT, DPT, CEEAA
Karen Weinschenk, PT, CEEAA
Fredrick White, PT, DPT, GCS, CEEAA
Cecelia Whitney, PT, CEEAA
Lacy Yaegle, PT, CEEAA

KANSAS CITY GRADUATES

September 2012

Thank you to the Department of Physical Therapy and
Rehabilitation Science at Kansas University Medical Center



Roohi Salman Ali, PT, CEEAA
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David Fredericks, PT, CEEAA
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Jill E. Walker, PT, GCS
Diane Wilson, PT, CEEAA
Aaron J. Witte, PT, DPT, CEEAA

CONGRATULATIONS GRADUATES

MINNESOTA GRADUATES

March 2013

Thank you to Park Nicollet Rehabilitation Services, Heart and Vascular Center and Methodist Hospital



CONGRATULATIONS GRADUATES

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Krista Hannon, PT, CEEAA
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PTNOW: AN ESSENTIAL TOOL FOR EVIDENCE-INFORMED PRACTICE

In collaboration with Sections, the APTA has developed PTNow.org to help busy practitioners quickly and easily access current evidence, including clinical practice guidelines, PTNow clinical summaries, and tests and measures—all free to APTA members. PTNow's long-term goals are to help physical therapists reduce unwarranted variation in practice and demonstrate the value of physical therapist services to the health care system.

Physical therapists want to use best practices based on current research, but time constraints are a reality. Using PTNow, a member can click on a diagnosis or condition and pull up the most recent Cochrane Systematic Reviews and clinical practice guidelines, which have been vetted for currency and relevance to physical therapy. PTNow also provides clinical summaries that synthesize evidence on the management of conditions in specific patient populations and provide rich linking to vetted resources.

PTNow is dynamic, a portal that will evolve over time, designed to respond to clinician needs. Case in point: functional limitation reporting.

As of July 1, Medicare will no longer reimburse claims that do not include functional outcome limitations data. Physical therapists are required to report data obtained through the use of evidence-based tests and measures. "PTs have to shift their thinking—from documenting what they did and documenting progress in terms of range of motion or muscle strength, to determining how those impairments impact a patient's function and how that patient is functioning based on therapy interventions," says Anita Bemis-Dougherty, PT, DPT, MAS, APTA Director of Clinical Practice.

Tests and measures can be costly to purchase or access and sometimes are even harder to find. PTNow is reducing the workload for members by research-

ing and licensing tests and measures that have been identified by Sections and EDGE Task Forces for use in functional limitation reporting.

The Section on Geriatrics Practice Committee, Reimbursement Committee, and GeriEDGE Task Force and the Home Health Section identified tests and measures that would be most critical for PTNow to post online for member use in functional limitation reporting:

- 6-Minute Walk Test (6MWT)
- 10-Meter Walk Test
- Berg Balance Scale (BBS)
- Disabilities of the Arm, Shoulder, and Hand Scale (DASH)
- Disabilities of the Arm, Shoulder, and Hand Scale - QuickDASH
- Elderly Mobility Scale
- Falls Efficacy Scale-International (FES-I)
- Five-Times-Sit-to-Stand (FTSTS)
- Fullerton Advanced Balance Scale
- Patient Specific Functional Scale (PSFS)
- Sitting Balance Scale
- Timed "Up and Go" (TUG)

Many of these tests are currently available on PTNow, including: 6MWT, 10-Meter Walk Test, BBS, DASH, PSFS, and TUG. Other available tests that may be of particular interest to geriatrics and home health PTs include BESTest, Freezing of Gait Test, and Modified Low Back Pain Disability Questionnaire. Many more are in the pipeline. Each test will have a test summary tailored for each condition to which the test applies, including psychometric information such as minimal detectable change data and links to test materials and demonstration videos.

"PTNow is a ready resource for the PT in the home to quickly access the valid, reliable, and standardized tests and measures that they need in order to provide a diagnosis and to show patient

progression based on the initial evaluation and subsequent progress reports," according to Bemis-Dougherty.

The APTA invites members to not only access the information included on PTNow but also interact in the discussion forums and contribute clinical cases and clinical summaries. The portal will be updated constantly with new resources. Visit PTNow today at www.ptnow.org, and test drive the many benefits it has to offer.

THE IOPTWH & IPTOP CONFERENCE

APRIL 26–28, 2013

BOSTON, USA

The song, *Please come to Boston in the Springtime*, couldn't have been better advise. What a beautiful location for a conference... and now we can tell ALL our relatives that we've been to Harvard!! We were blessed with perfect weather, a beautiful location for the conference, and many opportunities for networking, interfacing, and collaborating. IPTOP was well represented by our Executive Board, Patron and Member Country Representatives.

A picture says a thousand words – so we will walk you through this event with brief descriptions and many photographs. We are planning to meet again in November 2014 (details follow in a subsequent item of this newsletter) and again at the WCPT Conference in Singapore in June 2015. So NOW is a good time to jot down dates and start planning to attend. IPTOP is clearly in an evolutionary phase...and we hope you'll join us.

This conference was a great place to meet other IPTOP member country physical therapists, enjoy some incredible speakers and topics, get a little IPTOP business accomplished and have

fun in Boston. We met in concert with another WCPT subgroup, the IOPTWH (International Organization of Physical Therapists in Women's Health) which was a wonderful marriage of subgroups. In addition to providing a unique focus for the conference topics, this collaboration also provided us with the opportunity to meet and network with other physical therapists from around the world.

We extend a heartfelt Thank You to Presidents Jennifer M Bottomley, IPTOP and Rebecca G Stephenson, IOPTWH – both of whom took this conference on as a full time job--in addition to their other career and personal responsibilities. Knowing that these two have been working on this collaborative event since our gathering in Amsterdam in June 2011, gives us the sense and appreciation for the enormous task and impressive final product. The membership of IPTOP would like to Thank Jennifer and Rebecca for their time, creativity, and dedication to making the Boston Conference an incredible event. Through all eyes, this conference was a total success.

OPENING RECEPTION AND REGISTRATION

The Boston Conference was started off with a Friday evening registration and opening reception among our sponsoring exhibitors. It was a great way to wind down after a long journey to Boston, to reunite with colleagues and friends, network, and meet the exhibitors. Plus the food was awesome at the Harvard Conference Center.

We had many sponsoring exhibitors, as you can see on the poster that Rebecca and Jennifer are standing next to. We extend the most grateful thanks to **Fox Rehabilitation** and **NuStep** – our primary sponsors. Thank you to **Hydroworxs**, **Cedaron**, **Aegis Therapies**, **Genesis Health Services**, **Polestar Pilates**, **BSN Medical**, **InTone**, **CMT**, **Magtister Corporation**, **Slack Publishers** and **AliMed**. Additionally, we greatly appreciate the support from the **Section on Geriatrics** and the **Women's Health Section** of the American Physical Therapy Association (APTA) and the incredible guidance and assistance from the **World Confederation of Physical Therapy (WCPT)**.



Rebecca G Stephenson, President IOPTWH, Conference Poster and Dr. Jennifer M. Bottomley, President IPTOP.



Nancy Prickett, IPTOP Treasurer at registration.



Conference attendees interact with Kim Willing from Hydroworx (left back) and Earl Carlow and Patti from Current Medical Technologies (CMT) during the opening registration and reception.



Karen Vitagliano & Sonia Schrank NuStep exhibitors.

SUMMARY OF THE OPENING ADDRESS AND KEYNOTE SPEECH

The Conference was a collaborative event between two World Confederation of Physical Therapy (WCPT) Subgroups – for Women’s Health (IOPTWH) and Older People (IPTOP) and hence the introduction to the Conference was accordingly given by the Presidents of each subgroups and joint organizers of the Conference, Rebecca Stephenson, President IOPTWH and Jennifer M. Bottomley, President IPTOP.

The Opening Address was delivered by **Anne Hartstein, the Secretary of Elder Affairs for Massachusetts (MA)**, herself a Social Worker who had done her Doctoral study with Jennifer. In providing an overview of aspects of health in the state, she then spoke about the Ageing Agenda. This 9-principled strategy for ageing well, that places quality of life for the individual across the age span at the hub of the document, has placed Massachusetts as leader in health reform across the USA.

Following Anne’s address, Marilyn Moffatt, the President of the WCPT gave a Keynote speech, focusing on 3 topics.

The first provided an overview of the WCPT, an organization that was the brainchild of, and founded by Mildred Elson in 1951. Marilyn described the changes as the organization has evolved and grown since. In particular she was proud of the collaborations undertaken both with physiotherapy colleagues

and with the other professions allied to health, as well as position statements set out by the WCPT. Secondly, Marilyn described the challenges we faced with respect to worldwide aging of populations, both in developing and developed countries. The rising numbers are no longer referred to as ‘the greying of the nations’, but now called the ‘Silver Tsunami’ due to the rapid growth of this age group. It presents a challenge in what we might use as an indicator of improving global health as well as how we design or implement sustainable policies on long-term and palliative care. And thirdly, she spoke of the issue when dealing with women’s health, given the longer life expectancy of female, and also the rise in noncommunicable disease.

Marilyn then outlined 13 truisms pertaining to the current global situation, or that were predicted by the middle of this century, that will be important for all PTs around the world. It was an inspiring and truly educational presentation.

Dr. Meena Sran, PT, MPhty, PhD, provided a wonderful lecture on *Physiotherapy and Osteoporosis: Goals and Strategies for Women and Older People*. Looking at bone health across the lifespan, she provided recommendations for exercise and bone preservation as well as clinical approaches to fall prevention.

Sherri Betz, PT, GCS, CEEAA, PMA®-CPT, introduced the conference attendees to the benefits of Pilates, not only in bone health, but in overall well-being and health in a dynamic lecture entitled *Posturing for the Future: Pilates and Bone Health*. Though there wasn’t time to perform Pilates exercises during class – we all gathered prior to the Sunday sessions – and started our day out right – with a little Pilates...;

Following a very healthy lunch, **Dr. Meghan Markowski, PT, DPT, WCS, BCB-PMD, CLT**, provided a very energetic lecture on Gotta Go...Can’t Go... Oh No!! Urogenital Issues and Their Implications in Aging. One comment from many from the IPTOP group regarding addressing urinary incontinence was that “we should have more of this type of instruction in our IPTOP conferences... much of this is new to me.”



Marilyn Moffatt, PT, DPT, PhD, DSc, GCS, CSCS, CEEAA, FAPTA, Educator, Motivator and Inspiration.



Rebecca Stephenson, President IOPTWH; Dr. Alan M Jette, Keynote Speaker, Dr. Jennifer M Bottomley, President IPTOP.

The **IPTOP's General Meeting** occurred Saturday afternoon and was well attended. It was a very productive meeting... AND we learned that we need to allot a longer time block for our Member's General Meeting. As we move into the future – we've more to accomplish than an hour allows. Thanks to all who attended the IPTOP Member's meeting.

IPTOP General meeting in Boston April 27, 2013. Much was accomplished and we are moving steadily in a period of growth, productivity, and accountability. The evening was a delightful gathering of all conference attendees at a gala dinner at the Longwood Inn. The food was incredible. We enjoyed a cocktail hour for meaningful interactions after a rich day of conference activities, and it was nice to see each other in a more casual setting. The highlight of the evening was an inspiring keynote presentation by **Dr. Alan M Jette, PT, PhD**, from the BU School of Public Health. Dr Jette challenged us to *Face Into The Storm* and work as a profession, globally to prepare for the globalization of health care, and changes in the roles that Physical Therapists will play in the future. As the PT becomes the possible entry point by patients into the health care system and we, as autonomous clinicians take on a more prominent leadership role in prescription and care of each of our patients, we need to prepare ourselves as a profession to meet the challenges and changes head on. True to form, Dr. Jette inspired us all.

Sunday, April 28, 2013 was another richly packed day of presentations. After a vigorous Pilates session and a lovely continental breakfast, we all gathered to learn from IPTOP's own **Bhanu**

Ramaswamy, IPTOP Website Editor/Manager. Bhanu addressed the important relationship between nutrition and aging, and the impact that nutrition and exercise have on healthy aging in her presentation entitled: *Nutrition and Exercise for Women and Men Across the Life Cycle*. Exercise prescription, with an eye on good nutrition was presented with recommended strategies to improve motivation and compliance and obtain maximally functional outcomes.

Dr. Neeraj Kohli, MD, provided an enlightening session entitled: *Understanding the Latest in Urogynecological Surgeries*. This was truly informative to many of us, who tend to refer our patient's to those PTs working in women's health when we run into urinary incontinence and other urogynecological issues in our aging patients. We learned

that there is much that we, as geriatric PTs could be doing to improve the post-surgical outcomes of our patients undergoing urogynecological procedures.

Sexual Changes in Women and Men as They Age, was presented by **Dr. Sharon Bober, PhD**. The important role that one's sexuality plays on self-image and sense of well-being was considered. We often see our older patients as "asexual," according to Dr. Bober. We learned of many resources and interventions available to address sexual dysfunction and sexuality as we age.

An impassioned presentation was provided by **Dr. Nancy Roberge, PT, DPT**, on *Breast Cancer and Quality of Life: Treatment Impact on the Geriatric Patient*. Dr. Roberge encouraged us to recognize the implications and age-related complications of breast cancer management on the aging adult. She presented the effect of institutional and clinician bias and discrimination and how this impacts care approaches in the older patient. Lastly, Dr Roberge discussed the role that PT intervention plays in improving the quality of life in oncology survivors.

Dr. Marilyn Moffat completed the day with a rousing presentation entitled: *Are You Pushing Your Patients/Clients Hard Enough*. Continuing her message from the first lecture she gave, she provided much evidence for exercise with multiple diagnoses and provided research-based evidence of effectiveness. The take home message... we can push our patients harder than we are... What a wonderful end to two richly packed days.



Country Representatives in Boston

Jan Tessier, Belgium; Helen Johnson, Canada; Hans Hobbelen, Netherlands, Bhanu Ramaswamy, UK; Gudfinna Bjornsdottir, Iceland; Lisa Dehner, USA; Jill McClintock, Ireland; Filiz Can, Turkey, Jennifer Bottomley, USA

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For age is opportunity, no less than youth itself,

*though in another dress, and as the evening twilight fades
away, the sky is filled with stars, invisible by day.*

- Henry Wadsworth Longfellow

Section on Geriatrics - APTA

GERINOTES

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Thinking about becoming a Geriatric Certified Specialist (GCS)?

Searching for geriatric specific continuing education?

Prefer to get your CEUs from the comfort of your own home?

The **Section on Geriatrics** is proud to release the new edition of our popular *Focus* course covering physical therapist practice in geriatrics across the practice patterns, written by a talented group of board certified specialists who are leaders in the profession. Special pricing is available for members, and for those who purchase the complete course.

The 6-monograph course includes:

Issue 1: *The Aging Musculoskeletal System* by **Karen Kemmis, PT, DPT, GCS, MS, CDE, CPRP, CEEAA**

Issue 2: *The Aging Neuromuscular System* by **Jason Hardage, PT, DPT, DScPT, GCS, NCS, CEEAA, and Mary Elizabeth Parker, PT, MS, NCS, PCS**

Issue 3: *The Aging Cardiovascular System* by **Ellen Strunk, PT, MS, GCS, CEEAA**

Issue 4: *The Aging Pulmonary System* by **John Lowman, PT, PhD, CCS**

Issue 5: *The Aging Integumentary System* by **Jill Heitzman, PT, DPT, GCS, CWS, CEEAA, FACCWS**

Issue 6: *Diabetes Across the Physical Therapy Practice Patterns* by **Pamela Scarborough, PT, DPT, MS, CDE, CWS, CEEAA**

All 6 issues are available through the APTA Learning Center at learningcenter.apta.org/geriatricssection. To learn more on how to become a GCS and to obtain a resource list visit www.geriatricspt.org, click on "About Us" then select, "What is GCS?"



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