

Rehabilitation strategy in the elderly

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ABSTRACT

The population is getting older. Rehabilitation can play an essential strategic role to counteract impairments and disability which characterize the elderly. Correct rehabilitative programmes have to be approached on the functional limitation and residual abilities of elders. Leading a more active lifestyle and regular physical activity including aerobic and resistance exercises have been demonstrated to improve cardiovascular, respiratory, musculoskeletal, and cognitive wellbeing in older adults. Occupational therapy, prescription of assistive devices, environmental, and home living adaptation, and family or caregiver educational training represent an essential rehabilitative strategy in elders developing disability. In these people, falls are dramatic events that lead to hospitalization, functional decline, decreased social activity, and poor quality of life. Rehabilitation incorporating balance, gait, and strength training exercise interventions can reduce the risk of falls. Frailty refers to a condition characterized by a gradual physiologic decline in multiple body systems, loss of physiologic reserve, and increased vulnerability to disease and death. Several therapeutic strategies have been proposed including exercises, multi-component training and approaches, all aimed at decreasing the need for nursing home placement, hospitalization, and reducing dependence and death. In these subjects, geriatric comprehensive assessment and the multi-disciplinary team have recently been demonstrated to be more effective than usual care.

Key words: *Elderly, Falls, Frailty, Hemodialysis, Rehabilitation*

INTRODUCTION

Epidemiologic surveys have widely demonstrated that in industrialized countries, the population is increasingly

aging. The Italian population is also dramatically changing as the elderly represent the fastest growing demographic segment. According to the “national demographic survey 2005” by the Italian National Institute for Statistics (ISTAT), 34% and 4.7% of people, respectively, will be older than 65 and 85 years in 2050, compared to a percentage of 19.5% and 2%, respectively, registered in 2005. By 2050, ISTAT forecasts one in three persons will be older than 65 years. This unprecedented demographic change brings with it a significant rise in demand for health and social care services. Thus, it is essential to plan and organize National Health System reforms, making it more resilient to the impact of our aging population and actually address the issue of integrating health and social care around older people’s needs. Aging is characterized by a progressive physiologic multi-organic decline that promotes the onset of functional limitation and disability. Rehabilitations play an essential and irreplaceable role to counteract impairments and to improve abilities. The main goal of rehabilitative intervention in the elderly is to maintain independent mobility and activities of daily living (ADLs). Correct programmes and objectives have to be approached on the residual ability and functional needs of elders (Tab. I). Since limitations and disability can be variable and complex, individualized multi-target rehabilitative interventions have been planned involving family and caregiver participation, particularly in frail older people. Extensive coverage of rehabilitative strategies in the elderly would go beyond the scope of this paper; thus, the role and effect of rehabilitation in elderly people will be provided focusing on some issues: i) role of exercise in the elderly; ii) occupational therapy and assistive devices; iii) rehabilitation intervention in older people at risk of falls; iv) rehabilitation in frailty and chronic kidney disease (CKD) in older patients;

PHYSICAL EXERCISE IN THE HEALTHY ELDERLY

Exercise is widely promoted to the adult general population because of its major benefit to health and well-being (1).

TABLE I
REHABILITATION PROGRAMMES AND GOALS IN THE ELDERLY

- Prescription of appropriate physical therapy including aerobic exercises focused on balance, gait mobility, and flexibility
- Prevention of falls
- Prevention of complications of mobility limitation and immobility
- Maintaining functional independence
- Assessment and prescription for equipment and devices
- Prevention and treatment of pain
- Patient and family education
- Maintaining social participation
- Improvement of quality of life

It contributes positively toward an individual's healthy weight, muscle strength, immune system, and cardiovascular health. The benefits of physical activity include enhancement of the cardiovascular, respiratory, musculoskeletal, and endocrine function, and psychologic wellbeing (2). Exercise lowers the risks of developing chronic diseases associated with inflammation (3) such as coronary heart disease (4), hypertension (5), colon cancer (6), and diabetes mellitus (7). Moreover, physical activity can promote better brain health with aging and reduce the risk of Alzheimer disease (8). Older adults should perform regular moderate-intensity aerobic activity focused on muscle-strengthening, flexibility, and balance (9-10). Aerobic exercises improve maximal oxygen volume uptake (VO₂ max) defined as the maximum rate of oxygen consumption measured during an exercise. The World Health Organization promotes at least 30 minutes of moderate intensity physical activity five days a week for older adults. With increasing age, there is a well-reported decline in voluntary physical activity associated with decreases in several measures of exercise tolerance, including maximal aerobic capacity, muscle strength, and fatigability, leading to an increased risk of frailty (11). Previous studies have revealed that physically active elders were less likely to develop impairments in their ADL or instrumental ADLs (12). A recent report suggested that older adults could benefit from practicing a more physically active lifestyle, typically by increasing ambulatory activity. Healthy older adults should take approximately 7000-10 000 steps/day (13). Likewise,

those also living with disability and/or chronic illness who display limited mobility and physical endurance could benefit from a physically active lifestyle by increasing their ambulatory activity at approximately 5000 steps/day.

OCCUPATIONAL THERAPY AND ASSISTIVE DEVICES IN ELDERLY

The use of assistive devices is a common intervention used to meet the goal of maintaining independence in disabled persons. In this respect, rehabilitation and occupational therapy in particular play a key role as there are countless assistive devices and their use depends on impaired function and disability. Assistive tools are commonly recommended for ADLs. They include dressing sticks, long-handled shoe horns, long-handled sponges, button hooks, shower seats, and three-in-one commodes. These items have been revealed to be effective in minimizing energy output and improving function with self-care and ADLs in patients with functional deficits because of orthopedic and neuromuscular diseases. Older people can suffer from painful polyarthritis affecting the major joints of the limbs including shoulders, hips, and knees as well as the small joints of the hands and feet. In elders with limited hand use, adapting an object's characteristics, such as handle size, can improve motor performance (14). Increasing the diameter of handles on writing instruments, grooming tools, feeding utensils, and other daily tools can also improve grip function. Frail older people have to rely on caregivers to have their needs met and caregivers have to tackle decreased psychologic and physical health. Educational training and assistive strategies on correct transfer, dressing, and toileting techniques is an important role for rehabilitation intervention and for occupational therapy in particular. Correct techniques can save energy, increase time efficiency, and decrease frustration. Simple interventions such as putting on a shirt over the arms first then over the head and trunk to make upper extremity dressing easier can be taught to family or caregivers. Pants with elastic waists or zippers on each side can be beneficial with clothing management for toileting. Rehabilitative intervention can help to find the best technique or equipment for a particular situation and recommend when a caregiver will have to provide more assistance. A further essential role of occupational therapy is environmental and home-living adaptation for elders with functional limitation who are at risk of falls. In these subjects suitable programmes include home hazard assessments by trained individuals, removal or modification of identified hazards, installation of safety devices such as handrails on stairs and grab bars on bathrooms, and improvements in lighting.

FALLS

Falls are the leading cause of injury and associated morbidity in the elderly. Thirty-five per cent of community-dwelling people older than 65 years fall each year and up to 10% of falls result in significant injury (15) such as hip fracture. Falls may lead to decreased mobility, hospitalization, depression-related symptoms, functional decline, decreased social activity, and poor quality of life (16-17). They have various causes including gait and balance disturbance, muscle weakness, visual deficit, dizziness, cognitive impairments, psychoactive and multiple drug use, arthritis, diabetes mellitus, pain, and environmental hazards (18). Among these, the most frequent factors include impairment in balance-related physiologic systems (impaired vision, slow reaction time, and greater postural sway) and mobility limitation. Individuation of older people at risk of falls and fall prevention is therefore an important issue in reducing medical costs as well as promoting the general well-being of the elderly. Indeed, quick validated fall risk screening tools for elders are now available for community, hospital, and nursing and residential care settings (19). Clinical practice guidelines and screening algorithms have also been published to prevent and reduce the risks of fall in older people (20-21). Furthermore, efforts have been made to translate evidence into policy and practice (22-23). Significant research has demonstrated the effectiveness of various interventions proposed for the reduction of falls. Exercise plays a key role in promoting general well-being and it is the most effective single falls prevention strategy in elder people (24) and also improves cognitive performance (25). All older adults at risk of falling should be offered an exercise programme incorporating balance, gait, and strength training. Flexibility and endurance training should also be offered but not as sole components of the programme (26). Systematic reviews concluded that exercise interventions reduce the risk and rate of falls (24, 27). Elder adults at low risk of falls should be encouraged to exercise regularly with a specific focus on balance training. On the other hand, frail older people or those with severe mobility limitation and cognitive impairment at high risk of falls, can also benefit from an exercise intervention, but consideration should be given to how these people are encouraged to exercise safely and effectively, because falls could increase with exercise (28). A recent study recommended that exercises to produce benefit in preventing falls have to focus on balance improvement, and must be of a sufficient dose intensity (around two hours a week) and duration, because the effects are quickly lost when exercise stops (29). Among proposed exercises, a widely used rehabilitative strategy is *Tai Chi Chuang*—a method also known as “Tai Chi” that

derives from Chinese martial arts. During the practice of Tai Chi, individuals do not usually exceed 55% of their maximum oxygen uptake and 60% of their heart rate. These proprieties make Tai Chi a moderate-intensity exercise (30).

Since fall risk can depend on several factors, a single approach can be insufficient. To date, several trials have demonstrated that multi-component and multi-factorial interventions resulted in an approximately 30% relative risk reduction in fall rate (26). The first method refers to a set of interventions offered to all participants in a programme that addresses more than one intervention category. In multi-factorial intervention, participants are only offered the adjusted subset of interventions that target the risk factors that have been identified through a fall risk factor assessment. This targeted or customized approach has been implemented primarily in community-dwelling older adults (31).

REHABILITATION IN FRAIL OLDER PEOPLE

Although there is a universal intuitive recognition of frailty by most physicians caring for older people, there is still a lack of both a consensus definition and a standardized assessment tool to be used in clinical practice and research. Generally, frailty refers to a condition characterized by a gradual physiologic decline in multiple body systems, by loss of function, loss of physiologic reserve, and increased vulnerability to disease and death (9, 32). Many definitions of physical frailty use measures of function and performance as markers of the changes in mobility, gait speed, balance, and strength found in frail older adults (33). It is nowadays widely recognized that frailty should be considered as a clinical syndrome resulting from multisystem impairments separated from the normal aging process. Weakness and fatigue are central to almost all definitions of frailty. Sarcopenia (loss of skeletal muscle mass) is probably a key component of these symptoms. New models have recently been developed to assess frailty based on comprehensive or multidimensional geriatric assessment (34-35). As frail elder persons are mostly inclined towards hospitalization, disability, and death, developing interventions is a crucial step in decreasing adverse health outcomes in frail older adults. Several therapeutic strategies have been proposed including exercises, multi-component training and approaches, all aimed to decrease the need for nursing home placement, hospitalization, improving quality of life, and reducing dependence and death. A large number of papers have reported that frail elder people can benefit from regular physical activity including aerobic or endurance exercise training (36). Among frailty factors, one of the most important is loss of muscle mass. Although data remain controversial, studies have revealed that aerobic exercises

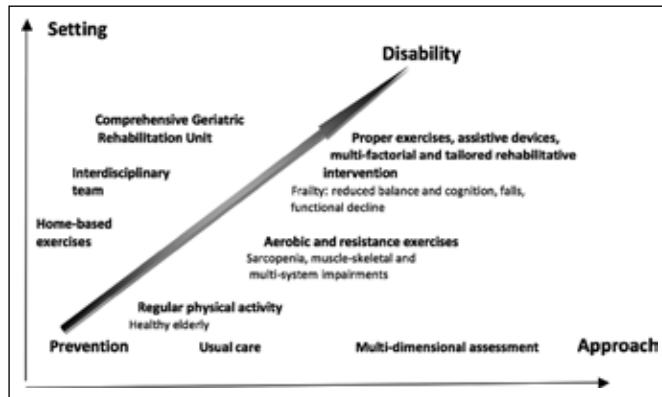


Fig. 1 - Assessment, approaches, and rehabilitative setting according to residual abilities and progression of functional decline in the elderly.

can increase the muscular mass of extremities in the elderly (37). Moreover, systematic reviews have reported that resistance exercise training in older adults was associated with increased strength (38-39). Since variable aspects including clinical, social, and cost issues could hamper rehabilitation at institutional centers, home-based exercise has been proposed in frail elders. This rehabilitative alternative has been revealed to improve mobility and gait velocity (40) and could result in a cost effectiveness strategy. Other than physical activity, there are indications that relatively long-lasting and high-intensive multi-component exercise programmes have a positive effect on ADLs and instrumental ADL (IADL) disability for community-living moderate physically frail older persons (41). An intriguing question concerns the correct rehabilitative approach in preventing and caring for the complexity of frailty. The right rehabilitative interventions should be planned on the functional ability of elders and tailored by more structured and interdisciplinary approaches as functional decline advances (Fig. 1). Geriatric comprehensive assessment and multi-professional team have been demonstrated to be more effective than usual hospital care and a single approach in treating frailty (42-43). The interdisciplinary care team usually includes a geriatrician or other medical practitioner knowledgeable in the care of older adults, a nurse, a social worker, and an occupational or physical therapist, if available. Inpatient geriatric rehabilitation programmes specifically designed for older people show an improvement regarding function, admissions to nursing homes, and mortality outcomes. However, the subgroup of patients who will benefit most from such programmes still remains as well as the efficacy of the characteristics of individual interventions (44). Furthermore, it has been reported that people older than 90 years suffering from hip fracture benefit from a geriatric multi-disciplinary rehabilitation approach (45).

REHABILITATION IN ELDERS WITH CHRONIC RENAL FAILURE

Data from the Health, Aging and Body Composition Study (46) and the Cardiovascular Health Study (47) reveal that physical impairment can be detected in the early stages of CKD. Elder adults suffering from CKD and in particular dialysis patients can develop frailty. They are associated with a high rate of disability because of frequent hospitalization (48-49) and metabolic changes. Physical activity including aerobic and resistance exercises have been recommended and they produce positive effects on cardio-respiratory fitness, physical function, and self-reported health (50). Moderate-to high-intensity strength training improves physical performance, muscle mass, and quality of life in elderly CDK (51) and dialysis patients (52). Significant improvements in lean body mass, quadriceps muscle area, knee extension, hip abduction, and flexion strength have also been reported (53). Exercise training may be delivered in non-dialysis time, either as outpatients or at home. Exercise may also be delivered during dialysis, denominated inter-dialytic exercise. Sophisticated machine such as leg press and free weights have been used to improve strength and to preserve physical function. On the other hand, simple and cheap elastic bands that can be used for resistance exercises during dialysis sessions may be an attractive alternative (54). Doubts remain over the correct physical programmes to obtain benefit, but no differences have been found between intradialytic versus home-based aerobic exercise training on physical function and vascular parameters in hemodialysis patients (55). Comprehensive multi-dimensional strategy and a goal-oriented approach should be provided in CKD older subjects presenting multiform disability.

To conclude, since the population is increasingly aging, rehabilitation will play an essential role to counteract impairment and to maintain functional independence in the elderly. Regular physical activity including aerobic and resistance exercises must be recommended to healthy older people. As functional decline advances, tailored and multi-factorial rehabilitative interventions must be planned in elder individuals with complex disability by a comprehensive geriatric team.

[AQ: please disclose any financial support and/or conflict of interest.]

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Accepted: January 09, 2012