The Physiotherapist’s role in maintaining a healthy elderly population
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Older people account for 16% of the UK population (Office for National Statistics 2009); in 2010 they will require approximately 45% of the NHS budget (Age Concern 2009). Fried et al. (1997) suggest that as many as 84% of those aged 65 years and over are dependent on family, friends or carers for some activities of daily living. The Office for National Statistics (2009) estimates that by 2033 the percentage of those aged 65 years or over will have increased to 23%. As the ageing demographic forecast becomes a reality, the challenge is to manage the social and economic burden. Through strategies such as the National Service Framework (NSF) for Older People (Department of Health (DoH) 2001), healthcare providers now have a mandate to encourage good health and well-being in an elderly population and to reduce the collective social and economic burden on healthcare.

Being elderly is a state of chronological, sociological and biological ageing (Balcombe and Sinclair 2001); the three are closely related. The effects of biological ageing determine what society considers an elderly state, and the average age at which this state is reached leads to our simple, chronological definition of ‘elderly’. This essay examines how the physiotherapist’s role, in maintaining health and well-being in an elderly population, is defined by: the pathophysiology of ageing, the policy, guidelines, standards and evidence base that exist in rehabilitation and preventive treatment, and by meeting the unique challenges that the elderly population present.

Physiotherapists, and other healthcare professionals, are interested in the biological process of ageing. Health Professions Council (HPC) Standards of Proficiency for Physiotherapists Standard 3a.1 (2007) requires the physiotherapist to understand both the development of ageing (physiologically, structurally and behaviourally), and the effect on functional ability. This is a factor physiotherapy can influence, and the result could redefine the sociological perception of ageing and the elderly.

The pathogenesis of the ageing process is well researched but poorly understood, with hundreds of competing theories. The accumulated mutations theory first proposed by Medawar in 1952 (cited in Kirkwood 2005) argues for the existence of a group of mutated genes that accumulate through generations whose deleterious effect on the genome is only
expressed when an individual has survived the extrinsic factors of mortality (Balcombe and Sinclair 2001). The evidence supporting this theory is controversial and limited. More credible evidence exists to support Williams’ (1957) antagonist pleiotropy theory, which suggests that ageing is caused by pleiotropic genes that have a positive effect on survival earlier in life but have a negative effect later in life. A review by Leroi et al. (2005) argued that antagonist pleiotropic genes were scarce, but cited one example, a gene, protein 53, that was associated with decreased cancer incidence, but was responsible for faster ageing. The concept of a trade-off between early life survival and progressive later life deterioration leads to Kirkwood’s (1977, cited in Kirkwood 2005) disposable soma theory that claims that the evolutionary allocation of a finite supply of energy invested in survival, such as thermogenesis or reproduction, is energy that is not invested in somatic maintenance, leading to ageing through accumulation of cellular damage.

Cellular theories such as the programmed cell death theory of Hayflick and Moorhead (1961, cited in Kirkwood 2005) suggests that cells have a fixed capacity to divide, calculated by progressive incomplete replication of the telomere end of the DNA strand on cell differentiation. The progressive telomere shortening effectively counts down the replications until there is insufficient DNA for further cell division. However, von Zglinicki (2002) demonstrated that oxidative stress from free radicals has a greater effect on the rate of telomere erosion, substantiating the work of Harman (1991), who had discussed mitochondrial mutation caused by excess free radicals and leading to a decrease in adenosine triphosphate (ATP) production and cell death.

Despite the wealth of research and different theories, no consensus has been reached. Two current and well regarded gerontologists, Harman (1998) and Kirkwood (2005), agree that ageing is the build-up of unrepaired diverse and adverse cellular changes in body tissues creating a negative systemic effect.

For the physiotherapist as a ‘movement specialist’ (Squires and Hastings 2002), the primary physiological manifestation of these cellular changes occurs in the musculoskeletal system. Martini (2006, 371) notes that the accumulation of cellular debris results in a reduction in myofibrils and a reduced capacity for ATP, creatine phosphate and glycogen. This creates smaller diameter muscle fibres with reduced strength, endurance and recovery. Collagen fibres laid down in response to accumulating tissue damage, create cross linkages and
membrane stiffening through fibrosis (Bortz 2002). The gradual loss of strength through weakening and stiffening muscles reduces mobility and function and can eventually lead to disability. Research suggests that the decrease is most evident in the back, trunk and proximal muscles of the lower limbs (Vogel et al. 2009), affecting posture, gait and balance and creating a major falls risk (Tinetti 2003). This is substantiated in practice with over 400,000 older people requiring hospital treatment each year due to falls (DoH 2001). NSF for Older People (DoH 2001) Standard Six requires that the National Health Service (NHS) is proactive in preventing falls and offering effective treatment and rehabilitation for those who have fallen, this is a key area for physiotherapy intervention.

A reduction in osteoblast activity can lead to osteopenia, a decline in bone turnover. In turn, osteopenia can cause degeneration to articular surfaces within joints such as osteoarthritis and, when combined with reduced circulation of synovial fluid, may result in rheumatic or osteoporotic conditions, causing swelling and pain, decreasing range of movement and leading to muscle contractures or atrophy (Martini 2006, 199; Newman 1995). This is confirmed in practice, as 14,000 older people die annually following osteoporotic hip fractures (DoH 2001).

Impairments are not limited to the musculoskeletal system. Martini (2006, 542) identifies neurological dysfunction arising from cellular changes, including reduced co-ordination, memory, dementia and proprioceptive feedback from the vestibular, visual and somatosensory systems. Swelling and pain from musculoskeletal conditions can also inhibit afferent sensory pathways. These cognitive impairments compromise balance, movement and function and contribute to an increased risk of falls (Tinetti 2003).

Martini (2006, 853) suggests that the principal change in respiratory function in the elderly is a reduction in lung compliance, caused by the loss of elastic tissue in the lungs and compromised chest movement, due to arthritic changes at the rib articulations and loss of flexibility in the costal cartilages. The reduction in lung compliance creates a lower vital capacity and limits the respiratory minute volume. A weakened immune system increases the risk of respiratory diseases (Martini 2006, 802).

Cardiovascular capacity declines with age (Martini 2006, 756). Cellular changes in the blood, such as a reduction in haemotocrit, changes to the heart including deconditioning and
myocardial stiffening, or changes in the activity of the nodal or conducting cells, combine to reduce the maximum heart rate. Dysfunction in the blood vessels, including the loss of arterial elasticity or atherosclerosis, contribute to the cardiovascular diseases, coronary artery disease, coronary heart disease and stroke (Jani and Rajkumar 2006).

Bortz describes a cycle of systemic deterioration: ‘Clearly, deficits in any of the other systems can impair function of the musculoskeletal system directly or indirectly’ (2002, 285). The loss of muscle bulk and strength, combined with the decrease in cardiovascular and respiratory function, creates a reduced tolerance for activities of daily living due to fatigue. The loss of functional ability frequently accelerates decline in all systems (Newman 1995). Whilst older people are able to improve their musculoskeletal, cardiovascular and respiratory health through moderate exercise, the presence of multiple pathologies within this age group is an additional consideration for the physiotherapist (Vogel et al., 2009).

The cumulative effect of cellular and systemic degeneration often presents a common set of key chronic pathologies in older people, as identified above. Accordingly, falls and instability, dementia, stroke, cardiovascular disease, respiratory disease, rheumatoid arthritis and osteoarthritis have evidence-based clinical guidelines published by the National Institute for Clinical Excellence (NICE), National Collaborating Centre for Nursing and Supportive Care (NCCNSC) 2004, National Collaborating Centre for Chronic Conditions (NCCCC), 2004, 2008a, 2008b and 2009. These guidelines and HPC Standard 1b.2 (2007) recommend the input of a multi-disciplinary team (MDT) in the management of each condition due to the likelihood of multiple pathologies (Smith, 1990). The guidelines define the role of the physiotherapist within the MDT as facilitating mobility and increasing functional ability.

Despite the NICE Guidelines (NCCNSC 2004; NCCCC 2004, 2008a, 2008b and 2009) and the mandate of the NSF for Older People (DoH 2001), the role of physiotherapy within the MDT in maintaining health and well-being for the individual or from a cost-benefit analysis is debated. Randomised controlled trials by Sackley et al. (2009) and Kerse et al. (2008) concluded that physiotherapy had no benefit on independence or mobility in an elderly care home population. However, neither study devoted significant time to therapy; Sackley et al. (2009) spent an average total of 2 hours 12 minutes with each subject over the course of the trial, of which a total of 63 minutes was spent on the intervention. Both trials were based on building repetitions of functional tasks, such as sit to stand rather than strength and balance...
training. Kerse et al. (2008) acknowledge that an improvement in functional independence might be seen with an increase in activity levels, but warns that compliance is likely to be low. Poor compliance has been observed in numerous studies. McMurdo and Johnstone’s (1995) study into the efficacy of a home exercise programme for elderly people with poor mobility, failed due to poor compliance. Barriers identified in completing the programme were identified as cognitive impairment, lack of professional support, motivation and having an opportunity to exercise. A more recent review of the literature surrounding barriers to exercise found poor health and pain to be the most common barrier, followed by the physical environment, health professional advice and knowledge (Schutzer and Graves 2004).

Evidently simply prescribing physical activity is not enough. The role of the physiotherapist must also be to ensure adherence and compliance with the intervention through effective collaboration with the patient. Understanding the client group requirements, potential contraindications and being able to fluidly adapt assessment and treatment techniques to suit, is a requirement of HPC Standard 3a.2 (2007).

Successful collaboration recognises that older people have symptoms, emotions and beliefs, created through social interaction with their environment that are as fundamental to success as the treatment itself (Rejeski and Brawley 2005). Harman (1998) noted that the physical and psychosocial effects of ageing were a result of extrinsic factors such as an individual’s environment, genetic defects, disease and an intrinsic hereditary longevity. Balcombe and Sinclair (2001) stress that environmental factors are inseparable from the ageing process. The increase in life expectancy seen over recent decades, for example, is a result of optimisation of environmental factors through social policy (Kirkwood 2001).

A holistic approach to therapy is key; encouraging and maintaining a healthy lifestyle requires the patient to have a strong intention, the necessary skills, no environmental constraints, a belief in the benefits and in their ability, a perception that there is a social pressure to perform and the anticipation of a satisfactory outcome (Conner and Norman 2005). The physiotherapist’s role in facilitating these factors can be analysed through considering each stage of Velicer et al.’s (1998) ‘Transtheoretical Stages of Change’ model. During the Precontemplation stage, the patient has not yet accepted that they have a problem. This is commonly attributed to lack of knowledge (Velicer et al. 1998); older people are typically unaware of the healthcare opportunities available to them (Grant 2008). In the older
age group this may also be due to habit (Bortz 2002); the ageing process is a slow, continual systemic deterioration, taking decades before an awareness of a problem arises (World Health Organisation 1980).

However, older people are the largest client group in the NHS and make the most regular visits to their GP (DoH 2001). Physiotherapists must ensure that GPs and other first contact healthcare professionals are aware of the opportunities and evidence supporting a physiotherapy intervention in maintaining health and well-being (French and Sim 2004; Schutzer and Graves 2004).

At the ‘Contemplation’ stage, initiating behavioural change is not easy. The elderly are of a generation that generally considers physical activity for the sake of it as unnatural, the prevailing sociological stereotype is that old age is a time to contemplate and relax (Grant 2008). A study into retention, adherence and compliance to a physiotherapy intervention in older people, was limited when up to 65% of those initially approached had no interest in participating in the trial (Cyarto et al. 2006). The result of this increasingly sedentary behaviour amongst the elderly is evident in the two-fold increase in the incidence of osteoporotic hip fractures during the last 50 years (Kirkwood 2001).

NSF for Older People Standard Eight (DoH 2001) aims to improve the health and well-being of older people through a proactive, co-ordinated programme of action, led by the NHS. Healthcare professionals need to encourage the elderly into this infrastructure to facilitate a healthy lifestyle. A Google site search of the Lancashire Teaching Hospitals NHS Foundation Trust (2009) website, using the key words ‘elderly’ and ‘health’ reveals little information for the elderly person. Whilst rehabilitation services include education, safety and falls prevention for existing elderly patients, there appears to be limited accessibility for these services to non-patients. This could suggest that the Standard is not yet being met.

Physiotherapy has a significant role in the ‘Preparation’ phase. As personal contact with the patient commences, building a successful relationship depends on respect, communication and trust (DoH 2004). The physiotherapist should respect each older person as a unique and valued individual with a lifetime of experience shaping his or her expectations and beliefs (Grant 2008). Being non-discriminatory in practice is a key feature of the physiotherapist’s role established in HPC Standard 1a.2 (2007). The NSF for Older People Standard One (DoH
Communication skills are increasingly important in healthcare. Addressing the patient with respect, and actively listening for abilities, aspirations and expectations can facilitate mutually agreed goal setting (DoH 2004). A study by Hirvensalo et al. in 2005 examined the elderly patient interpretation of advice relating to physical activity from healthcare professionals. The data analysed was up to twenty years old and out of date with current practice, but the need for clear, concise communication, uncomplicated advice and informed and agreed goal setting remains valid for building patient belief and intention.

The final stage in preparation is to provide a safe environment for the intervention. Physiotherapists and Occupational Therapists are responsible for conducting environmental assessments, evaluating walking and transport, assessing and treating posture, balance, lifting, stairs, walking, breathing, encouraging a healthy diet in collaboration with a dietician, and foot care. Physiotherapists prescribe aids and appliances to facilitate the intervention, such as walking aids, wheelchairs, and making the patient aware of social opportunities such as group exercise classes (Smith cited in Smyth 1990).

To achieve the ‘Action’ stage of change, patients must reach a level of activity that is sufficient to reduce their health risk exposure. Defining and measuring the activity level is therefore key to the physiotherapist’s role in maintaining health and well-being. A study by Delecluse et al. (2004) found that endurance training in a cohort of elderly men increased general functional capacity despite not influencing the usual physiological markers of performance, such as VO\textsubscript{2} max and body composition, suggesting that selection of an appropriate functional outcome measure, such as the Barthel Index, Elderly Mobility Scale or Rivermead Mobility Index, is more reliable. Research continues to debate the validity of the various outcome measures used in elderly healthcare (Squires and Hastings 2002). More important is that the outcome measure is most suited to the aspirations and expectations of the patient. Progressing to the ‘Maintenance’ phase will be facilitated if the patient can relate to the progress being made (Velicer et al. 1998).

The final stage of change is completed when the patient is able to maintain the lifestyle
change without relapse. This stage typically comes as the traditional role of the physiotherapist ends. HPC Standard 1b.1 (2007) requires the physiotherapist to collaborate closely with other professionals, carers, support staff, service users and their relatives as, in this context, responsibility for maintaining long term behavioural change passes from the physiotherapist.

With finite healthcare budgets and an ageing population, social policy in the UK has inevitably had to address the chronic healthcare conditions faced by older people. Documents, such as the National Service Framework for Older People (DoH 2001), have given a mandate to the healthcare profession to adopt a proactive approach in maintaining health and well-being.

With the systemic degeneration of the ageing process manifesting predominantly in the musculoskeletal system as reduced functional ability, along with the inherent psychosocial implications this has, physiotherapy, being a profession that primarily defines itself as having a core interest in human movement and maintaining function (CSP, 2002), is ideally placed to react. The standards of proficiency and curriculum framework for physiotherapy require an understanding of how the ageing process will influence an individual from pathogenesis through to manifestation in functional ability; to consider the unique, individual extrinsic factors that have influenced ageing and how these same factors must be considered in assessment, treatment and goal setting.

In establishing an infrastructure of preventive care for the elderly, healthcare professionals and physiotherapists are creating a healthier future for both this and subsequent generations of older people. However, despite the policies, guidelines and standards, there still exists debate on the efficacy of physiotherapy, and standards are not being met. The challenge for physiotherapy as a profession must be to educate. To educate the elderly population in the various services and support that are available to them, to educate physiotherapy students, many of whom will graduate without any practical experience in the unique challenges of working with this age group (French and Sim 2004), and to educate other members of the healthcare profession from the evidence base available, that physiotherapy has a tangible role in maintaining the health and well-being of an elderly population.
References


