

**Title:** Chronic Oedema and the Older Person: The effects of ageing upon treatment outcomes.

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**Keywords,** Chronic Oedema, Ageing Process, Quality of Life, Age related deterioration of systems, increased susceptibility.

### **Learning Points –**

- Chronic oedema is a long term condition that can manifest as result of ageing and existing co-morbidities.
- The impact of chronic oedema upon quality of life is a factor in achieving the goal of patient self-management within the older population.
- The ageing process can affect the existing systems (vascular) that maintain homeostasis, and can create challenges in the treatment/management options.
- Patient outcomes can be improved through careful consideration of the impact the ageing process in the devising of care plans.

### **Abstract**

Chronic and Lymphoedema (CO) are long term conditions (LO) that can become more complicated due to the ageing process, or have a relationship in the development of CO/LO. The ageing process can lead to alterations in the structures that support the normal function of the lymphatic system, or put it at greater risk of damage. The main three components (skin care, exercise and compression therapy) within the management of CO/LO can become more challenging. This is due to reduced healing rates, decreased cardio vascular capacity or deterioration in vascular/arterial structures as examples of ageing. The impact of ageing and how this can affect patient/treatment outcomes requires careful consideration.

### **Introduction**

The effects of chronic oedema and its manifestation within the older population (over 65 yrs) cannot be underestimated. The advent of the ageing process and deterioration within the bodily systems increases the likelihood in the development of CO, but also the predicted outcomes of management strategies that may be employed within this group (Knight, 2017; Moffatt et al, 2012). At the present time there are over 1.6 million people within England over the age of 85 years, with those over the age of 65 representing 1.9 million (DH, 2012). It has been estimated that 15 million people have a long term condition in England, and those with co-morbidities will increase from 1.9 to 2.9 million (DH, 2012; 2014). Despite the impact upon services, in which it is estimated that those over the age of 65 years utilise up to 70% services, there is also the impact upon themselves and significant others (DH, 2012). This is relevant figures suggest that as a person ages the risk of CO/LO increases, with those aged over 85 yrs rises from 3.99 per 1,000 to 28.99 per 1,000 (Moffat et al, 2012).

### **Chronic oedema/Lymphoedema (CO/LO)**

CO/LO is the physical symptom that the lymphatic system and others, for example vascular may not be operating correctly (ILF, 2006; Rankin, 2016). This leads to the physical presentation of aching, tingling and then subsequent oedema in the affected limb, which responds in the early stages to elevation but alters as the condition progresses (ILF, 2006). The diagnosis of CO is the presence of

oedema, dependent upon cause (primary/secondary) over three months to be given the title 'chronic', but this may be given earlier if clinical history indicates a relationship between factors and presentation (Rankin, 2016). Receiving a diagnosis and treatment can be challenging receive diagnosis and effective management, due to service inequity (Cooper, 2017; TCST, 2016). The complications of the condition can not be underestimated, with this group of patients' being at greater risk of cellulitis, and the current focus upon hospital admission prevention (NCAT, 2013; NHS England, 2014).

### **Treatment/Management Options**

The next section will consider the ageing process upon the three main treatment options available, which include 1) skin care, 2) exercise and 3) compression therapy. The aim of treatment is to improve the patients' condition, through appropriate interventions that may include reduction/reshaping of the affected limb, leading towards self-management (ILF, 2006, 2012). However, the ageing process can affect this outcome, which will be discussed below:

**Skin Care** – The skin is known as the largest organ in the body, with multiple functions, such as excretion, protection and absorption of UVB to synthesis vitamin D (Marieb and Hoehn, 2015). In the management of CO/LO maintaining the skin integrity and its functions is pertinent (ILF, 2006; BDNG, 2012). These functions deteriorate as a person ages, leading to skin related issues, such as eczema and psoriasis, which are not life threatening but can cause distress and decrease a persons' quality of life (QOL) (Davies, 2008). The effects on QOL can be in the form of pruritus (itchiness) linked to long term conditions, such as diabetes, kidney disease, and the environment, such as 'winter itch' caused by overheated indoor environments (Niagm, 2017; Patel and Yosipovitch, 2010). It has been noted previously that those persons diagnosed with CO/LO are affected especially in regard to QOL (Baumann, 2018).

The ageing process increases the likelihood of the above and xerosis (extreme skin dryness), linked to reduced sebum secretion (Niagm, 2017), and due to a decrease in rete ridges (Tobin, 2017). The ridges access the dermal blood supply, and the available nutrients and oxygen, but this supply diminishes by up to 60% due to the ageing process (Tobin, 2017; Knight, 2017). Atrophy of the epidermis is noted, with a suggested 20% loss in the dermal layer and further loss in the hypodermal (Tobin, 2017). It is suggested that the atrophy does not occur in the stratum corneum layer, but this layer is not replaced as rapidly, due to mitosis being reduced by up to 50%, between the ages of 20 to 70 years (Tobin, 2017; Nigam, 2017). This factor within the ageing process is further exacerbated by the presence of oedema that can affect the normal mechanisms, such as fluid exchange, increased pro-inflammatory mediators and skin alterations (papillomatosis) (ILF, 2006, Byung-Boong et al, 2018).

As a further consequence an older person is less able to deal with shearing forces, due to a reduction in subcutaneous fat and collagen of up to 1% throughout a person's adult life (Yaar and Gilchrist, 2003). This is further exacerbated by a 50% reduction in mast cells with further decreases in langerhan cells and other immune responses (Farage et al, 2013; Nigam, 2017). These changes increase the risk of cellulitis, which is the one of the main complications of CO/LO and can lead to lymphorrhea (ILF, 2006). The main cause of infection relates to fungal infections, which can be challenging to prevent, due to the requirement to reach bodily area, such as feet and nails in those that are elderly (ILF, 2006, Knight, 2017). Despite these considerations, skin care remains as one of the main components in the treatment and management of the condition, and requires careful attention (ILF, 2006). Assessment of the skin, such as texture, moisture and temperature, can yield information that can form the basis of a plan of care, and requires appropriate patient education (ILF, 2006; James, 2011; Nigam, 2017).

## **Compression Therapy**

Compression therapy (CT) is one of the main components in both the treatment and management of CO/LO, which encompasses a number of components, such as compression hosiery (CH), adjustable velcro wrap systems (AVWS) and compression bandaging (CB) (ILF, 2012, ILF, 2006). The purpose of CT is to increase the efficiency and effectiveness of both the lymphatic and venous system, in the movement of fluid and debris towards achieving homeostasis (ILF, 2012, Rooney et al, 2018). However, achieving this outcome can become complicated, due to the ageing process upon the vascular and arterial system, which is a variable that needs to be considered when devising a plan of care.

Peripheral venous disease (PVD) within the lower limbs increases with age, body mass and is related to family histories, which can lead to the development of chronic venous disease and thrombosis formation as examples (Jarvis, 2018; Scovell, 2018). These factors alone can lead to the development of CO/LO, or further complicate the management of the condition (ILF, 2006). Especially when veins become distended, due to high pressure, or valves become incompetent (chronic venous insufficiency), the effectiveness of the venous pump action via muscle stimulation is diminished (Jarvis, 2018). It is interesting that research has suggested that around 50% of those who experience a deep vein thrombosis will develop CVI (Mills and Armstrong, 2018). These developments place pressure upon the lymphatic system leading to oedema formation, due to an increase in the presence of fluid within the interstitial space, as the veins can contain up to 2-2.5 times the volume of blood compared to the arteries (ILF, 2006, Levick: 2010; Rainkin, 2016; Jarvis, 2017).

CT offers a means of altering the current state within the body, through the creation of working (movement) and resting (non-movement) pressures, generated by selected medical devices, such as (CH, AVWS) (ILF, 2006; ILF, 2012). However, ageing can affect the arterial system, leading to the development of peripheral arterial disease (diabetic patients 9.5%), and dependent upon the severity can be a contraindication for CT (ILF, 2006; Jarvis 2018). The medium to large arteries, experience thickening due to age, causing reduced elasticity in the tunica intima (inner) and media (middle), caused by changes in collagen (cross-linking), leading to calcification and atherosclerosis (AS) (Ferrari et al, 2003; Knight, 2017). These affects can also be caused by the lifestyle choices of the individual, such as smoking and diet, which can predispose them to atheroma formation and AS development (Jarvis, 2018). Vasodilation can be affected by ageing, and a reduction in the production of nitric oxide which is a vasodilator by the endothelium cells, becomes damage over a period of time, despite increase in pro-inflammatory mediators linked to AS (Knight, 2017). Despite, these considerations CT offers the most effective means of managing CO/LO, with a recent systematic review suggesting that symptoms can be improved in those people experiencing intermittent claudication (Lane et al, 2017).

### **Exercise:**

The ability to perform exercise which can be active (yoga, running) or passive (carer assisted) can have positive impacts upon CO/LO. This includes 1) Blood velocity increase via muscle pump, 2) Lymphatic stimulation, 3) Muscle strength and 4) Psychological wellbeing (LF, 2006; ILF, 2012; Cooper, 2017). Systematic reviews and case studies specific to CO/LO, and other areas have noted the benefits of exercise (Lane et al, 2017; Baumann, 2018, Rooney et al, 2018). Nevertheless the ageing process can affect a persons' ability to engage in exercise, and to meet the recommended 150 minutes per week of moderate exercise (19-64yrs) (Knight, 2017, PHE, 2016). PAD increases from the age of 40 years old, alongside muscle thickening within the heart (women) or reduced muscle mass (men) (Strait and Lakatta, 2012, Knight, 2017). It is also noted that between 50-75% of the cells that comprises the bodies' pacemaker (sinoatrial node) decrease, set against increased fibrosis within the atrioventricular node, which affects the efficiency of the electrical conduction (Knight, 2017). Blood pressure also increases, due to the changes mentioned in regard to AS, reduced nitric oxide, but also caused by a desensitisation of baroreceptors, and up regulation of the renin-angiotensin cascade (Knight, 2017).

Exercise in regard to level and intensity has to be tailored, due to the impact of ageing has upon cardia function, but also mobility and respiratory (Knight, 2017; Strait and Lakatta, 2012). There is a noted loss of respiratory muscle strength due to muscle atrophy (diaphragm/intercostal), with this increasing in those that lead a sedentary lifestyle (Nigam et al, 2009). The lungs also lose elasticity, with this extending to the alveolar ducts in those over the age of 50 yrs, and a 25% reduction in alveolar surface in those aged over 90 yrs (Sharma and Goodwin, 2006; Knight, 2017). Despite, these factors aerobic capacity reduces by 6-10% per decade, but it is noted that exercise will still benefit older people (Night, 2017). The promotion of physical activity within CO/LO can include walking, engaging with specific groups or home exercises (ILF, 2006; Rooney et al, 2018, NHS Choices, 2017). The positive outcome of exercise within CO/LO when combined with CT can lead to fluid reduction, and empowerment of the individual to manage their condition (Rooney et al, 2018).

### **Conclusion:**

The management and treatment of CO/LO is a combined approach with skin care, compression therapy and exercise. Other adjuncts are available and can be used in combination with existing options. Ageing is one more area that cannot be presently reversed, with this affecting the majority of the body either directly or indirectly. The presence of CO/LO is noted as increasing with age, which is relevant when we consider the efficiency of the systems that support homeostasis (veins, heart), and how these diminish over a persons' lifetime. Despite, the effects of ageing, improvements in health can be achieved, but the context of the person (health, age, background), needs to form part of the assessment and within the care plan for that individual.

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