

LYMPHATIC FILARIASIS AND THE ROLE OF NURSING INTERVENTIONS

Rebecca Penzer

Lymphoedema in the resource rich countries of the world is usually associated with cancer or venous disease. In the developing world, however, large numbers of people (1.2 billion) (Dean, 2001) are at risk of developing lymphoedema because they live in areas where the infected mosquitos take frequent blood meals from humans. This article seeks to explore the relationship between mosquitos, lymphatic filariasis and the associated lymphoedema and to discuss the relevant nursing interventions which can have a positive impact on literally millions of individuals.

Key words

Lymphatic filariasis
Lymphoedema
Skin care
Nursing interventions

Lymphatic filariasis and the mosquito

In the tropical countries of Africa, Central America and Asia, mosquitos are the vector for parasites which cause extreme suffering and ill-health. Most people know of the relationship between malaria and the mosquito, fewer are aware that mosquitos also carry the parasite that causes lymphatic filariasis (LF) leading to lymphoedema and eventually elephantiasis. Ninety-one per cent of LF cases are caused by the genus *Wuchereria Bancrofti*, while the remaining 9% of cases can be attributed to *Brugia Malayi* and *Brugia Timori*.

The life cycle of the LF parasite is partly in the mosquito and partly in humans. As the mosquito takes a

blood meal from a human (which it does by sticking its proboscis into the superficial blood supply) it picks up microfilariae (mf) which are circulating near the surface of the skin. Once in the mosquito, mf undergo a number of developmental stages which take place in the flight muscles of the mosquito. Having undergone these stages, the mf migrate back to the mouth parts of the mosquito. On the

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next blood meal that the mosquito takes, it deposits the parasite onto the skin of the human where it has to make its way through the puncture wound into the blood supply. This transmission is not very efficient (Kazura, 2000) and many mosquito bites are required before the parasites are effectively established within the human (McCarthy, 2000).

Once in the blood stream, the parasite make its way to the lymphatic system where it grows: male adult worms growing to 4cm in length and females up to 10cm (Scott, 2000). The worms live tangled together in 'nests' in the lymphatics, these can be seen pulsating on an ultrasound scan. At adulthood, the worms mate and the female releases further microfilariae into the lymphatics. These immature parasites migrate to the superficial blood vessels where the mosquito picks them up on taking a blood meal and, thus, the disease is transmitted. At night time the density of microfilariae in the superficial blood supply is higher than during the day. It seems that the mf 'know' that this is the time when the mosquitos are most likely to bite and, therefore, they are most likely to get picked up and transmitted.

Effect of the lymphatic filariasis parasite

As the adult worms grow within the lymphatic system, the vessels become dilated through mechanisms not entirely understood (Addiss and Brady, 2007). What is clear is that this dilatation makes the lymphatic vessels less effective (Vaqa and Ryan, 2003). The progressive nature of lymphoedema can be explained by considering the frequent inflammatory episodes experienced. A failing lymphatic system is unable to cope with bacterial invasion, which penetrate through any lesions in the

Rebecca Penzer is an Independent Nurse Consultant in skin health and Editor of *Dermatological Nursing*

epidermis to create what is known as an acute dermatolymphadenopathy (Mortimer, 2000). Dermatolymphangioadenitis, often referred to as 'acute attacks', cause an individual to suffer pain, nausea and fever. These inflammatory episodes trigger the release of cytokines and growth factors into the epidermis, these stimulate the growth of fibrotic tissue and fat. The result of these inflammatory changes is that the swelling is less and less caused by fluid accumulation and more caused by fibrotic tissue and fat.

As the above description suggests, lymphoedema caused by LF is staged. Initially, the lymphoedema is reversible with swelling going down following elevation. There will be few, if any, skin changes. However, if the limb is not cared for (see section below on skin care), there are repeated bacterial infections and the skin will gradually change, with deep skin folds, nodules and knobs and mossy lesions (Figure 1). The limb will gradually become bigger and bigger. Eventually elephantiasis may result.

The impact on the individual is significant. Acute bacterial infection introduced through small skin breaks (e.g. small wounds or interdigital maceration) make the individual feel unwell, with significant pyrexia, nausea and pain. This can last for a few days and severely impact on the economic stability of a household, particularly if the sufferer is the main income generator. The long-term effects of lymphoedema and eventual elephantiasis are physical, social and psychological. There is a general discomfort (and often pain) and mobility may be significantly decreased. The individual may feel rejected by society and struggle in work and social situations (Wijesinghe et al, 2007). There is often a social stigma associated with swollen disfigured limbs which goes beyond the physical appearance. The society may believe that the altered limb is caused by witchcraft and/or a curse, thus isolating the individual even further (Coreil et al, 1998).

How big is the problem?

As already mentioned, 1.2 billion people live in parts of the world where they are at risk of contracting LF; this equates to one-fifth of the world's population all living in the poorest parts of the world. LF is most definitely a disease of poverty. 120 million people have been infected with the LF parasite, and while many of these people will remain asymptomatic, around 10% will go on to develop elephantiasis either of the leg, arm, breast or genitals (World Health Organization [WHO], 2000; www.who.int).

Elephantiasis describes the stage of the disease where there is huge swelling and skin changes often accompanied by pain, smell, immobility, social exclusion and economic hardship. While this article focuses on the problem of limb lymphoedema, LF is also associated with hydrocoele and scrotal lymphoedema in men, and vulval and breast lymphoedema in women.

How is lymphoedema in lymphatic filariasis managed?

WHO have identified LF as an eliminatable disease, in other words, it

is possible to reduce the level of the circulating parasite to such an extent that it no longer poses a public health problem (Ottesen, 1998). In 1997, the World Health Assembly passed a motion making the elimination of LF a public health priority.

The programme to eliminate LF as a public health problem has two pillars. The first is to treat every individual who lives within an endemic area with drugs that will kill the LF microfilariae. This requires each individual to take drugs once a year for 5–10 years. The effect of this is to gradually decrease the level of circulating microfilariae in the blood of individuals, thus making it harder and harder for the disease to be transmitted (i.e. when the mosquito bites there is an ever decreasing chance of it picking up the mf). The drugs are given in tablet form, distributed by the public health services. The precise drugs given depends on the location, however, they consist of either diethylcarbamazine (DEC) in conjunction with ivermectin or albendazole (Ottesen et al, 1997). In some communities, the DEC is given through fortified salt rather than as tablets (e.g. in Guyana).



Figure 1. Advanced skin changes in an adult with lymphoedema in Tanzania.

While this population-based ‘mass drug administration’ approach will eventually eliminate the disease, there will still be a significant burden of disease, i.e. people will continue to suffer from the effects of the disease for years to come. Consequently, a programme to manage the effects of the disease (largely lymphoedema and skin changes) forms the second pillar of the elimination programme. It is this second pillar that the remainder of this article refers.

Morbidity management and disability prevention

In this instance, morbidity relates to the illness caused by lymphoedema and skin changes, and disability relates to the consequences of these experiences. Management of lymphoedema in relation to LF is based upon the premise of reducing the progression of the disease by effective and simple strategies that have minimal resource implications. Because the disease and its impacts potentially affect a huge population, health education messages need to be straightforward and aimed at whole communities. These basic messages can be summarised as:

- ▶▶ Looking after the skin
- ▶▶ Elevation
- ▶▶ Movement.

Looking after the skin

This is an absolutely fundamental part of lymphoedema management in LF endemic parts of the world. These messages are being taught to those who are healthy as a preventive measure, and to those with lymphoedema and skin changes in order to prevent progression of the disease to the more serious stages. McPherson was able to show improved Dermatology Life Quality Index scores in individuals who were taught basic skin care routines by nurses in Guyana (McPherson, 2003).

Skin care messages

Various skin care messages have been developed with colleagues throughout the world (in particular, Dr Gerusa Dreyer from Brazil) (Dreyer et al, 2002). These include:

1. Wash the skin carefully on a daily basis using soap and clean water, always rinse the skin carefully (Figure 2).
2. Dry the skin thoroughly but gently with a clean towel or soft cloth.
3. Apply an emollient to the skin if the skin is cracked or dry.
4. Check between toes and in skin folds for breaks in the skin and fungal infections (Figure 3) — treat with an appropriate antifungal or antibacterial product.
5. Wear comfortable shoes to protect the skin from traumatic damage.



Figure 2. Encouraging self-care — person washing their own limb.



Figure 3. Checking between toes for entry points.

While these steps seem relatively simple to follow, in resource poor environments many issues remain problematic. For example, clean water may not be available and, even if it is, it may not be plentiful, soap may be unavailable (and/or of a very poor quality), an individual may not own a towel or even a piece of clean cloth to dry with, and emollients are often well beyond the resources of those who need them. Despite these potential problems, it appears that these simple skin hygiene measures can make a difference in terms of reducing the frequency of acute attacks (Kerketta et al, 2005).

Elevation

Elevation is most effective at reducing swelling in the early stages of the disease. Low level swelling may be totally reversed overnight if the leg is elevated. Ideally, the limb should be raised to the same height as the hip, but the individual must feel comfortable. The knee should be slightly flexed and pressure on the ankle/heel should be avoided (Dreyer et al, 2002). In communities where furniture is scarce, elevation may be achieved by rolling a piece of cloth to place under a sleeping mat or by using a box padded by a piece of cloth.

Movement

Movement and simple exercises that stimulate lymphatic flow are effective ways of helping individuals to manage lymphoedema. Once they have been taught, the individual can undertake this form of therapy independently.

Over exercising, for example, through vigorous running, can be counter productive and aggravate lymphoedema. Therefore, movement should be gentle yet deliberate and carried out on a regular daily basis. While movement is focused on the foot, for example, circling and flexing it, movement of the whole limb is beneficial. Walking and foot exercises are probably the most effective ways of promoting lymph flow (Vaqas and Ryan, 2003). Breathing exercises have not traditionally formed part of the LF programme, however Vaqas and

Ryan note that the breathing taught to lymphoedema patients in resource rich countries is similar to that used in some Asian traditional systems of medicine (Vaqas and Ryan, 2003). In a recent paper, 112 Indian case studies are reported which suggests that the use of Ayurvedic medicines and yoga (including breathing techniques) may be helpful in the management of lymphoedema related to LF (Narahari et al, 2007).

Other health promotion messages

Communities are also being taught a number of other health messages to reduce the impact of LF on their own health and that of their children (Figure 4). Mosquito nets are important for preventing the transmission of all mosquito borne diseases, and their use is being actively encouraged through the LF programme. It has also been noted that it is likely that initial infection occurs in childhood (Witt and Ottesen, 2001), which means that protection of children is particularly important. The annual mass drug administration is often heralded as something of a community event. Celebrities and dignitaries may be invited to attend to encourage all members of the community to come

and take the drugs. While individuals cannot be forced to take the medication, there is often significant peer pressure to do so. The drugs are provided to the individuals within a community for free. Generally, these are then distributed on specific days in public venues, for example, a health centre.

Messages not included in the public health messages

Bandaging and massage

In resource rich environments, bandaging and massage form important components of lymphoedema management. In resource poor environments, these are generally not part of the strategy for management.

Bandages are costly and difficult to use effectively in poor environments, which may be dirty and hot with poor water supplies. Even where individuals can afford bandaging, the heat and humidity may prohibit their use. The complexity of lymphatic massage makes it impractical as part of a public health message. However, there are clearly exceptions to this, for example, bandaging and massage are used to good effect in communities in India.



Figure 4. Teaching skin care messages to a village group.

How to look after Big Foot



WASH WITH SOAP AND WATER

DRY

USE MOISTURISER

An illustration showing a person washing their feet in a bowl of water. A circular inset shows hands being washed with soap and water. Another circular inset shows hands being dried with a cloth. A third circular inset shows hands being applied with cream. A bottle of moisturiser is shown next to the person.

CHECK FOR WOUNDS

IF NEEDED, USE MEDICATED CREAM

DAWA

An illustration showing a person checking their feet for wounds. A circular inset shows a person applying cream to their foot. A tube of DAWA cream is shown below.

DO EXERCISES

ELEVATE LEG

GO FOR A WALK

An illustration showing a person standing and performing exercises. Another person is sitting on the floor with their leg elevated on a stool. A third person is walking with a companion.

IF YOU HAVE FEVER / PAIN, SEE YOUR HEALTH CARE WORKER

An illustration showing a person sitting with their leg elevated. Below, a person is shown with a health care worker.

USE A MOSQUITO NET

TAKE TABLETS

WEAR SHOES

An illustration showing a person lying under a mosquito net. Below, a person is shown taking a tablet. A pair of sandals is shown at the bottom.

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Figure 5. Educational resource developed by the International Skin Care Nursing Group in Tanzania.

The nursing response

The International Skin Care Nursing Group (ISNG) has been an active member of the WHO's efforts to eliminate LF as a global health problem. Particularly in the early 2000s, ISNG had resources to fund a project worker who worked within the WHO programme to begin to mobilise the nursing response (although there is no longer a project worker for the ISNG, it still exists as a network supporting nurses who have an interest in skin health). This involved discussions about curricula, resource development, field work and training. The ISNG also had an impact on developing the skin care messages related to lymphoedema management. Figure 5 is a patient education leaflet that was developed for use in Tanzania in conjunction with the Tanzanian LF team. The challenge now is to find ways to work across specialisms to ensure that skin care within LF management maintains a high profile and attracts the resources it needs to be successful.

As Addiss pointed out in his recent article on the global LF programme (Addiss, 2007), despite the differences between standards and approaches to care, some of the basic elements, i.e. underlying physiology, protecting barrier function through skin care and the psychosocial impacts are the same whatever the underlying disease process causing lymphoedema. This should encourage us to work together, regardless of where our interest in lymphoedema starts.

Conclusions

Lymphatic filariasis is a disease of the lymphatic system which causes lymphoedema and elephantiasis. A WHO programme has been developed to eliminate this parasitic disease as a public health problem. However, there will continue to be significant disease burden caused by ongoing lymphoedema and related health problems. A series of public health messages have been developed to help communities prevent the problems related to limb

lymphoedema, these are largely based on the importance of managing the skin and promoting its function and integrity. Nurses have a significant role to play and the lymphoedema and dermatology specialists should enhance their impact by working together. JL

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Key points

- » Lymphatic filariasis is a mosquito-borne disease which can lead to lymphoedema and elephantiasis.
- » As the condition affects millions of people in tropical countries around the world, a public health approach is needed.
- » A public health approach includes providing drugs to the whole population to interrupt transmission and simple health promotion messages to manage the impact of lymphatic changes.
- » Health promotion messages are skin care, elevation and movement.