Managing patients following a lower limb amputation

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Amputation surgery can be traumatic and life-changing for patients and many struggle to come to terms with the loss of a limb. Wounds that fail to heal following surgery can have an impact on each individual’s rehabilitation process. It is important to provide the correct management for these wounds to facilitate healing and enable the patient to work towards mobilisation. Equipping community nurses with the knowledge and skills to assist patients in managing their residual limbs can improve the time from amputation to ambulation. Similarly, overcoming problems with patients’ skin; achieving properly fitting prostheses; and managing the ‘wear and tear’ of prosthetic limbs are all challenging aspects in the management of this patient group.

KEYWORDS: Amputation, Wound care, Skin care, Rehabilitation

Between 5–6,000 major limb amputations are performed every year in the UK and more than half of these are performed on patients aged 70 or over (NHS Choices, 2012). To cope with this volume of patients there are currently 44 prosthetic and amputee rehabilitation centres (PARCs) in the UK (Limbless Statistics, 2013) — these provide expert knowledge, advice and counselling to this specialist group. Multidisciplinary teams include doctors, nurses, physiotherapists, occupational therapists, prosthetists and counsellors, although this may vary slightly in each PARC.

Many patients have complex health and psychological needs, including those with congenital limb absence/abnormalities; limb loss due to various conditions such as meningitis and infection; people with diabetic and vascular conditions; and trauma patients who may have lost their limb due to a motorbike, car or industrial accident (Limbless Statistics, 2013). Good working relationships with other disciplines and healthcare professionals can be beneficial in managing these patients (Chadwick and Wolfe, 1992).

The nurse within the PARC may be the first contact with the patient following referral, and can provide information, advice and support before the patient’s first visit to the team, which will help to alleviate any worries or concerns about the rehabilitation process. The nurse can also provide advice and support to patients, families and other nurses regarding wound healing and oedema control (British Society of Rehabilitation Medicine [BSRM], 2003).

EARLY STAGES OF REHABILITATION

Following surgery, patients are often encouraged to rest their residual limbs on pillows. Although they often find this comfortable, it encourages either the hips or knees to adopt a flexed (bent) position (depending on the surgery performed) and over a period of time this can result in fixed-flexion (Coletta, 2000). Flexed joints make walking with a prosthesis more difficult, therefore joints need to be encouraged to extend, which will strengthen the muscles. Pain relief is paramount at this stage (Walsh, 2005; Vascular Society 2012), and rehabilitation is easier if the patient has a good range of movement.

Patients are often keen to mobilise following surgery and many use their remaining foot to transfer in and out of bed, or pull themselves around using their wheelchairs, which can cause pressure damage. This can severely affect their ongoing rehabilitation (Young, 2004), and it
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Infection can pose serious complications for people who have undergone amputation. Methicillin-resistant Staphylococcus aureus (MRSA) continues to be a major problem and it is recommended that aggressive wound monitoring should be performed in all patients. One complication is cellulitis, causing swelling, pain, pus, erythema and fever, sometimes leading to sepsis. Even localised wound infection can be problematic, resulting in excess exudate and breakdown of the suture line — severe infections can cause dehiscence, tissue necrosis and require further surgery. 

Source: Harker (2006)

Wound care can be very challenging for people who have undergone amputation. The level of lower limb circulation, affecting their healing and diabetes and have compromised vascular supply, trauma and extensive ulceration, etc.

In these cases, transfemoral (above-knee) amputation may be performed, which will have an impact on the patient’s ability to walk in the future — the prosthetic leg required will be longer, which can affect the patient’s balance, and higher levels of energy will be required to mobilise as the prosthetic limb used in transfemoral amputation patients is much heavier. Finally, transfemoral amputations the prosthesis fits into the groin area, which can be uncomfortable and often causes hygiene issues. Overall, rehabilitation of transfemoral patients is much more complex and challenging for clinicians as well as patients.

Surgical revision
Healing the wound without further surgery will have a positive impact on the eventual ability of the patient to mobilise. However, surgical revision is sometimes performed to improve the blood supply to the wound bed and aid healing, although in some cases it may be necessary to perform a transfemoral amputation due to continued impaired healing. Over time, many patients develop pressure ulcers around the bony prominences of their residual limb due to changes in residual limb shape, deterioration in health, weight loss/gain (Stewart, 2008), or muscle wasting (Walsh, 2005).

Due to impaired sensation these changes often occur without the patient realising. If dressings are required to aid wound healing, it is important to consider their suitability. For instance, choosing a padded dressing may initially provide the patient with some relief but will actually increase the pressure within the socket over time, potentially resulting in pressure on other parts of the residual limb (Saluwa et al, 2006).

In some wounds it may be possible to use film dressings to facilitate moist wound healing without increasing pressure, and patients may continue to weight-bear depending on the wound’s severity. The prosthetic support and for patients living with amputation this referral may need to be swift; their needs may well require a specialist nurse, prosthetist, physiotherapist or a range of other professionals to be involved in order to solve the problem.

This is a patient group that often has multiple comorbidities and managing their holistic needs has been highlighted as an important role of the PARC.
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socket, which is custom-made by the prosthetist to fit each individual patient depending on the shape and condition of the residual limb, can be modified to alleviate pressure and allow continued prosthetic wear. However, patients should be advised to remove prostheses throughout the day to relieve pressure on the wound and aid healing (Saluwa et al, 2006). This is often difficult and frustrating for patients who can be reluctant to remove their prostheses because of the impact on their independence and day-to-day living, and resort to using their wheelchairs to mobilise instead.

**ROLE OF THE PARC**

To make sure that patients begin mobilising as soon as possible, community nurses should consider prompt access to the PARC multidisciplinary team (Melsom and Danjoux, 2011). Physiotherapy, occupational therapy and, where required, psychological support or counselling are all integral to the rehabilitation process (BSRM, 2003; Vascular Society, 2012).

Many patients benefit from physiotherapy and early walking aids before prosthetic fitting, although ‘hopping’ with frames is discouraged as this can contribute to falls and trauma to the contralateral (other) limb. Wheelchair use is encouraged, although some patients prefer to try and manage with crutches or frames.

**Figure 1.**
*The Femurett adjustable training aid.*

The Femurett (Össur) adjustable training aid (Figure 1) is often used when patients attend a PARC for physiotherapy following transfemoral amputation. It helps assess patients’ suitability for prosthetic use — many patients may visit the PARC for physiotherapy before being treated by the multidisciplinary team at the PARC for the first time (when they become known as a ‘primary patient’).

Many primary patients often have unrealistic goals and physiotherapy allows the team to monitor their progress, for example when transferring from the bed to a chair, or with their ability to tolerate exercise. Balance can also be assessed by the Femurett due to it having a ‘foot’. The Femurett can also be used when patients are ready to begin walking training and before they receive a prosthesis, providing them with a realistic understanding of prosthetic use. Observing patients’ capabilities in this way benefits the team as it will ultimately save on the manufacture of unsuitable or impractical prostheses (Parry and Morrison, 1989; BSRM, 2003).

Pneumatic post-amputation mobility aids (PPAM aids) can also be used following amputation (Figure 2). These facilitate early walking for transtibial amputation patients, preventing deterioration of muscle tone and reduction in residual limb oedema — they can also be used as an early assessment tool for patients’ potential to mobilise with a prosthetic limb (Redhead et al, 1978; Parry and Morrison, 1989; Broomhead et al, 2006).

Compression socks (Figure 3) provide graduated compression and help those with transtibial amputation to reduce oedema as well as encouraging the residual limb into a cylindrical shape ready for casting (Louie et al, 2010). These socks are often provided following wound healing (BSRM, 2003). The shape of the limb is important as it will affect the prosthetic fitting (Chakrabarty, 1998). Compression socks can be easy to apply for patients and family members and should be painless to wear (Bouch et al, 2012) — in the authors’ experience, patients often state that these compression socks provide support and comfort (Figure 3).

**‘Stump’ boards**

Patients with transtibial amputations who are using wheelchairs to mobilise should be issued with stump boards. These detachable accessories fit on the wheelchair and allow elevation of the residual limb (Bouch et al, 2012), which assists with the management of dependent oedema (Young, 2004; Harker, 2006). Stump boards also reduce the formation of fixed-flexion deformities at the knee and protect the limb from possible impact injury (White, 1992) — they should be used whenever the patient is in the wheelchair (Bouch et al, 2012).

Some patients who visit the PARC for appointments fail to use the stump boards on their wheelchairs, which can be problematic as the residual limb often swells while they are travelling. Not only does this makes it hard for the prosthetist to cast a prosthetic socket which fits properly into the prosthesis — joining the two and ensuring a proper and safe fit — it also means that it is hard for patients to participate in physiotherapy sessions with their prosthetic limb. This can often mean that they have had a wasted journey and need to re-arrange due to the altered shape of the limb (BSRM, 2003).
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Falls
Falls can also damage patients’ residual limbs causing bruising to the bone, which may be painful and can take time to heal. The area may also be sensitive after a fall and walking training may have to be suspended until the patient can tolerate the pressure in the socket.

Falling on the amputation site may also open up existing wounds, which may then need further surgery (Ertl, 2014). Although advice and written information is given to patients regarding the risk of falls, when their prosthesis is not attached they can forget that they no longer have a limb and attempt to walk, resulting in accidents. It is important to always encourage patients to mobilise while ensuring that they have an awareness of their safety when transferring (BSRM, 2003).

The prosthetist
The prosthetist will measure, assess, cast and design the patient’s prosthesis. The multidisciplinary team will discuss the patient following physical assessment and formulate a prescription unique to that individual (Coletta, 2000). The prosthesis is then manufactured to the prosthettist’s instructions. When the prosthesis arrives, the prosthetist will adjust it to align with the patient’s residual limb, which will help optimise his or her walking. However, sometimes an unusual walk or gait may pre-date the surgery and intensive physiotherapy will be required to correct this.

The prosthetist works closely with the physiotherapist at this stage to ensure that the patient is competent in putting the prosthesis on and mobilising safely and with confidence, although the aids mentioned above may still be required for a time. Patients may need to visit the physiotherapist a number of times before they are able to take their prosthesis home with them.

Frustration and low mood can affect those patients keen to mobilise following surgery (Chakrabarty, 1998). This is sometimes exacerbated by unrealistic goals provided by healthcare professionals. Previous to their amputation surgery, patients’ mobility may have been limited due to various medical conditions, and they may have experienced chronic pain, both of which may not be entirely solved by the prosthesis. Therefore, clinicians have to be wary of raising unrealistic expectations.

It is also important that all patients who have undergone surgical amputation are referred to their local PARC, even if it is felt that they are not suitable for prosthetic use (Vascular Society, 2012). This enables realistic rehabilitation goals to be set in partnership with the patient as soon as possible — a delay in referral may also delay the rehabilitation process.

Not all patients may be suited to a prosthesis for walking, but may still require one for transfer or cosmetic purposes (Ertl, 2014). Other patients come to accept that wearing a prosthetic limb is not for them and that alternative methods of mobility such as wheelchairs and other aids may provide the independence that they require (Chadwick and Wolfe, 1992; BSRM, 2003).

SKIN CARE
Initial advice for patients who have been fitted with a prosthesis is to gradually build up wear-time (Coletta, 2000). When they first receive their prosthesis and begin mobilising at home patients may have been immobile for a long period of time due to surgery and/or wound-healing complications — wearing the prosthesis for most of the day, despite advice to the contrary, can often cause pressure-related ulcers (Figure 4).

Many patients have impaired feeling in their residual limb and it is important to ensure that they regularly check the skin’s integrity and follow a skin-care regimen. This includes washing the limb each day with a mild soap (preferably non-perfumed), and ensuring that the skin is dry after washing. Moisturising the residual limb at night will help to keep the skin hydrated and in good condition (Limbs4Life, 2009).

The confined space and airtight sockets in the prosthesis can cause perspiration to become trapped resulting in skin problems, although there are various liners and socks available on the market to help with this. The patient may also be susceptible to bacterial and fungal infections that may require topical creams, and allergic reactions to liners and socks can also be

Figure 3. Compression socks can help reduce oedema and encourage a cylindrical limb shape.

Five-minute test
Answer the following questions about this article, either to test the new knowledge you have gained or to form part of your ongoing practice development portfolio.

1. Can you explain why some patients may require amputation?
2. What is meant by the term transitional?
3. Why is the fitting of the prosthetic limb so important?
4. What are some of the complications of poorly maintained prosthetics?
5. Can you explain how patients may manage their skin care?
Figure 4. Pressure-related ulcers can result from extensive use of prosthetics.

problematic. The skin should be kept clean and dry, spare socks should always be available, and patients should be encouraged to regularly wash liners and socks with hot water and mild soap (Limbs4life, 2009).

ONGOING MANAGEMENT

Established prosthetic weares are encouraged to attend regular appointments at their local PARC to prevent complications, have their equipment maintained and to review any medical conditions.

Adjustments to the prostheses may be required over time to maintain the patient’s independence and mobility (BSRM, 2003); similarly, further casts of the residual limb may be needed so new sockets can be manufactured as the patient grows older and his or her medical conditions change (BSRM, 2003). It is also important for patients to understand that the level of oedema in their limbs can fluctuate throughout the day as they mobilise. Along with their prosthetic limb, they will be provided with socks of different thicknesses and may need to add or remove these to ensure that their limb fits safely and comfortably.

CONCLUSION

Major surgical amputation is traumatic and life-changing for patients who often have complex health and psychological needs. Evidence supports early referral to a PARC to ensure that patients receive prompt assessment, specialist advice, realistic goal-setting and a multidisciplinary approach to their individual rehabilitation process.

Early intervention by nurses with the right skills and knowledge to support these patients, as demonstrated in this article, has the potential to reduce complications, encourage rehabilitation and optimise patient outcomes. JCN

REFERENCES