DRUG USERS WITH injection-related wounds may present to GPs, practice nurses, treatment room nurses and district nurses. Other services that provide wound care for this population are homeless health nursing services and harm reduction services. Intravenous (IV) drug use is increasing globally and has implications for healthcare practitioners, wound care services and hospital departments (Saunders et al 2004, Takahashi et al 2007). Dermatology and vascular departments are also finding that their work with injecting drug users is increasing as a result of the complex and intractable nature of these wounds.

IV, subcutaneous and intramuscular injecting of drugs may lead to the development of wounds. Serious wounds in these patients can be life threatening because of associated infections such as sepsicaemia and necrotising fasciitis. Infection may be common as a result of the unsanitary conditions that IV drug users, particularly those who are homeless, can find themselves injecting in squats, for example (Guild 2008).

Conservative estimates of the annual healthcare costs associated with injection site infection range from £15.5 million to £47 million per year. The vast majority of these costs account for hospital admissions associated with severe infections (Hope et al 2008).

Although opiate addiction has been recognised as a problem, political concern in the UK dates back to the 1950s when recreational drug use was common among young people (Joseph Rowntree Foundation 2000). Illicit drugs are those that are controlled under the Misuse of Drugs Act 1971 and the Misuse of Drugs Regulations 2001. This legislation regulates controlled drugs and divides them into three classes: A, B or C, depending on the harm they cause (Table 1).

Heroin is the drug most commonly injected (Stein 1990), but is frequently combined with cocaine. The risk of developing injection-related wounds is more common when combining drugs because of the increased level of impurities in the constitution of the injection. Citric acid is used in preparing some illicit drugs for injection in the UK and varying amounts may contribute to damage within the vessels or the subcutaneous tissues, leading to cell death and necrosis. The potential for localised numbness and the increased frequency of injections as a result of the short duration of action of cocaine may also increase the risk of developing infection-related wounds (Guild 2008).

<table>
<thead>
<tr>
<th>Class of drug</th>
<th>Type of drug</th>
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<tbody>
<tr>
<td>Class A</td>
<td>Cocaine, ecstasy, heroin, lysergic acid diethylamide</td>
</tr>
<tr>
<td>Class B</td>
<td>Amphetamines, cannabis, codeine</td>
</tr>
<tr>
<td>Class C</td>
<td>Diazepam, clonazepam, co-proxamol</td>
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(Surelines 2010)
Intravenous drug use

Drug addiction is a chronic illness. Most drug users in the UK are people aged 15-44 years, and it is estimated that in Scotland alone there are almost 56,000 illicit IV drug users, of which 50% are injecting drugs (Common Services Agency 2002). Devey (2007) found this age range correlates with the type of patients treated at clinics in Sheffield as part of the needle exchange programme (which enables drug users to obtain sterile hypodermic needles and associated injection equipment) and in homeless hostels. There are no national data for the prevalence of injection-related drug use (Health Protection Agency (HPA) 2005). In the UK, for example, there may be at least a sevenfold difference in the prevalence of injection-related drug use between cities and primary care trusts (PCTs) (Hickman et al 2009). Bristol, where the author works, is the largest city in the south west of England with a population of approximately 400,000, and has extremes of affluence and deprivation. Bristol PCT has a high prevalence of injecting drug use with approximately 2.2% of individuals injecting drugs (Hickman et al 2009).

Homeless people are four times more likely to misuse drugs than the general population (Kershaw et al 1999). Approximately 70% of homeless people aged 25-34 years have a drug dependency problem (Kershaw et al 1999). The often chaotic nature of an injecting drug user’s life may be further compounded by problems such as unemployment, homelessness and criminal behaviour, which may prevent access to healthcare services. Drug users may access drug treatment services, but continue to inject, or may not declare that they are still injecting to nurses and therefore do not receive appropriate wound care. Injecting drug users may disguise continued injecting behaviour from their methadone prescriber or the GP. Potential health complications such as wounds and related wound infection may not be addressed because patients fear losing their methadone prescription (Pieper 1996, Finnie and Nicolson 2003). Treating drug misuse and addiction, and addressing social problems such as homelessness, will have a significant effect on reducing the prevalence and severity of injection-related wounds in drug users.

Depression and anxiety are common among injecting drug users. Mental health problems can affect psychosocial functioning and the person’s ability to follow long-term treatment plans for wound care (Pieper et al 2000). Advice and treatment may be difficult for the person to comply with because of poor mental health, a chaotic lifestyle, homelessness, fear of negative attitudes from healthcare professionals and/or problems with literacy (Carroll 1996, Pieper et al 2000).

Types of wounds and soft tissue problems

The skin is the largest organ system of the body. As long as it remains healthy and intact, the skin represents an effective physical barrier against invasion from microorganisms (Pankey et al 1985). The acidic pH and dryness of the skin, and the complex lipids in the sebaceous secretions, inhibit most pathogenic bacteria and fungi. Injecting drug users will have to breach the surface of the skin to achieve drug entry. Injection-related wounds are commonly linked to IV and high-risk subcutaneous or intramuscular injection. Drug users may also resort to skin or muscle ‘popping’ – injecting directly into the dermis where the drug is absorbed subcutaneously or from the muscle (File and Tan 1995, Lloyd-Smith et al 2005).

A wide range of wounds may be observed in the injecting drug user. The three types of wounds mainly seen in the author’s clinic are leg ulcers, abscesses and sinuses. However, there are numerous other skin changes that may be observed including track marks (Figure 1), urticaria, pruritus, necrosis, lymphoedema (Figure 2) and other changes associated with venous disease of the lower limbs. Other problems that may occur include cellulitis, limb and digit puffiness, nerve tingling and burning sensations...
Skin and soft tissue infections

Injecting drug users may be exposed to potentially serious bacterial infections such as Staphylococcus aureus, Group A Streptococcus and Clostridia, which may result in life-threatening conditions such as septicemia, necrotising fasciitis and wound botulism (Gordon and Lowy 2005, Guild 2008, HPA 2009). Infection among injecting drug users is associated with a range of behavioural and environmental factors such as sharing of injecting equipment and injecting in unhygienic conditions. The key to reducing infections and maintaining good injecting hygiene is to provide access to needle exchange schemes, which offer drug users sterile equipment, safer injecting advice, immunisation against hepatitis B and other interventions. These schemes are designed to reduce the harm associated with injecting drug use significantly. However, an audit carried out in 2005 and 2006 of needle exchange programmes in England and Scotland, found diversity in the range of injection-related equipment offered, interventions provided and service accessibility (Abdulrahim et al 2006, Scottish Executive 2006, Scott 2008).

Sources of bacterial contamination may include the skin of injecting drug users, especially if hands and injection sites are not washed before use. A study of 1,057 drug users in the United States found that those who always clean their skin before injecting were 50% less likely to experience abscesses than those who did not clean their skin (Vlahov et al 1992). Other sources of bacterial contamination may include the type of drugs injected, the paraphernalia (drug injecting equipment such as spoons, needles, citric acid and syringes) used or the injecting environment (Gordon and Lowy 2005).

Abscess formation

Abscesses that form at the injection site are a common complication of injecting drug use (Figure 3). Around a third of IV drug users reported having an abscess, open wound or sore at an injection site over one year (Hope et al 2008). However, it is unclear what mechanisms or opportunistic factors contribute directly to these skin problems. Abscesses may develop into chronic ulcers especially in the lower limb. If injecting drug users cannot readily obtain a vein, they may resort to skin or muscle popping. This approach can lead to muscle malformation, infection and frequent scarring, including multiple small circular coin-shaped scars (Figure 4) (Bergstein et al 1995, Finnie and Nicolson 2002).

Cellulitis and/or inflammation

Cellulitis is a diffuse acute infection of the skin caused by entry of bacteria, usually through a break in the skin. Group A Streptococcus and Staphylococcus are the most common of these bacteria, which are part of the normal flora of the skin, but normally cause no infection while on the skin’s outer surface. Cellulitis
is characterised by local heat, redness, pain and swelling. Skin on the legs is most commonly affected by this infection, although it can occur on any part of the body. The mainstay of treatment is antibiotics and recovery can be anywhere from 48 hours to six months (Cox and Lawrence 1998).

Cellulitis and/or inflammation may be present at injection sites. The severity of infection depends on tissue trauma, the direct effect of the injected drug, tissue ischaemia and inoculation of bacteria. Repeated injections in the same site traumatise skin and the surrounding area. Some drugs, such as cocaine, can cause vasospasm and thrombosis (Pieper and Hopper 2005, Devey 2007). Immune disorders such as the human immunodeficiency virus (HIV) caused by hepatitis B and hepatitis C viruses predispose the person to infection (Pieper and Hopper 2005). Heroin and other opiates may suppress several T-cell functions that are important to immunity and may also inhibit the series of biochemical wound healing events taking place to repair the damage (Ebright and Pieper 2002). The transmission rate of HIV and hepatitis C infections from injecting drug use is higher now than during the late 1990s. Around two fifths of injecting drug users are infected with hepatitis C and about 73% with HIV (HPA 2009).

Extravasation of heroin, citric acid (which is frequently mixed with illicit drugs) or injecting directly into the skin may result in infection and abscess formation. The most common signs and symptoms of an abscess are pain and tenderness, erythema (redness), lymph node tenderness and fever (Pieper 1996). Infections can be deep and will therefore not show many of these common signs and symptoms, so a thorough clinical assessment of the patient is paramount. Wound assessment for injecting drug users should be no different from that of the general population.

Benbow (2007) suggested that wound assessment should include documentation of the location of the wound, size and depth, any clinical signs of infection, pain and a description of the wound bed, such as percentage of any slough, necrosis and granulation. Patients should be asked to report strategies that they feel would help heal the wound and those that they feel do not, and records should be kept accordingly (Benbow 2007). Many patients with a history of injecting drug use will have self-managed their wounds and may need additional advice and support with education to change potentially harmful wound care practices, for example application of dry gauze to open wounds or washing wounds with alcohol swabs.

In Bristol PCT, the harm reduction strategy group in collaboration with the Safer Bristol Partnership concluded that an information leaflet would promote self-care and raise awareness among injecting drug users of the signs and symptoms of infection, and provide information regarding safe and effective ways to undertake self-care of their wounds (Powell and Monk 2008).

**Treatment**

Abscesses may be treated with incision and drainage under local or general anaesthetic. Surgical drainage will result in wounds of various size and depth. They will require packing and further dressing. Systemic antibiotics will be needed to treat the causative bacteria, which are most commonly aerobes such as *S. aureus* and *Streptococcus* (Bergstein et al 1995). Antibiotics should generally be prescribed for a minimum of seven days and in some cases 14 days depending on the therapeutic response, complexity of the wound, causative organisms, and site and degree of associated cellulitis (Ebright and Pieper 2002). Other considerations include rest, elevation of the limb and adequate nutrition (Pieper and Hopper 2005).

Holistic assessment is essential before choosing a wound dressing (Morris 2006). The number and sophistication of many modern wound dressings available makes dressing selection an advanced skill, particularly for complex wounds (Casey 2000). Some nurses may need advice and should refer to nurses who specialise in wound care. Wound care formularies and local guidelines may be available for nurses in many trusts.

The type of dressing used can have a significant effect on healing (Casey 2000). Antimicrobial silver or honey dressings may be suitable for use initially on these wounds as such dressings kill bacteria and honey has been found to reduce inflammation (Ousey and McIntosh 2009). Hydrophobic wound dressings, which are a bacteria-binding dressing that can be prescribed as a ribbon, dressing pad or a non-adherent gauze, are simple, but effective (Ljungh et al 2006, Hampton 2007). After a few weeks these dressings can be changed to a dressing that protects the wound and promotes healing, such as a non-antimicrobial or hydrophobic dressing.

**Nutrition**

Poor nutrition has been correlated in some studies with poor wound healing and impaired immunity (Todorovic 2002, Anderson 2003, Thompson and Fuhrman 2005, Brown and Phillips 2010). Good nutrition provides the necessary nutrients for healthy skin and effective wound healing. However,
drug users who are homeless may not be meeting their nutritional needs because of a lack of money, and few means to cook and store food. Pieper and Hooper (2005) found that clinical manifestations of malnutrition can be overlooked. There are direct and indirect adverse nutritional consequences of illicit drug taking as a result of lifestyle disruption, disordered food intake and metabolic effects, as well as effects on the immune system (Desjarlais et al 1995). Drug addiction not only disrupts regular food consumption, for example through missing meals, but it can also increase the likelihood of wasting of muscles and tissues. Inadequate nutrition may also make the IV drug user more susceptible to infections, which may be introduced through injecting.

Protein-energy malnutrition occurs as a result of an imbalance or deficiency of nutrients. Protein depletion in the diet can affect the rate and quality of wound healing (Gray and Cooper 2001). There is an increased demand for protein in the presence of a wound, particularly in cases where there is sepsis. The main demand for protein synthesised during the healing process is collagen, and the strength of collagen determines wound strength. Protein is required as part of the inflammatory process in the immune response and granulation process (Gray and Cooper 2001). Even short periods of low protein intake can result in delayed wound healing. In the case of low carbohydrate intake, the body breaks down protein to provide glucose for cellular activity. Therefore it is important to include both protein and carbohydrate in the diet. The role of fatty acids in wound healing is unclear, but as they are involved in the synthesis of new cells, depletion is likely to delay wound healing.

Vitamins and minerals are important in collagen synthesis and energy release from carbohydrates (Gray and Cooper 2001, Shepherd 2003). B-complex vitamins are involved in a number of metabolic functions associated with wound healing, and vitamin C has an important role in collagen synthesis. Minerals such as zinc are required for protein synthesis and are involved in enzymatic reactions.

While drug abuse appears not to affect average energy intake, it may affect the frequency of meals and nutritional quality of the foods eaten. Nurses need to understand the roles of specific nutrients in wound healing as this will aid assessment and screening (Shepherd 2003). Nutrition is an important consideration when adopting a holistic approach to wound healing (Gray and Cooper 2001). Nutritional screening is an invaluable component of nursing assessment.

References
Carroll J (1996) Attitudes to drug users according to age of staff. Professional Nurse. 11, 6, 401-404.

NURSING STANDARD
Questions should be asked about the patient’s nutritional status to assess the individual’s risk of being malnourished. Appropriate actions should follow and may include a more detailed nutritional assessment. Malnutrition Universal Screening Tool, widely known by the acronym MUST, was developed for use in the community (National Institute for Health and Clinical Excellence 2006) and may be helpful for nurses assessing the nutritional status of injecting drug users.

The Royal College of Nursing (2008) recognises that good nutritional care is the responsibility of the multidisciplinary team and should be promoted. Weight and body mass index are useful objective indicators for identifying either under or over nourished people, but they will not identify patients who are gradually losing or gaining weight (Brown 2009).

Engaging patients about their dietary history is the first stage to screening. Some questions to consider include:

- Do you consider your appetite to be good, or has it changed?
- On an average day what would your meals consist of?

Conclusion

IV drug use is a chronic and often relapsing condition, and injection-related wounds have implications for patients and the healthcare professionals treating them. Wounds need to be assessed in terms of type, location, size, depth, drainage, odour and infection. Physical and psychosocial factors also need to be considered and nutritional screening should be carried out accordingly. Teaching the patient about the cause of the wound and rationale for treatment can have a positive effect on the outcome.

Dressings should be based on the principles of moist wound healing, depth of wound and absorption of exudate. The assessment of antibiotic therapy and antimicrobial dressing therapy will need to be considered for abscess sites. Studies have suggested that infection and contamination can be reduced by hand washing and cleaning the skin before preparing the drug for injection. Correct diagnosis of the wound and holistic assessment is critical to ensure the best possible treatment and outcome for the patient. NS