Corns and calluses
Corns and calluses are areas of thickened, often yellowish skin that can cause burning or sharp pain. Sufferers often describe corns as feeling like “walking on stones”. They can be painful on direct pressure.

Corns and calluses are due to a reaction (hyperkeratosis) of the skin to shearing force or direct pressure, and typically form on areas of high pressure.

Risk factors include poorly fitting footwear, foot deformity, biomechanical disorders, high levels of activity and involved (curved) toenails. Foreign bodies (eg, a splinter of glass in the foot) can also elicit hyperkeratosis. The patient may report feeling something in the skin or, indeed, know that they have previously stepped on something sharp (although this may not be the case in diabetic neuropathy).

There are several types of corn. Hard corns (heloma durum) are pea-sized with a plug of hard skin in the centre (see Figure 4) often occurring over toe joints, other bony prominences, areas of excessive high pressure (eg, ball of the foot) or where a curved nail is placing pressure on the nail fold. If they are not treated they can become fibrous, extend to the dermis and develop a vascular base. (Vascular corns bleed if cut.)

Soft corns (heloma molle) occur between the toes and result from hard skin becoming hyperhydrated and are often surrounded by macerated white skin. They are vulnerable to infection. They may occur due to bony prominences on the toes or poorly fitting footwear holding the toes together.

Seed corns can occur singularly or diffusely. They are associated with dry skin types and appear as small, light pinpoints (“seeds”) within a surrounding callus. Their exact cause is unknown but they are usually painless.

Calluses are often wider than corns and do not have such a defined edge. Differential diagnoses include psoriasis, eczema, mycosis, verrucas, palmo-plantar keratoderma (a condition involving marked thickening of the skin) and atypical moles.

Corns and calluses can lead to ulceration because mechanical forces are transferred through the hard skin to the deeper tissues, which can rupture. This is a particular problem in diabetes because ulceration can lead to rapid spread of infection.

Management Most corns and calluses can be managed with self care — using a pumice to reduce hard areas after bathing the feet. Most will resolve if pressure from the area is relieved so attention to footwear is advised (see Panel 4). Felt pads can be used to deflect pressure away from an area and toes can be protected with sponge or silicone tubes.

OTC treatments include rehydrating and keratolytic creams containing urea (eg, Eucerin Dry Skin Intensive Foot Cream 10 per cent) and applications containing salicylic acid (eg, Bazuka Gel). I advise avoiding corn plasters containing acids because these do not discriminate between the corn and the surrounding skin and can cause a chemical burn, leading to infection.

Soft corns should be dried by wiping surgical spirit between the toes. Avoid talcum powder because it does not allow moisture to evaporate. Sponge, silicone, low density plastic and closed cell (ie, trapped air) insoles are all available to reduce plantar pressure.

Hard skin should not be removed with a blade because this can cause infection. Such a procedure should be left to a podiatrist, who should be able to remove the corn or callus painlessly using a scalpel. The podiatrist may also apply a range of medicaments (eg, salicylic acid, silver nitrate) to the area to prevent recurrence.

Electrosurgery (high frequency electric current) can also be used to remove corns.

If deformity is causing the corn (eg, hammer toe when muscles and tendons shorten and the toes is forced to bend downwards, usually due to wearing shoes that are short, narrow and too tight, or arthritis; see Figure 5), corrective surgery may be required.

Corns that are infected (ie, painful, swollen, discharge around the callused area) should be referred. Patients who may have a foreign body in the foot should also be referred. Anyone with a callus and an underlying condition that can cause severe foot problems (eg, diabetes) should also be referred as should people with a corn or callus associated with sports (they may require a biomechanical examination) or that does not resolve with OTC treatment.

Chilblains
Chilblains (erythema pernio) are small, red swellings on extremities, such as toes (see Figure 7), caused by an abnormal reaction to cold — arterial vasoconstriction in the skin in cold conditions followed by vasodilation on sudden warming. Symptoms include itching, burning, pain, inflammation, blistering and ulceration.

Risk factors include sudden changes in temperature from cold to hot (eg, using a hot water bottle to warm cold feet).

History of onset may determine diagnosis but blood tests may be required to rule out underlying systemic conditions — chilblains can be secondary to systemic lupus erythematosus and can be confused with Raynaud’s syndrome (see later).

Management Chilblains usually resolve after two or three weeks. Sufferers should be advised to avoid scratching the affected areas because this can cause infection. Calamine lotion or witch hazel can be applied to reduce the itch. Feet should be dried thoroughly after washing.

Chilblains can be avoided by warming cold feet slowly, and using woolen socks and other footwear to prevent feet from becoming too cold. Smoking can exacerbate the condition.

Symptoms that do not resolve after three weeks of preventive care should be referred, as should patients with ulcerated or infected toes.

Dermatitis
Pharmacists may encounter dermatitis or eczema affecting the feet: red, dry or flaky skin that can be itchy or painful. A full discussion of dermatitis is beyond the scope of this article, but I would like to remind readers how irritating or allergic contact dermatitis might affect the feet. Soaps and detergents leaching from socks after washing, chemicals from the shoe leather tanning process and plastics can all act as irritants. Allergens in footwear can include nickel (eg, in buckles, lace eyes, studs), rubber (eg, in soles and...
trimming) and glues (eg, in soles and uppers). Irritant dermatitis accounts for 80 per cent of all contact dermatitis. Careful questioning (eg, when did it begin?, when is it worse?) can help diagnosis as it can keep a record of what is being worn on or applied to the foot.

Differential diagnoses include atopic eczema, varicose eczema and pachyonychia, drug eruption and fungal infection.

**Management** If a causative agent is identified, remove it from the environment and keep skin hydrated. Use soap substitutes and emollients. Corticosteroid and antihistamine creams can reduce inflammation and itching. The prognosis is good if the causative agent is found and removed. If removing suspected irritants have not resolved the problem the patient should be referred. Infection secondary to scratching or breaks in dry skin also require referral. The patient could see a podiatrist or doctor.

**Fractures**
Symptoms of a fracture include pain, swelling, bruising, stiffness, deformity, limping due to pain (antalgic gait) and inability to bear weight.

A single, direct assault on the foot is the major cause of fractures. However, fractures due to repetitive stress are common in joggers and can present secondary to osteoporosis and some cancers. In addition, avulsion fractures can occur when there is a sharp twisting of the foot causing sudden tension of tendon, which tears bone away from the point of its insertion. This is common in inversion injuries causing the base of the fifth metatarsal to fracture. Diagnosis can be made purely from the history of the complaint (especially with lesser toes) but X-rays may be used for confirmation.

**Management** Initially rest, ice and elevation of the limb will reduce swelling and pain in the foot. Toe fractures can be immobilised by taping two toes together and using a stiff soled shoe. Fractures of larger bones in the foot may require offloading using casting or splinting systems as well as crutches.

Fractures that are misaligned or surgery. Open fractures (fractures where the broken bone comes through the skin) will require antibiotic and anti-tetanus cover. Analgesia may be required to reduce pain in the foot.

Referral to a doctor should be made if there is worsening pain in the area or swelling, or both. Urgent medical care is required if the bone is exposed, there is a wound close to the area, there is bleeding from the area, the skin is grey or blue, there are symptoms of tingling, numbness or cold or the foot is deformed.

Most foot fractures heal without complication in four to eight weeks. However, a complex fracture or one which crosses a joint may cause arthritis, stiffness, pain or deformity.

**Gout**
Gout can occur in almost any joint but often affects the feet (when it is known as podagra), typically at the first metatarsophalangeal joint (big toe). The initial symptom is excruciating nocturnal pain in the joint with swelling and red or purple colouration. The slightest contact can cause pain and most people will seek medical help due to the pain.

Pharmacists will know that gout is caused by primary hyperuricaemia due to overproduction or under-excretion of uric acid. Chronic symptoms can develop if not treated, including tophi (white, chalky deposits of sodium urate under the skin, which may rupture the surface), secondary arthritis, secondary ulceration and calculi in the urinary system.

Hyperuricaemia can also result from medication (especially with diuretics and aspirin derivatives, which cause the body to produce enough uric acid to overwhelm the kidneys).

A person with a parent with gout has a 20 per cent chance of developing it. It tends to appear in men after puberty while women tend to get it after menopause. The condition is more common in black people and is the main cause of inflammatory arthritis in men over 40 years. Other risk factors include drinking alcohol (especially lager), a diet high in red meat, oily fish, shellfish and yeast, and being overweight.

**Management** Treatment is beyond the scope of this article but it is important to recognise the symptoms and refer suspected gout to a GP, who can make a diagnosis from the history of symptoms, blood tests, radiology and joint aspiration. Differential diagnoses include rheumatoid arthritis, osteoarthritis, infective arthritis, fracture and pseudogout (deposits of calcium pyrophosphate in the joints causing secondary arthritis).

Sixty per cent of people with gout will have a similar or worse attack within a year of the first attack. Over-the-counter pain relief (not aspirin) may be supplied to reduce acute symptoms.

**Heel fissures**
Cracked heels have been discussed in a “Question from practice” article available online (see Resources).

**Ingrown toenails**
A toenail is ingrown when one or both sides pierce the skin of the nail fold, causing pain, redness and swelling (see Figure 7).

Infection can easily occur. The ingrowth can be caused by the natural curve of the nail or a wide nail. The big toe is most likely to be affected. Ingrowth may be initiated by poor nail cutting leaving a spike or rough edge to the nail. The problem is exacerbated by sweat, causing the skin of the nail fold to become soft and easily damaged and the nail plate to tear. Sometimes hypergranulation can occur, resulting in the formation of extra tissue.

Ingrown toenails are more often seen in teenagers, whose feet tend to sweat more, and in the elderly because toenails thicken with age and are more difficult to cut. Fungal infection and trauma can also cause the nail to fragment and ingrow. Tight shoes and hosiery can exacerbate the problem.

Diagnosis is usually symptom-based. An X-ray may be required if the diagnosis is uncertain. Differential diagnoses include onychophosis (hyperkeratosis in the nail fold, often seen in the elderly), foreign body, tumour, fracture, other bacterial infection (paronychia), fibroma and pyogenic granuloma (benign vascular lesions).
Metatarsalgia

Pain or inflammation that does not resolve in a couple of days should be referred to a podiatrist, as it can affect two or more metatarsal heads, including poor footwear, arthritis, overuse, stress fracture, gout, being overweight, fat pad atrophy (seen in older people), pes cavus (having high arches), oedema, poor venous return, neuroma (eg, Morton’s neuroma), hammer toe and bunions.

Diagnosis may involve physical examination and X-ray, magnetic resonance imaging, ultrasound and blood tests to determine any underlying disease.

Management

A number of simple measures can be recommended to relieve symptoms:

- Wearing shoes with a wide toe area and low-heels
- Resting with feet elevated whenever possible
- Using shock absorbing insoles and orthotic inserts, such as metatarsal pads or bands, to help reduce pressure on the metatarsal heads
- Exercising (eg, if a stiff ankle or Achilles tendon is the problem)
- Taking analgesics such as paracetamol or NSAIDS
- Losing weight where appropriate
- Exercising
- Keeping weight off the foot when possible.

The patient should see a podiatrist or GP to have the diagnosis confirmed. Severe infections (eg, spreading cellulitis) and patients confirmed. Severe infections (eg, spreading cellulitis) and patients should also be referred. For severe athlete’s foot not responding to OTCT treatment, oral terbinafine (eg, 250mg od for two to six weeks), itraconazole or griseofulvin, can be prescribed.

Topical treatments for fungal nail infections require sustained use over several months and do not perform as well as those for athlete’s foot, probably because people stop adhering to them.

Management

Good foot hygiene and wearing cotton socks and shoes with leather uppers will aid treatment. Many topical OTCT products are available for athlete’s foot, containing terbinafine, clotrimazole, econazole, ketoconazole or miconazole. Most infections will respond well to these but treatment with imidazoles should be continued for two to 14 days (see individual summaries of product characteristics) after symptoms have resolved to help prevent relapse. The patient should be advised to leave his or her feet exposed to air as often as possible.

Pharmacists can help identify patients’ needs and select a product that best suits their lifestyle. For example, there are now OTC products that claim to require a single application only. Combination products containing hydrocortisone can be used to reduce inflammation but these should not be used for more than seven days and should be used with caution between the toes (ie, occluded areas) because the risk of adverse effects may be increased.

Generally, if there are no signs of improvement after two weeks, the patient should be referred to a GP to have the diagnosis confirmed. Severe infections (eg, spreading cellulitis) and patients with secondary bacterial infection should also be referred. For severe athlete’s foot not responding to OTCT treatment, oral terbinafine (eg, 250mg od for two to six weeks), itraconazole or griseofulvin, can be prescribed. Most mycoses resolve without further complication.

Topical treatments for fungal nail infections require sustained use over several months and do not perform as well as those for athlete’s foot, probably because people stop adhering to them. Treatment of fungal toenail infections is discussed in more detail in a previous CPD article (2006) available online. Since the launch of amorolfine as a pharmacy medicine in 2006, a group of other products for
fungal nail infections have been launched, for example Scholl Fungal Nail Treatment and Excilor. These claim to prevent fungal growth by lowering the pH of the nails but there are no comparative studies suggesting these are any more efficacious than other topical treatments.

**Overpronation**

Overpronation is a biomechanical disorder. It is an abnormality in how weight and impact are distributed in the foot during walking. Some turning in of the foot is needed as the foot adapts to the ground but in overpronation, the foot rolls inwards excessively. The arch flattens and collapses, soft tissues stretch, and joint surfaces function at unnatural angles. Initially, overpronation can cause fatigue but, with time, strain on the muscles, tendons, and ligaments of the foot and lower leg can cause permanent problems.

Symptoms of overpronation include burning sensations, aches, stabbing pain, heel pain, arch pain, foot strain and metatarsalgia, plantar fasciitis, inversion sprain, ligament rupture, flat feet (pes planus; see Panel 5), bunions and knee pain that resolves at rest.

Causes of overpronation include congenital misalignment of the foot, knee or hip, congenital deformity known as varus (PES PLANUS) and, in fact, is normal in infants and toddlers. But by the time a child is two or three years old, tendons holding the joints in the foot together tighten and an arch is formed. However, in some people, the tendons remain loose. In addition, ageing or injury can damage the tendons and cause flat feet to develop later in life.

Most flat feet do not cause pain. If foot, ankle or lower leg pain are present, referral is advised. Sometimes people can feel their feet become achy or tired when standing for long periods or after playing sports.

No treatment is needed for flat feet that are not causing any pain or problems walking. For people who experience pain, an arch supporting insert can be prescribed. Other options depend on the type of flat feet.

**Raynaud's disease**

Raynaud's disease — the spasming of small blood vessels — often occurs in the toes. Vasospasm can cut off the blood supply, resulting in whitening and pain. This condition is the focus of another CPD article (2007; see Resources).

**Subungual haematoma**

Injury to a toe can cause blood to collect in the space between the nailbed and toenail — subungual haematoma — and this can cause pain.

The damage can be due to a single event or multiple microtraumas. For example, microtrauma when a toenail is repeatedly struck against the end of the shoe is commonly seen in athletes.

**Management** Minor haematomas can be managed with ice, elevation and an NSAID. If pain is intense or the haematoma affects more than a quarter of the nailbed, the person should be referred to a GP or podiatrist. An X-ray may be required to exclude fracture. In addition, in the early stages a subungual haematoma can be evacuated (trephined) to reduce the bruising and this may prevent loss of the nail, which, without treatment, can fall off as part of the healing process. This is
especially likely if a haematoma covers the nail bed. Regrowth of the toenail can take up to 18 months.

Evacuation involves making a hole in the nail to allow drainage of the haematoma. The release of pressure also relieves pain. It can be done using hot- or electrocautery, a fine-point scalpel, a surgical drill or a laser. The hole in the nail will grow out with the nail.

If the nail is removed by the injury (or the clinician), the toe should be soaked in salty water and does not heal properly, this should be treated with caution and require urgent investigation.

The prognosis often depends on speed to diagnosis and treatment. The sooner a foot ulcer is correctly diagnosed and treated, the better the outcome.

**Verrucas**

A verruca is a wart cause by human papilloma virus (HPV), including types 1, 2, 4, 27 and 57. The virus penetrates broken skin (often caused by hyperhydrosis) and infects epidermal keratinocytes causing hyperplasia. This may lead to formation of a lump of tissue which forms its own capillary network. The lump can form on non weight bearing areas or an area of hard skin may form on weight bearing areas. It may appear several months after infection.

Verrucas can feel as if there is something pressing into the foot. Verrucas on weightbearing areas can cause pain. There may be loss of the normal pattern of lines in the skin (strial patterns) and dark spots of new capillaries bleeding into the tissue — “pepper pot appearance” — can be seen. A verruca growing beneath a toenail may cause discoloration, pain and nail dystrophy.

Up to 10 per cent of children who swim regularly have a verruca. Prevalence drops with age but can be increased in immunosuppression. HPV is commonly found in areas that are wet, especially around swimming pools and in changing rooms. Walking barefoot in these areas and sharing towels can spread the virus. Using a protective cover, such as a swimming sock, can prevent spread to others.

Verrucas can usually be diagnosed by visual inspection for changes in strial patterns and the pepper pot appearance, and pain on squeezing but not on direct pressure.

**Resources**

- **Rheumatoid arthritis: Features, causes and diagnosis**.
- **Rheumatoid arthritis: Management** and “Promoting self care of joint pain” are available to member of the RPS at www.pjonline.com/cpd__musculoskeletal_and_joint__diseases.
- A PJ article on heel fissures is available at www.pjonline.com/content/quests_ions_from_practice__heel__fissures.
- Further details on stretching exercises for plantar fasciitis are available at www.patient.co.uk/health/Plantar-Fasciitis.htm.
- A CPD article “Managing Raynaud’s phenomenon” is available at www.pjonline.com/cpd_cardiovascular_system.

**Panel 6: General Foot Care Advice**

- Wash your feet each night with soap and water, dry them thoroughly and apply a moisturising foot cream.
- Inspect your feet regularly. (Elderly people who may not be able to inspect their feet should see a podiatrist regularly.)
- Gently remove any hard skin with a pumice or foot file.
- Always trim toenails straight across.
- Warm up properly before exercising. If you jog, it is better to run a short distance a few times a week than a long run once a week.
- Shop for shoes in the afternoon, when your feet are largest, to ensure your shoes will be comfortable.
- Always wear the right shoes for the job — high heels or pointed shoes should only be worn on special occasions.

**Differential diagnoses** include skin tag, corn, callos, subungual haematoma, subungual osteoma, melanoma and seborrhoeic keratoses (benign wart-like growths).

**Management** Verrucas may resolve without the need for treatment but this can take months to years. Verrucas that cause pain or are spreading may require treatment. Keratolytics such as salicylic acid can be used to destroy the infected epidermal layer. Some podiatrists also use trichloracetic acid. Silver nitrate may be used, but the lesion requires regular debriement for it to be effective and application requires precision. Glutaraldehyde and formaldehyde are also available.

Cryotherapy can be effective in blistering the infected epidermis, but can damage the surrounding tissue and spread of the infection. OTC products, such as Wartner, contain dimethylsulphide and propane (DMEP) but surgeries use liquid nitrogen.

If OTC treatment has not worked within three months, the infection is rapidly spreading, the area is too painful to walk on or there are signs of infection, the person should be referred to a podiatrist or GP. Those with diabetes, peripheral vascular disease or Raynaud’s phenomenon should be referred without treatment.

Electrodesiccation or surgery can be used to remove infected tissue, but can cause scarring. Podophyllin is available for use on verruca pedis by podiatrists. Topical 5-fluorouracil 5 per cent cream, bleomycin injection, laser vapoporation, retinoid cream and immune modulators (such as imiquimod) are used by some dermatologists (unlicensed).

Treatments can cause hypersensitivity reactions, scarring, spread of infection, pain and blistering and ulceration. No treatment guarantees resolution.

**How pharmacists can help**

The fundamental message is that feet should not hurt and people should not put up with foot pain. In addition to advising on the conditions in this article, pharmacists can help people to prevent foot problems by taking good care of their feet. Recommendations pharmacists can give for maintaining general foot health are listed in Panel 6.

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