

Warts (including verrucas)

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About this topic

Have I got the right topic?

All ages

This guidance covers the management of cutaneous warts.

This guidance does not cover the management of anogenital warts, mucosal warts, and other viral skin infections.

There are separate CKS topics on *Molluscum contagiosum* and *Herpes simplex — genital*.

The target audience for this guidance is healthcare professionals working within the NHS in England, and providing first-contact or primary health care. *Patient information from NHS Direct* is intended to be printed and given to people with this condition, and the *Shared decision making* sections are designed to provide a focus for discussion during the consultation about the treatment options.

Changes

Version 1.0.0, revision planned in 2010.

Last revised in January 2007

July–September 2006 — rewritten. Validated in December 2006 and issued in January 2007.

This guidance has been reviewed, restructured and updated following a full literature review. There are no major changes to the recommendations. The use of OTC cryotherapy has been added and the treatment of mosaic warts has been removed. Details on the practical use of salicylic acid, cryotherapy, and duct tape has been added. A detailed evidence section has been incorporated to support the existing recommendations.

Previous changes

October 2005 — minor technical update. Issued in November 2005.

November 2002 — written. Validated in June 2003 and issued in July 2003.

Update

New evidence

Evidence-based guidelines

No new evidence-based guidelines since 1 March 2007.

HTAs (Health Technology Assessments)

No new HTAs since 1 March 2007.

Economic appraisals

No new economic appraisals relevant to England since 1 March 2007.

Systematic reviews and meta-analyses

No new systematic review or meta-analysis since 1 March 2007.

Primary evidence

No new high quality randomized controlled trials since 1 March 2007.

New policies

No new national policies or guidelines since 1 March 2007.

New safety alerts

No new safety alerts since 1 March 2007.

Changes in product availability

No changes in product availability since 1 March 2007.

Concise knowledge for clinical scenarios

Which therapy?

- **No treatment may be best**, as warts do not usually cause symptoms, most resolve spontaneously, and treatment can cause adverse effects (such as local skin irritation).

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- **Treatment may be preferred** if the wart is painful or cosmetically unsightly, or if it is persisting. If treatment is required:
 - o **Offer topical salicylic acid or clinic-based cryotherapy** with liquid nitrogen.
 - o **Alternatively**, occlusion with duct tape can be tried.
- **Children with warts and verrucae should not be excluded from activities such as sports and swimming.** However, it is sensible to consider measures to reduce the risk of transmission:
 - o Cover the wart with a waterproof plaster when swimming.
 - o Wear flip-flops in communal showers.
 - o Avoid sharing towels.

Factors affecting the choice of wart treatment

Choice of treatment is likely to be guided by availability, what has already been tried (including over-the-counter treatments), the person's choice, and whether the wart is on the face.

- **Topical salicylic acid** can be self-administered and seems to be as equally effective as cryotherapy, but is less likely to cause adverse effects. Avoid use on the face.
- **Clinic-based cryotherapy** requires several clinic visits, can be painful at the time of application, and is more likely to cause adverse effects such as local pain and blistering.
- **Duct tape** has only limited evidence supporting its effectiveness, but adverse effects are uncommon. Avoid use on the face.
- **Facial warts:** cryotherapy is recommended. Avoid salicylic acid (risk of severe irritation and scarring) and duct tape (risk of irritation and unsightly).
- **Pregnancy:** try not to treat at all (warts are eventually self-limiting) or use a treatment that does not contain salicylic acid, such as duct tape or cryotherapy.
- **People with poor circulation** (diabetes and peripheral vascular disease): both salicylic acid and cryotherapy should be avoided where possible (increased risk of damage to skin, nerves, and tendons). Consider referral to chiropody to exclude corns, calluses, and underlying ulcers for plantar warts.

Practical prescribing points

For further information please see the *Medicines Compendium* (www.medicines.org.uk) or the *British National Formulary* (www.bnf.org).

How should I advise patients to use topical salicylic acid?

- **Apply treatment daily.** It may need to be used for 12 weeks or longer.
- **Before applying treatment, soak the wart** in warm water for 5 minutes to soften the skin.
- **Peel off any film** remaining from the previous application.
- **Debride the wart/verruca surface with a disposable nail-file once or twice a week**, to remove excess keratin (hard skin). (Do not share nail-files.)
- **Additional occlusion**, for example with a plaster, might improve the clearance of warts.

How should I perform cryotherapy with liquid nitrogen?

- Many use a spray, but cotton-tipped sticks may be preferable when treating children or for warts near the eyes.
- Freeze until a halo of frozen tissue appears around the wart and then time for 5–30 seconds, depending on the site and size of the wart.
- Repeat treatment every 2–4 weeks for a maximum of 3 months (i.e. about four treatment cycles). Longer treatment courses are unlikely to offer any additional benefit.

How should I advise patients to use duct tape?

- **Cover the wart with duct tape and leave in place for 6 days.** (If the tape falls off, apply a fresh piece.)
- **After 6 days**, remove the tape, soak the wart in warm water for 5 minutes and then gently debride with an emery board or pumice stone.
- Leave the wart uncovered overnight and apply a fresh piece of tape the next day.
- **Continue treatment for up to 2 months.**

Should I refer or investigate?

Refer?

- In general, warts can be managed in primary care.
- Suggested indications for referral to a dermatology service are as follows:
 - o Uncertain diagnosis

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- o Immunocompromised people (often resistant to treatment and *potential for malignancy*)
- Note: local funding for dermatology services for warts varies.
- Chiropody services are invaluable when treating difficult plantar warts, and seeking advice is certainly an option.

Follow-up advice

Prescriptions

Salicylic acid 12.5% gel (Scholl Seal and Heal)

Age from 12 years onwards

- - Apply to the wart or verruca twice a day. Supply 5 ml.
- NHS Cost £3.09
- OTC Cost £4.85
- Licensed use: yes
- Patient Information: Before applying the treatment to the wart or verruca, soak the affected area in warm water to soften the skin (e.g. for 5-10 minutes). Gently peel off old elastic film before re-applying. Avoid applying the treatment to the skin surrounding the wart/verruca - wipe off excess gel with a tissue. Rub the wart/verruca surface gently with a disposable nail file once or twice a week to remove hard skin. This gel may need to be used for up to 3 months to remove the wart/verruca.

Salicylic acid 12% gel (Bazuka)

Age from 1 year onwards

- Bazuka gel. Apply to the wart or verruca once a day. Supply 5 grams.
- NHS Cost £3.39
- OTC Cost £5.35
- Licensed use: yes
- Patient Information: Before applying the treatment to the wart or verruca, soak the affected area in warm water to soften the skin (e.g. for 5-10 minutes). Gently peel off old elastic film before re-applying. Avoid applying the treatment to the skin surrounding the wart/verruca - wipe off excess gel with a tissue. Rub the wart/verruca surface gently with a disposable nail file once or twice a week to remove hard skin. This gel may need to be used for up to 3 months to remove the wart/verruca.

Salicylic acid 17% gel (Compound W)

Age from 6 years onwards

- Salicylic acid 17% paint. Apply to the wart or verruca once a day. Supply 6.5 ml.
- NHS Cost £2.21
- OTC Cost £3.60
- Licensed use: yes
- Patient Information: Before applying the treatment to the wart or verruca, soak the affected area in warm water to soften the skin (e.g. for 5-10 minutes). Gently peel off old elastic film before re-applying. Avoid applying the treatment to the skin surrounding the wart/verruca - wipe off excess gel with a tissue. Rub the wart/verruca surface gently with a disposable nail file once or twice a week to remove hard skin. This paint may need to be used for up to 3 months to remove the wart/verruca.

Salicylic acid 12% gel (Salatac)

Age from 1 year onwards

- Salatac gel. Apply to the wart or verruca once a day. Supply 8 grams.
- NHS Cost £3.12
- OTC Cost £4.89
- Licensed use: yes
- Patient Information: Before applying the treatment to the wart or verruca, soak the affected area in warm water to soften the skin (e.g. for 5-10 minutes). Gently peel off old elastic film before re-applying. Avoid applying the treatment to the skin surrounding the wart/verruca - wipe off excess gel with a tissue. Rub the wart/verruca surface gently with a disposable nail file once or twice a week to remove hard skin. This gel may need to be used for up to 3 months to remove the wart/verruca.

Salicylic acid 26% gel (Bazuka Extra Strength)

Age from 1 year onwards

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- Bazuka Extra Strength 26% gel. Apply to the wart or verruca once a day. Supply 5 grams.
- NHS Cost £3.95
- OTC Cost £5.45
- Licensed use: yes
- Patient Information: Before applying the treatment to the wart or verruca, soak the affected area in warm water to soften the skin (e.g. for 5-10 minutes). Gently peel off old elastic film before re-applying. Avoid applying the treatment to the skin surrounding the wart/verruca - wipe off excess gel with a tissue. Rub the wart/verruca surface gently with a disposable nail file once or twice a week to remove hard skin. This gel may need to be used for up to 3 months to remove the wart/verruca.

Salicylic acid 26% solution (Occlusal)

Age from 1 year onwards

- Occlusal 26% solution. Apply to the wart or verruca once a day. Supply 10 ml.
- NHS Cost £3.39
- OTC Cost £5.97
- Licensed use: yes
- Patient Information: Before applying the treatment to the wart or verruca, soak the affected area in warm water to soften the skin (e.g. for 5-10 minutes). Gently peel off old elastic film before re-applying. Avoid applying the treatment to the skin surrounding the wart/verruca - wipe off excess gel with a tissue. Rub the wart/verruca surface gently with a disposable nail file once or twice a week to remove hard skin. This solution may need to be used for up to 3 months to remove the wart/verruca.

Salicylic acid 16.7% paint (Salactol)

Age from 1 year onwards

- Salactol paint. Apply to the wart or verruca once a day. Supply 10 ml.
- NHS Cost £1.79
- OTC Cost £2.81
- Licensed use: yes
- Patient Information: Before applying the treatment to the wart or verruca, soak the affected area in warm water to soften the skin (e.g. for 5-10 minutes). Gently peel off old elastic film before re-applying. Avoid applying the treatment to the skin surrounding the wart/verruca - wipe off excess gel with a tissue. Rub the wart/verruca surface gently with a disposable nail file once or twice a week to remove hard skin. This paint may need to be used for up to 3 months to remove the wart/verruca.

Salicylic acid 11% gel (Cuplex)

Age from 1 year onwards

- Cuplex gel. Apply to the wart or verruca twice a day. Supply 5 grams.
- NHS Cost £2.23
- OTC Cost £3.49
- Licensed use: yes
- Patient Information: Before applying the treatment to the wart or verruca, soak the affected area in warm water to soften the skin (e.g. for 5-10 minutes). Gently peel off old elastic film before re-applying. Avoid applying the treatment to the skin surrounding the wart/verruca - wipe off excess gel with a tissue. Rub the wart/verruca surface gently with a disposable nail file once or twice a week to remove hard skin. This gel may need to be used for up to 3 months to remove the wart/verruca.

Salicylic acid 16.7% paint (Duofilm)

Age from 2 years onwards

- Duofilm paint. Apply to the wart or verruca once a day. Supply 15 ml.
- NHS Cost £2.25
- OTC Cost £3.96
- Licensed use: yes
- Patient Information: Before applying the treatment to the wart or verruca, soak the affected area in warm water to soften the skin (e.g. for 5-10 minutes). Gently peel off old elastic film before re-applying. Avoid applying the treatment to the skin surrounding the wart/verruca - wipe off excess gel with a tissue. Rub the wart/verruca surface gently with a disposable nail file once or twice a week to remove hard skin. This paint may need to be used for up to 3 months to remove the wart/verruca.

Salicylic acid 50% ointment (Verrugon)

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Age from 6 years onwards

- Verrugon complete 50% ointment. Apply to the wart or verruca once a day. Supply 6 grams.
- NHS Cost £2.83
- OTC Cost £4.75
- Licensed use: yes
- Patient Information: Before applying the treatment to the wart or verruca, soak the affected area in warm water to soften the skin (e.g. for 5-10 minutes). Avoid applying the treatment to the skin surrounding the wart/verruca. Fix the self-adhesive ring (provided) with the hole over the verruca. Apply the ointment into the hole and directly onto the verruca. Cover the ring completely with a plaster (provided). Rub the verruca surface gently with a disposable nail file once a week to remove hard skin. This ointment may need to be used for up to 3 months to remove the verruca.

Salicylic acid 40% medicated disks

Age from 1 year onwards

- Scholl Verruca Removal System. Apply a new disk to the wart or verruca every 48 hours. Supply 45 discs.
- NHS Cost £2.59
- OTC Cost £4.20
- Licensed use: yes
- Patient Information: Select a size of medicated disk that best fits the size of the verruca. Fix it over the verruca. Use a new disk every 48 hours. Rub the verruca surface gently with a disposable nail file once a week to remove hard skin. These disks may need to be used for up to 3 months to remove the verruca.

Advice note: liquid nitrogen cryotherapy

- **Age from 4 years onwards**
- Advice: Freezing warts or verrucas with liquid nitrogen can be used to treat them. Liquid nitrogen is sprayed on, or applied to, the wart by the GP or practice nurse. Liquid nitrogen is very cold and the freezing and thawing destroys the wart tissue. To clear the wart fully can often need about 3 treatments, about 2-3 weeks apart. Freezing treatment can be painful. Sometimes a small blister develops for a day or so on the nearby skin after treatment.

Advice note: duct tape

- **Age from 1 month onwards**
- Advice: Cover the wart or verruca with duct tape for 6 days. (If the tape falls off, apply a fresh piece of tape.) After 6 days, take the tape off and soak the affected area in warm water to soften the skin (e.g. for 5-10 minutes). Rub the wart/verruca surface gently with a nail file or foot file to remove hard skin. Leave the wart uncovered overnight and then reapply the duct tape the next day. Continue treatment until the wart/verruca disappears. If it is still persisting after 2 months of treatment, seek further medical advice.

Drug rationale

Drugs not included

- **Over-the-counter cryotherapy** (with a dimethyl-ether/propane [DE-P] spray such as Wartner® or Scholl Freeze®) is not included. The only available study [[Caballero Martinez et al, 1996](#)] is difficult to extrapolate to current practice because it assessed physician-administered DE-P spray, not self-administration, and people with plantar warts (a product indication) were not included in the study. Therefore, the concerns of experts that DE-P spray does not reach low enough temperatures to treat plantar warts have not been evaluated [[Sterling et al, 2001](#)].
- **Topical formaldehyde** is virucidal and hardens the skin, which makes debriding easier. However, the evidence that formaldehyde soaks are effective is of poor quality [[Gibbs and Harvey, 2006](#)] and there is no proprietary product available. A formaldehyde 0.75% gel is available, but there is no randomized controlled study of its effectiveness.
- **Topical glutaraldehyde** is an alternative to formaldehyde but has the disadvantage of staining the skin brown.
- **Topical silver nitrate** showed some evidence of benefit over placebo in one small randomized controlled trial, but the rate of complete healing was low (43%) [[Yazar and Bazaran, 1994](#)]. Occasionally, pigmented scars develop after silver nitrate use.
- **Topical salicylic acid with podophyllum** (for plantar warts only) has not been shown to be any more effective than salicylic acid alone. It is therefore not included.
- **Wartex** (topical salicylic acid 50% ointment) is not included because the pack does not contain plasters, which are needed to keep the ointment in place.

Drugs included

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- **Topical salicylic acid:** limited evidence from randomized controlled trials showed that two-thirds of warts will clear by 12 weeks with topical salicylic acid, compared with just under a half of warts in the placebo groups [Gibbs and Harvey, 2006].
- **Duct tape occlusion** has only been studied in one randomized controlled trial [Focht et al, 2002] but adverse effects were minimal, so some individuals may want to try it.

Shared decision making

- **Warts and verrucas usually clear without treatment.** You have about a 50/50 chance that they will go within a year. Most go eventually.
- If you prefer treatment:
 - o **Salicylic acid will usually clear warts:**
 - Apply each day. It takes up to three months to clear warts.
 - Rub off the dead tissue from the top of the wart with a pumice stone or similar once or twice a week.
 - It is best to soak the wart in water for five minutes before applying the salicylic acid.
 - Do not apply it to the face.
 - Try not to get it on the surrounding skin.
 - o **Freezing the warts** is an alternative — for example, with liquid nitrogen. It is about as effective as acid, but may be painful.
 - o **Covering with tape may also clear warts:**
 - Cover the wart with duct tape and leave for six days. (If the tape falls off, apply a fresh piece.)
 - After six days, remove the tape, soak the wart in warm water for five minutes and then gently rub off dead tissue with a pumice stone or similar.
 - Leave the wart uncovered overnight and apply a fresh piece of tape the next day.
 - Continue treatment for up to two months.
- Children with verrucas should not be barred from swimming. However, it is sensible to try to reduce spread.
 - o Cover the wart or verruca with a waterproof plaster when swimming.
 - o Wear flip-flops in communal showers if you have a verruca.
 - o Don't share towels.

Detailed knowledge about this topic

Goals and outcome measures

Goals

- To offer adequate reassurance until natural resolution occurs
- To eliminate warts, if treatment is appropriate, with minimal adverse effects

Outcome measures

- Clearance of warts

Background information

What are they?

- Cutaneous warts (common warts, verruca vulgaris) are small, rough, skin-coloured lesions affecting the epidermis of the skin and caused by infection with the human papilloma virus (HPV).
 - o HPV infects epithelial cells, and viral replication results in proliferation of the cells with the formation of the typical warty papule or plaque.
 - o Over 100 HPV types are recognized, with affinity for different sites of the body.
 - o Mucous membranes and anogenital regions can be affected.
 - o The clinical appearance of warts is variable and depends to some extent on the type of HPV involved and the site of infection.
- Warts are benign lesions:
 - o A small subset of HPV types (types 6, 11, 16, 18, 31, and 35) are associated with cervical carcinoma and some anal, genital and oropharyngeal carcinomas (especially in people with immunosuppression).
 - o The common types associated with genital warts (type 6 and 11) however are not associated with cancer.

[Rinker and Shenefelt, 2005]

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How are they caught and spread?

- Warts are spread by contact, either directly from person to person, or indirectly via fomites left on surfaces (such as towels, shoes, floors) [BAD, 2005].
- Infection via the environment is more likely to occur if the skin is macerated and in contact with roughened surfaces (conditions that are common in swimming pools and communal washing areas).
- Auto-inoculation can lead to persistence of infection:
 - Scratching can lead to local spread of wart lesions.
 - Nail biting and finger sucking spreads subungual and periungual lesions [Sterling and Kurtz, 1998].
 - Shaving of the face or legs can cause plane/flat warts to spread [Sterling and Kurtz, 1998].
- Warts are thought to be contagious for as long as they are present [HPA, 2003].
- The incubation period varies from 1 to 24 months [HPA, 2003].

How common are they?

- Cutaneous warts are common, and most people at some point in their life will have them.
- There is limited published prevalence data, and figures vary considerably:
 - Most surveys have used selected subsets of the population, such as people attending dermatology outpatient clinics, or schoolchildren.
 - The reported prevalence of warts in children and adolescents in the UK is in the range 4–5% [Sterling et al, 2001].
 - Other surveys from the US have found prevalence of 3–20% in children and adolescents, and 3% in adults aged 25–34 years [Sterling et al, 2001].
- It is generally agreed that warts are uncommon in infancy, are increasingly common in childhood (reaching a peak in the teenage years), and decline in frequency thereafter [Gibbs and Harvey, 2006].
- Prevalence is higher in people with atopic eczema or who are immunosuppressed, or who are in certain occupations (such as abattoir workers, butchers, engineers, and office workers) [Sterling and Kurtz, 1998].
- A UK study of 1000 children with warts found that 74% had common warts, 24% had plantar warts, 3.5% had plane warts, and 2% had filiform warts [Sterling and Kurtz, 1998].

How do I diagnose them?

- Diagnosis is usually made by clinical examination.

History

- Cutaneous warts do not usually cause symptoms, but plantar or periungual warts can be painful.
- Other members of the family (or close contacts) may also have warts (see *How are they caught and spread?*).
- Warts should be particularly considered in people with:
 - Certain occupations (such as abattoir workers, butchers)
 - Atopic eczema
 - Impaired cellular immunity (e.g. long-term immunosuppressive therapy, AIDS, transplant patients, lymphomas, leukaemia, or Hodgkin's disease)
- People with impaired immunity often give a history of numerous warts that are resistant to treatment.

Examination

- It is usually not difficult to diagnose warts on clinical examination (for some images, see www.dermis.net and search under the term *verruca vulgaris*).
- Some lesions, however, can be confused with warts (see *What else might it be?*).
- [Table 1](#) outlines the common types of cutaneous warts and their characteristic features.

Table 1. Type, distribution, and morphology of warts.

Clinical type	Site	Appearance	Number
Common wart	Typically occur on the hands (palmar warts), elbows, and knees, but can occur	Firm, rough, keratotic papules and nodules	Single or multiple, but usually less than 20

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	anywhere		
Plane wart (flat warts)	Typically occur on the hands, face, and legs, usually in young children (rare in adults)	Flat-topped papules with minimal scaling. Skin-coloured, light brown, or pigmented rashes are often not recognised as planar warts.	One to a hundred; may coalesce
Plantar warts (verrucae)	Occur on the soles of feet, as well as heels and toes. Can be overlying the metatarsal heads, but also consider calluses in pressure-point areas.	Sharply defined, rough, keratotic lesion with a smooth collar of thickened skin. Punctuate black dots (thrombosed capillaries) are seen if the surface is shaved away.	Single or multiple, usually less than 20. Individually can grow from 1 mm to 1 cm in size, but may coalesce to form mosaic warts.
Mosaic warts	Hands or feet	Occur when palmar or plantar warts coalesce into larger plaques	Usually one or a few in an area, but often with nearby small individual plantar warts.
Filiform warts	Face	Fingerlike projections	Typically in clusters
Data from [Sterling and Kurtz, 1998; Lowy and Androphy, 1999; Sterling et al. 2001]			

What else might it be?

Differential diagnosis of common warts

- **Molluscum contagiosum**
 - o Common, benign skin lesions
 - o White umbilicated papules, often with a central depression
- **Pigmented naevus (mole)**
- **Seborrhoeic keratosis**
 - o Common benign skin lesions
 - o Superficial, crusted plaques, usually brown or black, with a greasy appearance
 - o Often multiple, commonest on trunk but can occur anywhere
- **Skin tag (fibroepithelial polyp)**
 - o Common, benign skin lesions
 - o Small, fleshy, pedunculated (usually 2–3 mm in diameter)
 - o Usually multiple, and most commonly in the axillae, groin, and neck
- **Solar keratosis (actinic keratosis)**
 - o Common skin lesions caused by exposure to the sun
 - o Benign, but can rarely become malignant
 - o Pink, scaly lesions, usually less than 2 cm in diameter.
 - o Often multiple; occur on light-exposed areas such as the back of the hands, face, scalp, and ears.
 - o Often tend to occur in an older age group than common warts do
- **Squamous cell carcinoma**
 - o A malignant epithelial tumour
 - o Usually occurs in areas exposed to the sun
 - o Begins as a small, slightly raised, warty, grey or brownish, hyperkeratotic lesion.
 - o Often tend to occur in an older age group than common warts do.

[Arnold et al, 1990; Ankreth and Williams, 1999]

Differential diagnosis of plane/flat warts

- **Lichen planus**
 - o An uncommon, inflammatory pruritic disease of the skin and mucous membranes, distinguished by purplish, flat-topped papules.

Differential diagnosis of plantar warts

- **Corns and calluses**

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- o Common skin lesions, in which there is a localized area of thickened skin (due to exposure to friction or pressure).
- o Most commonly occur on the hands and feet.
- o Corns are inflamed and painful, while calluses are areas of painless hard skin.
- o Paring of corns leads to a pearly bead of keratin, rather than a small thrombosed vessel of viral warts.

[Arnold et al, 1990]

- **Verrucous squamous cell carcinoma**
 - o Consider in a long-standing plantar wart.
 - o Sub-type of a squamous cell carcinoma.
 - o Found on soles of the feet.
 - o Tendency to invade the dermis in a 'pushing' pattern rather than infiltrating.
 - o Indolent growth, local destructive, but rarely metastasizes.

[Hess, 2006]

Complications and prognosis

Complications

- **Psychological distress**
 - o Owing to the unsightly appearance, particularly if warts are widespread
- **Complications relating to treatment**
 - o Common — local skin irritation and pain
 - o Rare — scarring, infection, and even keloid formation
- **Malignant change**
 - o Malignant change is extremely rare in people who are not immunocompromised [Sterling et al, 2001].
 - There are a small number of reports of lesions that have initially appeared as warts and later become invasive squamous cell carcinomas.
 - o People who are immunocompromised (e.g. transplant patients) are at higher risk of malignant change.
 - In such people, exposure to the sun increases the incidence of warty lesions and also acts as a co-carcinogen.
 - Dysplastic change is common, often with poor correlation between clinical and histological appearances.
 - Numerous human papilloma virus types have been found in benign and malignant squamous lesions in people who are immunocompromised.

Prognosis

- **Warts usually resolve spontaneously, because of the development of natural immunity to the human papilloma virus, but time to resolution can vary markedly between individuals:**
 - o Two-thirds of warts will resolve spontaneously after 2 years [Sterling et al, 2001].
 - o Trials have found cure rates of 30% at 10 weeks with placebo preparations [Bigby and Gibbs, 2005].
 - o One study found that, in children with warts at the age of 11 years, 90% no longer had warts by the age of 16 years [Sterling et al, 2001].
 - o Warts seem to persist for longer in older children and adults [Massing and Epstein, 1963].
 - o A wart may persist unchanged for months or even years, or alternatively large numbers may develop rapidly [Sterling and Kurtz, 1998].
- Treatment failure (defined as incomplete clearance of wart) and recurrence are common [Rinker and Shenefelt, 2005].
- In immunocompromised people, warts may be impossible to eradicate [Lowy and Androphy, 1999].

Management issues

Overview of management

Warts are contagious, so **prevention** and limiting the **risk of spread** is essential. Not all warts need treatment, as spontaneous resolution is common. If treatment is decided on, try topical **salicylic acid** or clinic-based **cryotherapy** with liquid nitrogen.

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Duct tape occlusion is an alternative (especially in small children).
Treatment **failure** and **recurrence** is common.

What advice should I give about reducing spread or transmission?

- Warts are contagious — the risk of transmission is undetermined but is presumed to be low.
- Children with warts and verrucae should not be excluded from activities such as sports and swimming.
- It is sensible to consider measures to reduce the risk of transmission, such as:
 - Cover the wart with a waterproof plaster when swimming.
 - Wear flip-flops in communal showers.
 - Avoid sharing shoes, socks, or towels.
- Limit personal spread (auto-inoculation) by:
 - Avoiding scratching lesions.
 - Avoiding biting nails or sucking fingers that have warts.
 - Keeping feet dry and changing socks daily.

[Sterling et al, 2001; HPA, 2003; NHS Direct, 2005]

Should warts be treated?

The decision whether or not to treat a wart should be taken after discussing the following points:

- **There is a strong case for no treatment, as:**
 - Warts are benign lesions that do not usually cause symptoms.
 - Many warts will resolve spontaneously without treatment.
 - Trials have found cure rates of 30% at 10 weeks with placebo preparations [Bigby and Gibbs, 2005].
 - Two-thirds of warts resolve spontaneously within 2 years [Sterling et al, 2001].
 - Exclusion from sporting activities and swimming is not necessary (see *What advice should I give about reducing spread or transmission?*).
 - Treatment may need to be prolonged and can cause adverse effects, such as local skin irritation and pain.
- **Treatment may be preferred, as:**
 - Warts can be cosmetically unsightly.
 - Occasionally, warts can cause pain (particularly plantar or subungual warts).
 - In some people, warts can take years to clear (or may even persist):
 - Warts are slower to clear in adults.
 - Plantar warts (especially of the mosaic type) tend to persist for longer.
 - Warts that have been present for a long time (e.g. more than 2 years) are less likely to clear spontaneously.
 - Warts are much less likely to clear in people who are immunocompromised [Sterling and Kurtz, 1998].

Which treatments are recommended in primary care?

- **If a decision is made to treat a wart, topical salicylic acid or clinic-based cryotherapy with liquid nitrogen is recommended first-line.**
 - There is *limited evidence* comparing the efficacy of treatment options for warts:
 - Trials show two-thirds of warts will clear by 12 weeks with topical salicylic acid, compared with just under a half with placebo.
 - Clinic-based cryotherapy with liquid nitrogen seems to have an effectiveness similar to that of topical salicylic acid.
 - Salicylic acid appears to be the most cost-effective treatment, with nurse-led cryotherapy clinics offering an alternative to the expensive option of GP-prescribed cryotherapy [Thomas et al, 2006].
 - Owing to the self-limiting nature of warts, a move towards self-treatment with over-the-counter (OTC) salicylic acid should be encouraged. Overall, OTC treatments are more cost-effective than GP-prescribed treatments are [Thomas et al, 2006].
- **Duct tape occlusion could also be considered**, although there is less evidence for its use.
 - Despite the *limited evidence* (only one randomized controlled trial), some individuals may want to try it.
 - Adverse effects are minimal, but local skin irritation can occur and tape may fall off.
- **Choice of treatment is likely to be guided by** availability, what has already been tried (including OTC treatments), individual choice, and whether the wart is on the face.

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Clinical Knowledge Summaries: Previous version – Warts (including verrucas)

- o **Topical salicylic acid** daily for up to 12 weeks is self-administered. It seems to be as equally effective as cryotherapy, but is less likely to cause adverse effects (usually mild skin reactions only).
- o **Cryotherapy** requires several clinic visits, can be painful at the time of application, and is more likely to cause adverse effects such as local pain and blistering, infection, and depigmentation.
- o **Duct tape** has only limited evidence supporting its effectiveness, but adverse effects are uncommon. It was used for up to 2 months in the study.
- o **Facial warts** should not be treated with topical salicylic acid, owing to the risk of severe irritation and possible scarring. Clinic-based cryotherapy or surgical options can be considered, depending on the person's preference and the doctor's experience [Sterling et al, 2001]. No evidence exists for use of duct tape in facial lesions, and experts do not advocate its use on the face (because of skin irritation and cosmetic unsightliness).
- o **In people with poor circulation** (diabetes and peripheral vascular disease), both salicylic acid and cryotherapy should be avoided where possible (because of the increased risk of damage to skin, nerves, and tendons). CKS recommends referral to chiropody in this situation, to exclude calluses and underlying ulcers for plantar warts. See *When should I refer?*
- **Combination treatment with salicylic acid and cryotherapy is not recommended** in primary care.
 - o There is only *limited evidence* for this approach [Gibbs and Harvey, 2006], and there is uncertainty regarding the best regimen to use when combining these treatments.
 - o Nevertheless, this technique is used in secondary care, and various approaches to alternating salicylic acid and cryotherapy are used, over differing timescales.
- Other treatments are available in secondary care, but may also be provided by some practices, depending on experience and availability of resources. *What treatments are available in secondary care?*

When should I refer?

- In general, warts can be managed in primary care.
- Suggested indications for referral to a dermatology service are as follows:
 - o Uncertain diagnosis
 - o Immunocompromised people (often resistant to treatment and *potential for malignancy*)
- Note: local funding for dermatology services for warts varies.
- Chiropody services are invaluable when treating difficult plantar warts and seeking advice on patients with poor circulation (diabetes and peripheral vascular disease).

What treatments are available in secondary care?

- For people referred to secondary care, it is likely that treatments offered will mainly comprise those available in primary care, either used singly or in combination.
- Other treatments that might be considered are outlined in [Table 2](#).
- There is insufficient evidence to guide a stepwise approach to management.

Table 2. Less commonly used treatments for warts.

Treatment	Comment
Physical ablation techniques	
Surgical removal (curettage/cautery or excision)	Surgery is not commonly carried out nowadays, owing to high reoccurrence rates and lack of funding. Can be carried out by curettage or blunt dissection followed by cautery. May be particularly useful for filiform warts on the face and limbs. Although data is limited, reported success rates are in the range 65–85%. However, recurrence occurs in up to 30%. Scarring is usual after these procedures, which is a particular concern for plantar warts (verrucae), as scars on the soles of the feet can cause long-term discomfort.
Laser treatment (CO ₂ laser or pulsed dye laser)	May be particularly useful for the treatment of periungual and subungual warts, but post-operative

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Photodynamic therapy	<p>scarring and pain may occur.</p> <p>No randomized controlled trials (RCTs) for CO₂ laser. One RCT for pulsed dye laser suggests wart clearance at 70%, although limited data.</p> <p>Pulsed dye laser depends upon energy absorption within the capillary loops of the wart, and produces more localized tissue necrosis and is less likely than the CO₂ laser to produce pain and scarring.</p> <p>RCTs show benefit over placebo, although trial evidence differs in quality and methodology.</p> <p>Photodynamic therapy depends on abnormal cells taking up a chemical that destroys the cells when activated by light (usually from a laser).</p> <p>The most commonly used photosensitizer is topical amino-laevulinic acid.</p>
Antimitotic treatments	
Topical podophyllin/podophyllotoxin	<p>Although used extensively in the treatment of anogenital warts, podophyllin is much less effective in the treatment of cutaneous warts, as penetration of the thick stratum corneum is poor.</p> <p>It may be effective if applied under occlusion after paring, but there is a risk of severe inflammation, sterile pustule formation, and secondary infection.</p> <p>No RCTs.</p>
Topical or oral retinoids	<p>Retinoids disrupt epidermal growth and differentiation, thereby reducing the bulk of the wart.</p> <p>Limited trial data suggest benefit at clearing warts.</p>
Intralesional bleomycin	<p>Sometimes used for the treatment of resistant warts.</p> <p>Pain on administration, and afterwards pain can be severe.</p> <p>Scarring, pigmentary changes, and nail damage are common problems.</p> <p>Five RCTs show conflicting evidence of benefit.</p>
Immunomodulatory treatments	
Topical sensitizers (dinitrochlorobenzene, diphencyprone, or squaric acid dibutylester)	<p>These cause a delayed hypersensitivity reaction.</p> <p>However, some people cannot be sensitized, and others get troublesome eczematous reactions.</p> <p>Dinitrochlorobenzene in two small RCTs show benefit over placebo.</p>
Topical imiquimod 5%	<p>Imiquimod activates the immune system by causing release of cytokines (such as interferon).</p> <p>Imiquimod cream has been used in a small number of people with cutaneous warts (including people with immunosuppression) with encouraging results.</p>
Intralesional interferon	<p>Mainly used in the treatment of genital warts, but some reports of success with cutaneous warts.</p>
Virucidal treatments	
Formaldehyde and glutaraldehyde	<p>These are virucidal, and limited trial evidence suggests benefit.</p> <p>Both are available as a gel or as a solution (to be used as a foot soak for plantar warts).</p> <p>These treatments are useful in patients with peripheral vascular disease and diabetes, as they are non-destructive to the circulation.</p>
Data from: [Sterling et al, 2001]	

Medicines management

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Which topical salicylic acid preparation should I use?

- There are many different commercial preparations, but only limited comparative data. Choice is best guided by the person's preference, the area to be treated, and the strength of the product.
 - o **Pregnancy:** systemic absorption is known to occur following topical use of salicylic acid. Malformations have been reported in rat embryos, but there are no case reports of salicylic acid causing malformations in humans [Micromedex, 2007]. Use of a low-strength product such as Cuplex® (salicylic acid 11%) on a small area would be associated with the lowest risk, but it is probably more sensible not to treat at all (warts are eventually self-limiting) or to use a treatment that does not contain salicylic acid, such as duct tape or cryotherapy.
 - o **Breastfeeding:** salicylates are excreted into breast milk, although the effect on the infant is not known. The American Academy of Pediatrics considers topical salicylic acid to be compatible with breastfeeding [Micromedex, 2007].
 - o **In people with poor circulation** (diabetes and peripheral vascular disease), both salicylic acid and cryotherapy should be avoided where possible (because of the increased risk of damage to skin, nerves, and tendons). CKS recommends referral to chiropody in this situation, to exclude calluses and underlying ulcers for plantar warts. See [When should I refer?](#)

Table 3. Topical salicylic preparations for warts and verrucas.

Site	Strength	Additional plaster needed *	Products
All sites (except the face)	12%	No	Bazuka, Salatac
	12.5%	No	Scholl Seal and Heal
	16.7%	No	Salactol
	17%	No	Compound W
	26%	No	Bazuka Extra Strength, Occlusal
Hands and feet only	11%	No	Cuplex
	16.7%	No	Duofilm
Feet only	4%	Yes (medicated discs – plasters in pack)	Scholl Verruca Removal System
	50%	Yes (ointment – plasters in pack)	Verrugon, Wartex

* Most do not need an additional plaster, as they form a film that stops them spreading away from the site of application.

How should topical salicylic acid be applied?

- **Topical salicylic should be applied daily for several weeks, often for 12 weeks or longer.**
- Before application, soften the area by soaking it in warm water.
- Peel off any film remaining from the previous application.
- Debride the wart/verruca surface with a disposable nail-file once or twice a week, to remove excess keratin (hard skin).
 - o Advise people not to share nail-files (to reduce transmission).
 - o Experts suggest that debridement can be undertaken more frequently (e.g. daily), provided that the skin does not become sore.
- Additional occlusion with a plaster improves the clearance of plantar warts [Veien et al, 1991; Focht et al, 2002]. It is also likely to improve the clearance of warts at other sites, although this has not been studied.
- **It is not suitable for use on the face or extensively affected areas** [Sterling et al, 2001], because the risk of skin irritation and possible scarring is greater.

How should cryotherapy with liquid nitrogen be performed?

- **Cryotherapy techniques differ between practitioners:**
 - o Many use a spray, but cotton-tipped sticks may be preferable when treating children or for warts near the eyes.

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- If cotton buds are used, reduce possible transmission of viruses by decanting liquid nitrogen into a separate disposable container (from a dewar flask), use one cotton bud for each person treated, disregard left-over liquid nitrogen, and keep the dewar flask cleaned and full [[Jones and Darville, 1989](#)].
- o It is common practice to freeze until a halo of frozen tissue appears around the wart, and then time for 5–30 seconds depending on the site and size of the wart [[Sterling et al, 2001](#)].
- o There is *limited evidence* that more 'aggressive' freezing regimens, such as freezing the wart then allowing it to thaw and then freezing it again (i.e. two freeze–thaw cycles), may improve clearance of warts but are more likely to cause adverse effects such as pain and blistering.
- **The ideal interval between freeze treatments is not known** – *limited evidence* suggests that intervals of 2, 3, and 4 weeks are equally effective. Although longer intervals have not been studied, it is assumed that these would result in poorer cure rates. A 3-week interval is commonly used.
- There is *limited evidence* that treating beyond 3 months (i.e. about four treatment cycles) is unlikely to offer any additional benefit.

How should duct tape be applied?

- **The method used in the study was as follows:**
 - o The wart was covered with duct tape for 6 days (if the tape fell off, a fresh piece of tape was applied).
 - o After 6 days, the tape was removed and the wart soaked in water and gently debrided with an emery board or pumice stone.
 - o The wart was then left uncovered overnight and duct tape reapplied the next day.
- **Treatment was continued for up to 2 months.** (Note: most warts that cleared with duct tape did so within 28 days.)

[[Focht et al, 2002](#)]

How do the recommended warts treatments work?

- **Salicylic acid** is a keratolytic, and is thought to clear warts by destroying the virus-infected epidermis and by causing local irritation that stimulates an immune response [[Sterling et al, 2001](#)].
- **Cryotherapy:** freezing is thought to clear warts either by destroying keratinocytes that are infected with human papilloma virus (HPV) or possibly by causing local inflammation, which results in the development of a cell-mediated immune response [[Sterling et al, 2001](#)].
- **Duct tape occlusion** may work by causing irritation of the wart and the development of an immune response.

Supporting evidence

Evidence for topical salicylic acid for the treatment of cutaneous warts

There is evidence that salicylic acid preparations are more effective than placebo at clearing cutaneous warts, with a low likelihood of adverse effects. Limited trial data suggest that they are at least as effective as cryotherapy. There is insufficient evidence to recommend any particular salicylic acid preparation over another. Topical salicylic acid is a well-established treatment for warts:

- A Cochrane review (search to March 2005) evaluated the evidence for local treatments for cutaneous, non-genital warts in healthy (immunocompetent) people [[Gibbs and Harvey, 2006](#)]. In general, the methodological quality of trials was poor. Thirteen trials of salicylic acid and other topical agents were included in the review. Most trials evaluated the effectiveness of salicylic acid, with or without lactic acid. The treatment period varied from 6 to 12 weeks and assessment of outcome was normally at the end of the treatment period (i.e. short-term follow-up, which may have overestimated effectiveness, as recurrences due to inadequate clearance of human papilloma virus would have been missed).
- **Compared with placebo:**
 - o Pooled data from five placebo-controlled trials (n = 322) found that active treatment was superior in terms of cure rate (defined as disappearance of the wart).
 - Cure rate was 73% in the active group compared with 48% in the control group (RR of cure 1.6, 95% CI 1.16 to 2.23; p = 0.005).
 - One person would be cured for every four people treated with salicylic acid or another topical agent for 6 to 12 weeks (NNT = 4, 95% CI 3 to 7).
 - o One placebo-controlled trial (n = 57) of children and adults with simple plantar warts was classified as having a high methodological quality.

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- Intensive topical treatment was used, combining trichloroacetic acid crystals with 60% salicylic acid ointment applied under an occlusive dressing and left in place for 1 week before being changed.
- Outcome was assessed at 6 weeks and 6 months.
- At 6 weeks, active treatment cure rate was 66% compared with 18% for placebo treatment.
- At 6 months, active treatment cure rate was 83% compared with 54% for placebo treatment (RR for cure 1.54, 95% CI 1.05 to 2.27).
- **Compared with cryotherapy:**
 - o Two trials (n = 320) compared cryotherapy with topical salicylic acid and lactic acid on hand and foot warts. In one trial, cryotherapy was administered every week, and in the other trial every 3 weeks.
 - o Pooled data found no difference in efficacy (RR 1.04, 95% CI 0.88 to 1.22; p = 0.7).
- **Other comparisons:**
 - o The other seven trials compared different preparations of salicylic acid, or compared salicylic acid with other topical treatments such as glutaraldehyde and anthralin.
 - o The limited evidence from these trials failed to show a convincing advantage of any particular treatment over topical salicylic acid.
- **Adverse effects:**
 - o In general, adverse effects were not well-reported in clinical trials. In one trial of intensive topical treatment, one of the 29 participants in the active group developed cellulitis. Minor skin irritation was reported occasionally in some of the other trials, but generally no important adverse effects of topical salicylic acid were identified.
 - o Conversely, a postal survey of people who had recently used topical treatments for warts reported that 70% of people who used salicylic acid felt a burning sensation after application, and 27% reported pain. Blistering was also reported by 14% of people, and bleeding was reported by a further 11% [Thomas et al, 2006].
 - o Note: as with any topical treatment, there is a risk of hypersensitivity to salicylic acid or any of the product ingredients.

Evidence for cryotherapy for the treatment of cutaneous warts

There is little evidence regarding the effectiveness of cryotherapy, and in particular there is no evidence to support the common view that cryotherapy is more effective than treatment with topical salicylic acid. Available data suggest more intense levels of freezing (i.e. longer duration of application of cold to the wart) are more effective than gentler freezing regimens, that treatment intervals of 2, 3 or 4 weeks are equally effective, and that treatment beyond 3 months is unlikely to give any additional benefit. There are limited data on adverse effects, but pain and blistering is a commonly reported adverse effect and seems to be more likely to occur with more frequent applications and more intense levels of freezing.

- A Cochrane review (search to March 2005) evaluated the evidence for local treatments for cutaneous, non-genital warts in healthy (immunocompetent) people [Gibbs and Harvey, 2006]. In general, the methodological quality of trials was poor. Seventeen trials of cryotherapy were included in the review, with cryotherapy being the main focus in 13 trials.
- **Compared with placebo:**
 - o Only two small trials (n = 69) were found that were suitable for inclusion in the review. Both these were classified as being of low methodological quality.
 - o Pooled data from these trials found no advantage of cryotherapy over placebo (RR of cure 0.88, 95% CI 0.6 to 2.95; p = 0.8), but the confidence interval was very wide and it was noted that one trial seemed to have an unusually low cure rate with cryotherapy, while the other trial showed a relatively high cure rate with placebo.
- **Aggressive versus gentle cryotherapy:**
 - o Four trials (n = 592) compared 'aggressive' with 'gentle' cryotherapy.
 - o The different regimens were:
 - Double versus single freeze
 - 10-second freeze versus a gentle freeze
 - 2 minutes versus 15 seconds with a cryoprobe
 - 20–30-second freeze versus 10–15-second freeze
 - o Pooled data from these trials found that aggressive cryotherapy was more effective, with cure rates of 52% versus 31% (RR for cure 1.9, 95% CI 1.15 to 3.15; p = 0.01). One extra person would be cured for every five people treated with aggressive cryotherapy instead of gentle cryotherapy (NNT = 5, 95% CI 3 to 7).
- **Optimum interval between treatments:**
 - o Three trials (n = 313) that examined the optimum treatment interval found no difference in cure rates between treatment at 2-, 3-, and 4-weekly intervals.

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- **Optimum duration of treatment:**
 - Only one trial (n = 400) examined the important question of the optimum number of treatments.
 - No benefit was found in extending 3-weekly cryotherapy beyond 3 months (approximately four freezes) for the treatment of warts on the hands and feet.
- **Liquid nitrogen or dimethyl ether/propane (DE-P) mixtures:**
 - Liquid nitrogen (-196°C) is most commonly used and was the agent used in the majority of trials investigating cryotherapy for cutaneous warts.
 - One small randomized controlled trial of 124 participants compared DE-P with liquid nitrogen for the treatment of warts, and concluded they had equal efficacy [[Caballero Martinez et al, 1996](#)]. However, the results of this study are difficult to extrapolate to current practice, because:
 - DE-P spray is only available as an over-the-counter (self-administered) preparation. However, it was applied by the clinician in this study, which may affect the success rates.
 - People with plantar warts (a product indication) were not included in the study. Therefore, the concerns of experts that DE-P spray does not reach low enough temperatures to treat plantar warts has not been evaluated [[Sterling et al, 2001](#)].
- **Compared with topical salicylic acid:**
 - See [Evidence for topical salicylic acid for the treatment of cutaneous warts](#).
- **Compared with duct tape:**
 - See [Evidence for occlusion with duct tape for the treatment of cutaneous warts](#).
- **Adverse effects:**
 - Adverse events were adequately reported in only two trials.
 - In one trial comparing an 'aggressive' freezing regimen with a 'gentle' regimen:
 - Pain and blistering occurred in 64% of participants in the aggressive treatment group, compared with 44% of those in the gentle treatment group (RR 1.45, 95% CI 1.12 to 2.31). This means that one extra person would have pain and blistering for every five people treated aggressively instead of with a more gentle regimen (NNH = 5, 95% CI 3 to 15).
 - Five participants from the aggressive treatment group withdrew from the trial because of the occurrence of adverse events, compared with one from the group treated more gently.
 - In another trial that compared different intervals between treatments, pain and blistering was reported in 29%, 7%, and 0% of those treated at 1-, 2-, and 3-weekly intervals respectively. The higher percentage of reported adverse effects with a shorter interval between treatments might have been a reporting artefact due to participants being seen shortly after each treatment.
 - A postal survey of people who had recently used topical treatments for warts reported that 57% of people who used cryotherapy felt a burning sensation after application, and 43% reported pain. Blistering was also reported by 37% of people, and bleeding was reported by a further 10% [[Thomas et al, 2006](#)].
- Experts also consider that caution should be used when freezing warts over tendons and in people with poor circulation, because of the risk of damage to the tendons or nerves. Hypo- and hyper-pigmentation can also occur, particularly in black skin [[Sterling et al, 2001](#)].

Evidence for combining topical salicylic acid and cryotherapy

There is weak evidence for the use of a combination of cryotherapy and salicylic acid in clearing warts. However, the optimum regimen is unknown.

- A Cochrane review (search to March 2005) evaluated the evidence for local treatments for cutaneous, non-genital warts in healthy (immunocompetent) people [[Gibbs and Harvey, 2006](#)]. In general, the methodological quality of trials was poor. Two trials that evaluated the effect of combination treatment with salicylic acid and cryotherapy were included in the review.
 - Pooled data (n = 318) comparing cryotherapy plus salicylic acid with salicylic acid alone found combined treatment to be more effective (RR 1.24, 95% CI 1.07 to 1.43; p = 0.004).
 - Pooled data (n = 328) comparing combination treatment with cryotherapy alone found no benefit (RR 1.2, 95% CI 0.99 to 1.45; p = 0.06).

Evidence for occlusion with duct tape for the treatment of cutaneous warts

There is weak evidence that occlusion with duct tape may be an effective treatment for warts. This is on the basis of only one small trial, in which duct tape was compared with cryotherapy. No trial has compared duct tape with other wart treatments. Adverse effects were infrequent and minor, and therefore, despite the limited evidence for effectiveness, duct tape occlusion may be worth trying in some people.

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- A Cochrane review (search to March 2005) evaluated the evidence for local treatments for cutaneous, non-genital warts in healthy (immunocompetent) people [[Gibbs and Harvey, 2006](#)]. In general, the methodological quality of trials was poor. One trial was found (n = 61) that evaluated the effect of occlusion with duct tape, and was classified as being of medium quality by the authors of the review.
- **Compared with cryotherapy:**
 - o Duct tape was applied for 6 days every 7 days for a maximum of 2 months, and cryotherapy was given for 10 seconds every 2 to 3 weeks up to a maximum of six times.
 - o Cure rates at 2 months in the intention-to-treat population were 71% in the duct tape group and 46% in the cryotherapy group, but this difference was not statistically significant (RR 1.52, 95% CI 0.99 to 2.31).
 - o Analyses from the original article [[Focht et al, 2002](#)] were based on the 51 participants who completed treatment. Cure rate at 2 months was 85% for the duct tape group and 60% for the cryotherapy group, a difference that just reached statistical significance (p = 0.05).
 - o The authors of the Cochrane review commented that the trial was relatively small and that some would argue that 10 seconds of cryotherapy is inadequate. In addition, an unspecified number of assessments were carried out over the telephone. Despite this, the results suggest that simpler and safer treatments are likely to be at least as effective as cryotherapy.
- **Adverse effects:**
 - o Adverse effects were reported to be infrequent in the duct tape group (slight skin irritation), but people did report difficulty in keeping the tape on. Note: as with any topical treatment, there is a risk of hypersensitivity to the constituents of the tape or its glue.
 - o Pain and burning at the treatment site (particularly at the time of treatment) was a common complaint in the cryotherapy group.

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All references with links to [Free Full-text] are freely available online to users in England and Wales. This includes the full text of Department of Health papers and Cochrane Library reviews.

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