GM016 - Hyperhidrosis
Appendix 3 – NICE CKS Summary with supporting evidence and references

Hyperhidrosis, or excessive sweating, can be classified by location (focal or generalized) and by the presence of an underlying cause (primary or secondary):

- **Primary focal hyperhidrosis** (sometimes known as primary idiopathic, primary localized, or simply 'focal' hyperhidrosis) may affect the axillae, hands, feet, face, or scalp, and has no underlying cause [Hornberger et al, 2004]. It typically begins during childhood or adolescence, but can occur at any age [Hornberger et al, 2004].
- **Secondary focal hyperhidrosis** involves specific areas of the body, but is caused by an underlying condition, such as a neuropathy, spinal disease or injury, or compensatory hyperhidrosis [Lowe et al, 2003].
- **Generalized hyperhidrosis** affects the entire skin surface area and is usually secondary to other medical conditions or induced by drugs [International Hyperhidrosis Society, 2008c].

There are no data to indicate how common hyperhidrosis is in the UK, but it is reported to affect 3 in every 100 people in the USA [Hornberger et al, 2004].

Hyperhidrosis, or excessive sweating, can be classified by location (focal or generalized) and by the presence of an underlying cause (primary or secondary):

Primary focal hyperhidrosis may affect the axillae, hands, feet, face, or scalp, and has no underlying cause. It typically begins during childhood or adolescence, but can occur at any age and runs a chronic course. A few people spontaneously improve after 25 years of age. Primary focal hyperhidrosis can be diagnosed when focal, visible, excessive sweating: Occurs in at least one of the following sites: axillae, palms, soles, or craniofacial region, and has lasted at least 6 months, and has no apparent cause, and has at least two of the following characteristics: bilateral and relatively symmetrical; impairs daily activities; frequency of at least one episode per week; onset before 25 years of age; positive family history; cessation of local sweating during sleep.

Secondary focal hyperhidrosis involves specific areas of the body, but is caused by an underlying condition, such as a neuropathy, spinal disease or injury, or compensatory hyperhidrosis.

Generalized hyperhidrosis affects the entire skin surface area and is usually secondary to other medical conditions or induced by drugs.

If the presentation is characteristic, no laboratory tests are needed.

Treatment should be reviewed after 1–2 months. If successful, it can be continued indefinitely.

Referral to a dermatologist should be arranged if the above measures are inadequate or unacceptable.

An underlying cause should be suspected if any of the following affect the person with hyperhidrosis:

- Generalized sweating
- Sweating during sleep
- Symptoms and signs of systemic disease
- Prescribed drugs that are known to cause sweating
- Unilateral or asymmetric sweating (which suggest a neurological lesion or tumour, an intrathoracic malignancy, or a cervical rib)

For people with suspected secondary focal or generalised hyperhidrosis, the history, examination, and investigations should look for an underlying cause. Appropriate management will often include a referral to secondary care.

Excessive sweating can have a profound effect on quality of life, interfering with daily activities, and causing social embarrassment, eczema, skin maceration, secondary skin infections, odour, and damage to clothing [Lowe et al, 2003; Coulson, 2004; Hornberger et al, 2004; Solish et al, 2007; Solish et al, 2008].

Causes of generalized hyperhidrosis include:

- Pregnancy
- Anxiety
- Prescribed drugs:
  - Anticholinesterases (pyridostigmine, neostigmine).
  - Antidepressants (venlafaxine, duloxetine, selective serotonin reuptake inhibitors, tricyclic antidepressants, trazodone, and mirtazapine).
  - Pilocarpine (eye drops to treat glaucoma).
  - Bethanechol (a bladder stimulant).
  - Propanolol.
- Substance or alcohol abuse or withdrawal (see the CKS topic on Alcohol - problem drinking).
- Cardiovascular disorders: heart failure, myocardial ischaemia, shock (see the CKS topics on Heart failure - chronic and Angina).
- Respiratory failure.
- Infections, such as tuberculosis (see the CKS topic on Tuberculosis), and brucellosis (which can cause nocturnal sweating), HIV, abscess, and malaria.
- Malignancy: Hodgkin's disease, myeloproliferative disorders.
- Endocrine or metabolic disorders or conditions: thyrotoxicosis, hypoglycaemia, phaeochromocytoma, acromegaly, carcinoid tumour, hyperpituitarism, obesity, gout, menopause. (See the CKS topics on Gout, Hyperthyroidism, Menopause, and Obesity.)
- Neurological disorders and lesions: Parkinson's disease, diencephalic epilepsy, hypothalamic lesions. (See the CKS topics on Parkinson's disease and Epilepsy.)
- Familial dysautonomia (Riley–Day syndrome).

Causes of secondary focal hyperhidrosis include:

- Neurological disorders, such as stroke (see the CKS topic on Stroke and TIA), peripheral neuropathies, diabetic autonomic neuropathy (see the CKS topic on Diabetes - type 2) and other neuropathies, spinal cord lesions, and tumours (all which may directly cause hyperhidrosis, or indirectly result in compensatory hyperhidrosis).
- Intrathoracic neoplasms (e.g. mesothelioma — see the CKS topic on Lung cancer - suspected) or a cervical rib, both of which can cause unilateral hyperhidrosis.
- Gustatory sweating (sweating induced by food or drink) may be due to:
  - Diabetic neuropathy (see the CKS topic on Diabetes - type 2).
  - Herpes zoster of the preauricular area.
  - Invasion of the cervical sympathetic trunk by a tumour.
  - Injury or surgery to the parotid gland such as that experienced in Frey's (auriculotemporal) syndrome.
- Cutaneous disorders: blue rubber-bleb nevus, other eccrine nevus or nevus sudoriferous, sudoriferous angioma, glomus tumour.

- Other: Raynaud's phenomenon, erythromelalgia, arteriovenous fistula, cold injury, rheumatoid arthritis, pachyonychia congenita, pachydermoperiostosis, nail-patella syndrome. (See the CKS topics on Raynaud's phenomenon and Rheumatoid arthritis.)

Management of primary focal hyperhidrosis

- Provide advice about lifestyle measures and sources of information and support.
  - For all people with primary focal hyperhidrosis:
    - Modify behaviour to avoid identified triggers (such as crowded rooms, caffeine, or spicy foods), where possible.
    - For people with primary axillary hyperhidrosis:
    - Use a commercial antiperspirant (as opposed to a deodorant) frequently.
    - Avoid tight clothing and manmade fabrics.
    - Wear white (as opposed to blue) shirts or black clothing to minimize the signs of sweating.
    - Consider using dress shields (also known as armpit or sweat shields) to absorb excess sweat and protect delicate or expensive clothing. These can be obtained via the internet or the Hyperhidrosis Support Group.
  - For people with primary plantar hyperhidrosis:
    - Wear moisture-wicking socks, changing them at least twice daily.
    - Use absorbent soles, and use absorbent foot powder twice daily.
    - Avoid occlusive footwear such as boots or sports shoes; wear leather shoes.
    - Alternate pairs of shoes on a daily basis to allow them to dry out fully before wearing them again.
  - For people with primary craniofacial hyperhidrosis:
    - Avoid food and drink triggers where possible, if they exacerbate symptoms (including caffeinated products, chocolate, spicy or sour foods, hot foods, alcohol, foods or drinks containing citric acid, or sweets).
- Recommend 20% aluminium chloride hexahydrate:
  - Driclor® and Anhydrol Forte® roll-ons are licensed, and can be prescribed or bought over-the-counter.
  - Odaban® spray is not a licensed medicinal product. However, it can be prescribed or bought over-the-counter.
  - Advise that aluminium chloride should be applied at night just before sleep:
    - To dry skin of the axillae, feet, hands, or face (avoiding the eyes), and should be washed off in the morning.
    - Every 1–2 days, as tolerated, until the condition improves.
    - And then, as required, which may be up to every 6 weeks.
  - Advise the person to avoid shaving for 24 hours before and after application.
  - Consider soaking lotion pads for application to the face.
  - For plantar hyperhidrosis, an aluminium salt dusting powder (Zeasorb®) can be used as an alternative to 20% aluminium chloride hexahydrate solution or spray.
  - Advise that skin irritation may occur. This can be managed by:
    - The use of topical emollients and soap substitutes.
    - A reduction in the frequency of application.
    - Giving a short course of 1% hydrocortisone cream, for up to 2 weeks.
  - Review 1–2 months after starting treatment. If successful, it can be continued indefinitely.
- Consider treating any underlying anxiety, which may be an exacerbating factor:

  - Cognitive behavioural therapy may be preferable to antidepressants or propranolol, which can cause or worsen hyperhidrosis.
- Refer to a dermatologist if the above measures are inadequate or unacceptable.

Inform people about sources of information and support:

- The Hyperhidrosis Support Group at www.hyperhidrosisuk.org
- The International Hyperhidrosis Society at www.sweathelp.org

Recommendations are based on expert opinion in the absence of trial evidence [Lowe et al, 2003; Hornberger et al, 2004; Clark, 2006; Halford, 2006].

Treatments in secondary care

- Modified topical therapy:
  - Emollients, topical corticosteroids, different strengths of aluminium salts (up to 50%), and topical glutaraldehyde or formaldehyde may be used.
  - Topical glycopyrrolate (an antimuscarinic agent) can be prepared by special order manufacturers, and may be useful for primary craniofacial hyperhidrosis.
- Iontophoresis:
  - In tap water iontophoresis, the sites of hyperhidrosis are immersed in warm water (or a wet contact pad may be applied) through which a weak electric current is passed.
  - If unsuccessful, glycopyrronium bromide (an antimuscarinic agent) can be added to the water, but adverse effects are common.
  - It is usually performed in hospital, but home treatment kits (using tap water) can be purchased for £250 to £500.
  - Treatment usually consists of 2–4 treatment sessions per week. Each treatment session lasts 20–30 minutes. Improvement usually occurs after 4–10 sessions.
  - Maintenance treatment is typically required at intervals of 1–4 weeks.
  - No serious adverse effects are reported for tap water iontophoresis, but it is only suitable for the hands, feet and, less easily, the axillae.
- Botulinum toxin:
  - Botulinum toxin is delivered by multiple intradermal injections to the affected areas.
  - Botox® is licensed for the treatment of axillary hyperhidrosis; botulinum toxin can also be helpful for palmar, plantar, and craniofacial hyperhidrosis but the procedure may be more difficult and painful at these sites.
  - Adverse effects include compensatory sweating (5–10%) and injection-site pain or reactions (9–12%). Transient muscle weakness and loss of fine motor control, as well as anaphylaxis, have been reported, and transmission of infectious agents is theoretically possible.
  - It is not always available at NHS hospitals, and is mostly given in private clinics.
- Surgery:
  - Resection of sweat glands can be carried out using local anaesthesia and is useful for small areas of axillary hyperhidrosis.
  - Endoscopic thoracic sympathectomy (ETS):
    - This involves video-assisted laparoscopic division of the sympathetic chain over the neck of the ribs under general anaesthesia, usually by a vascular surgeon.
    - ETS is indicated (as a last resort) for severe palmar, axillary, and sometimes craniofacial hyperhidrosis. Lumbar sympathectomy is not used for plantar hyperhidrosis because of the risk of sexual dysfunction.
    - Complications include: compensatory hyperhidrosis (very common, up to 100%), gustatory sweating (common, up to 50%), rhinitis (quite common, up to 10%), pneumothorax (common,

up to 75%, but usually resolves spontaneously), significant bleeding (up to 5%), Horner's syndrome (rare, < 1%), and phrenic nerve damage (extremely rare).

- Other treatments that may be used:
  - Oral antimuscarinics, such as glycopyrronium bromide (which needs to be imported) and oxybutinin, may be used, but their use is limited by adverse effects.
  - Clonidine.
  - Diltiazem.
  - Benzodiazepines.

Management of secondary focal or generalized hyperhidrosis

- Direct the history, examination, and investigations to look for an underlying cause, and manage appropriately. This will often require a referral to secondary care.
  - If a person has generalized hyperhidrosis, but symptoms and signs are non-specific, the following baseline investigations may be carried out in primary care in order to guide appropriate referral and management:
    - Full blood count.
    - Erythrocyte sedimentation rate or C-reactive protein.
    - Urea and electrolytes.
    - Liver function tests.
    - Random blood sugar tests.
    - Thyroid function tests.
    - Chest radiography.
    - Blood film for malarial parasites, if indicated.
    - HIV testing (after counselling), if indicated.
  - For people with suspected secondary focal hyperhidrosis, chest radiography may be useful to identify an intrathoracic neoplasm or a cervical rib.

Recommendations are based on expert opinion from *Guidelines for the primary care treatment and referral of focal hyperhidrosis* [Lowe et al, 2003] and a US expert consensus statement, *Recognition, diagnosis, and treatment of primary hyperhidrosis* [Hornberger et al, 2004].

Basis for recommendation

Recommend or prescribe 20% aluminium chloride hexahydrate in alcohol solution.

- CKS found no randomized, placebo-controlled trials of the efficacy and safety of aluminium chloride hexahydrate, or any other aluminium salts for the treatment of primary focal Hyperhidrosis.
- The recommendation to use 20% aluminium chloride hexahydrate in alcohol solution as first-line treatment of primary focal hyperhidrosis is based on poor quality evidence from two small, quasi-controlled trials [Rayner et al, 1980; Goh, 1990]; four case series of between 12 and 65 highly selected subjects [Scholes et al, 1978; Ellis and Scurr, 1979; Jensen and Karlsmark, 1980; Glent-Madsen and Dahl, 1988]; and expert opinion, including two published consensus statements [Hornberger et al, 2004; Solish et al, 2007], two guidelines [Lowe et al, 2003; International Hyperhidrosis Society, 2008b], and an evidence-based review [DTB, 2005].
- Prescribing advice is based on expert opinion from *Guidelines for the primary care treatment and referral of focal hyperhidrosis* [Lowe et al, 2003] and CKS external reviewers' comments.

Consider treating any underlying anxiety which may be an exacerbating factor.

- CKS found no trials of the efficacy of treating anxiety for people with primary focal hyperhidrosis. Treatment of underlying anxiety is recommended on the basis of expert opinion that focal

hyperhidrosis can be exacerbated by emotional stimuli, expressed in published review articles [Cheung and Solomon, 2002; Hornberger et al, 2004; Solish et al, 2008] and by expert reviewers.

  - A systematic review of psychological interventions for primary hyperhidrosis also found no controlled trials [Kennard and Lopez, 2004]. Two small case-control studies and four small case series were identified, which suggested some benefits from relaxation and biofeedback.

- Cognitive behavioural therapy (CBT) is recommended over antidepressants or propranolol on the basis of expert opinion and common sense:
  - CBT is recommended as a first-line treatment of anxiety in current guidelines published by the National Institute for Health and Clinical Excellence [NICE, 2007].
  - CBT is recommended as a treatment for primary focal hyperhidrosis 'where anxiety is thought to be the predominant cause' in a *10 minute consultation* review article, published in the British Medical Journal (expert opinion) [Piercy, 2005].
  - Antidepressants and propranolol can cause or exacerbate sweating. Meta-analyses have found that between 8.6% and 14% of people taking antidepressants experience increased sweating, the highest incidence being seen with venlafaxine and the lowest with trazodone and fluvoxamine [DTB, 2005; Cheshire and Fealey, 2008].

Refer to a dermatologist if the above measures are inadequate or unacceptable.

- This recommendation is based on expert opinion from *Guidelines for the primary care treatment and referral of focal hyperhidrosis* [Lowe et al, 2003], on the basis that other treatments require additional expertise or equipment only likely to be found in secondary care.

Treatments in secondary care (in Additional information).

- Descriptions of possible secondary care treatments are mainly derived from *Guidelines for the primary care treatment and referral of focal hyperhidrosis* [Lowe et al, 2003], an evidence-based review [DTB, 2005], US and Canadian expert consensus statements [Hornberger et al, 2004; Solish et al, 2007], and internet-based guidelines [International Hyperhidrosis Society, 2008b].
  - Details of the availability of topical glycopyrrolate are from a letter by UK consultant dermatologists published in the British Journal of Dermatology [Kavanagh et al, 2006].
  - The statement that botulinum toxin is not always available at NHS hospitals, and is mostly given in private clinics, is made on the Hyperhidrosis Support Group website, and expert reviewers have also identified the variation in NHS funding.
  - Complication rates of endoscopic thoracic sympathectomy are from an evidence-based review [Ojimba and Cameron, 2004].
- The quality of trial evidence for the listed secondary care treatments varies depending on the individual treatment, and is often based on expert opinion. Whilst there is evidence of the efficacy and safety (when performed by trained healthcare professionals) of botulinum toxin for primary axillary hyperhidrosis from four randomized, controlled trials, including nearly 1000 people, the evidence for other treatments is from small controlled trials, case series, or expert opinion.

Topical aluminium salts

CKS found no randomized, placebo-controlled trials of the efficacy and safety of aluminium chloride hexahydrate or any other aluminium salt for the treatment of primary focal hyperhidrosis. The recommendation to use 20% aluminium chloride hexahydrate in alcohol solution as first-line treatment of primary focal hyperhidrosis is based on poor quality evidence from two small, quasi-controlled trials [Rayner et al, 1980; Goh, 1990], four case series of between 12 and 65 highly selected subjects [Scholes et al, 1978; Ellis and Scurr, 1979; Jensen and Karlsmark, 1980; Glent-Madsen and Dahl, 1988], and expert opinion, including two published consensus statements [Hornberger et al, 2004; Solish et al, 2007], two guidelines [Lowe et al, 2003; International Hyperhidrosis Society, 2008b], and an evidence-based review [DTB, 2005]. Satisfaction with treatment varied between 63% and 99%, and discontinuation due to irritation varied between 2% and 20%. However, these findings should be

interpreted with caution in the absence of any randomized, controlled trials, and they are not readily generalizable to a UK primary care population.

- In one quasi-controlled trial, published as a letter in the British Medical Journal, 38 people with axillary hyperhidrosis on a waiting list for surgery were treated with topical 20% aluminium chloride hexahydrate, and a placebo, applied on alternate nights for 14 nights [Rayner et al, 1980]. After 14 days, whichever solution relieved symptoms (it is not clear how this was decided) was used on the opposite axilla on alternate nights for a further 14 days, and when necessary to the axilla where relief had already been obtained, and presumably thereafter for 6 months, although this is not clear.
  - 24 people obtained considerable relief with the active compound, two obtained considerable relief with the placebo, four obtained equal relief with both solutions, six showed no improvement, and two defaulted.
  - Five of the 24 people experiencing considerable relief with the active compound opted for surgery because the treatment was not acceptable.
  - After 6 months, only six of the original 19 people experiencing considerable relief and finding the treatment acceptable, had sustained relief. In all, 26 out of 38 people still opted for surgery.
- In another quasi-controlled trial, with assessor blinding only, 12 people with idiopathic palmar hyperhidrosis were instructed to apply aluminium chloride hexahydrate to one palm every night for 4 weeks, with the other palm acting as control [Goh, 1990].
  - All subjects reported an improvement in symptoms on the treated side.
  - Four people experienced stinging, which settled in three people. One person dropped out because of this adverse effect.
  - In the remaining 11 people, treatment was associated with a significant reduction in skin water vapour loss compared with no treatment ($p = 0.004$).
- Four case series have been published:
  - Sixty-four out of 65 people with axillary hyperhidrosis, treated in UK dermatology clinics with 20% aluminium chloride hexahydrate in absolute alcohol, achieved 'excellent control of sweating' at 12 months [Scholes et al, 1978]. Twenty-nine people experienced some irritation, 28 of whom said that it was readily relieved by applying 1% hydrocortisone cream on the morning after treatment.
  - Forty-two people with axillary hyperhidrosis on a waiting list for surgery were treated with topical 20% aluminium chloride hexahydrate in absolute alcohol [Ellis and Scurr, 1979]. At 3 months, eight people had defaulted, 27 people described the treatment as highly successful, and seven people stopped using the treatment (three because they could not manage it, and only three because of severe irritation or soreness).
  - Sixteen people with palmar or plantar hyperhidrosis, or both, were treated with aluminium chloride hexahydrate 25% in absolute ethyl alcohol. In 12 out of 13 people with palmar hyperhidrosis, control of sweating was achieved after 3–4 weeks of daily treatment [Jensen and Karlsmark, 1980]. In 10 out of 11 people with plantar hyperhidrosis, control of sweating was achieved after 5–6 weeks of daily treatment. Five people complained of itching.
  - One study compared the efficacy of aluminium chloride hexahydrate 25% in ethanol alone and combined with an additional topical treatment, triethanolamine [Glent-Madsen and Dahl, 1988]. The results of the aluminium chloride only arm alone can be viewed as a case series. Out of 30 people treated, the median for sweat secretion (authors stated 'reduction', presumably incorrectly) decreased to 25% of the value before treatment. Six people (20%) discontinued treatment because of irritation.
- Two other studies which essentially amount to case series, suggest that good efficacy may be achieved by using a different vehicle for aluminium chloride hexahydrate, or by using a different aluminium salt. Neither are currently available for use in the UK [BNF 56, 2008].

  - Out of 238 people with localized hyperhidrosis treated on 332 anatomical sites with aluminium chloride hexahydrate (of varying concentrations), in a salicylic acid gel base [Benohanian et al, 1998]:
    - Good or excellent outcomes were reported for over 90% of treatments to axillae, 60% of treatments to hands, and over 80% of treatments to feet.
    - Subjects self-reported outcomes. The duration of treatment was not specified.
  - Twenty people with primary or idiopathic hyperhidrosis were treated with a new foam formulation containing 20% of an aluminium salt (sesquichlorhydrate) [Innocenzi et al, 2005]:
    - On average, sweating halved after 15 days' treatment, but quality of life improved only for people with axillary, not palmar, hyperhidrosis.
- CKS found no randomized, placebo-controlled trials of foot powder containing an aluminium salt for people with primary focal hyperhidrosis. An RCT was published that compared a preparation referred to as Zeasorb® with placebo, but the constituents differed markedly from the current preparation, and did not include an aluminium salt [Helfand, 1963].

Secondary care treatments

The quality of trial evidence for the listed secondary care treatments varies depending on the individual treatment, and is often based on expert opinion. Whilst there is evidence of the efficacy and safety (when performed by trained healthcare professionals) of botulinum toxin in the treatment of primary axillary hyperhidrosis from four randomized, controlled trials (RCTs), including nearly 1000 people, the evidence for other treatments or botulinum toxin at other sites (beside the axillae) is either from small or non-randomized, controlled trials, case series, or expert opinion.

- Emollients, topical corticosteroids, different strengths of aluminium salts, and topical glutaraldehyde or formaldehyde:
  - The use of modified topical therapy is based on expert opinion from *Guidelines for the primary care treatment and referral of focal hyperhidrosis* [Lowe et al, 2003].
  - A trial of topical formaldehyde is recommended for localized hyperhidrosis on the basis of expert opinion from the British Association of Dermatologists (CKS external reviewer comments).
- Topical glycopyrrolate:
  - The use of this treatment for facial hyperhidrosis is based on limited evidence of efficacy from one small case series [Kim et al, 2008], and on expert opinion from consensus statements [Hornberger et al, 2004; Solish et al, 2007] which state that topical glycopyrrolate is a *possible* treatment, and from a letter published in the British Journal of Dermatology [Kavanagh et al, 2006].
- Iontophoresis:
  - Evidence on the efficacy and safety of iontophoresis is based on several small controlled trials (in palmar hyperhidrosis) and case series (in plantar and axillary hyperhidrosis), which were identified in two evidence-based consensus statements [Hornberger et al, 2004; Solish et al, 2007]. No new controlled trials have since been published.
- Botulinum toxin:
  - The consensus statements and an evidence-based review identified three large randomized, placebo-controlled trials, involving 672 subjects, of the efficacy and safety of botulinum toxin in the treatment of primary axillary hyperhidrosis [Hornberger et al, 2004; DTB, 2005; Solish et al, 2007]. Another large, randomized, placebo-controlled trial, involving 322 subjects and lasting 1 year, has since been published [Lowe et al, 2007]. Each study reported statistically significant improvements in symptoms with botulinum toxin compared with placebo, with 75% to 95% of people achieving a treatment response with botulinum toxin. Between 10% and 12% of people in active treatment groups experienced adverse effects, most commonly increased non-axillary

sweating or injection-site pain or reactions, compared with between 3% and 8% in placebo groups.

- Several smaller, controlled trials found similar benefits for botulinum toxin in the treatment of primary palmar hyperhidrosis, but evidence is more limited for plantar and craniofacial hyperhidrosis [Hornberger et al, 2004; Baumann et al, 2005; Solish et al, 2007].

- Other treatments that may be used:
  - CKS found no good-quality RCTs of the efficacy and safety of oral antimuscarinics (propantheline, oxybutynin, glycopyrronium bromide, benzatropine), clonidine, diltiazem, or benzodiazepines in the treatment of primary focal hyperhidrosis.
    - There is very limited evidence of the efficacy of oral glycopyrronium bromide from a case series, in which a third of people stopped taking it because of adverse effects [Bajaj and Langtry, 2007].
    - Expert opinion is divided in relation to these treatments. They are recommended by the International Hyperhidrosis Society which states, 'If the person's symptoms occur during, or are exacerbated by, anxiety-provoking situations (such as work presentations), consider treatment prior to such events with an anticholinergic (antimuscarinic) or a short-course benzodiazepine (or clonidine or diltiazem, in the algorithm)' [International Hyperhidrosis Society, 2008b]. CKS questions whether performance would be improved by medications (antimuscarinics and benzodiazepines) that can cause drowsiness, dry mouth, palpitations, or dizziness [Hornberger et al, 2004; BNF 56, 2008].
    - Oral glycopyrronium bromide (2 mg, two to three times daily) and oxybutnin (an antimuscarinic) were recommended in feedback from two expert reviewers. However, antimuscarinic medication is not recommended in *Guidelines for the primary care treatment and referral of focal hyperhidrosis* [Lowe et al, 2003], or the Drug and Therapeutics Bulletin [DTB, 2005], and it is only recommended as third- or fourth-line treatment in the Canadian consensus statement [Solish et al, 2007], or as a final option before considering surgery in the US consensus statement [Hornberger et al, 2004].

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