

## Pharmacological Management of Hypersalivation in Children & Adults

**Scope:** Patients with Parkinson’s Disease, Motor Neurone Disease, drug-induced hypersalivation, children with neurodisabilities, cerebral palsy and drooling due to long term ventilation

### Assessment of severity

Hypersalivation is also known as drooling or sialorrhoea. Severity of drooling should be assessed through discussion with patients and/or their parents/carers. The Thomas-Stonell and Greenberg scale (1) can be used to graded drooling. Counting bibs can also be used as a practical method to quantify severity of hypersalivation.

#### **Thomas-Stonell and Greenberg Scale (1):**

Drooling Severity		Drooling frequency	
Score	Description	Score	Description
1	Dry	1	Never
2	Mild - wet lips	2	Occasionally
3	Moderate - wet lips and chin	3	Frequently
4	Severe - clothing damp	4	Constantly
5	Profuse - clothing, hands & objects wet		

### Prescribing considerations (2)

**There is no evidence to support the use of one treatment over another.**

Take into consideration individual patient factors to determine choice of drug. The following are to be considered when prescribing antimuscarinic medications to treat hypersalivation:

- Medical history e.g. urinary retention, constipation, glaucoma etc.
- Other medications the patient is prescribed contributing to total anticholinergic burden
- Risk of adverse effects

### Drug treatments for ADULTS

Refer to the BNF & Summary Product Characteristics (SPC) for full prescribing information.

#### THICK Saliva/ Sputum (3)

- Carbocisteine 375mg capsules **GREEN**

375-750mg THREE times daily

Each patient will need to be assessed and drug choice individualised. Medicines are shown below in order of cost-effectiveness.

- Amitriptyline tablets (off-label) (4) **GREEN**

10mg ONCE daily at night, increased in 10mg increments as required to a MAXIMUM dose of 100mg ONCE daily at night

- Ipratropium bromide nasal spray 21 micrograms per dose (Rinaspray®) (off-label) (4) **GREEN**

2 sprays **sublingually** ONCE daily at night titrated as necessary/tolerated up to a maximum of 2 sprays THREE times a day

- Hyoscine Hydrobromide 300 microgram tablets (Kwells®) (off-label) (3) **GREEN**

300 micrograms ONCE daily at night, increase by 300 micrograms every 2 to 3 days to a MAXIMUM daily dose of 300 micrograms THREE times daily

- Hyoscine Hydrobromide 1mg/72 hours transdermal patches (Scopoderm®) (off-label) (3) **GREEN**

Use 1 patch (1mg) every 72 hours

- Atropine 1% eye drops 0.5ml unit dose preservative free (Minims) (off-label) (3) **GREEN**

1 to 2 drops **sublingually** (or add to 10mL of water and use as a mouth rinse) ONCE daily in the morning; titrate as required by 1 drop every 2 days up to a MAXIMUM of 2 drops FOUR times daily. **Potential for overdose – see other considerations.**

### Drug treatments for CHILDREN

Refer to the BNFC & Summary Product Characteristics (SPC) for full prescribing information.

Each patient will need to be assessed and drug choice individualised. Medicines are shown below in order of cost-effectiveness.

- Hyoscine hydrobromide 150 micrograms and 300 micrograms tablets (Kwells Kids® and Kwells®) (off-label) (7) **GREEN**

#### Child aged 2 – 11 years

10 micrograms/ kg FOUR times daily (MAX 300 micrograms per dose)

#### Child aged 12 – 17 years

300 micrograms FOUR times daily

- Hyoscine Hydrobromide 1mg/72 hours transdermal patches (Scopoderm®) (off-label) (7)(8) **GREEN**

#### Child aged 1 month to 2 years

Use ¼ patch (250 micrograms) every 72 hours

#### Child aged 3 – 9 years

Use ½ patch (500 micrograms) every 72 hours

#### Child aged 10 years and older

Use 1 patch (1mg) every 72 hours

Not tolerated or ineffective at maximum tolerated dose -  
**SEEK SPECIALIST INPUT**

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**Drug treatment for ADULTS with input from specialist services**

- **Glycopyrronium bromide 1mg capsules (Glycobromag)** (Unlicensed) (5) **ADVICE**  
1mg THREE times daily, increased as required after 7 days to 2mg THREE times daily.
- **Glycopyrronium bromide 1mg tablets (Assicco®)** (off-label use)(17) **ADVICE**

**PRESCRIBE BY BRAND NAME**

1mg THREE times daily, increased as required after 7 days to 2mg THREE times daily.



- **Trihexyphenidyl (Benzhexol) 2mg tablets** (off-label) (2) **ADVICE**

2mg daily, increased as required in steps of 2mg every 3 – 5 days. MAINTENANCE 5 – 15mg DAILY in 3 – 4 divided doses



**SEEK FURTHER SPECIALIST ADVICE**



**Drug treatment for CHILDREN with input from specialist services**

- **Glycopyrronium bromide 1mg tablets (Assicco®)** (Licensed) (6) **ADVICE**

**PRESCRIBE BY BRAND NAME**

**Child 3–17 years**

Initially 20 micrograms/kg THREE times a day, increased in steps of 20 micrograms/kg THREE times a day, every 7 days, adjusted according to response.

MAXIMUM 100 micrograms/kg THREE times a day (max. per dose 3 mg).

- **Glycopyrronium bromide 400 micrograms/mL** (320micrograms/mL of glycopyrronium) **oral solution sugar free (Sialanar®)** (Licensed) - **NB: doses below expressed as glycopyrronium bromide** (9) **ADVICE**

**Child and adolescents aged 3 years and over with chronic neurological disorders**

Initially 16 micrograms/kg THREE times daily, increased in steps of 16 micrograms/kg THREE times daily, every 7 days according to response. MAXIMUM dose of 80 micrograms/kg THREE times daily (MAX 2.4mg per dose)



- **Trihexyphenidyl (Benzhexol) 2mg tablets** (off-label) (10) **ADVICE**

**Children aged 3 years and over**

Initially 1mg TWICE daily, increase after 2 weeks to 2mg TWICE daily as necessary. Dose can be titrated every 2 weeks up to a MAXIMUM dose of 2mg THREE times daily.



**SEEK FURTHER SPECIALIST ADVICE**

### **Patients with Parkinson's Disease (4)**

Only consider pharmacological management if non-pharmacological management (e.g. speech and language therapy) has not been effective or available. Glycopyrronium can be considered to manage hypersalivation in patients with Parkinson's Disease, it does not cross the blood brain barrier. If treatment is not effective or not tolerated refer to specialist services. Other anticholinergics other than glycopyrronium should only be considered if risk of cognitive adverse effects is thought to be minimal. Topical preparations e.g. atropine should be used if possible to reduce risk of adverse effects.

### **Patients with Motor Neurone Disease (MND) (11)**

Glycopyrronium to be considered as the first-line treatment for sialorrhoea in people with MND who have cognitive impairment, because it has fewer central nervous system side effects. If first-line treatment for sialorrhoea is not effective, not tolerated or contraindicated, consider referral to a specialist service for Botulinum toxin A injections.

### **Drug-induced hypersalivation (4)**

Antipsychotics, in particular clozapine, are strongly associated with drooling. Direct and indirect acting anticholinergic agonists used for the treatment of dementia of the Alzheimer type and Myasthenia Gravis.

Treatment for drug-induced hypersalivation is the same as other forms of hypersalivation with the use of antimuscarinics. Cumulative antimuscarinic burden (e.g. increased constipation, urinary retention, blurred vision, drowsiness, confusion, tachycardia and arrhythmia) is a risk in this patient group.

### **Other Considerations (2)(4)**

#### **Carbocisteine**

- Rarely causes peptic ulceration – consider adding a Proton Pump Inhibitor.
- Available as an oral solution for patients with swallowing difficulties or enteral feeding tubes (12).

#### **Amitriptyline**

- Amitriptyline has been used anecdotally, but its sedative properties may limit its use to patients experiencing hypersalivation at night (16).
- The tablets can be crushed and dispersed in water. If administering via enteral feeding tube tablets should be crushed well to ensure film-coating is properly broken up (14).

#### **Ipratropium bromide nasal spray 0.03%**

- There is limited evidence for the use of ipratropium for hypersalivation and the only placebo controlled RCT conducted showed ipratropium has no significant effect on the amount of saliva produced, but was well tolerated. Ipratropium bromide nasal spray, used sublingually for hypersalivation, is included in the Maudsley Prescribing Guidelines.

## Hyoscine hydrobromide

- Hyoscine hydrobromide patches can be cut or the portion of the patch not required can be covered to prevent contact with the skin.
- Patches to be applied to dry hairless areas e.g. behind the ear.
- Tolerance may develop.
- Patches may be advantageous over other treatments due to ease of administration, maintenance of steady state concentrations and lower incidence of systemic side effects.
- Hyoscine hydrobromide tablets can be dissolved in water for administration via enteral tubes (13).

## Sublingual atropine 1% eye drops

- Advantages of sublingually administered atropine include its availability as eye drops, low cost and reversibility (16). However, use should be avoided in patients with limited dexterity as the dropper is difficult to manipulate and there is potential for accidental overdose with drops.
- The exact dose of sublingual atropine has not been established and atropine should not be used in patients with cognitive impairment, dementia and hallucinations (16).

## Glycopyrronium bromide

- The evidence base for use of glycopyrronium bromide in adults is very weak, and its use for hypersalivation should be reviewed on a regular basis. If there has been no improvement, it should be discontinued.
- Due to the lack of long-term safety data, glycopyrronium bromide is recommended for short-term intermittent use only.
- Lower incidence of central nervous system adverse effects e.g. sedation, restlessness due to inability to cross the blood brain barrier.
- Less tachycardia reported compared with hyoscine and atropine
- Glycopyrronium bromide tablets and oral solutions are **not interchangeable** on a microgram-for-microgram basis due to differences in bioavailability (6).
- Assicco® tablets are licensed for the symptomatic treatment of severe sialorrhoea (chronic pathological drooling) in children and adolescents aged 3 years and older with chronic neurological disorders (17). Use in adults is off-label.
- Assicco® tablets should be **prescribed by brand**. The tablets are scored and can be divided into equal doses. Assicco® tablets are licensed to be dispersed in water; they are also licensed for administration, by tablet solubilisation, via an nasogastric tube or a percutaneous endoscopic gastrostomy (PEG) tube.
- Where prescribing a liquid formulation of glycopyrronium the **strength** and **dose** should be clearly indicated. This is to reduce the risk of errors as there are two separate liquid formulations available with different strengths.
- Sialanar® oral solution has approximately 25% higher bioavailability and therefore equivalent doses will be lower than for tablets and generic oral solutions (6).
- Sialanar® oral solution contains 400 micrograms/mL of glycopyrronium bromide which is equivalent to 320 micrograms/mL of glycopyrronium (6). Doses in BNF Publications are expressed as glycopyrronium bromide, however Sialanar® oral solution doses may be expressed as glycopyrronium in other literature (6).
- Liquid formulations of glycopyrronium bromide can be administered via enteral feeding tubes. The tube should be flushed with 20mL of water after each dose (15).

- Absorption of enteral glycopyrronium oral solution can be decreased by concomitant food. Stop feed 2 hours before dose. Restart feed 1 hour after dose.

### **Trihexyphenidyl**

- Trihexyphenidyl is indicated for control of drooling in for children with dyskinetic cerebral palsy, but **only with input from specialist services**.
- Use not recommended in the elderly because of risks of toxicity and aggravating dementia (2).
- The tablets will disperse in water for administration via enteral tubes.
- Side effects include tachycardia, constipation, urinary disorders, hallucinations and memory impairment (4).

### **Botulinum toxin (4)**

Xeomin (botulinum neurotoxin type A) is recommended, within its marketing authorisation, as an option for treating chronic sialorrhoea caused by neurological conditions in adults. Patients should be referred to specialist services as botulinum toxin type A is commissioned as Red (Hospital/ Specialist use only) (18).

### Cost comparison

Drug	Cost per pack	Dose used for cost	Approximate cost per 28 days treatment <sup>A</sup>
Amitriptyline 25mg tablets	68p for a pack of 28	100mg ONCE at night	£2.72
Carbocisteine 375mg capsules	£2.97 for 120	750mg THREE times daily	£4.16
Ipratropium bromide nasal spray 21 micrograms per dose (Rinaspray <sup>®</sup> )	£6.54 for 180 doses	2 sprays sublingually up to three times daily	£5.96
Hyoscine Hydrobromide 300 microgram tablets (Kwells <sup>®</sup> )	£1.84 for a pack of 12	300 micrograms THREE times daily	£12.88
Carbocisteine 250mg/5ml oral solution	£4.41 for 300ml	750mg THREE times daily	£18.52
Hyoscine 1mg/72 hours transdermal patches (Scopoderm <sup>®</sup> )	£12.87 for pack of 2	1 patch every 72 hours	£64.35
Atropine 1% eye drops 0.5ml unit dose preservative free (Minims)	£15.10 for a pack of 20 minims	2 drops FOUR times a day – cost based on use of 4 minims daily	£84.56
Glycopyrronium 1mg capsules (Glycobromag) - unlicensed	£106 for a pack of 84 <sup>B</sup>	1mg THREE times daily	£106 <sup>B</sup>
Glycopyrronium bromide 1mg tablets (Assicco <sup>®</sup> )	<b>PRESCRIBE BY BRAND</b> £79 for a pack of 30 <sup>C</sup>	1mg THREE times daily	£221.20 when prescribed by brand <sup>C</sup> .
Glycopyrronium bromide 400 micrograms/mL oral solution sugar free (Sialanar <sup>®</sup> )	£320 for 250ml	1mg THREE times daily	£268.80
Glycopyrronium bromide 1mg/5mL oral solution sugar free	£104.01 for 150ml <sup>C</sup>	1mg THREE times daily	£291.23 <sup>C</sup>
Glycopyrronium bromide 1mg tablets	£265.29 for a pack of 30 <sup>C</sup>	1mg THREE times daily	£742.81 <sup>C</sup>
<b>Medicines to be prescribed on specialist advice only</b>			
Drug	Cost per pack	Dose used for cost	Approximate cost per 28 days treatment <sup>A</sup>
Trihexyphenidyl 2mg tablets	£3.88 for 84	2mg THREE times daily	£3.88
Trihexyphenidyl 5mg/5mL oral solution sugar free	£82.54 for 200ml	2mg THREE times daily	£69.33
Botulinum Toxin Type A (Xeomin <sup>®</sup> )	£129.90 for 100 units	100 units	£422.18 per annum <sup>D</sup>
<sup>A</sup> Cost based on the Drug Tariff, August 2022 (19) <sup>B</sup> Cost based on data from MedOptimise (20) <sup>C</sup> Cost based on the Drug Tariff, February 2024 (21) <sup>D</sup> Cost per annum as treatment not recommended more frequently than every 16 weeks			

## References:

1. Reece A and Colin A. Clinical cases in paediatrics: A trainee handbook. JP Medical Ltd; 2014
2. Pan Mersey Area Prescribing Committee. Pharmacological Management of Hypersalivation in Children and Adults. Version 1.5. 01 November 2017. Available from: [Hypersalivation: pharmacological management in children and adults \(panmerseyapc.nhs.uk\)](https://panmerseyapc.nhs.uk/pharmacological-management-in-children-and-adults)
3. Lerner, E. Clinical Guidance for the Management of Respiratory / Oral Secretions in Motor Neurone Disease (MND), Norfolk and Norwich University Hospitals NHS Foundation Trust. Version 1. 23 March 2022.
4. Surrey & North West Sussex Area Prescribing Committee. Pharmacological Management of Hypersalivation in Adults. January 2020. Available from: <https://surreyccg.res-systems.net/PAD//Content/Documents/2/Hypersalivation%20Pathway%20Adults-%20Final%20Jan%202020.pdf?UNLID=>
5. Dawa Limited. Glycopyrronium Bromide 1 mg Tablets. 10/03/2015 [Updated July 22]. Available from: <https://www.medicines.org.uk/emc/product/13883/smpc>
6. British National Formulary for Children (BNFC). Glycopyrronium bromide. [Last updated 13/12/23]. Available from: [Glycopyrronium bromide | Drugs | BNFC | NICE](https://www.bnf.co.uk/bnf/article/Glycopyrronium_bromide)
7. British National Formulary for Children (BNFC). Hyoscine hydrobromide. [Updated 29/06/22]. Available from: <https://bnfc.nice.org.uk/drugs/hyoscine-hydrobromide/>
8. Guy's & St Thomas' NHS Foundation Trust. Paediatric Formulary. April 2020. Available from <https://app.clinibee.com/articles/30e7544a-dd28-444c-baf4-6d67abdf23b2>
9. British National Formulary for Children (BNFC). Glycopyrronium Bromide. [Updated 29/06/22]. Available from: <https://bnfc.nice.org.uk/drugs/glycopyrronium-bromide/#indications-and-dose>
10. The Royal Children's Hospital Melbourne. Saliva Control in Children An information guide for families and clinicians. Available from <https://www.rch.org.au/uploadedFiles/Main/Content/plastic/salivabook.pdf>
11. National Institute of Health and Care Excellence. Motor Neurone Disease: assessment and management. February 2016. Available from: <https://www.nice.org.uk/guidance/ng42/resources/motor-neurone-disease-assessment-and-management-pdf-1837449470149>
12. Wrexham Maelor Hospital Pharmacy Department. The NEWT Guidelines Carbocisteine. [Updated May 2010]. Available from <https://access.newtguidelines.com/C/Carbocisteine.html>
13. Wrexham Maelor Hospital Pharmacy Department. The NEWT Guidelines Hyoscine hydrobromide. [Updated April 2012]. Available from <https://access.newtguidelines.com/H/Hyoscine%20hydrobromide.html>
14. Wrexham Maelor Hospital Pharmacy Department. The NEWT Guidelines Amitriptyline. [Updated October 2018]. Available from <https://access.newtguidelines.com/A/Amitriptyline.html>
15. Wrexham Maelor Hospital Pharmacy Department. The NEWT Guidelines Glycopyrronium. [Updated March 2020]. Available from <https://access.newtguidelines.com/G/Glycopyrronium.html>
16. Pickett, K. UK Medicines Information Hypersalivation – what are the treatment alternatives to glycopyrronium and hyoscine? 25<sup>th</sup> June 2015.
17. Electronic medicines compendium. Assicco 1mg tablets; March 2021. Available from [Assicco 1mg Tablets - Summary of Product Characteristics \(SmPC\) - \(emc\) \(medicines.org.uk\)](https://www.medicines.org.uk/assicco/1mg-tablets-summary-of-product-characteristics-smpc-emc)



18. CCG and NHS Trusts in Norfolk and Waveney. Therapeutics Advisory Group Index of TAG recommendations. 10<sup>th</sup> June 2022. Available from [https://www.knowledgeanglia.nhs.uk/LinkClick.aspx?fileticket=kmax5\\_4K73M%3d&portalid=1](https://www.knowledgeanglia.nhs.uk/LinkClick.aspx?fileticket=kmax5_4K73M%3d&portalid=1)
19. NHS Business Services Authority. NHS Electronic Drug Tariff. August 2022. Available from <https://www.drugtariff.nhsbsa.nhs.uk/#/00819670-DC/DC00819667/Home>
20. MedOptimise. Available from <https://analysis.medoptimise.co.uk/>
21. NHS Business Services Authority. NHS Electronic Drug Tariff. February 2024. Available from <https://www.drugtariff.nhsbsa.nhs.uk/#/00819670-DC/DC00819667/Home>

**Version Control** (To be completed by policy owner)

Version	Date	Author	Status	Comment
1	April 2023	N.Cunningham	Medicines Optimisation Pharmacist	New guidance document
2	February 2024	N.Cunningham	Medicines Optimisation Pharmacist	Addition of Assicco® tablets to the pathway for children & adults; Sialanar® replaced with Assicco® tablets in adult pathway. Glycopyrronium formulations (Assicco® and Sialanar®) in the children's pathway changed to 'Advice' from formulary status 'Green'. Paediatricians consulted and in agreement that glycopyrronium would not be initiated in primary care for children. Glycopyrronium formulations in the adults pathway also changed to 'Advice' from 'Green'. Cost comparison table and references updated.