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# Secretion Management in MND?

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## This Session

- Saliva – what is it and how is it produced
- Saliva management in MND
- Medication
- Thick or thin ??
- Complimentary therapy
- The evidence



## Saliva

- Extracellular fluid produced and secreted by saliva glands
  - 99.5% Water
  - Electrolytes
  - Mucus
  - White blood cells
  - Enzymes
  - Antimicrobial agents





## Role of saliva

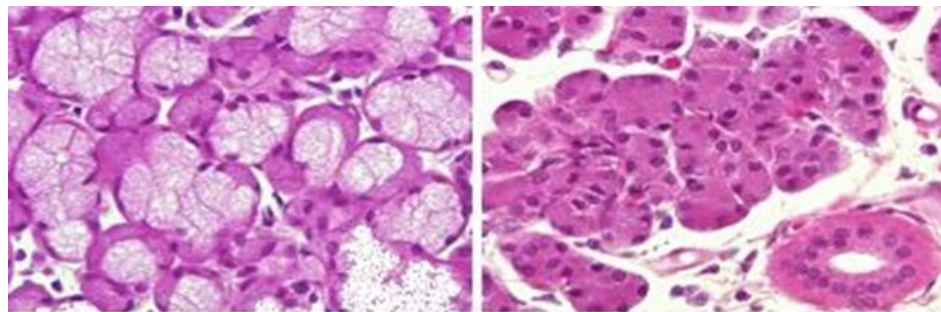
- Lubricant
- Aids digestion – dilution of starch and sugars
- Taste
- Maintenance of pH of the mouth
- Tooth integrity
- Antibacterial
- Tissue repair
- Aids speech





## The salivary glands

- Parotid - Watery, serous secretion
- Submandibular – Mixed serous and mucous secretion
- Sublingual – Mucous secretions



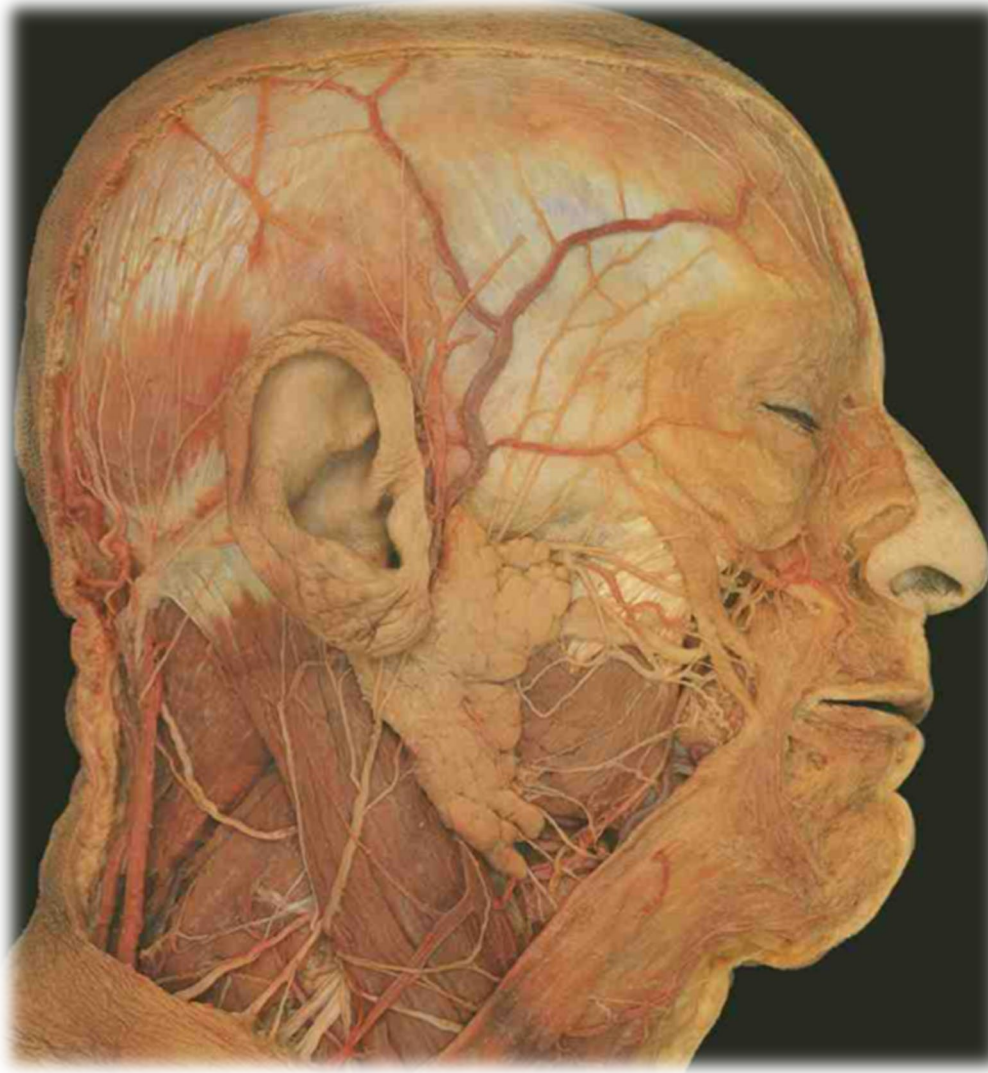
**Mandibular gland (mixed)**

**Parotid gland (serous)**

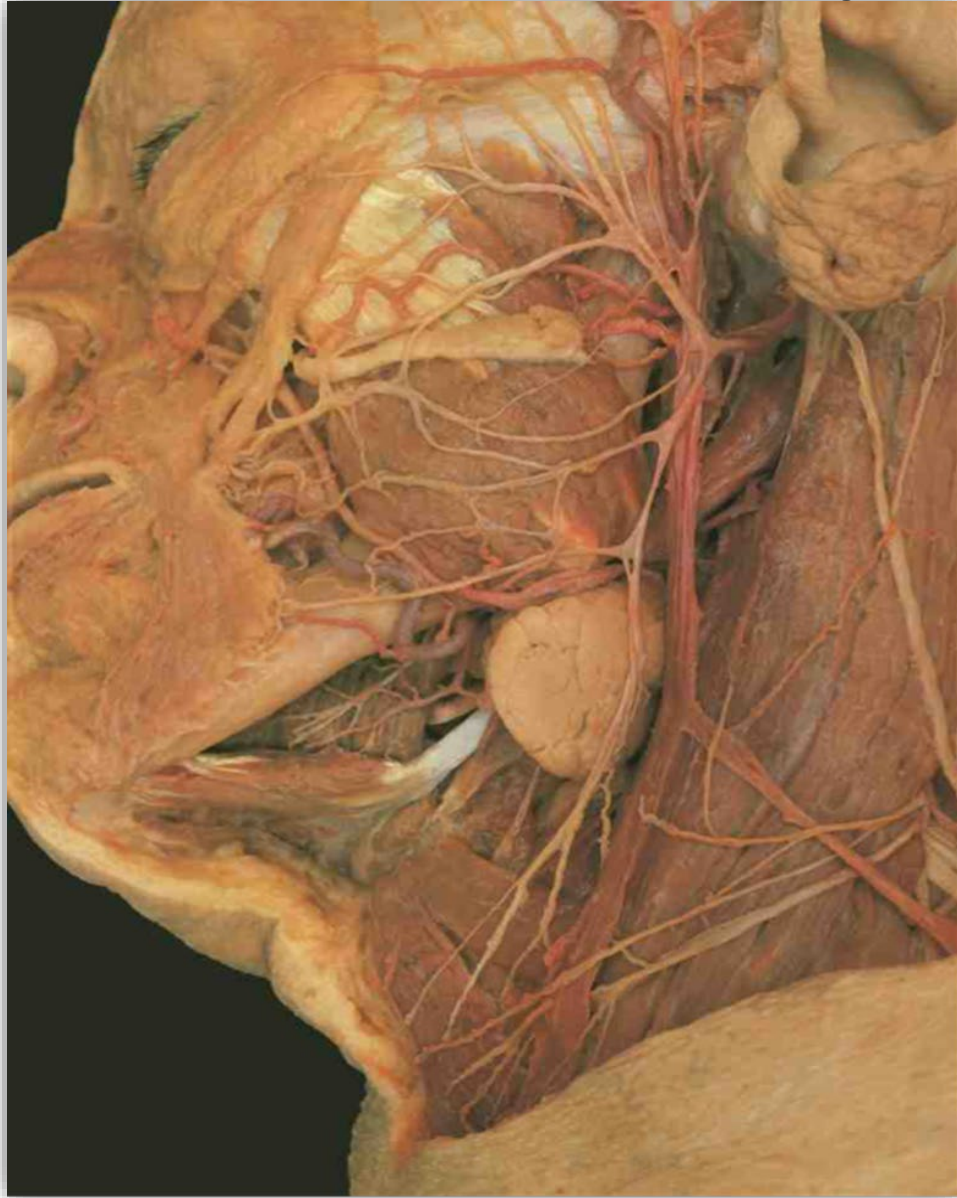


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## Production of saliva

- Controlled by autonomic NS, mediated by adrenergic and cholinergic nerve endings, primarily under parasympathetic control
- 70% of unstimulated saliva production from submandibular and sublingual glands 20% from parotid 10% from minor secretory glands
- Most stimulated saliva production comes from parotid
- Stimulated flow is 5x greater than unstimulated flow



## Parasympathetic control of saliva

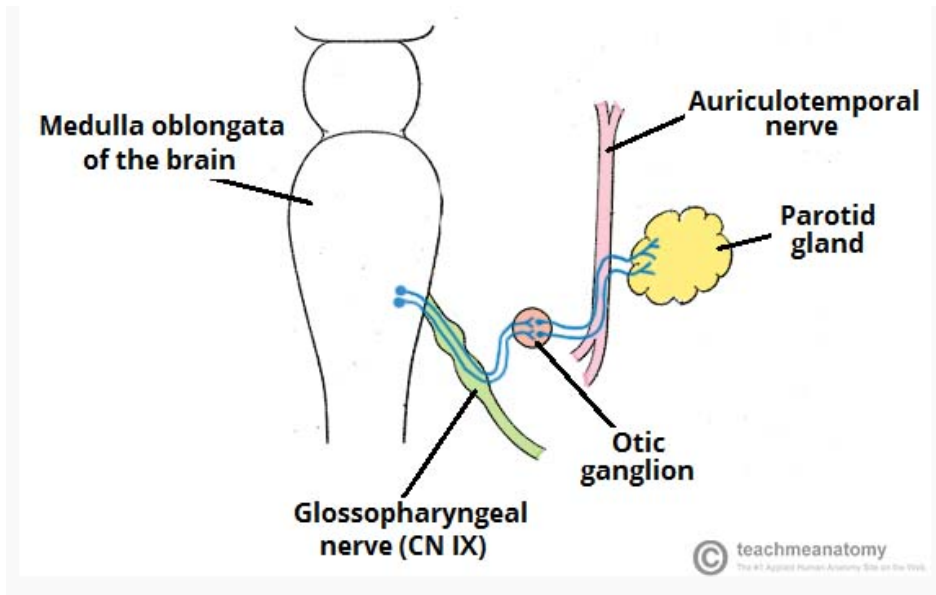


Fig 2 – Path of parasympathetic fibres to the parotid gland.

- PSN co-ordinated by centres in medulla
- stimulated by facial & glossopharyngeal nerve
- Stimulation of PSN releases Ach which acts on Muscarinic receptors
- Muscarinic receptors
  - Increase production of saliva
  - Increase blood flow to saliva glands
  - Cause contraction of myoepithelium
  - Increased rate of expulsion of saliva



## Muscarinic receptors

- Eyes
- Glandular secretion
- Cardiovascular
- GI
- Bladder
- Lungs
- CNS





## Saliva management in MND

- Drooling
- Poor dental hygiene
- Feeding difficulties
- Local skin maceration
- Fluid loss
- Adversely affects self-image
- Leads to poor socialisation
- Increased care needs
- Odour
- Infection





## Treatment

- Anticholinergic drugs
- Can be effective but risk of significant side-effects
- Side-effects compounded by common medications; antihistamines, neuroleptics, sedatives
- 20-40% non-compliance
- Cannot be given to patients with glaucoma, obstructive uropathy, gastrointestinal motility problems, myasthenia gravis



techtalk.com



## Antimuscarinic medication side effects

- Eyes                      pupillary dilatation, blurred vision
- Cardiovascular        increase in HR
- GI                            Constipation
- Bladder                    Urinary retention
- Respiratory            bronchodilation and drying of secretions
- CNS                        antiemetic properties  
                                  drowsiness  
                                  confusion

**Reduction in saliva production**



- **Atropine**
  - Readily absorbed through GI tract and the eye
  - Crosses BBB
  - Avoid in close angle glaucoma
  
- **Amitriptyline**
  - Crosses BBB
  - Metabolised by liver
  - Can be given with poor renal function
  
- **Hyoscine Butylbromide**
  - Buscopan
  - Doesn't cross BBB
  
- **Hyoscine Hydrobromide**
  - Scopolamine patches
  - Crosses BBB
  - Lasts for 72 hours





## ■ Glycopyrronium

- The recommended dosage is 0.02 mg/kg 3 times daily initially, with doses titrated in increments of 0.02 mg/kg every 5–7 days based on therapeutic response and adverse effects.
- The maximum recommended dose is 0.1 mg/kg 3 times daily (not to exceed 1.5 to 3 mg per dose based on weight).
- Doses should be given at least 1 hour before, or 2 hours after, meals.

NICE; Hypersalivation: oral glycopyrronium bromide  
Evidence summary [ESUOM15] Published date: July 2013



- Carbocisteine

- Mucolytic agent
- Rapidly absorbed from GI tract
- 375mg / qds



- The combination of mucolytics with antitussives and/or substances that dry out secretions (atropinic) is not rational
- <https://www.medicines.org.uk/emc/2019>





## Botulinum Toxin

- First recorded In 1822
- Botox binds selectively to cholinergic nerve terminals at presynaptic membrane
- It inhibits ACh release, reduced function of parasympathetic controlled endocrine glands
- Blockade is irreversible but temporary



Estimated cost of £2.4k/patient/year (Hertfordshire Medicines Management Committee – Sept 2012)



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**NICE** National Institute for  
Health and Care Excellence



# Motor neurone disease: assessment and management

NICE guideline

Published: 24 February 2016

[www.nice.org.uk/guidance/ng42](http://www.nice.org.uk/guidance/ng42)

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## A or B ?

### **Botulinum Toxin A Versus B in Sialorrhea: A Prospective, Randomized, Double-Blind, Crossover Pilot Study in Patients with Amyotrophic Lateral Sclerosis or Parkinson's Disease**

Arianna Guidubaldi, MD,<sup>1</sup> Alfonso Fasano, MD,<sup>1</sup> Tamara Ialongo, MD, PhD,<sup>1</sup> Carla Piano, MD,<sup>1</sup> Maurizio Pompili, MD, PhD,<sup>2</sup> Roberta Mascianà, MD,<sup>2</sup> Luisa Siciliani, MD,<sup>2</sup> Mario Sabatelli, MD, PhD,<sup>1</sup> and Anna Rita Bentivoglio, MD, PhD<sup>1\*</sup>

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Movement Disorders p313-319 Vol. 26, No.2, 2011



## Not for everyone?

### ▪ Pro

- Effect lasts for 8-12 weeks
- Reduces the need for administration of medication
- Good for people who live alone
- Easy to administer in clinic

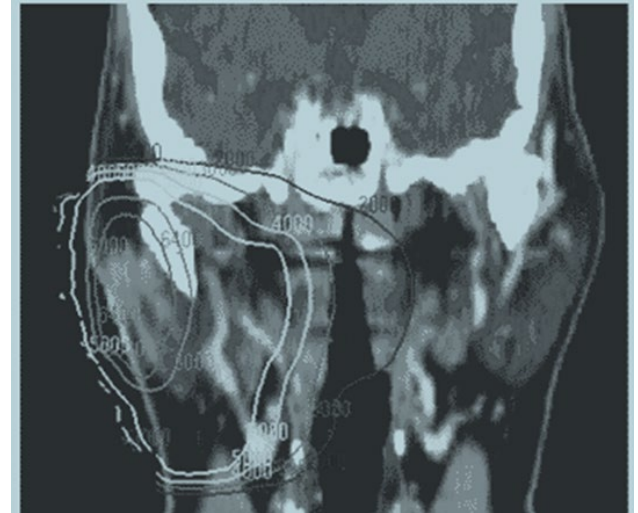
### ▪ Cons

- Lasts for 8-12 weeks
- Temporarily irreversible
- Needs access to hospital to administer
- Difficult to access at end of life?
- May make secretions thicker?



## Radiotherapy

- Local irradiation of the parotid gland
- Xerostomia, dental caries, hyperpigmentation, burns, mucositis
- Malignancy 10-15 years post-treatment
- Restricted to elderly with severe drooling where surgery is not an option and medication is contraindicated





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## Thick Saliva

- Hydrate
- Avoid caffeine and alcohol
- Humidification / saline nebulisers
- Suck on crushed ice
- Carbocysteine
- Introduce beta-blocker if associated with excess secretions



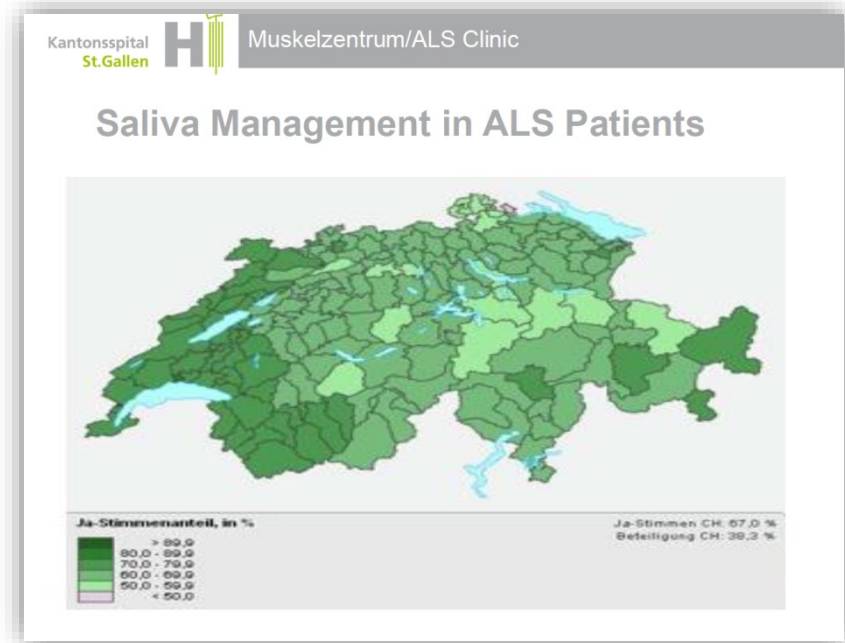
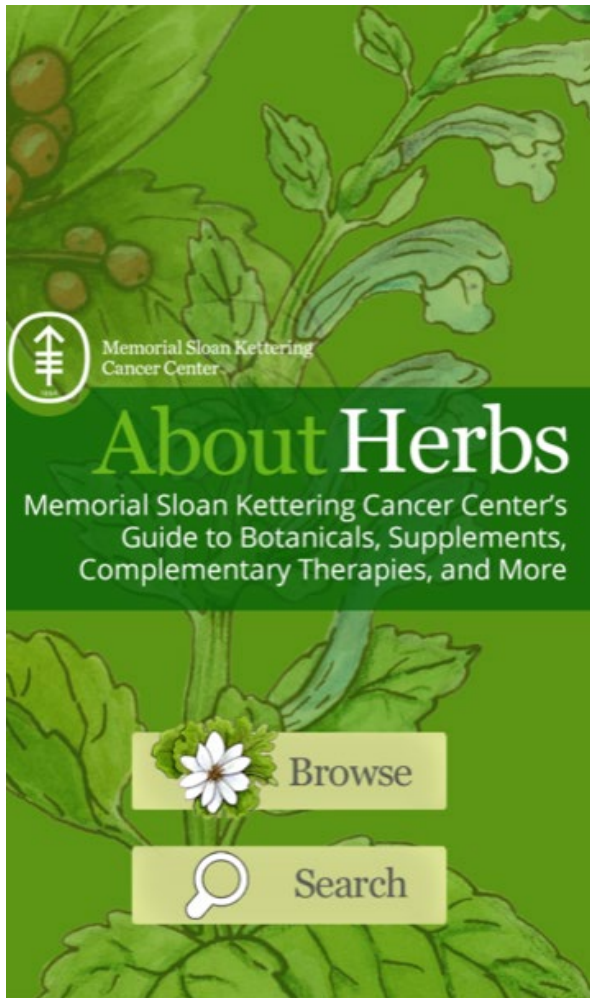
## Thin Saliva

- Postural changes
- Support collars
- Anticholinergic mediation
  - Ease of administration
  - Frequency needed
  - Half life
  - Side effects
  - Access to therapy





# Complimentary therapy





- Kali Bi
  - Action on mucous membranes
  - Thick, stringy yellow or white secretions
  - Pan-sinusitis
  - Nausea and vomiting of stringy mucous





- Hedera Helix

- Spasmodic cough
- Acute and chronic inflammatory bronchial disease
- Reduces bronchial mucous





- Pelargonium= Umckaloabo

- South African medicinal plant
- Pelargonium root extract
- Works against viruses and bacteria
- Is expectorant
- For the treatment of acute bronchitis
- Infect blocker, also prophylactic





- Ginger

- Ginger increases salivation, gastric juice production, bile flow and intestinal peristalsis.
- Ginger tea is also drunk on coughs and colds. It is likely to have a mucolytic effect in these cases because of the pungent taste.
- Good for loss of appetite, bloating and flatulence.





- Turmeric (Herb, Ingredient of Curry)
  - Strengthens immune system
  - Inhibits inflammation
  - Strong anti-oxidative effect
  - Supports the liver during detoxification
  - Concentrated feed for the cells





- Papain Enzyme
  - Breaks down protein in mucous
  - Found in papaya and pineapple



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# Evidence?



Cochrane Database of Systematic Reviews

## Treatment for sialorrhea (excessive saliva) in people with motor neuron disease/amyotrophic lateral sclerosis (Review)

Young CA, Ellis C, Johnson J, Sathasivam S, Pih N

## Use of radiotherapy for control of sialorrhea in patients with amyotrophic lateral sclerosis

Harriman, Maureen; Morrison, Murray; Hay, John; Ravonta, Matti; et al

*The Journal of Otolaryngology*; Aug 2001; 30, 4; ProQuest

pg. 242

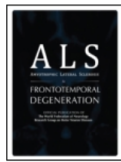
## AUTHORS' CONCLUSIONS

### Implications for practice

There is extremely limited evidence from randomized controlled trials about treatments to reduce sialorrhea in MND. The well designed trial on botulinum toxin type B injected into parotid and submandibular glands showed beneficial effects for four or more weeks (Jackson 2009).

### Implications for research

There is a need for considerable further work on treating this dis-



## Amyotrophic Lateral Sclerosis and Frontotemporal Degeneration



ISSN: 2167-8421 (Print) 2167-9223 (Online) Journal homepage: <http://www.tandfonline.com/loi/afd20>

Developing an outcome measure for excessive saliva management in MND and an evaluation of saliva burden in Sheffield

## RESEARCH ARTICLE

### Botulinum Toxin A Versus B in Sialorrhea: A Prospective, Randomized, Double-Blind, Crossover Pilot Study in Patients with Amyotrophic Lateral Sclerosis or Parkinson's Disease

Arianna Guidubaldi, MD,<sup>1</sup> Alfonso Fasano, MD,<sup>1</sup> Tamara Isalongo, MD, PhD,<sup>1</sup> Carla Piano, MD,<sup>1</sup> Maurizio Pompili, MD, PhD,<sup>2</sup> Roberta Mascianà, MD,<sup>2</sup> Luisa Siciliani, MD,<sup>2</sup> Merio Sabatelli, MD, PhD,<sup>1</sup> and Anna Rita Bentivoglio, MD, PhD<sup>1\*</sup>

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### *Nebulized Glycopyrrolate for Drooling in a Motor Neuron Patient*

To the Editor:

Sialorrhea and drooling are common problems for patients with motor neuron disease (MND). About 40% of patients are troubled by

mented an improvement in both the sialorrhea and drooling in the case notes.

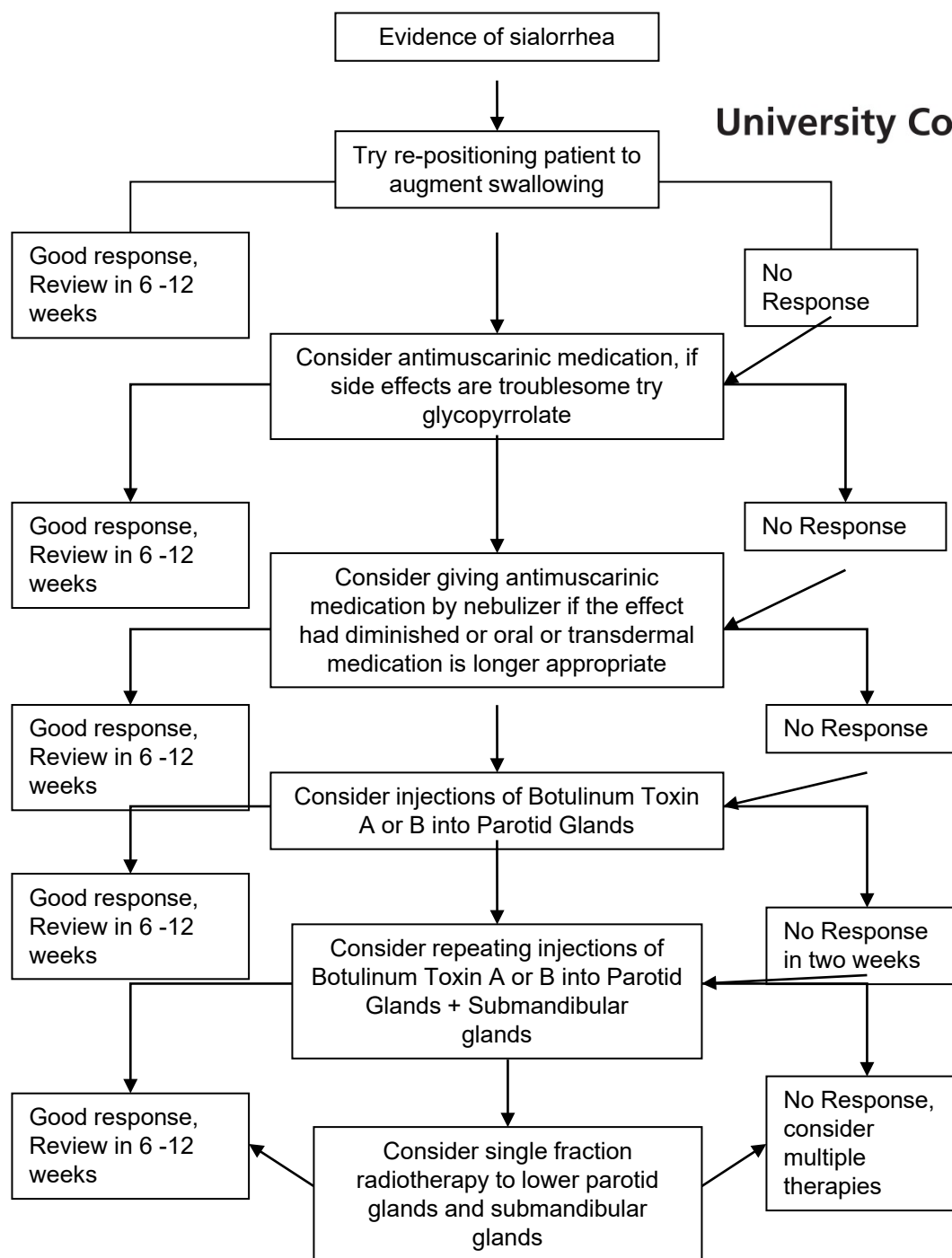
The same regimen was continued for two months with good symptom control, but she then developed a rash around her mouth. It was erythematous, maculopapular and pruritic in nature. She was evaluated by a dermatologist who thought the nebulizer was potentially responsi-





# Step wise algorithm to treatment of sialorrhoea in MND

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