SECTION **THERAPEUTIC SUBSTITUTION ASL-03**	PAGE Page **1** of **4**
SUBJECT/TITLE **TOPICAL MEDICAL TREATMENT OF GLAUCOMA**	ORIGINAL DATE **2003-03-28 (Formerly RS-14)** REVISION DATES **2005-11-24 (Formerly RS-14)** **2021-04-29 (As ASL-03)**

PREAMBLE

Glaucoma occurs in 1 in 40 adults aged over 40 years[1]. The estimated global prevalence is 3.54% in adults aged 40-80[2]. There is a strong familial association with a ten-fold increased risk for individuals with an affected first-degree relative[1]. Primary open angle accounts for two thirds and normal pressure glaucoma for about a quarter of those affected[3].

In the nursing home population, glaucoma has been found to have a prevalence of up to 45%[4]. Despite this very high prevalence, one study found only 48% of residents had been screened for glaucoma by an ophthalmologist[5]. On-site eye examinations for screening, surveillance and monitoring are not usual practice. The burden of resulting visual loss in the elderly LTC patient can be considerable in terms of quality of life, physical and mental functioning and communication. There are no guidelines for the management of glaucoma in the nursing home from either US or Canadian professional ophthalmology organizations. Treatments tend to be based on individual practice preference and dependent on regular eye exams in the office of the ophthalmologist.

Definitions, Symptoms and Risk Factors

Glaucoma is a group of disorders characterized by progressive optic neuropathy that is often associated with increased intra-ocular pressure (IOP). All forms of glaucoma show optic nerve cupping, and peripheral visual field loss. Early open-angle glaucoma is asymptomatic, with patients experiencing symptoms only very late in the disease course. Such symptoms of glaucoma might include glare (in bright sunlight or at night) and poor contrast differentiation or inability to distinguish shapes in a poorly illuminated environment.

Primary open-angle glaucoma (POAG) is the most common form, accounting for 60-70% of the cases. The level of IOP is greater than 21 mmHg. Onset is insidious with a slowly progressive course. An early symptom is decreased, peripheral vision, with central acuity preserved. Symptoms appear late in the disease. The main risk factor is raised IOP. Other risk factors include increasing age, severe myopia, African ancestry or Latino/Hispanic ethnicity, family history of glaucoma, and corticosteroid use (inclusive of inhaled, intranasal, ophthalmic, systemic and topical). Hypertension and diabetes are variably associated with glaucoma in the literature[6].

Normal pressure (or low tension) glaucoma is normal IOP that is too high for an individual patient. The IOP is less than 22 mmHg but the patient shows characteristic glaucomatous optic nerve and visual field changes. Screening for elevated IOP alone is not sensitive and specific for the diagnosis of

glaucoma: many patients with glaucoma do not have high IOPs. Most people with IOPs above the normal range do not have glaucoma.

Acute angle closure glaucoma is a rapid and severe rise in IOP caused by physical obstruction of the anterior chamber drainage angle. Symptoms include unilateral inflammation and pain (eye or eyebrow pain), pressure over the eye, a reddened eye, moderate pupil dilation that is non-reactive to light, a cloudy cornea, blurring and decreased visual acuity, photophobia and seeing halos around lights. Risk factors include elderly women, far-sightedness, cataract and family history. Anticholinergic medications (antidepressants, antipsychotics) can precipitate an acute episode[7].

Prognosis

In most patients with POAG, ocular abnormalities progress slowly over the years and patients usually remain asymptomatic until late in the disease[8]. Functional vision loss due to glaucoma never substantially reverses[1].

Advanced field loss is found in 20% of patients at diagnosis. Progression results in difficulty moving from a bright room to a darker room and impaired judgment of steps and curbs. Blindness occurs from gross loss of visual field or loss of central vision. Once early field defects present, and where IOP is greater than 30 mmHg, untreated people may lose the remainder of the visual field in 3 years or less[3]. Progression of visual field loss is slower in normal pressure glaucoma. Acute angle glaucoma leads to rapid loss of vision.

Aims of Therapy

- To prevent, halt or slow progressive visual loss.
- To minimize adverse effects from condition and treatment (e.g. pain and discomfort in and around eye areas).
- To preserve the structure and function of the optic nerve
- Improve/maintain quality of life and functional vision (e.g. night vision, near vision, reading speed and maneuvering through one's environment)

Choice of Topical Treatment and Clinical Evidence

Randomized controlled trials (RCTs) have found that topical medical treatment reduces IOP compared with placebo. The trials with long term follow up (AGIS, NTGS, CIGTS, OHTS, EMGT) have found clear benefit in terms of protection against loss of visual field[3].

SECTION **THERAPEUTIC SUBSTITUTION ASL-03**	PAGE Page **3** of **4**
SUBJECT/TITLE **TOPICAL MEDICAL TREATMENT OF GLAUCOMA**	ORIGINAL DATE **2003-03-28 (Formerly RS-14)** REVISION DATES **2005-11-24 (Formerly RS-14)** **2021-04-29 (As ASL-03)**

All of the available topical treatments are effective for reducing IOP. The prostaglandin analogues are slightly more efficacious than the topical beta-blockers and are generally first-line therapy.[6] Second-line medications include beta-adrenergic antagonists (beta blockers), alpha-adrenergic agonists, carbonic anhydrase inhibitors, cholinergic agonists, and fixed combination preparations.

Choice of an agent is often prescriber preference with consideration for patient compliance (once daily versus two or three times a day administration), potential systemic side effects, cost and provincial funding status, desired extent of reduction in IOP and previous therapy.

PROTOCOL

Upon admission to a LTC facility, the admission topical medical treatments can be continued for the grace period up to 3-6 weeks, during which time further information regarding the treatment history and consulting ophthalmologist should be obtained.

A. The Calgary Zone LTC Formulary has a therapeutic substitution in place for prostaglandin analogues, carbonic anhydrase inhibitors and the alpha-adrenergic agonist. Unless contraindicated, follow the substitution protocols listed in the Automatic Substitution List-01.

B. When there is a history of ophthalmology consults within the last two years, the Pharmacy Service Provider (PSP) and/or attending physician will contact the ophthalmologist to obtain the required information to support any remaining non-formulary drug choice - including history, if any, of side effects and to establish the treatment regimen. The attending physician and/or specialist are asked to consider changing to the formulary alternatives, provided there are no contraindications or history of the agent having already been tried and failed or not tolerated.

    - In situations where formulary listed agents are not clinically suitable, a request for non-formulary drug-use could be considered.

C. In the event there is no traceable history of care by an ophthalmologist, drug therapy will be prescribed according to the formulary alternatives following a discussion with the resident/family, and provided there are no known contraindications reported by the resident/family or in the documented medical history. A referral for ophthalmology for examination and review of treatment could be considered.

SECTION **THERAPEUTIC SUBSTITUTION ASL-03**	PAGE Page **4** of **4**
SUBJECT/TITLE **TOPICAL MEDICAL TREATMENT OF GLAUCOMA**	ORIGINAL DATE **2003-03-28 (Formerly RS-14)** REVISION DATES **2005-11-24 (Formerly RS-14)** **2021-04-29 (As ASL-03)**

- In situations where the formulary listed agents are not clinically suitable, a request for non-formulary drug-use could be considered.

Formulary Listings*

52:40.04 Alpha-Adrenergic agonists

brimonidine	0.2%		F

52:40.08 Beta-Adrenergic Agents

betaxolol	0.25% eye drops		F
timolol	0.25%, 0.5% eye drops		F
timolol long-acting solution	0.25%, 0.5% eye drops		F

52:40.28 Prostaglandin Analogs

latanoprost	0.005% eye drops		F
latanoprost / timolol	0.005%*0.5% eye drops	*A cost-effective combination product when compared to individual components	F

52:40.92 Misc. antiglaucoma agents (Carbonic Anhydrase Inhibitors)

acetazolamide	250 mg tablet		F
dorzolamide	2% eye drops		F
dorzolamide / timolol	2%*0.5% eye drops	*A cost-effective combination product than individual components	F

*If there is a discrepancy between the listing in this document and the posted Calgary Zone Long Term Care Formulary, the posted Formulary will take precedent.
NOTE: Cost-effective fixed combination preparations (lantanopost/timolol and dorzolamide/timolol) result in less exposure to benzalkonium chloride, reduced drop administration time, and may be

reasonable options without prior use of the concomitant single agent topical. Pharmacy to dispense the LCA and the most suitable pack size to minimize waste.

Therapeutic Substitutions*

ORIGINAL ORDER			**AUTOSUB TO:**		
Name	**Strength**	**Frequency**	**Name**	**Strength**	**Frequency**
bimatoprost (Lumigan RC®, Vistitan®)	0.01% or 0.03%	as ordered	latanoprost	0.005%	one drop to eye(s) once daily (usually at bedtime)
Travoprost (Travatan Z®)	0.004%	as ordered	latanoprost (Xalatan®)	0.005%	one drop to eye(s) once daily (usually at bedtime)
travoprost-timolol (Duotrav PQ)	0.004% - 0.5%	as ordered	latanoprost / timolol Or individual components with substitution applied to travoprost. Allow 5 minutes between products	0.005% * 0.5%	same number of drops and frequency
brimonidine PF (Alphagan®)	0.15%	as ordered	brimonidine	0.2%	same number of drops and frequency
brimonidine / timolol (Combigan®)	0.2% * 0.5%	as ordered	individual components of the combination products. Allow 5 minutes between products		same number of drops and frequency
brimonidine / brinzolamide (Simbrinza®)	0.2% *1%	as ordered	individual components of the combination **with** substitution applied to brinzolamide. Allow 5 minutes between products		same number of drops and frequency
brinzolamide / timolol (Azarga®)	1% * 0.5%	as ordered	dorzolamide / timolol **Or** individual components **with** substitution applied to brinzolamide	2% *0.5%	same number of drops and frequency
brinzolamide (Azopt®)	1%	as ordered	dorzolamide	2%	same number of drops and frequency

SECTION **THERAPEUTIC SUBSTITUTION ASL-03**	PAGE Page **6** of **4**
SUBJECT/TITLE **TOPICAL MEDICAL TREATMENT OF GLAUCOMA**	ORIGINAL DATE **2003-03-28 (Formerly RS-14)** REVISION DATES **2005-11-24 (Formerly RS-14)** **2021-04-29 (As ASL-03)**

**If there is a discrepancy between the listing in this document and the posted Calgary Zone Long Term Care ASL-01, the posted ASL-01 will take precedent.
NOTE: Cost-effective fixed combination preparations (latanoprost/timolol and dorzolamide/timolol) result in less exposure to benzalkonium chloride, reduced drop administration time, and may be reasonable options without prior use of the concomitant single agent topical. Pharmacy to dispense the LCA and the most suitable pack size to minimize waste.

References

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