The goal of glaucoma treatment is to maintain the patient’s visual function and related quality of life, at a sustainable cost. Individualised glaucoma treatment aims at providing glaucoma management tailored to the individual needs of the patient and rate of progression. Major risk factors for glaucoma blindness are the severity of the disease at the presentation and life expectancy. Patients with severe functional loss or younger patients with manifest disease should have more aggressive treatment and closer follow-up than patients with little or no risk. Glaucoma patients may show progression despite treatment, even with IOP within statistically normal range. Therefore, relying on tonometry alone for glaucoma follow-up is insufficient. Determining the rate of visual field progression is a new standard in glaucoma care. EGS recommends three visual field tests per year for the first 2 years to be able to find out rapidly progressing patients. After two years of perimetric monitoring without progression being detected the frequency of the tests may be reduced.

Currently, the only approach proven to be efficient in the preserving visual function is lowering the IOP. Other possible treatment areas have been investigated, including ocular blood flow and neuroprotection.

**Target IOP**

Target IOP is defined as “A range of acceptable IOP levels within which the progression of glaucomatous neuropathy will be halted/retarded.” It is the specific level of pressure that, if achieved, will prevent further optic nerve damage and is the IOP where the rate of loss of ganglion cells will equal the age induced loss. It should be re-evaluated regularly and additionally, when progression of disease is identified or when ocular or systemic comorbidities develop. There is no single target IOP level that is appropriate for every patient, so the target IOP needs to be estimated separately for each eye of every patient (Figure 1).

**Setting the target IOP**

In a newly diagnosed patient, the target is IOP initially determined according to the stage of the disease and the baseline IOP, with the treatment goal being a specific IOP level or percentage reduction, whichever is lower. The target IOP then needs to be refined according to the presence of other risk factors (Figure 2). Initial therapy may be with topical medications or laser trabeculoplasty. The target IOP should be re-evaluated and adjusted accordingly (Figure 3).

**Ocular Hypotensive medications**

There are five classes of topical hypotensive medications: prostaglandins, β-blockers, α-2 agonist, carbonic anhydrase inhibitors (CAI) and cholinergic. Systemic medication’s include CAI like oral acetazolamide and hyperosmotic agents like mannitol (intravenous) and oral glycerol. The use of some compounds like epinephrine and dipivefrin has decreased significantly since drugs with better efficacy and fewer side effects became available.

**How to treat**

**Start with monotherapy:**

It is recommended to start the treatment with monotherapy. Treatment is considered effective when the achieved IOP reduction is comparable to the published average range for that drug in similar population. According to meta-analysis of randomised controlled trails, the highest reduction of IOP is obtained with prostaglandins (25-35%), followed by non-selective β-blockers (20-25%), α-2 agonist (18-25%), selective β-blockers (20%) and last topical CAI (20%). However, it should be noted that treatment effect depends on baseline IOP, with larger reductions in patients with higher pre-treatment pressure levels. Therapy is usually started in worse eye first. This is known as the one eye
therapeutic trial. After the peak IOP reduction ability of that drug is reached, diurnal variation of IOP is evaluated to look for reduction in IOP and fluctuation.

**Switch to another monotherapy:**
If the initial therapy does not seem to be effective, with target pressure not being reached, or the drug is not tolerated, one should switch to another monotherapy rather than adding a second drug. This also applies to prostaglandin analogues, when used a first choice. As there are non-responders to certain PG analogues, the switch to another PG analogues or another class of monotherapy might be beneficial.

**Add Second Drug/ Combination Therapy:**
If the first choice monotherapy is well tolerated and has effective lowering but has not succeeded in reaching the target IOP, the addition of second drug should be considered (Figure 4). Issues to consider in selecting an adjunctive agent include additive efficacy, safety, frequency of dosing and cost. It is recommended to combine agents with different modes of action. In general, treatment with a combination of agents of different classes is associated with superior IOP lowering efficacy as compared to each of components used alone. However, polydrug regimens for glaucoma poses several important clinical challenges: multiple topical treatments may jeopardize adherence result in reduced efficacy due to wash out of earlier medications with later medications and increased exposure to preservatives. Therefore fixed drug combination therapy should be preferable to two separate instillations of agents. When on multiple drugs, a time interval of at least 5 minutes should be given before administering the second drop. If combination therapy fails to lower IOP sufficiently, one can substitute the second drug or add a third medication to the fixed combination. Laser or incisional surgery can also be considered if target IOP is still not achieved.

**How to Instill Eye Drops**
The patient should be instructed to wash both hands before instillation. With head tilted slightly backwards while gazing upwards, the lower lid is gently pulled down with non-dominant hand to form a small concavity. With dominant hand, the dispenser is held above this concavity. The bottle should be near enough to make sure that the drop will eye and far enough so as not to touch it (2-5 cm). After application, lids should be kept closed or digital compression be applied to the punctum for 1-2 minutes to minimize systemic absorption. Any excess fluid wiped from the skin, especially when using PG medications that may darken the skin color.
Neuroprotection and Glaucoma Treatment

Neuroprotection can be defined as a “therapeutic approach” aiming to directly prevent or significantly hinder neuronal cell damage. Since, glaucoma patients can continue deteriorating in spite of an apparently well controlled IOP, the need for effective non-IOP related treatment is widely acknowledged. Several compounds have been neuroprotectant in preclinical studies. Only two of them have reached large scale clinical trials. Memantine, an NMDA antagonist, was analysed in 2008 with low success rates in human trials\(^{10}\). More recently, LoGTS (Low pressure Glaucoma Treatment Study) has claimed to show that Brimonidine may have neuroprotective properties as compared to Timolol.

Follow-up

In general, a patient with established glaucoma should be followed up every 6 months. However, the frequency of follow-up can be increased or decreased depending on the severity of the disease and whether there is any progression over time. In stable patients with early disease, a yearly follow-up may be adequate, while in advanced cases or documented progression, a 3-4 monthly follow-up will be advised.

Glaucoma surgery

Consider for a surgery if
  - There is progressive glaucomatous damage, in spite of maximal medical therapy.
  - Failure to achieve target IOP.
  - Fluctuation of IOP despite proper medical management.
  - Non-compliant patient
  - Patient cannot afford multiple medications
  - Intolerant to antiglaucoma medications

Recommendations of EGS Guidelines

- Assess each eye individually when deciding the most appropriate therapy.
- It is essential to involve patients as informed partners in decisions regarding the management of their condition.
- The least amount of medication (and consequent inconvenience, cost and side effects) to achieve the therapeutic response should be a consistent goal.
- A therapeutic medical trial on one eye first can be useful to determine the IOP lowering efficacy, although not always logistically feasible or advisable (e.g., very high IOP or advanced disease).
- Usually there is no need to start the treatment until all baseline diagnostic data are collected, unless the IOP is very high and there is severe damage.
- After diagnosis it is advisable to measure untreated IOP more than once before initiating IOP lowering treatment.
- Monotherapy is the first choice when initiating therapy.
- Baseline IOP should be considered when evaluating the efficacy of a therapy.
- Fixed combination therapy should be considered when patients fail to achieve their individualized target IOP with monotherapy.
- The prescription of more than two drugs for simultaneous use should be avoided as it can lead to non-compliance.
- Fixed combination preparation may be preferable to the use of separate instillation of two agents. However, fixed combinations are not the first line medications.
- Ocular surface should be evaluated and considered in clinical management of glaucoma patients. In case of ocular surface disease, preservative-free formulations should be considered.
- Generic drops can differ from brand drops and it may be necessary to monitor patients more closely after switching.
- During pregnancy, the potential risks of continuing anti-glaucoma medications to the foetus (and neonate) must be balanced against the risk of vision loss in the mother.

References