



STANDARD
LIST

IAPB ESSENTIAL LIST for Glaucoma

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INTRODUCTION

IAPB considers appropriate information as a vital resource in improving eye health in developing countries. In resource-constrained settings especially, procurement decisions can play an important role in ensuring that a maximum number of people have equitable access to quality services, the investment makes a satisfactory social return and significantly enhances the quality of life of the beneficiaries.

The IAPB consults a panel of experts with considerable experience in resource-constrained settings, to identify good practice and assist with the compilation of Essential Equipment Lists. Armed with IAPB's essential lists, NGOs, Ministries of Health, District health services, eye clinics and hospitals in developing countries can plan and purchase inventory which will support the delivery of high-quality care and enhance health outcomes.

Glaucoma is the leading cause of global irreversible blindness and the second most common cause of blindness worldwide. Congenital glaucoma is an important cause of childhood blindness.

What does this list contain?

This list contains recommendations for a range of equipment, instruments, consumables and pharmaceuticals required to provide quality glaucoma services. Timely detection and lowering IOP with medications, laser, or microsurgery are the only interventions shown to prevent the loss of sight from glaucoma. Timely treatment is, however, hampered because people with Chronic or Primary Open Angle Glaucoma (POAG), are usually not aware of any signs or symptoms, especially in the early stages of the disease.

This list thus recognises the importance of a multifaceted approach to reduce the risk of vision loss. The ability to detect, accurately diagnose, assess (extent or severity and stability), provide medical, surgical or laser treatment and follow-up of people who have glaucoma or are at risk of glaucoma, or had glaucoma treatment, are essential components of glaucoma care strategies and vision preservation. This includes awareness raising to communities and generalist health care personnel about the risk factors and symptoms associated with glaucoma and the need for early detection, also compliance with management of the condition.



Efforts to ensure that services are integrated, sustainable, excellent, equitable and available to all who need these, should be supported. Glaucoma care should be integrated within comprehensive eye care programmes. Eye health services should further be linked to low vision and rehabilitation programmes and social support services. Figure 1 depicts an example of an eye health team to provide comprehensive glaucoma care.

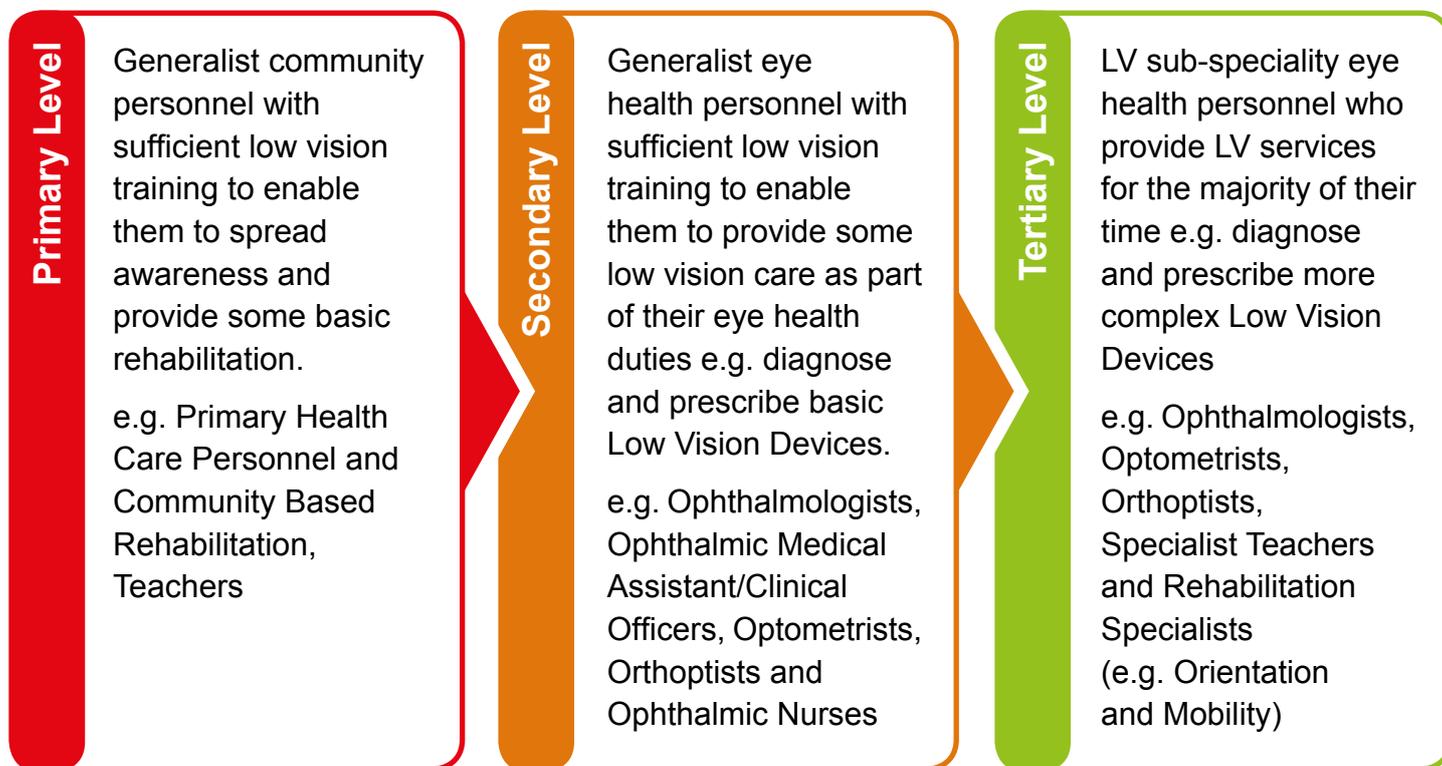


Figure 1: This list is based on a three-tier model of care: Personnel at primary, secondary and tertiary level, able to refer appropriately for that level, both vertically for eye care services and horizontally to other service providers.

How can quantities be calculated?

Recommendations for quantities of items have been calculated per million population per year based on a typical glaucoma unit/base hospital that performs opportunistic community glaucoma screening, medical treatment of outpatients diagnosed with glaucoma (**1,000 patients per million population per month**) and patients undergoing laser treatment. Calculation of **glaucoma surgery consumables** was based on an average glaucoma surgical rate of 140 procedures per million population per year.¹

Quantities need to be adjusted for different caseloads, since prevalence and incidence vary globally and the burden of disease also varies with changes in screening and referral practices. Additionally, factors such as surgical expertise and support to improve productivity will influence the workload.

¹ Mansouri K, Medeiros FA, Weinreb RN. Global rates of glaucoma surgery. Graefes Archive for Clinical and Experimental Ophthalmology. 2013;251(11):2609-15 (*The average Glaucoma Surgical Rate (GSR) was 139.2 ± 113.1 (range, 2.9–500.0)*)

Description	Standard List Category or Locally Purchased (L)	Essential (E) or Desirable (D)	Quantity Required
AWARENESS PROGRAMMES, CASE DETECTION AND REFERRAL BY PRIMARY OR COMMUNITY HEALTH CARE WORKERS			
Torch or other light e.g. ArcLight or Wilson Smart Loupe		E <i>For Relative Afferent Pupillary Defect</i>	50
Visual or audio-visual materials: Risk factors and symptoms associated with glaucoma: the need for early detection, compliance with management.		D <i>Ensure material is appropriate to target audience</i>	
GLAUCOMA IDENTIFICATION BY TRAINED EYE HEALTH PERSONNEL (e.g. Optometrists, Ophthalmic Clinical Officers, Ophthalmic Nurses, Ophthalmologist)			
Visual Acuity Charts with letters and tumbling Es (<i>For vision assessment, must be done monocularly</i>)		E	5
Ophthalmoscope: Indirect or Direct e.g. ArcLight ² (<i>For Cup:Disc Ratio</i>)		E	10
Tonometer: Non-Contact (Puff) or Contact e.g. Perkins or Tonopen – (<i>For intraocular pressure (IOP) assessment</i>)		E	5
Perimeter: Frequency Doubling Technology (FDT) for vision field screening – (<i>FDT perimeter: cheaper, easier to use, good for screening</i>)		D	1
Perimeter: Full threshold fields e.g. Standard Automated Perimeter (central thresholding test) – (<i>rarely used in the field/LMIC due to advanced glaucoma at diagnosis and lack of trained technicians</i>)		D	1
GLAUCOMA MANAGEMENT BY GLAUCOMA SPECIALISTS (Additional to equipment above)			
DIAGNOSTIC EQUIPMENT			
Slit Lamp – (<i>To perform gonioscopy, Check for corneal oedema, depth of anterior chamber and secondary causes e.g. synechiae</i>)		E	2
Slit Lamp Lenses – +90D & +60D or +78D – (<i>Disc/optic nerve assessment, with dilatation</i>)		E	1 of each
Applanation Tonometer attached to Slit Lamp e.g. Goldmann – (<i>IOP measurement</i>)		E	2
Spare tonometer heads		E	2
Gonioscopy: 3 Mirror Goldmann Gonio Lens or 4 mirror Zeiss or Sussman (D) – (<i>peripheral anterior chamber configuration and depth assessment</i>)		E	1 of coupled and one non-coupled

2 *For optic disc assessment.* Lowe J, Cleland CR, Mgaya E, Furahini G, Gilbert CE, Burton MJ, Philippin H. The Arclight Ophthalmoscope: A Reliable Low-Cost Alternative to the Standard Direct Ophthalmoscope. J Ophthalmol. 2015;2015:743263

Description	Standard List Category or Locally Purchased (L)	Essential (E) or Desirable (D)	Quantity Required
DIAGNOSTIC EQUIPMENT – Continued			
Pachymetry: Ultrasound or Optical – <i>(central corneal thickness (CCT) measurement)</i>		D	1
Fundus Camera: Stereoscope (preferably non-mydratic) – <i>(Obtain an optic nerve head image at diagnosis for baseline documentation)</i>		E	1
Optical Coherence Tomography (OCT): With or without Anterior Segment OCT Capability <i>(For in vivo cross-sectional imaging of the ONH and retina structure for diagnosis and detection of progression. Anterior segment allows for direct visualization of the anterior chamber angle)</i>		D	1
ADDITIONAL DIAGNOSTIC EQUIPMENT FOR CONGENITAL GLAUCOMA (for examination under anaesthesia)			
Applanation tonometry e.g. TonoPen/iCare/Perkins hand-held tonometer – <i>(Intraocular pressure (IOP) may need to be recorded while the child is under general anaesthesia (GA). Pressures recorded while under GA are usually lower than those obtained in the clinic.)</i>		E	1
Caliper – <i>(For measuring the corneal diameter (enlarged because of elevated IOP) Corneal diameter >12 mm in the first year of life is strongly suspicious of congenital glaucoma.)</i>		E	1
Ultrasound pachymeter – <i>(Corneal swelling may occur)</i>		E	1
Hand held slit lamp – <i>(The cornea may be oedematous and hazy. The anterior chamber may be deepened. Haab striae may be seen.)</i>		D	1
Gonioscopy lens – <i>(The drainage angle needs to be examined. The iris and angle anatomy are frequently abnormal.)</i>		E	1
Direct ophthalmoscope – <i>(Optic nerve examination)</i>		E	1
A-scan ultrasound – <i>(To measure the axial length of the eye)</i>		E	1
GLAUCOMA LASER EQUIPMENT			
YAG laser (Can be multi-modality) <i>(For iridotomy)</i>		D	1
SLT laser <i>(For Selective Laser Trabeculoplasty)</i>		D	1
Infra-red Diode Laser – <ul style="list-style-type: none"> • <i>laser trabeculoplasty</i> • <i>iridotomy</i> • <i>transscleral cyclophotocoagulation (TCP) (Less invasive)</i> • <i>endocyclophotocoagulation (ECP) (invasive) in combination with cataract surgery)</i> 		D	1

Description	Standard List Category or Locally Purchased (L)	Essential (E) or Desirable (D)	Quantity Required
Argon Green Laser <i>(For iridotomy)</i>		D	1
Iridotomy Laser Lens (any type) – <i>(Only applicable if you have an Argon green, YAG or Diode laser)</i>		E	1
ALT/SLT Laser Lens (any type) – <i>(Only applicable if you have an Argon green, or SLT laser)</i>		E	1
Hoskins laser suture lens <i>(post trabx, post Baerveldt tube shunt)</i>		D	1
GLAUCOMA SURGERY INSTRUMENTS			
Complete Trabeculectomy Set			2
Non-toothed forceps eg. Moorfields		E	
Fine toothed forceps		E	
Fine needle holder		E	
Vannas scissors		E	
Spring scissors		E	
Paracetesis blade		E	
Speculum		E	
Diathermy		E	
Punch – <i>(Can do sclerostomy manually, but Kelly punch preferred)</i>		D	
Full cataract set (MSICS or Phacoemulsification) – <i>(Ensure toothed & non-toothed forceps, diathermy, paracentesis blade with trabeculectomy punch, sponges for 5FU or MMC)</i>		E	2
Micro invasive or minimally invasive glaucoma surgery (MIGS) – <i>new procedures, undergoing testing: Trabectome, iStent, Xen Gel stent, CyPass micro-stent. May reduce C)</i>		Long term outcomes not known	
Autoclavable Gonioprism – <i>(for Goniosynechialysis & MIGS eg. iStent) e.g. Swan Jacob)</i>		E	
ADDITIONAL SURGICAL INSTRUMENTS FOR CONGENITAL GLAUCOMA			
Goniotomy knife and surgical gonioscopic lens – <i>(Clear cornea needed)</i>		E	1
Trabeculotomy probe – <i>(Can be performed in eyes with cloudy corneas)</i>		E	1
Complete trabeculectomy set – <i>(Also needed for adult glaucoma)</i>		E	1
Glaucoma Drainage Devices/implants/tube shunts		D	As needed keep 2 in stock
Cyclophotocoagulation <i>When all else has failed</i>		D	

Description	Standard List Category or Locally Purchased (L)	Essential (E) or Desirable (D)	Quantity Required
PHARMACEUTICALS/CONSUMABLES			
SURGICAL PHARMACEUTICALS			
Disinfectants and cleansers Povidone iodine aqueous 10% solution for skin (diluted to 5% for ocular surface) – <i>(For antiseptic preparation of surgical operating field and during removal of sutures in out-patient setting)</i>		E	400 bottles
Local anaesthetic agents – lignocaine and bupivacaine injection Bupivacaine spinal 5mg/ml x 4 ml injection Lignocaine HCl 2% x 50 ml inj – <i>(For regional (periocular) anaesthesia)</i>		E	Box/5 – 100
5-Fluorouracil – <i>(Antimetabolite drugs use in trabeculectomy)</i>		E	500mg/10 ml injection – 5,000
Mitomycin C (MMC) 5-Fluorouracil (where it is the only one available) – <i>(Antimetabolite drugs use in trabeculectomy and aqueous shunts)</i>		E	40 mgs provided as a sterile powder requiring reconstitution – 100 bottles
Balanced salt solution – <i>(Irrigation of ocular surface following use of antimetabolites. Also used during intraocular surgery)</i>		E	500 mls – 4,000 bottles
Subconjunctival or intracameral antibiotics eg. Cefuroxime – <i>(Prophylaxis against postoperative infection)</i>		E	1.5 g inj i.v. – 100 bottles
Pilocarpine 1% or 2% – <i>(For PI (Argon PI or ALPI))</i>		E	500 bottles
Dexamethasone/Maxidex (5 ml) or Prednisolone 1%/Pred Forte (10 ml) – <i>(post PI)</i>		E	500 bottles
Antibiotic eye drops eg. gentamicin sulphate, tobramycin, ciprofloxacin, moxifloxacin – <i>(Prophylaxis against postoperative infection)</i>		E	1,000 bottles
Tobramycin/dexamethasone or ciprofloxacin/dexamethasone – <i>(Combination eye drops increase compliance and reduce toxicity to conjunctiva from preservatives)</i>		E	0.3%/0.1% x 5 mls or 7.5 mls drops or suspension – 1,000 bottles
Tobramycin/dexamethasone ointment		E	3.5 gm – 100 tubes
Atropine sulphate – <i>(Postoperative cycloplegia and pupillary dilation)</i>		E	75 bottles
Intravitreal Bevacizumab (Avastin) – <i>(for neovascular glaucoma)</i>		E	100mg/4ml injection – 15 bottles

Description	Standard List Category or Locally Purchased (L)	Essential (E) or Desirable (D)	Quantity Required
SURGICAL SUPPLIES			
Peribulbar needles and Subtenon's cannulae – <i>(For administration of regional anaesthetic)</i>		E	10/box – 50 boxes
10 O nylon and 6 or 8 O vicryl sutures <i>(for trabeculectomy and glaucoma drainage devices)</i> and 3 O supramid nylon monofilament stent suture <i>(for Baerveldt shunts)</i>		E	12/box – 15 boxes
30 gauge needles <i>(for intravitreal and subconjunctival injections)</i>		E	100/box – 5 boxes
Syringe on 27 gauge or 30 gauge anterior chamber (Rycroft) cannula		E	as needed – at least 140 (1 per case)
Sponges for 5FU or MMC		E	As many as needed
Drainage tubes – Ahmed, Baerveldt, Molteno – <i>(if surgical skills available)</i>		E	25
Anterior chamber maintainer (eg. Lewicky cannula)		E	As needed – keep 10 in stock
Bandage contact lenses--Large diameter (eg. 18-20 mm) soft contact lenses – (for bleb leaks)		E	As needed – keep 10 in stock
Freeze dried sclera or pericardium for human allograft (can also use donor cornea or sclera from an Eye Bank if accessible) – <i>(For coverage of tube in Ahmed valves Baerveldt tubes and during bleb revision/ repair of scleral defects caused by scleral melt)</i>		E	As needed – keep 2 boxes in stock
DIAGNOSTIC PHARMACEUTICALS			
Tetracycline Eye Ointment 1% – 5g (pack of 25)		E	
Paracetamol 500mg (1000 tabs)		E	
Fluorescein Strips – (IOP)		E	Box/100 – 600 boxes
Anaesthetic Drops e.g. benoxinate, amethocaine, tetracaine 0.5%, proparacaine – (IOP)		E	15 ml – 2,000 bottles
Mydriatics eg. Tropicamide 0.5% and/or 1% Phenylephrine 2.5% and/or 5% – <i>(Pupillary dilation for optic nerve assessment (fundoscopy and/or photography))</i>		E	1% x 15 ml – 4,000 bottles
Hypochlorite Solution – <i>(Disinfection of Tonometer Head)</i>		E	1 bottle
Methylcellulose or other coupling gel – <i>(Gonioscopy)</i>		E	0.5% x 15 mls drops – 500 bottles

Description	Standard List Category or Locally Purchased (L)	Essential (E) or Desirable (D)	Quantity Required
MEDICAL TREATMENT: INTRAOCULAR PRESSURE (IOP) LOWERING PHARMACEUTICALS			
Prostaglandin Analogue (bimatoprost, latanoprost 50µg/mL, and travoprost 0.004%) – <i>(increase uveoscleral outflow. Generally, the recommended first-line drugs: IOP lowering effect of 28–33%, once a day dosing, limited local side effects. However, they are expensive and can be difficult to obtain.)</i>		E	X 2.5 ml – 60,000 bottles
Beta-blockers consist of two main groups: non-selective (timolol 0.25%, levobunolol), and selective (betaxolol) – <i>(decrease aqueous production. Timolol is cheaper and quite effective (an IOP lowering effect of 20–30%), but it has systemic side effects: worsens obstructive pulmonary diseases, slows heart rate, lowers blood pressure. Timolol 0.5% is no more effective than 0.25% is, but is much more likely to cause side effects.)</i>		E	10 mls – 15,000 bottles each (timolol 0.25% and betaxolol 0.25%)
Carbonic anhydrase inhibitors systemic (acetazolamide, methazolamide) – <i>(decrease aqueous formation)</i>		E	250 mg tablets 500/ bottle – 200 bottles
Topical Carbonic Anhydrase Inhibitor. Dorzolamide 2%, brinzolamide 1%) – <i>(decrease aqueous formation)</i>		E	X 10 ml – 15,000 bottles
Dorzolamide 2%/timolol 0.5% combination eye drops – <i>(Combination eye drops increase compliance and reduce toxicity to conjunctiva from preservatives)</i>		D	40,000 bottles
Alpha-2 adrenergic agonists (apraclonidine, brimonidine) Brimonidine tartrate 0.1% – <i>(Decrease aqueous production and increase uveoscleral outflow. Also used prior to ALT, SLT and YAG laser to minimise post-laser IOP spike.)</i>		E	x 10 m – 20,000 bottles
IV acetazolamide 500 mgs provided as a sterile powder requiring reconstitution – <i>(For emergency use in acute glaucoma)</i>		E	Use as needed – keep 10 vials in stock
Osmotic diuretics eg: IV Mannitol 10% – <i>(For emergency use in acute glaucoma)</i>			20% x 500 mls i.v. – 5 bags
Parasympathomimetics (pilocarpine, carbachol) increases aqueous outflow – <i>(increases aqueous outflow through the trabecular meshwork by means of ciliary muscle contraction, and may open the drainage angle in angle-closure glaucoma by stimulating the iris sphincter muscle)</i>	i.	E	2,000 bottles
MEDICAL TREATMENT: FOR CONGENITAL GLAUCOMA			
To be used with caution in this age group – <i>(These may be used as a temporary measure to lower IOP and assist with clearing of the cornea)</i>		D	As needed – can be obtained from adult pharmacy

References/Resources

Publication/Manual	Published by	Where available
Poster – What is wrong with my vision, and what can I do?	Community Eye Health Journal	http://www.cehjournal.org/wp-content/uploads/download/ceh_25_79.80_062.pdf
Glaucoma: diagnosis and management	NICE Guidelines	https://www.nice.org.uk/guidance/cg85
ICO Guidelines for Glaucoma Eye Care	ICO Guidelines	http://www.icoph.org/downloads/ICOGlaucomaGuidelines.pdf
Glaucoma	American Academy of Ophthalmology	http://www.aao.org/eye-health/diseases/what-is-glaucoma
Primary Open-Angle Glaucoma: Everyone's Business	Community Eye Health Journal Volume 25 Issues 79 & 80	http://www.cehjournal.org/primary-open-angle-glaucoma/
The basics of good postoperative care after glaucoma surgery: Fatima Kyari, Mohammed M Abdull	Comm Eye Health Vol. 29 No. 94 2016 pp 29 - 31	http://cehjournal.org/article/the-basics-of-good-postoperative-care-after-glaucoma-surgery/
Glaucoma diagram	Elektron	http://www.elektron-technology.com/en-gb/blog/new-white-paper-glaucoma-screening-global-perspective?language=id
Considerations for Managing Hazardous Drugs, May 2016	Pharmacy Purchasing & Products (this journal is NOT open access)	http://www.pppmag.com/article/1873/?search=EnsuretheSafeHandlingofHazardousDrugs
Ensure the Safe Handling of Hazardous Drugs, March 2016	Pharmacy Purchasing & Products (this journal is NOT open access)	http://www.pppmag.com/article/1836/?search=EnsuretheSafeHandlingofHazardousDrugs
Mitomycin C: Indications for Use and Safe Practice in Ophthalmology	American Society of Ophthalmic Registered Nurses	http://mobius.appserverhost.com/wp-content/uploads/2016/08/ASORN_content_Pages_ForPrint-ilovepdf-compressed.compressed.pdf
What is mitomycin C?	Mobius	https://mobiustherapeutics.com/
Mitomycin C – safe handling, use and disposal (guidelines for operating theatre staff)	ASORN	American Society of Ophthalmic Registered Nurses

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WORKING TOGETHER TO ELIMINATE AVOIDABLE BLINDNESS

IAPB's ESSENTIAL LISTS identify equipment and consumables considered essential, minimum requirements to perform high quality eye health interventions. IAPB produces these lists in collaboration with leading experts from around the world and updates them from time to time.



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