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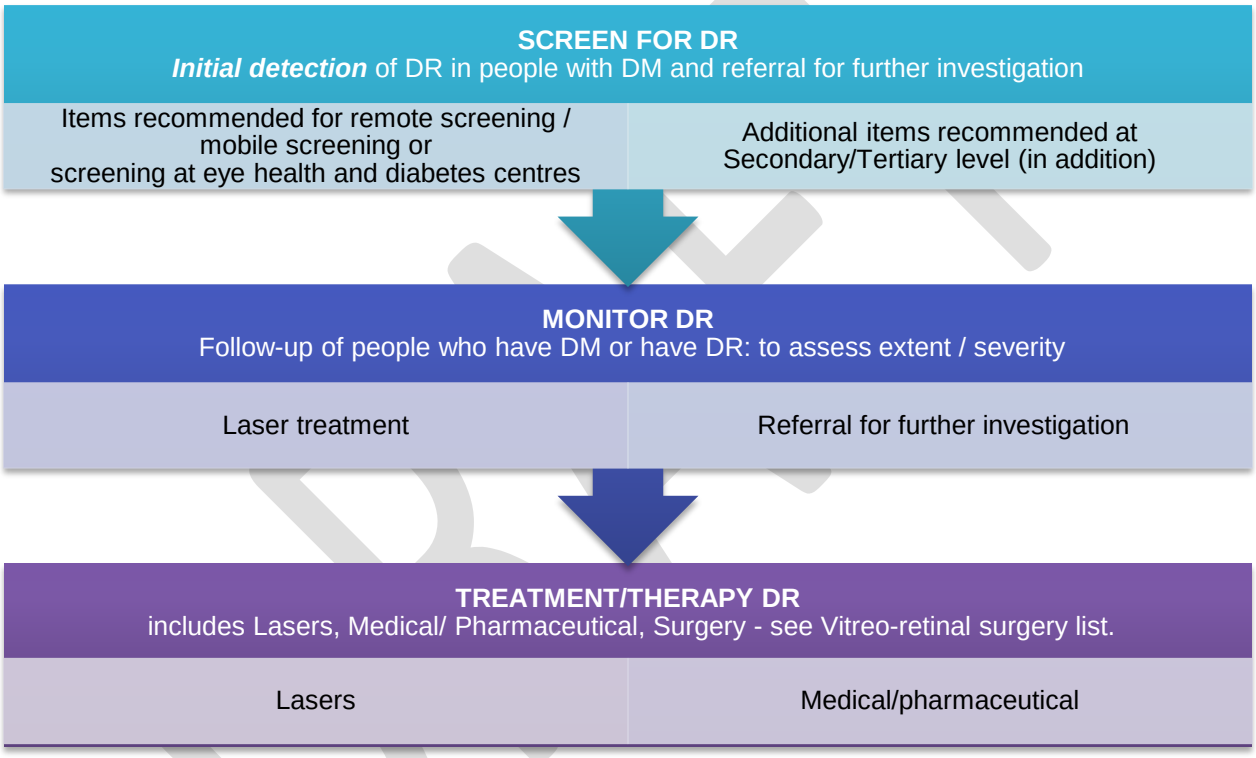
Essential List for screening, monitoring and treatment for diabetic retinopathy

Version: Third Edition (April 2018) – DRAFT

This *Essential List for Diabetic Retinopathy* contains recommendations for a range of ***essential items*** required at community / primary level (for screening); at secondary and tertiary levels (for treatment and follow up). It also contains recommendations for items that are ***desirable***, and efforts should be made to obtain these.



Estimating quantities of items for DR services
Recommendations for quantities of items for DR services are dependent on a number of factors that are variable and difficult to standardise.

Number of people with DM

- Prevalence of DM varies enormously from Region to Region and within Regions between different countries.

Number of people with DR and number who attend DR services

- Rate of progression of DR is variable (associated with glycaemic control).
- Lack of awareness about regular visits for early detection and treatment (both public and health care provider, LMIC and HIC) or other barriers (time or cost etc)

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Contextual factors

Standards of living and health services vary between countries and regions.

- In countries with either little diagnosed DM or very constrained budgets, health personnel and infrastructure, the most likely interventions would concentrate on Primary Health interventions (controlling glycaemia and blood pressure, health education and promotion of health seeking behaviour).
- In high prevalence or high income countries, Primary Health interventions should be integrated with the more advanced clinical interventions for DR: centre-based and outreach photographic screening, laser or anti-VEGF treatment, surgery
- Available services vary according to the Health Budget, population being served, region in the country, numbers of competent specialists and other personnel, numbers of effective units, protocols / guidelines for e.g. for screening intervals, availability/affordability of treatment options

Broad guidelines to plan DR services

Thus while local knowledge can best inform planning for DR services and the calculation of the required of quantities of items required, the following broad guidelines have been suggested to estimate the burden of DR:[i]

- **1** in **3** people with DM have DR, or will develop it in the span of their disease (ranges from **1** in **10** to **6** in **10**, usually higher in LMIC)
- **1** in **10** people with DM have or will develop advanced, vision threatening DR in the span of their disease.[ii]

The table below shows the numbers of people who require services when these assumptions are applied to a population size of 100 000. Programs can substitute any of their own information to calculate numbers more relevant to their circumstances.

Planning DR services for:	**100.000 Population**
People with DM Screening: retinal photography (If no DR, 2-year screening intervals)	5.000
People with DR Comprehensive follow / up-monitoring visits	1.700
People in Need of Treatment Laser, Injection of anti-VGEF agents, Retinal Surgery	500

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SCREENING / MONITORING FOR DR

For remote screening/mobile screening/screening at eye health and diabetes centres

Equipment	**Standard List Category or locally purchased (L)**	**Essential (E) or Desirable (D)**	**Quantity Required**
Fundus Camera	Diagnostic / Fundus/retinal Cameras / Non-Mydriatic Portable	E A Non-Mydriatic Camera does not usually need pupil dilation, thus faster and more comfortable for people than methods that require dilation. Thus is more suited to screening Most screening programmes use non-mydriatic digital cameras whether or not the pupils are dilated because these offer better image quality through smaller pupils.	1
Software & Laptop to use with Fundus Camera	L	E for image storage, preferably also for patient records and recall system	1
Slitlamp biomicroscope	Diagnostic / Slit Lamps / Static	E As an alternative/ adjunct/ back-up to a non-mydriatic camera	1
Noncontact biconvex indirect lenses to use with the slitlamp: 90D or 78D or 60D lens	Diagnostic / Diagnostic Ophthalmic Lenses / Fundus Lenses	E At least one lens is needed to view the retina using a slitlamp (90 D for screening, 78 D for more magnification)	1
Adapter for digital camera for use with slit lamp		D As an alternative/ adjunct/ back-up to an indirect ophthalmoscope image or non-mydriatic camera Caution: different adapters are required for different slitlamps	1

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Equipment	**Standard List Category or locally purchased (L)**	**Essential (E) or Desirable (D)**	**Quantity Required**
Adapter for use of a smart phone to capture images		D As an alternative/ adjunct/ back-up to an indirect ophthalmoscope image or non-mydriatic camera Caution: different adapters are required for different smartphones	1
Indirect Ophthalmoscope if possible, with wireless capability to take digital images	Diagnostic / Ophthalmoscopes / Indirect	E Dilated exam (preferably with digital images) as an alternative/ adjunct/ back-up to a non-mydriatic camera or slitlamp (**optional** for screening, panoramic view, low magnification)	1
20D or 28D lens	Diagnostic / Diagnostic Ophthalmic Lenses / Fundus Lenses	E At least one lens is needed to view the retina using an indirect ophthalmoscope	
Direct ophthalmoscope	TBA	E Dilated exam as an alternative/ adjunct/ back-up if a non-mydriatic camera, slitlamp or indirect ophthalmoscope are not available.	1
Vision charts (distance and near)	TBA	E	
Pinhole Occluder	Refractive Service / Occluders	E	
Glucometer with test strips or test for HbA1c Sphygmomanometer OGTT equipment	TBA	D If DR services are not integrated with general diabetes services	1
Supplies/Consumables			

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Equipment	Standard List Category or locally purchased (L)	Essential (E) or Desirable (D)	Quantity Required
Dilating eye drops[1]		E To dilate pupils if required for retinal photography /examination	
Tropicamide 1% 5ml /eye Drops or alternative e.g. Cyclopentolate HCl 1% 5ml Eye Drops (Mydriatic)	E Pharmaceuticals / Mydiatrics / Dilating Drops	E Tropicamide is faster acting, and dilation is of shorter duration than Cyclopentalate	
Phenylephrine HCl 2.5% Eye Drops (Mydriatic)	Pharmaceuticals / Mydiatrics / Dilating Drops	E Phenylephrine can be used in conjunction with tropicamide to increase the speed and amount of dilation, especially with dark irises	

[1] The need for dilation is dependent on age (older people are more likely to need dilation of their pupils), ethnicity (pigmented irises tend to have a higher upgradable image rate) and the amount of untreated cataract in the population (cataract interfering with image quality).

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MONITORING FOR DR at Secondary/Tertiary level (in addition to above)

Equipment	**Standard List category or locally purchased (L)**	**Essential (E) or Desirable (D)**	**Quantity required**
Large field conventional fundus camera		D For mydriatic retinal photography in reference centres Non-mydriatic cameras are used either with staged mydriasis, routine mydriasis over the age of 50 years or routine mydriasis in all age groups.	
Three-mirror contact lens used with slit lamp	TBA	D Stereoscopic and high-resolution images of the macula (evaluation of macular oedema).	
Optical Coherence Tomography (OCT)	TBA	D Most sensitive method to identify sites and severity of retinal oedema	
Supplies/Consumables	**Standard List category or locally purchased (L)**	**Essential (E) or Desirable (D)**	**Quantity required**
Proparacaine 0.5% or Amethocaine Hcl 0.5% Eye Drops 5ml (or similar topical anaesthetic)	Pharmaceuticals / Local Anaesthetic Preps	E	
Methylcellulose drops e.g. Viscotears, Hypomellose 2.5% Goniogel	TBA	E a coupling agent for three mirror contact lens	

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LASER TREATMENT FOR DR (Panretinal photocoagulation/Focal/Grid)

Equipment - Lasers	**Standard List category or locally purchased (L)**	**Essential (E) or Desirable (D)**	**Quantity required**
Green laser (532 nm), frequency-doubled Nd:YAG or argon laser (514 nm using 50-100ms pulse duration)		E Argon Green laser, a direct/focal laser, is still commonly used for single burns. There is no good evidence that modern laser systems are more effective than the argon (ETDRS) but they appear to have fewer adverse effects Its portability is a further benefit	
Infrared laser (810 nm Krypton red) or diode laser		D Causes deeper burns with a higher rate of patient discomfort, but tend to be cheaper, is effective, and requires less maintenance.	
Pattern Scanning Laser with different wavelengths - green (532nm) or yellow laser (577 nm) using 20-30ms pulse duration, spot size (400 microns) If hazy media, use diode red laser (814 nm).		D Pattern Scanning Lasers with predetermined multi-spot treatment cascade for PRP or grid. Produces multiple spots making it less tedious and time consuming, and more comfortable for the patient	
Light focal laser - minimise lesion intensity and pulse duration (10-50ms)		D 'Light' refers to using lasers at lower power and producing less severe burns: Minimum intensity photocoagulation (MIP)	
Subthreshold micropulse diode laser - low-intensity, longer wavelength shorter duration pulses		D Produces less retinal damage and is safer, less likely to produce macula oedema Shows promise in focal laser for DMO but there are very few data on use in PRP	

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Delivery systems Some lasers have built in delivery systems	**Standard List category or locally purchased (L)**	**Essential (E) or Desirable (D)**	**Quantity required**
Slitlamp delivery system	Diagnostic / Slit Lamps / Static	E	
Indirect delivery system		D an indirect ophthalmoscope and lens is used to focus the laser light onto the retina, particularly for patients where pain requires the use of an anaesthetic E In situations where travel by patients is often physically and financially impossible, outreach with a binocular indirect equipped with laser and fibreoptic cable enables access to definitive treatment. It is more affordable in resource-constrained countries.	
Endolaser probe (direct delivery)		D During surgery, the endolaser probe is put into the vitreous and is fired directly to the retina	
Laser contact lenses	Diagnostic / Diagnostic Ophthalmic Lenses / Fundus Lenses	E a contact lens is used to focus a beam of laser light onto the retina and provide magnification wide angle contact lenses are useful for panretinal photocoagulation because these provide easy access to the post-equatorial region which is difficult to visualize with a three mirror lens	
Monitor to view retinal images during laser treatment	L	D	
Fundus Fluorescein Angiography (FFA) including retina camera and image net	N/A	D FFA is not needed to diagnose DME or PDR, these are diagnosed by a clinical exam. FFA can be used as a guide for treating DME and to evaluate cause(s) of unexplained decreased VA	

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Sub-Tenons Local Anaesthesia

Equipment	**Standard List category or locally purchased (L)**	**Essential (E) or Desirable (D)**	**Quantity required**
Lid speculum (eg Kratz Barraquer	TBA	E	
Small forceps (eg Hoskins-style notched tip)	TBA	E	
Curved blunt-tipped spring scissors (eg blunt Westcott)	TBA	E	
Sub-Tenon's Anasthesia Cannula 19g, curved, flattened and blunt tipped	TBA	Alternative curved blunt-tipped cannula (eg. Stevens) Kumar-Dodds plastic cannula, Greenbaum or "ultrashort" cannula	
Supplies/Consumables	**Standard List category or locally purchased (L)**	**Essential (E) or Desirable (D)**	**Quantity required**
Povidone Iodine 4%	Pharmaceuticals > Antibiotics	E	
local anesthetic drops proxymetacaine 0.5% or oxybuprocaine 0.4%	Pharmaceuticals / Local Anaesthetic Preps	E	
Lignocaine hydrochloride 2%	TBA	E Patients on Warfarin	4mls of 2% Lignocaine (no Adrenaline)
Hyalase (Hyaluroneidase) 1500IU vial	Pharmaceuticals > Others	Alternative to Lignocaine – Mixed in with the anaesthetic. It allows the local anaesthetic to penetrate through the tissue planes more extensively. • 2% lignocaine+150 iu hyauronidase: ±45 minutes of surgical anesthesia. • 2% plain lignocaine, 0.5% plain bupivacaine, and 150 iu hyaluronidase: ±60–90 minutes of surgical anesthesia	
0.5% or 1% Ropivacaine (Naroprin)	N/A	If a longer procedure is expected mix • 0.5% Ropivacaine in a 50:50 with the 2% Lignocaine. • 1% ropivacaine+150 iu hyaluronidase :±90–120 minutes of surgical anesthesia	

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5ml / 10ml Syringe	Consumables / Syringes / Needles	E	
25g / 27g Needles	Consumables / Syringes / Needles	E	
Eye pads and tape	L	D	
FFA		D	
Inkjet Cartridge, Plastic Cover Photo Paper, Printing paper	L	E - if FFA	
Plaster Roll	L	E - if FFA	
Fluorescein Sodium 20% 3ml amp	TBA	E - if FFA	
Syringe (1cc)	Consumables / Syringes / Needles	E - if FFA	
Syringe (5cc)	Consumables / Syringes / Needles	E - if FFA	
Saline flush	L	E - if FFA	
Mydriatics	Pharmaceuticals / Mydiatrics / Dilating Drops	E - if FFA	
Sterile wipes	L	E - if FFA	
Butterfly or cannula with the vecafix	TBA	E - if FFA	

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PHARMACEUTICAL TREATMENT for Diabetic Macular Oedema

Equipment	**Standard List category or locally purchased (L)**	**Essential (E) or Desirable (D)**	**Quantity required**
Lid Speculum	TBA	E	
Calipers	TBA	E To mark 3.5mm behind limbus for pseudophakes and 4mm for phakic individuals	
Pharmaceuticals	**Standard List category or locally purchased (L)**	**Essential (E) or Desirable (D)**	**Quantity required**
Anti-VEGF: Avastin 1.25mg (bevacizumab) [although outcomes are effective, aflibercept (and ranibizumab) are expensive and not cost-effective compared with bevacizumab. Avastin may not, however, be an option for some low-middle income settings (cost and human resources implications)	TBA	E /D – context (and resources (Trained personnel and equipment) dependant Focal laser being a preferred choice if anti-VEGF is not available Avastin is delivered via typically supero-temporal or infero-temporal) intravitreal injections. Needs refrigeration and to be kept sterile.	Compounding pharmacy will draw out the aliquot of 0.05. Multiple punctures are safe. See responsibly pharmaceutical compounding
Steroids: triamcinolone, a short acting steroid, which is not licensed for use in the eye, has been widely used.		E /D - context dependant Steroids are unlikely to be much used at such an early stage as NPDR because of the risk of complications, but may have a role in pseudophakic patients, or in patients with macular oedema that does not respond to anti-VEGF treatment.	
Topical Anaesthetic	Pharmaceuticals / Local Anaesthetic Preps	E	
Antibiotic drops	Pharmaceuticals > Antibiotics	For 3 days after OR stat dose after	
Diamox 250mg tables and iopidine drops	TBA	To reduce a sudden rise in pressure	

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Supplies/Consumables

Description	**Standard List category or locally purchased (L)**	**Essential (E) or Desirable (D)**	**Quantity required**
1ml (Tuberculin) syringe	Consumables / Syringes / Needles	E If not already preloaded syringe then a drawing up needle is required	
27g or 30g needle	Consumables / Syringes / Needles	E	
Sterile Masks	TBA	E **Vital** – post-injection endophathlmitis typically has a different bacterial profile vs post-cataract endophthalmitis, most notably being more respiratory pathogens involved. Practitioner should not breath on patient and patient should not talk during injection	
Povidone iodine 5% or 10% solution 200 ml or alternative cleaning agent if allergic	Pharmaceuticals > Antibiotics	E In conjunctival sac for minimum of 3 minutes prior to procedure	
A sterile dressing kit with sterile gauze and a tray for the iodine.	L	D	
Iodine surgical scrub, hand towels and sterile gloves	L	D	
A sterile drape is used to capture the lashes	L	This is not used in some centres (e.g. in USA). If a drape is not pre-cut scissors are required	
Cotton Tips	L	E	

SURGERY FOR DR – See Separate VITREORETINAL List

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RESOURCES

Publication / Manual	Published by	Where available
Diabetic Retinopathy Treatment & Management	Medscape	http://bit.ly/1eoJtxW
ICO Guidelines for Diabetic Eye Care	ICO	http://www.icoph.org/resources/309/ICO-Guidelines-for-Diabetic-Eye-Care-available-in-English-Chinese-French-Portuguese-Serbian-Spanish-and-Vietnamese--.html
		http://www.diabeticretinopathy.org.uk/index.html
Diabetic retinopathy for the comprehensive ophthalmologist. Authors: Raj Maturi, Jonathan D. Walker, Robert Chambers, D.O. 2016	Deluma Medical Publishers	http://drcobook.com/download.php
IDF Diabetes Eye Health – A guide for health professionals, 2015	IDF and Fred Hollows Foundation	https://www.idf.org/our-activities/care-prevention/eye-health/eye-health-guide/1-item1.html

IAPB wishes to acknowledge and thank the following experts and organisations for their input and support in compiling this list:

- Richard Le Mesurier, Chair, IAPB Western Pacific
- Anthony Hall, Consultant Ophthalmologist Newcastle Eye Hospital, Australia (formerly Head of Dept, KCMC / CBM)
- Nick Kourgialis, Vice President at Helen Keller International and Chair of the IAPB Diabetic Retinopathy Work Group
- Tien-Yin Wong, Chair for ICO Working Group on Diabetic Eye Diseases
- Hugh Taylor, President for ICO, Former Chair ICO Working Group on Diabetic Eye Diseases
- Serge Resnikoff, Member ICO Working Group on Diabetic Eye Diseases
- Peter Scanlon, Clinical Director, Diabetic Retinopathy Screening Programme UK and affiliated with the Gloucestershire NHS Trust
- David S. Friedman, Senior Ophthalmologist and Eye Health Technical Advisor, HKI
- Rènée du Toit, Independent Eye Health Consultant
- Philip Hoare, IAPB Standard List & Procurement Manager
- Vishnu Prasad, Aurolab-Aravind Eye Care System
- Thulasiraj Ravilla, LAICO-Aravind Eye Care System
- Vijay Kumar, LAICO-Aravind Eye Care System
- Kim Ramasamy, Aravind Eye Hospital (Madurai) – Aravind Eye Care System
- Praveen Raja, Aurolab-Aravind Eye Care System
- Giridharan, Aurolab-Aravind Eye Care System
- Naresh Babu Kannan, Aravind Eye Hospital (Madurai) – Aravind Eye Care System
- Anand Rajendran, Aravind Eye Hospital (Madurai) – Aravind Eye Care System
- Dr Belma Malanda, IDF

This list also reflects the procedures and requirements outlined in the ICO Guidelines for Diabetic Eye Care

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[i] Regional diabetic retinopathy programme CBM Eastern Mediterranean Region (EMR) Developed in collaboration with the International Council of Ophthalmology (ICO)

[ii] Ruta LM, Magliano DJ, Lemesurier R, Taylor HR, Zimmet PZ, Shaw JE. Prevalence of diabetic retinopathy in Type 2 diabetes in developing and developed countries. Diabet Med. 2013 Apr;30(4):387-98. doi: 10.1111/dme.12119