



# LOV.MAN.002

## Lions Outback Vision

### Diabetic Retinopathy Screening Manual

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## Introduction

This manual has been designed to support health workers who are conducting diabetic retinopathy screening. It is to help in supporting the operator in understanding what diabetic retinopathy is, what contributes to it and how to complete effective screening.

## Acknowledgements

Lions Outback Vision would like to begin this training module by acknowledging the traditional custodians and keepers of country past and present. We would also like to acknowledge the support and help from local community health service providers, non-government community groups, allied health services, and key people in each of the designated communities for their knowledge and patience in developing, integrating and delivering the Diabetic Retinopathy Screening [DRS] program in Western Australia.

## Glossary

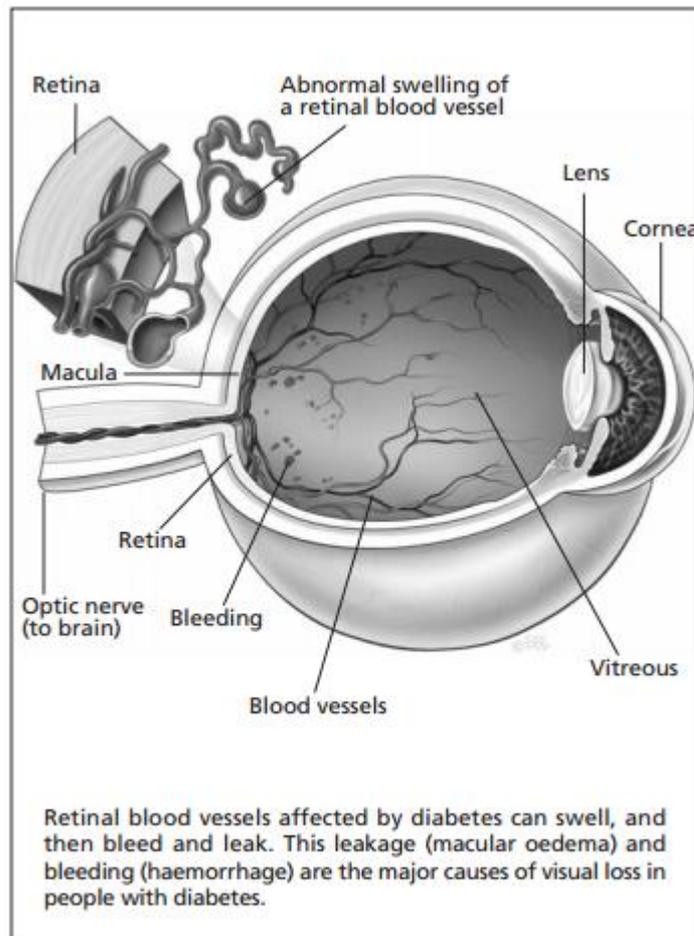
LOV	Lions Outback Vision
DRS	Diabetic Retinopathy Screening
DR	Diabetic Retinopathy
AHP	Aboriginal Health Practitioner
AHP's	Allied Health Practitioners
AMS	Aboriginal Medical Service
CHN	Community Health Nurse
GP	General Practitioner
PN	Practice Nurse
EN	Enrolled Nurse
RN	Registered Nurse
VA	Visual Acuity
NVA	Near Visual Acuity
PH	Pinhole
BC	Best Corrected
CF	Counting Fingers
HM	Hand Movement
N/I	No Improvement
LP	Light Perception
NLP	No Light Perception
NPDR	Non-Proliferative Diabetic Retinopathy
PDR	Proliferative Diabetic Retinopathy
STDR	The interior lining of the eyeball including the retina
Retina	A layer at the back of the eye where visual image is formed
Macula	Central part of the retina containing sharpest vision
VOS	Visiting Optometrist Clinic
Mydriatic	Dilation of the pupil
Pan retinal	Laser treatment for proliferative diabetic retinopathy
Photocoagulation	Laser retinal photocoagulation is a therapeutic option in many retinal and eye conditions
Anti-VEGF	Anti-VEGF treatments are given by an injection into the eye and work by reducing the growth of new blood vessels and the Oedema (swelling).

## What is Diabetic Retinopathy?

Diabetic Retinopathy is a diabetes complication that affects eyes. It's caused by damage to the blood vessels of the light-sensitive tissue at the back of the eye (retina). At first, diabetic retinopathy may cause no symptoms or only mild vision problems.

## How does diabetes impact on eye health?

The retina is a layer of special light-sensitive tissue at the back of the eye that sends nerve impulses up the optic nerve to the brain. In people with diabetes, tiny blood vessels in the retina may become diseased and damaged. This process is called diabetic retinopathy. It usually affects the retina slowly, over months or years. The longer a person has diabetes, the greater the risk of diabetic retinopathy. All people with diabetes are at risk, whether or not they are insulin dependent. Diabetes can cause the blood vessels to swell and leak blood or fluid around the retina. The healing process forms scar tissue. These problems can damage the retina so badly that the retina functions less effectively and vision is impaired. The area of the retina that provides the sharpest vision is called the macula. Leaking blood or fluid can cause the macula to swell (macular oedema). This causes blurred vision and is a common result of diabetic retinopathy. What are the signs of Diabetic Retinopathy?



Picture: RANZCO Diabetic Retinopathy Online Patient Advisory

## How is Diabetic Retinopathy identified through screening?

Diabetic retinopathy is identified by taking a picture of both eyes using a fundus camera which captures a 45 degree image of the retina in the back of the eye.



## How are patients identified for screening?

Patients are identified for screening through chronic disease care plans, scheduled diabetic retinopathy screening clinics and on an opportunistic basis.

## How often is screening required?

Retinopathy screening is indicated where a patient has known diabetes mellitus. Diabetic retinopathy screening should be performed on an annual basis for Aboriginal patients and every two years for non-Aboriginal patients with known risk factors for the development of diabetic retinopathy.

## Restrictions

Patients who are not diabetic do not require diabetic retinopathy photographic screening.

## How do we screen?

Screening involves collecting basic patient information for registration, measuring visual acuity (VA) and taking a digital retinal photograph.

## How long does it take to screen a patient?

A retinal screening will take around 10 minutes if the patient's eyes do not require dilation.

## When are you required to dilate the eyes?

When using a non-mydriatic camera some patients may still require mydriatic (dilating) drops to capture an adequate image of the retina. This is usually when the pupil is less than 3.0mm in diameter. The use of mydriatic drops will enable the pupil to allow light into the back of the eye to capture an adequate image.

This procedure will lengthen the time of the screening test from 10 minutes to 30 minutes, as the solution takes 20 minutes to take effect in the eyes.

Note: Dilating of eyes should only be undertaken by suitably qualified staff. Consent from patient must be received prior to dilation and appropriate assistance arranged to support the patient while eyes remain dilated. The drops will be effective for 4 to 6 hours post screening.

Prior to dilating the patients eyes a general eye health check must be made to ensure cataracts or other eye health conditions are not present as some conditions can restrict light entering the back of the eye and applying dilating drops will not improve the quality of the image.

## Who initiates screening for Diabetic Retinopathy?

Patients do not have to have a referral to have a diabetic retinal photo taken. A patient can self-refer or they may be contacted by a PN, AHP, AHP's, GP, RN, CHN or AMS for their annual screening.

Note: Patients who are not diabetic do not require diabetic retinopathy photographic screening.

## Screening Locations

Screening may be undertaken at many different facilities eg: Primary Care services, Aboriginal Medical Services, hospitals, optometry practices, GP practices.

## Preparing a workspace for Diabetic Retinopathy Screening

You will require a consultation room or workspace with the following features:

- ) Easy access for patients and staff (essential)
- ) Adequate space to fit the camera, a height adjustable chair or height adjustable patient bed inside the room
- ) Wheelchair access (some of our patients may present on wheelchairs)
- ) Enough space to measure VA with 3 or 6 metre Snellen eye chart in the room or in a corridor
- ) Power points for camera and other necessary equipment
- ) Well ventilated area or air-conditioned room where possible



- ) Ability to darken room to obtain adequate images and aid pupil dilation
- ) The room should be kept clean and dust free
- ) Operate equipment and ensure patient safety as per your organisations OH&S policies
- ) Always acknowledge cultural diversity and practice appropriate cultural customs when screening patients. If in doubt, please consult with your clinic manager, or cultural officer.

### Equipment required for Diabetic Retinopathy screening

- ) Camera operator
- ) Fundus camera
- ) Camera Operators Manual
- ) Adjustable height chair or adjustable patient bed
- ) Visual Acuity charts (VA)
  - o Long Distance Snellen Chart 3M or 6M
  - o Near Vision Chart
  - o "Tumbling E" chart for patients used for patients with low English literacy skills
- ) Measuring tape or pre-measured rope and a marker or coloured duct tape to measure and mark the exact spot and distance from patient to the Visual Acuity chart (usually 3 metres or 6 metres, depending on the VA chart used)
- ) Occluding Pinhole Lens
- ) Pen torch
- ) Pen or pencil to record patient details and information
- ) Lions Outback Vision Grading Request form to record the following:
  - o Patient details, type of Diabetes, last screen date
  - o Distance and Near Vision Acuity measurements
  - o Presenting eye health conditions and additional information provided by patient
- ) USB stick or hard drive to store images, transfer into patient record and email to LOV for grading
- ) Mydriatic eye drops (Tropicamide 1% or 0.5%) if patient pupils are less than 3mm in diameter and require dilation to obtain adequate image quality
- ) Latex gloves to cover your hands when dilating and prevent cross infection
- ) Box of tissues for the patient if they have weeping eyes or when dilating patient eyes
- ) Educational resources (Bad Sugar, Bad Eyes DVD / Indigenous Eye Health Unit resources), can be used before or after taking the picture
- ) Tub of disinfectant wipes (use before and after each patient) to clean Occluding Lens, head rest and chin rest on DRS camera
- ) Box of Clear Wipe brand lens cleanser as required. Care should be taken when cleaning the lens to avoid smudges or artefacts that can adhere to the surface of the lens.
- ) Extension power cord with multiple socket connections and power surge protection
- ) Cardboard or sheet to cover windows if required.
- ) Last but not least... A smile...

### Visual acuity tests

Visual acuity tests measure the ability to see fine detail. Visual acuity is determined by measuring the smallest size print that a person can read. Both distance and near acuities are measured when screening for Diabetic Retinopathy to help determine the current effects (if any) of Diabetes on the health of the patient eyes.

### Visual Acuity test for distance

#### Unaided (No glasses)

- ) Test patient vision without any visual aids (glasses / pinhole)



- ) Record strength of unaided vision from a distance of 6 metres or 3 metres

### Pin Hole (PH)

- ) Use Occluding Pinhole Lens if patient does not have long distance glasses
- ) Use Occluding Pinhole Lens to look for improvement of vision if patient could only see at 6/12 or worse unaided on the vision chart
- ) Refer to Optometry for further examination if vision is 6/12 or worse and there is significant improvement of vision when using Occluding Pinhole Lens

### Best Corrected (BC)

- ) Testing patient vision while they wear their long distance glasses is to make certain the strength of lens is still adequate for long distance vision
- ) Refer to Optometry if lenses have not been reviewed in the past 12 months, or vision is 6/12 or worse while wearing lenses

### Recording Visual Acuity

Record finding as per following instructions:

- ) Always record Right Eye first
- ) Always record the smallest size print that the patient can read

For example: 6/9 = First number is the distance (6) from patient to chart. The second number (9) is the size of the letter / symbol they can see without making mistakes.

### Protocol for measuring patient Visual Acuity

- ) Begin test by measuring Unaided (without glasses) Visual Acuity
- ) Ask patient to stand or sit at 6 metres, or 3 metres, from the distance chart
- ) Explain the test
- ) Begin by asking patient to cover their left eye with the Occluder lens, or a cupped hand
- ) Point to the top letter / symbol of the chart and ask patient to identify what you are pointing to
- ) Repeat the process for the first symbol on each line moving down the chart until the patient is unable to identify the symbol
- ) Stop and continue to the inside of the chart when patient begins to falter or stops reading.
- ) When the patient can no longer identify symbols record the visual acuity line eg: 6/9
- ) Record finding / always record the smallest size print that the patient can read

Note: Make sure you encourage responses (keep going, you're doing well, have a guess, very good). Do not correct the patient if they make a mistake / keep encouraging until they cannot continue reading. Proceed to measure Visual Acuity using Occluding Pinhole Lens if unaided vision is 6/12 or worse and patient does not have glasses for distance

Proceed to measure Visual Acuity after unaided test if patient wears glasses for long distance

### Near visual acuity

Near visual acuity tests a person's central vision at arm's length. It is recorded in point notation, the same as for computer font, and marked with an 'N'.

- ) N18 - N16 is large print (refer to Optometry)
- ) N18 is 18 point font (refer to Optometry)
- ) N8 is newsprint
- ) N6 is telephone book print



### Examples of the impact of certain visual acuity levels:

Acuity Level	Description
6/6	Normal vision
6/12	Reduced vision, Australian legal driving limit.
6/18	Low vision (World Health Organisation definition)
Less than 6/60	Legal blindness (eligible for various entitlements)

### Terms used to indicate that vision is too reduced to see a chart:

Term	Description
CF	count fingers at distance specified
HM	can see a hand moving at a close distance in front of the eyes
LP	can perceive light and dark but no detail
NLP	No light perception or totally blind

References: <http://www.visionaustralia.org/eye-health/assessing-vision-loss/vision-tests>

## Diabetic Retinopathy Screening Procedure

Ensure the room is as dim as possible when taking photos.

If you are having difficulty with the camera operations refer to the cameras operation manual or your camera representative.

### Clinic Preparation

- ) Take a test photograph on a colleague to ensure that the camera is working properly
- ) Use LOV Grading Request Form to record patient information and VA measurements
- ) You will need a USB or external hard drive to store and send files for grading

### Procedure

- ) Complete patient information on LOV Grading Request Form
- ) Take patients visual acuity and record on LOV Grading Request Form
- ) For first time patients you will need to record the patient details in the camera
- ) For previously registered patients search for existing patient details
- ) Sit patient on a chair or the patient bed in front of the camera
- ) Make sure they are comfortable, their forehead and chin are in position and their eyes are focussed directly on the lens
- ) Take photo of the right eye first
- ) Check quality of image
- ) Repeat the same process for the left eye

Note: If the image quality is poor refer to the *Tips and Tricks for Camera Operators* resource for common photography problems.



## Referring patient to Optometry for DR Screening

Sometimes you may not be able to capture an adequate image for screening. This may be due to poor physical condition of the patient eyes or environmental or physical conditions that may hinder the screening process or restrict the ability of the camera to capture a good image.

If adequate images are unachievable refer the patient to the local Optometrist or book them for the next Visiting Optometry Service.

## Transferring images for grading

- ) Transfer the images from the camera to your PC using USB or external hard drive, attach images to patient records.
- ) Compose an email containing the LOV Grading Request Form and retinal images

Note: Do not reduce size of retinal image files, reduced images makes grading difficult.

When transferring images use one of the following options:

[retinal.screening@health.wa.gov.au](mailto:retinal.screening@health.wa.gov.au)

[outbackvision@gmail.com.au](mailto:outbackvision@gmail.com.au)

Client Information Sharing System (CISS)

## LOV Grading Reports

- ) Grading Reports will be returned via email to the screener within 5 working days
- ) Reports should be actioned according to the grading outcomes
- ) Record grading outcomes in patient medical records

The grading report will describe the following:

- ) The diagnosis (diabetic retinopathy): Yes/No
- ) Grading outcome: 3 tier grading outcome (refer to pathway diagram)
- ) Photo quality: adequate (sharp/clear) inadequate (fuzzy/too dark/dirty lens)
- ) Next review: refer to optometry, refer to ophthalmology, recall in 12, 3 or 6 months

Note: referral to ophthalmology will require a written referral from the general practitioner or optometrist.

## 3 Tier Grading Outcome explained

### No Symptoms of Diabetic Retinopathy found

- ) Create annual screening recall alert in patient file with referral to Diabetes Educator for further education and support for on-going self-management of Diabetic condition

### No Diabetic Retinopathy found but referral to Optometrist is required for Vision correction

- ) Book for next Visiting Optometrist clinic or refer to Optometrist practice for vision correction
- ) Create annual screening alert in patient file with referral to Diabetes Educator for further education and support for on-going self-management of Diabetic condition

### Symptoms of Sight Threatening Retinopathy (STDR) found

- ) Sight Threatening Diabetic Retinopathy is found, the specialist will request that the patient be referred to the next Ophthalmology clinic for a consultation and possible treatment
- ) Remove patient from annual screening list and place in visiting Ophthalmology clinic list until patient is discharged from ophthalmology specialist management
- ) Refer patient to Diabetes Educator for further education and support for on-going self-management of Diabetic condition

## How is Diabetic Retinopathy treated?



Treatment does not cure diabetic retinopathy but can slow down or prevent further vision loss. Some treatment may include:

- ) Laser treatment (photocoagulation/ pan retinal) – the ophthalmologist uses a laser beam to seal leaking blood vessels and to shrink abnormal blood vessels
- ) Injection treatment (Anti-VEGF Injection) - Injections are used in some cases to treat macular Oedema, or swelling of the macula, often associated with diabetic retinopathy

Please consult with your Ophthalmologist, for further advice on the types of treatment available

### **Referral to Optometry**

When a patient is found to need further assessment for vision correction, the grading report will request for patient to be referred to the local optometrist or be booked for the next Visiting Optometrist Clinic. No written referral is required.

### **Referral to Ophthalmology**

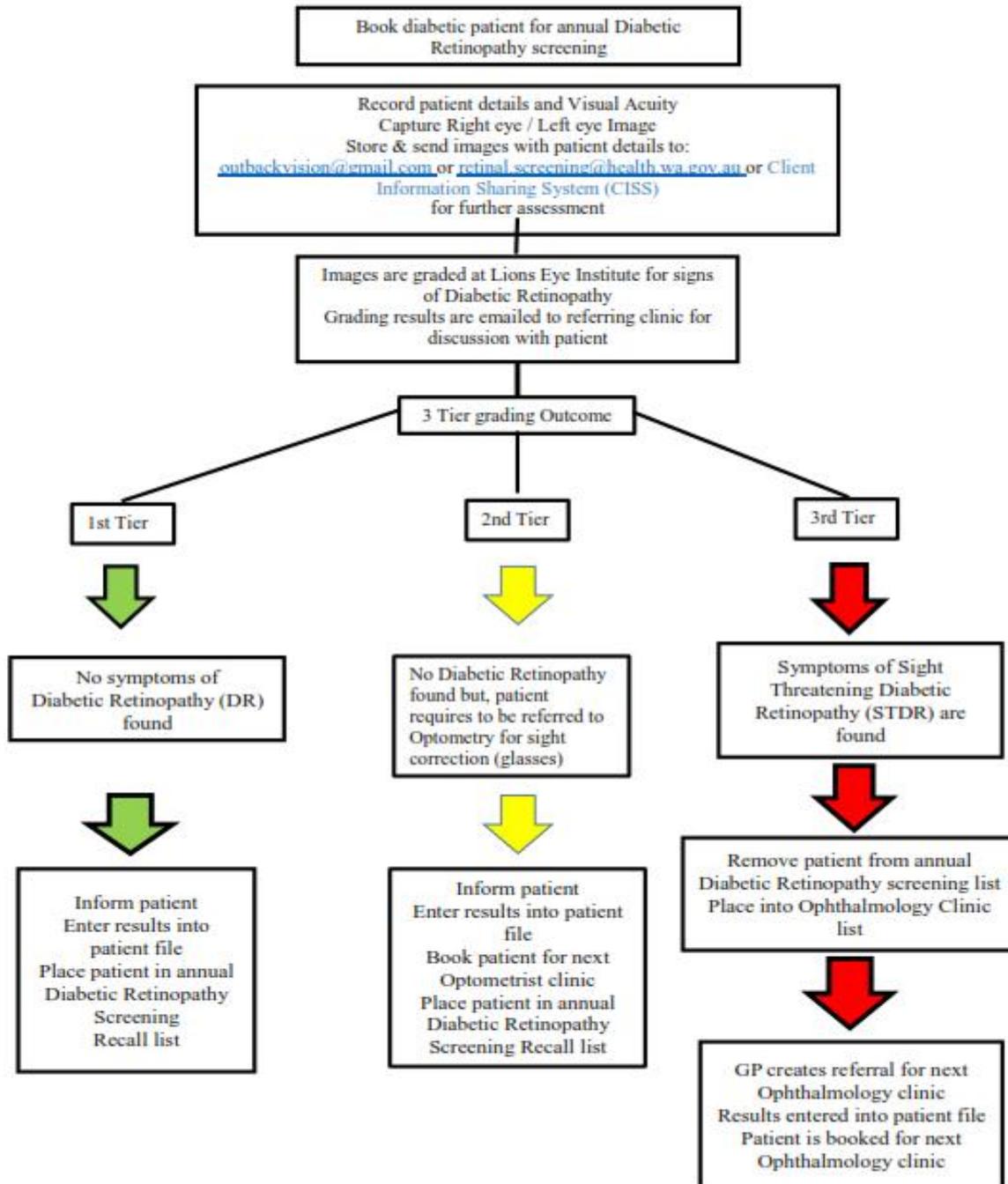
When a patient is identified with diabetic retinopathy (DR), the grading report will request for the patient to visit an ophthalmologist for further assessment of condition. A written GP referral will be required to book the patient for an appointment with the local Ophthalmologist practice or be booked for the next visiting Ophthalmology clinic at the hospital.

### **Outcome from referral to Optometry / Ophthalmology**

It is recommended that when there is no clinical report received from the Optometrist or Ophthalmologist the outcome summary report should be followed-up with the relevant hospital, ophthalmology or optometry practice. Outcomes should be documented into patient record once received and the follow up plan actioned if further treatment or visits are required.



## Referral Protocols



## Key Points

- ) A retinal screening can take between 10 minutes without using dilating drops, or 30 minutes if dilating drops are required.
- ) Diabetic retinopathy screening should be undertaken by staff with appropriate training only.
- ) New patients will need to be registered on the camera data base to create a folder for the images.
- ) Prior to performing the screening, it is important to obtain a visual acuity.
- ) Screening should occur in a darkened room so that the pupils are not too small, the darker the room the larger the pupils are likely to be.
- ) It is important that camera operators record the visual acuity correctly and apply proper screening techniques for this test at all times.
- ) Incomplete patient data and poor screening will produce inadequate screening reports for grading.
- ) Ensure to always back up images to external hard drive / USB stick
- ) LOV Grading reports should be filed on the patients chart and actions/follow up or recalls should be managed as per relevant practice policies and procedures

## DR Screening Cameras – Tips and Tricks for Operators

### What makes a good photo?



**This is an excellent photo of the retina.**

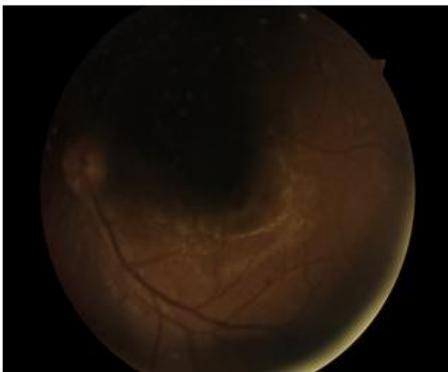
The **optic nerve** and **macula** (dark area) are clearly visible

The image is **centred** on the macula

There are **no artefacts** obscuring the image

### Common Photography Problems

#### Dark Image

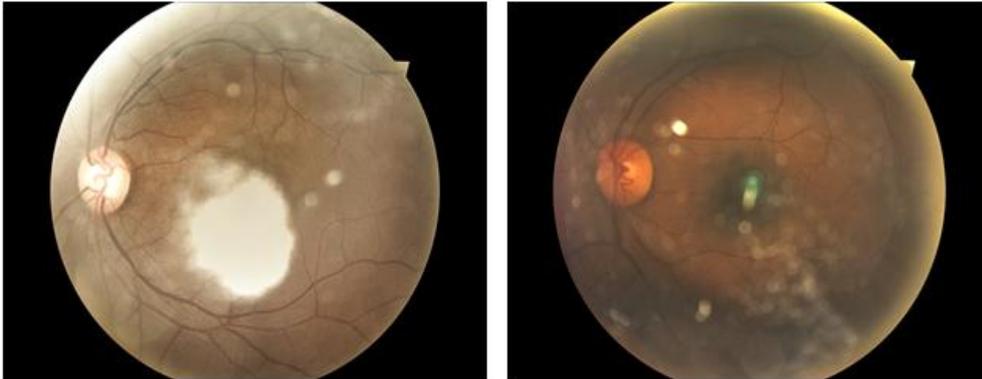


This image has been taken through a pupil that is not dilated enough.

The photo could be improved by:

1. Ensuring the room is dark
2. Using dilating drops if available in your practice<sup>i</sup>
3. Have the patient close their eyes for 30s – 2 minutes between photos to allow the pupils to dilate again

#### Artefact on the camera lens



There is a smudge on the lens of the camera which is visible in both photos. Clean the camera lens with the cleaning cloth<sup>ii</sup> that you have available and then retake the photos. It can help to shine a small torch or pen light to show where the smudges are on the lens.

<sup>i</sup> Dilating drops should be administered by a general practitioner or with a standing order.

<sup>ii</sup> A normal glasses cleaning cloth is adequate to clean the lens. Lens wipes also work well if available.

### Photo Not Centred on the Macula



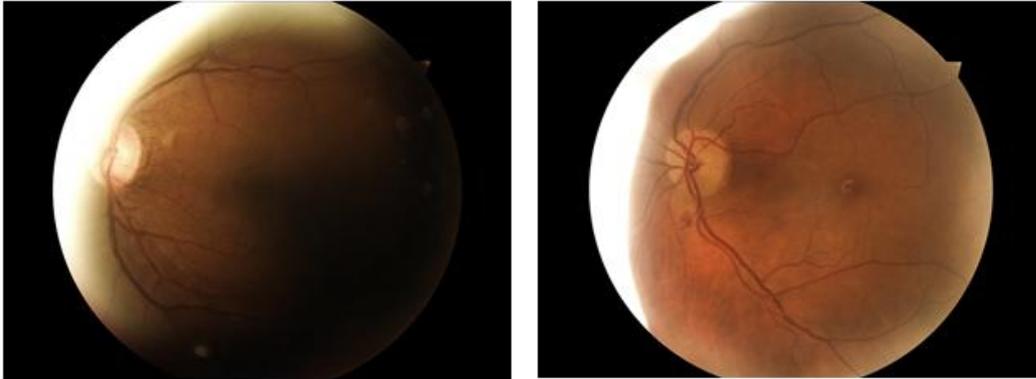
This can happen when the patient is not looking at the fixation target (a small red/green flashing dot) or if they look away at the moment of photography.

- If this happens then retake the photos – you might need to give more instruction to the patient.
- If the patient cannot fixate on the target because of low vision, you can ask them to look at the external target or to look “straight” ahead with their other eye if there is good vision in that eye

### Pale Crescent Shaped Artefact



- On its own, it does not usually prevent grading of photos – this can occur when the patient is not quite centred or in position at the camera





## Diabetic Retinopathy Screening Checklist

### When Testing Vision

Explain the test	<input type="checkbox"/>
Position the patient six (6) metres from a 6 metre eye chart (or 3 metres from a 3 metre eye chart)	<input type="checkbox"/>
Test <u>right</u> eye then <u>left</u> eye for visual acuity (VA)	
Without glasses ( <i>unaided</i> )	RE <input type="checkbox"/> LE <input type="checkbox"/>
If poor vision test pinhole (poor vision is 6/12 or worse)	RE <input type="checkbox"/> LE <input type="checkbox"/>
With glasses if the patient usually uses them for distance	RE <input type="checkbox"/> LE <input type="checkbox"/>
Note: Do not test vision with reading glasses	
Record findings (always put the right eye first)	
Type of vision test:	
No glasses = VA	
Top line = 6	
Bottom line = lowest numbered line they could read	RE <input type="checkbox"/> LE <input type="checkbox"/>
Pinhole = VA <sub>PH</sub>	
Top line = 6	
Bottom line = lowest numbered line they could read	RE <input type="checkbox"/> LE <input type="checkbox"/>
With glasses = VA <sub>BC</sub> ( <i>BC = best corrected</i> )	
Top line = 6	
Bottom line = lowest numbered line they could read	RE <input type="checkbox"/> LE <input type="checkbox"/>
Eg. 6/12 – when line 12 was the smallest they could read	

### After Taking Photos

Make sure you check the photos before the patient leaves and repeat them if they poor quality.

### When Sending Photos

Make sure you include all of the information:

- ) Full Name
- ) Gender
- ) Date of birth
- ) Visual acuity (distance and near VA)
- ) Type of diabetes
- ) Last screening date
- ) Care Plan type
- ) History of Eye health conditions past and present



## **Useful Resources and References**

[www.outbackvision.com.au](http://www.outbackvision.com.au)

[Link to Ellex DRS Retinal Camera Manual on the Webpage](#)

[Link to Screening Clinic poster template](#)

[Link to IEHU](#)

[www.brienholdenvision.org](http://www.brienholdenvision.org)

[Link to Visiting Optometry Services](#)

[Link to regional retinal screening sites](#)

[Contacts at LOV](#)

[www.iehu.unimelb.edu.au](http://www.iehu.unimelb.edu.au)



## Appendix 1 Templates

### Retinal Screening Report



2 Verdun Street, Nedlands WA 6009  
 t (08) 6382 0802  
 f (08) 9381 0700  
 e [outbackvision@gmail.com](mailto:outbackvision@gmail.com)  
[www.outbackvision.com.au](http://www.outbackvision.com.au)

### Retinal Screening Report

All enquiries regarding Retinal Screening Reports should be sent to [outbackvision@gmail.com](mailto:outbackvision@gmail.com) or phone 08 9381 0802

Patient Name		DOB:	Gender:
Name of Grader		Date of report:	

Diabetic Retinopathy	YES
	NO

Type of Retinopathy	Non-proliferative retinopathy (MILD)
	Non-proliferative retinopathy (MODERATE)
	Non-proliferative retinopathy (SEVERE)
	Proliferative retinopathy
	Maculopathy

	Right Eye	Left Eye
Visual Acuity		
Pinhole Visual Acuity		
Best Corrected Vision		

Photo Quality	Adequate	Inadequate
---------------	----------	------------

Comments:

#### NEXT REVIEW:

	Repeat Photo in 12 months
	Next optometry clinic
	Next ophthalmology clinic



## Diabetic Retinopathy Image Grading Request Form

### DIABETIC RETINOPATHY IMAGE GRADING REQUEST FORM

Referring Site	
Referrer Name	
Date of Referral	

**Patient Information**

*Surname		Date of Birth	
* Given Name		Gender	M / F
CALD	Y / N If yes, name of Country:		

**Contact Details (or affix patient label)**

Street Number and Name	
Suburb, Postcode & State	
Home & Mobile Number	

**Medical History**

Diabetes Type	Type 1	Type 2	
Year diagnosed	Date		
Under a Care Plan	Y / N	Date	
Previous Retinal Screen	Y / N	Date	

**Vision**

	Right Eye	Left Eye
VA Uncorrected		
VA Pinhole VA		
VA Corrected		



## Letter of Referral

PRINT ON YOUR LETTER HEAD

DATE

Dr Angus Turner  
Ophthalmologist  
Lions Outback Vision  
2 Verdun St  
NEDLANDS WA 6009

Dear Dr Turner,

Following a diabetic eye screening at XXXXXX XXXXX Diabetes Clinic

NAME            DOB            ADDRESS

was found to need further ophthalmological review. Thank you for your assessment and management as required.

Yours sincerely,

REFERRER NAME

Prov No: