# Diabetes and the Eyes

<table>
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<th>Aim(s) and objective(s)</th>
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<td>The aim of this guideline is to ensure that all eligible people with Diabetes Mellitus (DM) are offered retinal screening to detect signs of diabetic retinopathy to allow for early intervention to prevent visual impairment.</td>
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<table>
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<th>Author(s)</th>
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| Anne Dougan - Diabetes Retinal Screening (DRS) Team Leader  
Dr Susan Arnott – Diabetes MCN Lead Clinician |

<table>
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<th>User group</th>
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| All eligible people with DM living in Lanarkshire.  
All professionals working within Diabetes care: General Practitioners, Practice Nurses, District Nurses, Diabetes Consultants, Diabetes Specialist Nurses, DRS Staff, Diabetes Dietitians, Diabetes Podiatrists. |

This guideline is not intended to serve as a protocol or standard of care. That is best based on all clinical data available for an individual case and may be subject to change as scientific knowledge and technology advances and patterns of care evolve. Adherence to guideline recommendations will not ensure a successful outcome in every case, nor should it be construed as including all proper methods of care or excluding other acceptable methods of care aimed at the same result. Ultimately a judgement must be made by the appropriate healthcare professional(s) responsible for a particular clinical procedure or treatment plan following discussion with the patient, covering the diagnostic and treatment options available. However, it is advised that any significant departure from the guideline should be documented in the patient’s medical record at the time the decision is taken.

**The diabetic retinopathy screening service was only established to detect signs of diabetic retinopathy. Those involved in diabetes care as well as those with diabetes should be aware of the need to continue to attend a community optometrist for all other eye care needs**

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<th>Guideline</th>
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<td><strong>Classification</strong></td>
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<td>- Background retinopathy (R1 – mild, R2 - moderate) – asymptomatic, fluctuates and can resolve (microaneurysms, blot or flame haemorrhages and hard exudates - waxy looking lipid deposits from damaged vessels)</td>
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<tr>
<td>- Pre-proliferative retinopathy (R3, moderate) – venous loops, beading or reduplication, arterial sheathing, arteriovenous shunts, cotton wool spots (retinal infarcts) and multiple, extensive haemorrhages. It denotes increasing retinal ischaemia. High risk of progression to new vessel formation within 12 months</td>
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<td>- Proliferative retinopathy (R4, severe) – new vessel growth on the optic disc or in the periphery of the retina in response to growth factors released by areas of ischaemic retina. These new vessels are friable and likely to cause pre-retinal or vitreous haemorrhage - <strong>sight threatening</strong></td>
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<td>- Advanced diabetic eye disease - includes retinal detachment due to fibrous traction and rubeosis iridis (new vessels on the iris) - <strong>sight threatening</strong></td>
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<td>- Maculopathy – mainly affects type 2 Diabetes. Can be exudative, oedematous or ischaemic – <strong>sight threatening</strong></td>
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Other ocular complications of diabetes include transient visual disturbances secondary to osmotic changes, cataract, primary glaucoma or glaucoma secondary to retinopathy.

**RISK FACTORS FOR THE DEVELOPMENT AND PROGRESSION OF RETINOPATHY**

- poor glycaemic control
- raised blood pressure
- duration of diabetes
- microalbuminuria and proteinuria
- raised triglycerides and lowered haematocrit
- pregnancy
- serum cholesterol (macular exudates and oedema)

The effect of smoking on the development and progression of retinopathy is unclear. Patients with multiple risk factors should be considered at higher risk.

**SYMPTOMS**

- **Asymptomatic** until relatively advanced
- Transient disturbance of refraction - myopia (short-sightedness), due to osmotic changes in the lens of the eye - patients should be advised to defer eye tests until glycaemic control has been stabilised
- Gradual loss of vision - maculopathy, cataract
- Sudden, painless, loss of vision - vitreous haemorrhage, retinal arterial or venous thrombosis
- Appearance of ‘floaters’ - small or recurrent vitreous haemorrhages
- Chronic pain and redness - rubeosis, glaucoma
- Field defects and impaired night vision - sequelae of extensive laser photocoagulation
- Extra ocular cranial nerve palsies - diplopia (double vision)

**RETINAL SCREENING (DRS)**

Screening is defined as the ongoing assessment of fundi with no diabetic retinopathy or non-sight-threatening diabetic retinopathy in order to detect referable, potentially sight-threatening retinopathy in asymptomatic people with diabetes so that treatment, where required, can be carried out to prevent visual impairment. Screening does not obviate the need for a regular general eye examination to monitor changes in refraction and to detect other eye diseases.

Systematic screening in NHS Lanarkshire is carried out in the community using digital retinal photography. If sight threatening eye disease is detected the patient is then referred directly to an ophthalmologist for intervention.

**Eligibility**

All people with type 1 diabetes are offered screening from age 12 years.
All people with type 2 diabetes are offered screening from diagnosis.

**Referral**

It is the responsibility of the General Practitioner to refer a person to the DRS Programme either by

A) a patient record appearing in SCI Diabetes when coded as having a diagnosis of diabetes on the GP IT clinical system or
B) a referral letter to the DRS administration office (if the patient has denied consent for their data to be recorded in SCI Diabetes)
**Suspension from Screening**

An individual may be suspended from the DRS screening programme temporarily or permanently by their General Practitioner through the SCI Diabetes DRS Register. This may be due to informed choice, if they are attending the ophthalmology clinic, if they have a terminal illness or if they are unfit for treatment. Patient transport is currently not available from the Scottish Ambulance Service for attendance at community based clinics. This follows a pilot where this service was poorly utilised and hence was not cost effective.

**Screening intervals**

- People newly diagnosed with diabetes will be offered an appointment for retinal screening within 90 days of referral
- Any person with diabetes and no diabetic retinopathy (R0) or maculopathy (M0) will be recalled for screening in 1 year
- Any person with diabetes and mild diabetic retinopathy (R1) and no maculopathy (M0) will be recalled for screening in 1 year
- Any person with diabetes and moderate retinopathy (R2) and/or observable maculopathy (M1) will be rescreened in 6 months
- People with referable retinopathy (R3 - moderate or R4 - severe) and/or referable maculopathy (M2) will be referred to ophthalmology by the DRS service

**Where is screening performed?**

In order for screening to be provided at a site convenient to the person, DRS in NHS Lanarkshire is situated at

- Buchanan Building, Coatbridge - 3 days per week
- Orchard Street Medical Centre, Hamilton - 5 days per week
- Wishaw Health Centre - 5 days per week
- Central Health Centre, Cumbernauld - 2 days per week

Contact Telephone Number for DRS Service - 0845 3373341.

DRS is carried out at Carstairs State Hospital and Shotts Prison annually using hand held slit lamp biomicroscopy.

**How is screening performed?**

Digital retinal photography or slit lamp biomicroscopy by trained individuals is used in the Digital Retinal Screening Programme in NHS Lanarkshire. Visual acuity is also measured and reported. Retinal photography can frequently achieve a sensitivity of 80% and is a more effective screening method than direct ophthalmoscopy, which only rarely achieves 80% sensitivity even when carried out by properly trained operators.

Slit lamp biomicroscopy carried out by an appropriately experienced practitioner is as good as photography for the assessment of clinically significant macular oedema.

Between 3% and 14% of retinal photographs are ungradeable. Slit lamp biomicroscopy used by properly trained individuals can achieve sensitivities similar to, or greater than, retinal photography, with a lower technical failure rate. However, slit lamp biomicroscopy has only limited validation as a screening tool. Patients with ungradeable retinal photographs will be offered slit lamp biomicroscopy as part of the DRS service in NHS Lanarkshire. This will be carried out by a trained, competent and accredited slit lamp examiner with experience of Level 2 grading and who participates in the internal and external quality assurance within the DRS programme.
Dilated direct ophthalmoscopy should only be used opportunistically when no other method is available.

The patient should be encouraged to attend the DRS Service in addition to their optometrist, even if this service is provided by them, to ensure quality assurance. The DRS Service uses the SCI Diabetes system available in Primary and Secondary Care to record the information in the single patient diabetes record. This system is also used to inform the Scottish Diabetes Survey. It is important the information on this database is robust, complete and consistent to inform service achievement and development.

Quality Assurance
Retinal photographs in NHS Lanarkshire are graded by an appropriately trained grader (DRS Diploma) to facilitate quality assurance. All graders are eligible to have 500 retinal photographs rechecked for quality assurance each year by an Ophthalmologist.

Results Reporting
The outcome of the screening test is entered into SCI Diabetes as part of the person’s single shared record of their diabetes. The information then back populates the GP IT clinical system. It is the GP’s responsibility to validate the DRS register to confirm the status of the person’s suitability for screening. It is the GP’s responsibility to suspend patients temporarily or permanently from the call/recall system dependant on attendance at the eye clinic, if registered blind or due to frailty or co-morbidity.

Further investigation and Treatment
Referral Intervals for Diagnosis and Treatment
Delay in treatment is associated with poor outcome and visual loss.

A Scottish Government policy outlines intervals for all patients from referral to treatment:

- All patients with referable retinopathy should be seen within 12 weeks
- All patients with sight-threatening retinopathy should be treated within 18 weeks
- Patients with high-risk proliferative retinopathy (neovascularisation of the disc or neovascularisation elsewhere with vitreous haemorrhage) should receive laser treatment urgently

Risk factor modification

- Tight control of blood glucose reduces the risk of onset and progression of diabetic eye disease in type 1 and 2 diabetes. Rapid improvement of glycaemic control can result in short term worsening of diabetic retinal disease although the long term outcomes remain positive
- Reducing blood pressure to at least 144/82 mm Hg in type 2 diabetes reduces the incidence and progression of sight-threatening diabetic eye disease and this is likely also to be the case for type 1 diabetes

Laser Photocoagulation

Severe visual impairment (legal blindness) can be reduced through laser photocoagulation.

- All people with type 1 or type 2 diabetes with new vessels at the disc or iris and elsewhere, with or without vitreous haemorrhage should receive laser photocoagulation
- People with severe or very severe non-proliferative diabetic retinopathy should receive close follow up or laser photocoagulation
• Modified ETD RS grid laser photocoagulation should be used for people with clinically significant macular oedema in the absence of significant macular ischaemia
• Laser photocoagulation, if required, should be completed before any rapid improvements in glycaemic control are achieved

Vitrectomy
Early vitrectomy is of proven value for improving long term vision in people with type 1 diabetes and persistent vitreous haemorrhage. Its value in type 2 diabetes is less certain. People with type 1 or type 2 diabetes who have severe fibrovascular proliferation with or without retinal detachment threatening the macula also have better visual acuity after vitrectomy. People with type 2 diabetes and vitreous haemorrhage which is too severe to allow photocoagulation should be referred for consideration of a vitrectomy.

Cataract Extractions in Patients with Diabetes
Visual outcome following cataract surgery in people with diabetes is closely linked to age and severity of retinopathy present before surgery. The balance of evidence does not show an increase in long term incidence of macular oedema or diabetic retinopathy following cataract extraction. Cataract extraction should not be delayed in people with diabetes and is advised when sight-threatening retinopathy cannot be excluded.

Pharmacological Therapy
Although a number of treatments for diabetic retinopathy are of interest, there is no compelling evidence for their routine use.

Rehabilitation
People with severe visual impairment should be registered as partially sighted (best corrected visual acuity 6/60) or blind (3/60 or worse). Delay in registration can lead to reduced awareness of available disability benefits and support. Any level of visual impairment that results in a recognised disability will allow direct referral to a local low vision network and/or visual impairment team for assessment and ongoing support. Low vision aid clinics and community self help groups, as part of a low vision service can improve quality of life and functional ability for people with visual impairment.

Follow up on discharge from Ophthalmology back to the DRS Service
The robust IT Soarian software and its interface with SCI Diabetes has the ability to suspend patients from the screening programme who are attending Ophthalmology for assessment and treatment.

There is a software fail safe built into the Soarian system to ensure that those patients attending Ophthalmology are recalled for screening if there has been no update in the Ophthalmology result page in a 12 month period.

References

Diabetes MCN endorsement
May 2014

Review date
May 2017
Summary - Diabetes and the Eyes

Retinopathy, a microvascular complication of diabetes, can cause visual impairment.

Classification

- Background retinopathy (mild to moderate)
- Pre-proliferative retinopathy (moderate)
- Proliferative retinopathy (severe) – sight threatening
- Advanced diabetic eye disease - sight threatening
- Maculopathy - sight threatening

Other ocular complications of diabetes

- transient visual disturbances secondary to osmotic changes
- cataract
- primary glaucoma
- glaucoma secondary to retinopathy

Risk factors for the development and progression of retinopathy

- poor glycaemic control
- raised blood pressure
- duration of diabetes
- microalbuminuria and proteinuria
- raised triglycerides and lowered haematocrit
- pregnancy
- serum cholesterol (macular exudates and oedema)

The effect of smoking on the development and progression of retinopathy is unclear. Patients with multiple risk factors should be considered at higher risk.

Symptoms

- Asymptomatic
- Transient disturbance of refraction
- Gradual loss of vision
- Sudden, painless, loss of vision
- Appearance of ‘floaters’
- Chronic pain and redness (glaucoma)
- Field defects and impaired night vision
- Extra ocular cranial nerve palsies

Diabetes Retinal Screening (DRS)

Systematic screening in NHS Lanarkshire is carried out in the community using quality assured digital retinal photography (or slit lamp biomicroscopy when images are ungradeable). If sight threatening eye disease is detected the patient is then referred directly to an ophthalmologist for intervention. Screening does not obviate the need for a regular general eye examination to monitor changes in refraction and to detect other eye diseases. GPs are responsible for validating the Retinal Screening Register on SCI DC network.

People with type 1 diabetes are offered screening from age 12 years
People with type 2 diabetes are offered screening from diagnosis
**Screening intervals**

- newly diagnosed with diabetes within 90 days of referral (by GP or identification through SCI Diabetes IT link)
- no diabetic retinopathy/maculopathy - recalled in 1 year (R0/M0)
- mild diabetic retinopathy and no maculopathy - recalled 1 year (R1/M0)
- moderate retinopathy (R2) and/or observable maculopathy (M1) - recalled in 6 months
- referable retinopathy (R3 or 4) and/or referable maculopathy (M2) will be referred to ophthalmology by the DRS service

Contact Telephone Number for DRS Service - 0845 3373341.

**Results Reporting**

- recorded on electronic SCI Diabetes
- SCI Diabetes back populates GP IT systems

**Further investigation and Treatment**

- Risk factor modification – control of blood glucose to 53mmol/mol, control of blood pressure to at least 144/82mmHg
- Laser Photocoagulation
- Vitrectomy
- Cataract Extractions
- Rehabilitation