Diabetic retinopathy causes a loss of sight that can affect physical and psychosocial abilities. Nurses can help reduce the incidence of this devastating condition.

Patient support to reduce risk of diabetic retinopathy

In this article...

- The risk factors of diabetic retinopathy
- How DR can be diagnosed and treated
- How nurses can help reduce the incidence of DR

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Abstract: McLauchlan R (2014) Patient support to reduce risk of diabetic retinopathy. Nursing Times; 110: 25, 12-15. Diabetic retinopathy (DR) is the most common cause of blindness in the western world resulting in damage to the blood vessels of the retina. This damage causes visual loss that can have a devastating effect on patients and their families, and is intensified by the loss of self-management abilities that may have physical and psychosocial implications. Nurses in both primary and secondary care settings need to understand the condition as they can play a vital role in reducing its incidence. This article discusses the causes, treatment and management of DR, and provides practical details of how nurses can help educate and empower patients to reduce their risk of developing it.

In the western world, diabetic retinopathy (DR) is the most common cause of blindness resulting in damage to the blood vessels of the retina (Royal College of Ophthalmologists, 2013). Approximately 90% of people with type 1 diabetes and 60% of those with type 2 diabetes will have developed retinopathy within 20 years of diagnosis (Royal College of General Practitioners’ Effective Clinical Practice Unit, 2002).

Despite the availability of effective screening and treatment, the prevalence of DR remains high (RCO, 2013); it is estimated that every year, in England, 4,200 people are at risk of blindness caused by DR and the condition causes 1,280 new cases of blindness per year (NHS Diabetic Eye Screening Programme, 2013). However, treatment can prevent blindness in 90% of those who are at risk if it is applied early and adequately (Department of Health and British Diabetic Association, 1995).

Pathophysiology

The clinical features of DR result from pathological changes in the blood vessels of the retina – the light-sensitive layer of cells at the back of the eye that constitutes the “seeing” part of the eye. When light hits the retina, it is converted into electrical signals, which are sent to the brain through the optic nerve; the brain interprets the signals to produce the images we see. A delicate network of blood vessels supplies the retina with blood, bringing it oxygen and nourishment.

Although the exact mechanism by which diabetes causes retinopathy remains unclear and several theories have been proposed, it is widely believed that when the capillaries become blocked or leak, or grow haphazardly (a microvascular feature associated with diabetes), the retina becomes damaged in a number of ways.

DR can be broadly divided into two clinical stages:

- Non-proliferative (background) retinopathy; and
- Proliferative retinopathy (RCO, 2013).

Table 1 shows a wider range of clinical stages but these are only used for grading purposes and to identify the levels of retinopathy and maculopathy so appropriate referrals are made.

Non-proliferative (background) retinopathy

Microaneurysms that outpouch from the side of the capillary walls and are one of the

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first identifiable features of DR. They appear as small, round red or black spots distributed unevenly around the posterior fundus. Examination of the back of the eye may also reveal haemorrhages (large red dots and blots due to capillary rupture). As the disease progresses, hard exudates (yellow lipid deposits leaked from surrounding microaneurysms and capillaries) can also be seen (Fig 1). At this stage no specific treatment is required.

Proliferative (advanced) DR
Proliferative retinopathy develops after the occlusion of retinal capillaries leading to retinal ischaemia. This promotes the development of neovascularisation owing to the release of vascular endothelial growth factors, a process by which new blood vessels proliferate on the surface of the retina (Fig 2). However, these vessels are fragile, haemorrhage easily and the resulting accumulation of blood in the vitreous cavity seriously impairs vision. This may be permanent due to further complications, such as traction retinal detachment, leading to registered blindness.

Diabetic maculopathy
Diabetic maculopathy (Fig 3) can occur at any stage of the diabetic retinopathy and involves changes in the macula (the macula provides central vision and is essential for clear, detailed vision and oedema), which can cause loss of visual acuity. The two main changes that can occur, either in isolation or simultaneously, are exudative maculopathy characterised by exudates and macular oedema (swelling or thickening of the macula caused by fluid leaking from the retina’s blood vessels), and ischaemic maculopathy (blood vessels that nourish the macula close off leading to cell death). Macular ischaemia can cause rapid vision loss at any stage of non-proliferative disease. In addition, similar vascular changes occur in non-proliferative retinopathy and can cause peripheral retinal ischaemia (lack of blood flow to the retina) and trigger progression to sight-threatening proliferative diabetic eye disease.

Risk factors
Several factors may cause or exacerbate DR, including:

- Duration of diabetes – this is the most consistent and probably the strongest predictor for the development and progression of retinopathy because the likelihood of developing DR increases over time after diabetes has developed (Klein et al, 1994);
- Pregnancy – pregnant women who have diabetes may experience an aggravation of their DR during pregnancy (Vestgaard et al, 2010);
- Poor glycaemic control – several studies have shown that this is correlated with the presence or progression of DR (Aiello et al, 1998);
- High blood pressure;
- Obesity;
- Alcohol consumption;
- Physical inactivity;
- Smoking; and
- High cholesterol levels.

A study by Sivaprasad et al (2012), which compared the prevalence of DR in people of various ethnic groups in the UK, found that, compared with white Europeans, African/Afro-Caribbean and South Asian people with type 2 diabetes were more prone to the condition, including developing sight-threatening retinopathy and maculopathy.

Signs and symptoms
DR does not usually cause any noticeable symptoms until it has reached an advanced stage, so it is important that people with diabetes are offered screening. Retinopathy symptoms may include:

- Reduced or blurred vision;
- Sudden change in vision;
- Difficulty reading;
- Seeing rings around lights or dark spots/dark strings floating in the vision (floaters);
- Flashing lights;

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Review

Loss of night vision; and
Fluctuating vision.

Vision loss is usually gradual and slow but, in the case of bleeding inside the eye or retinal detachment, it is rapid and marked.

Diagnosis and investigations
Diagnosis is obtained by direct visualisation after careful history taking as a part of comprehensive eye examination. Fluorescein angiography and optical coherence tomography (OCT) are also used to:
- Confirm the diagnosis;
- Determine the extent of damage;
- Plan treatment; and
- Monitor its efficacy.

Fluorescein angiography involves a camera taking a series of photographs of the retina after a small amount of yellow dye (fluorescein) is injected into a vein in the arm. The photographs of the fluorescence dye travelling throughout the retinal vessels will highlight “leaky” blood vessels, microaneurysms and blot-and-dot haemorrhages. Areas of non-perfusion appear as homogenous dark patches bordered by occluded blood vessels; intraretinal microvascular abnormalities can be found in the borders of the non-perfused retina and are evidenced by collateral vessels that do not leak.

OCT is used to determine the thickness of the retina, the presence of retinal swelling and vitreomacular traction. It is particularly useful for diagnosing and managing diabetic macular oedema.

If the retina cannot be seen because of vitreous haemorrhage, an ultrasound test can be conducted to determine whether the retina has detached. If there is detachment near the macula, this often calls for urgent surgery.

Screening
If DR is to be detected and treated before it becomes sight-threatening, regular eye screening is necessary. The national screening programme in the UK aims to reduce the risk of sight loss among people with diabetes by detecting, and treating it, early. All patients over 12 years of age should be offered a retinal screening at least every 12 months, from the moment they are diagnosed with diabetes. The only exceptions are those with diabetic eye disease who are already under the care of an ophthalmology specialist.

The screening test involves checking visual acuity and administering eye drops to enlarge the pupils so the retina can be visualised. Digital photographs and OCT of the retina are taken by trained staff who then use the standardised protocol (Table 1) to grade the DR.

Treatment and management
The treatment basis of DR is the strict control of blood-sugar levels (the aim is for HbA1c <7%, ideally 6.5%) and blood-pressure control (goal of ≤140/80mmHg) (UK Prospective Diabetes Study Group, 1998; Diabetes Control and Complications Trial Research Group, 1993). Lipid-lowering therapy has also been shown to reduce the risk of progression of DR (RCO, 2013). If a patient experiences a sudden loss of vision, any new abnormal blood vessels on the surface of the iris, vitreous haemorrhage, retinal detachment or maculopathy, a referral should be made for an emergency review by an ophthalmologist.

Current management of DR includes laser surgery, intravitreal injection of steroids and various antivascular endothelial growth factor (anti-VEGF) drugs. Retinal laser can reduce the oxygen need of the retina and is highly effective in slowing the progression of retinopathy and preventing blindness. Laser surgery can be performed to shrink abnormal new vessels and reduce macular swelling. Steroids or anti-VEGF drugs injected into the eye may also be considered to manage diabetic macular oedema.

Vitrectomy surgery – removing intra-vitreous haemorrhages or treating retinal detachment is important in the treatment of proliferative retinopathy to improve or maintain vision.

The role of nurses
The complications of diabetes can have a devastating effect on patients and their families. This is often intensified by the loss of a patient’s ability to self-manage, which may have physical and psychosocial implications (Williams et al, 2004). All nurses who care for patients with diabetes have an important role to play in preventing complications, and it is important to establish clear communication between the health professionals in different disciplines in all settings who provide care for these patients.

Patient education plays an important role in the management of retinopathy, as increased awareness is linked with motivation to adhere to self-management goals (RCO, 2013). Patients with sight-threatening retinopathy may need counselling regarding a potential loss of vision as well as a clear explanation of the treatment options. It is important that patients understand:
- What retinopathy is;
- Why it develops; and
- What can be done to prevent its progression and reduce the risk of blindness.

Patients also need to know about other potential ophthalmic complications of diabetes. They should be made aware that the unusual changes in blood-sugar level resulting from diabetes can have an effect on the lens of their eye, especially when diabetes is uncontrolled. This can also result in blurring of their vision temporarily causing focusing problems and it may not be retinopathy (Walker and Rodgers, 2002). Additionally, it is also important to remind the patient that...
other factors, such as presbyopia (age-related blurred near vision) and cataract (opacity of the lens), may also cause blurring of their vision. However, patients should be advised to seek urgent medical advice if they experience any changes in their vision.

Understanding the risk to their sight posed by complications of their diabetes may increase patients’ motivation to attend screening and clinic appointments, and to maintain good glycaemic control. This means it is important that they receive appropriate information at the very early stages from nurses who are knowledgeable about DR.

As the risk of the development and progression of DR is closely associated with the type and duration of diabetes, blood glucose, blood pressure and, possibly, lipids, it is important that patients understand the importance of controlling their blood-glucose levels, blood pressure and cholesterol as soon as they are diagnosed with diabetes. This can be reinforced when patients are particularly aware of the implications of vision loss due to diabetes.

Smoking has been shown to be associated with microangiopathy when complications occur early in the course of type 1 diabetes, so patients who smoke should be given cessation advice or referred to stop-smoking services; all patients, however, should be given advice on achieving a healthy, balanced diet and sufficient exercise.

Attending an ophthalmic clinic for the first time can be stressful, so patients should be advised what to expect at each stage of the examination. Visual acuity will be checked to determine the level of vision. It also involves dilating the pupils using mydriatic eye drops, and patients must be warned that this can lead to temporary blurred vision (McBride, 2001).

Undergoing tests can be stressful so it is important patients receive correct and consistent information from all the health professionals who are involved in their care. Fluorescein angiography is a common investigation to evaluate retinal circulation; it does have side-effects but they are generally minimal. The dye will give the skin a yellow tinge and urine will be bright yellow for 24-48 hours until it has been excreted from the body. Patients who use urine dipsticks for visual glucose monitoring should be made aware that the dye may have an effect on their reading.

Laser therapy is used in the early stage of DR to halt its progression; patients should be informed that during the laser treatment they will be aware of flashing light and that their vision will be “dazzled” and blurred for a few hours after the treatment. Patients needing an injection of an intravitreal drug should be made aware that an anesthetic drop will be instilled to numb the surface of their eye, and the drug will be injected through sclera (white part of their eye) into the vitreous humour.

It has been estimated that without treatment, 50% of all patients with DR will become blind within five years of diagnosis (Hamilton et al., 1996), which can be a devastating experience. People who lose their vision go through all the stages of grieving associated with other losses of function such as denial, anger, frustration, depression, anxiety and hopelessness (Horowitz and Reinhardt, 2000). Patients may fear how they will cope with many everyday activities, such as going out alone, and how they will learn the new skills they will need to cope with their disability. Visual impairment may also cause anxiety and its effects are often accompanied by physical disability such as loss of competence in daily living skills (Crews and Campbell, 2001). It is important to explain that help is available to enable patients to make the most of their remaining sight, and to signpost patients to those organisations that can give them more information.

Conclusion
Dr does not usually cause any noticeable symptoms until visual loss develops. It can have a devastating impact on patients’ lives, so early identification and treatment are crucial. Regular ophthalmic screening is essential to detect the condition, so patients need to understand the importance of this. All nurses, whether in primary or secondary care, have a major role to play to help reduce the incidence of DR by educating and empowering patients to maintain their blood-glucose control, and encouraging them to attend for regular eye examinations.

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