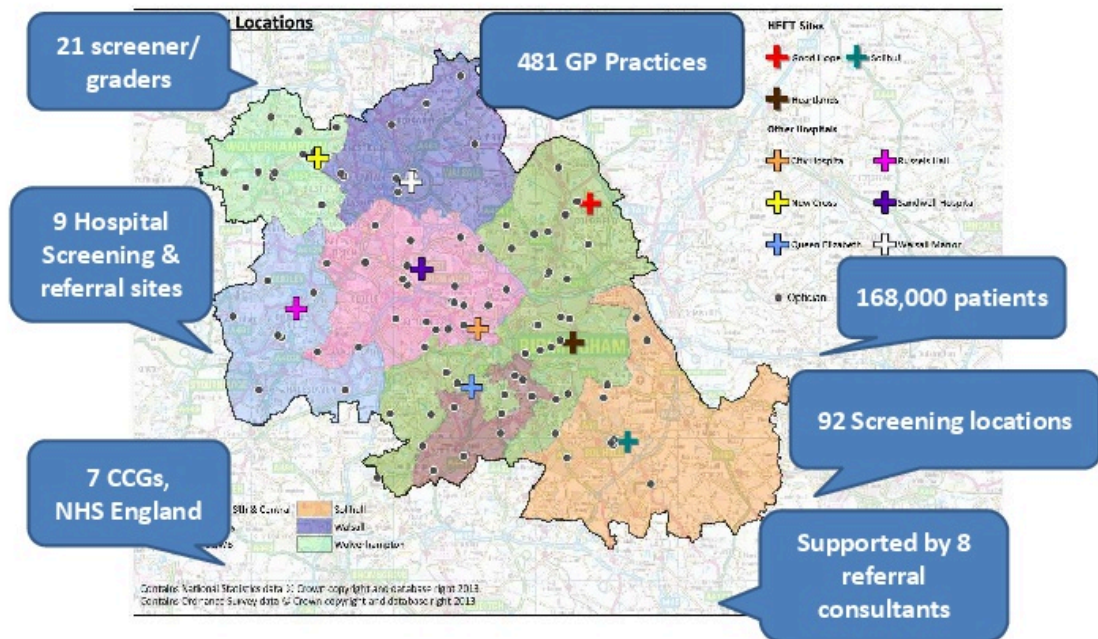


## Diabetic Eye Screening Programme in Birmingham, Solihull and the Black Country: one of the biggest interlinked programmes.

The eye screening service is managed by Heart of England NHS Foundation Trust (HEFT) and covers the Birmingham, Solihull and the Black Country areas. We are the largest screening programme in the country and offer diabetic eye screening at over 90 optician and Hospital sites across the catchment area to a population of 176,000 diabetic patients. We now also screen in Wolverhampton, which means that patients throughout the area have a wider choice of locations to be screened at. Diabetic eye screening is very important as part of good diabetes care. The screening visit itself is a quick and simple process. The NDESP Goal is to reduce the risk of sight loss among people with diabetes, by the prompt identification and effective treatment of sight threatening retinopathy at the appropriate stage during the disease process.

*Our diabetic eye screeners and graders are all accredited and highly trained practitioners, with our grading team based at Heartlands Hospital in Birmingham. All of the images taken at diabetic eye screenings may be reviewed by several different graders before a final decision is reached.*



### Programme team:

Our programme consists of a management team and 21 screener/graders based at Heartlands Hospital with Dr. Margaret Clarke as our Clinical Lead, and a number of coordinators spread across the region at each hospital site. Aside from routine digital screening (RDS) and grading members of staff also take on Digital Surveillance (DS) clinics, slit-lamp biomicroscopy (SLB) clinics, clinical studies, City and Guilds assessment, failsafe and administration duties. As a team we undertook over 150,000 grades last year.

**Promotional activities:**

The screening programme has undertaken a variety of promotional activities that aim to increase patient uptake, especially in geographic areas and ethnic groups with high 'Did Not attend' (DNA) and 'Did Not Respond' (DNR) rates. DNA/DNR results were analysed giving us an understanding of areas with poor eye screening uptake. Using our DNA/DNR statistical information has helped to give an overview of which areas should be targeted, to increase awareness about screening.



We are currently in the post-production stages of making an awareness video about the perils of not attending your eye screening appointments. Starring Asian music artist, Kazz Kumar, it is hoped the short film will appeal to our hard-to-reach patients. It will be translated into numerous languages.

Our programme is using a variety of methods to engage with GP practices that have a poor uptake of diabetic patients attending eye screening. Screening co-ordinators are visiting these GPs with information about how to register/update diabetic patients information for screening, exclude patients no longer eligible to our scheme (helping to cleanse inaccurate data), as well as giving information about referral pathways and protocols.

In addition, posters and leaflets have been sent to every GP in Birmingham and the Black Country, as well as numerous pharmacies. Four posters were designed each using the same concept of 'point-of-view' images being obscured by sight threatening retinopathy. They're intended to appeal to hard to reach groups included young people, the African-Caribbean and Asian communities and a more generalised poster depicting a driver whose view of the road is seriously obscured by advanced retinopathy. Electronic versions of the general 'car driving' poster have also been sent to GPs to be displayed on their TV screens.

Some of our Screener/Graders have photography and design backgrounds and have designed numerous leaflets and posters in-house, drastically reducing the cost of producing the material. The team have produced information leaflets aimed at **pregnant patients and DS patients**, explaining why it is important that these patients have to attend screening more frequently.

**What Happens Next?**  
Attached should be an appointment for screening. It is important that you attend this. If you need to rearrange it please telephone the local coordinator.

<b>City Hospital</b> Birmingham, B13 7QH 0121 507 3516 Mon-Thurs 9.30am-3.30pm	<b>Briarley Hill Health Centre</b> Dudley, DY1 2HQ 01384 456 111 ext 5293 Mon-Fri 7.30am-1.30pm
<b>Good Hope Hospital</b> Sutton Coldfield, B75 7RR 0121 424 9250 Mon-Fri 8am-3pm	<b>Sandwell Hospital</b> West Bromwich, B71 4HJ 0121 507 3516 Mon-Thurs 9.30am-3.30pm
<b>Heartlands Hospital</b> Birmingham, B9 5SS 0121 424 3173 Mon-Fri 9.30am-2.30pm	<b>Solihull Hospital</b> Solihull, B91 2JL 0121 424 3173 Mon-Fri 9.30am-2.30pm
<b>Queen Elizabeth Hospital</b> Edgbaston, B15 2WB 0121 371 6916 Mon-Fri 8.30am-4.30pm	<b>Walsall Manor Hospital</b> Walsall, WS2 9PS 01922 656415 Mon-Fri 10am-4pm
<b>New Cross Hospital</b> Wolverhampton, WV10 0QP 01902 695311 Mon-Fri 8.30am-5pm	

**Diabetic Eye Screening During Pregnancy**

Birmingham, Solihull and Black Country  
Diabetic Eye Screening Programme

**NHS**

The leaflets have been given out at community events across the region and were also attached with diabetic medication packaging at pharmacies in Dudley.

A multi-language leaflet was also produced with the simple phrase 'Diabetes Can Harm Your Vision' translated into:

Urdu  
Punjabi  
Hindi  
Bengali



A comic book style leaflet aimed at young people, as well as people with learning disabilities, is currently being produced. It is hoped that the colourful and simple way the information is delivered in this leaflet will increase awareness about the screening process, as well as alleviating fears and misconceptions about diabetic eye screening.



Our eye screening programme was featured on Midlands Today, broadcast on BBC1 on 24/04/13 on the main and shorter bulletins throughout the day. The news segment featured interviews with experienced screener David Roy and a patient whose sight was saved by attending his regular diabetic eye screening.

One of our consultants Dr Ateeq Syed has been interviewed on one of the West Midlands most popular Asian radio stations, Raaj FM. Through the interview he was able to reach an Asian audience and inform them the dangers diabetes poses to sight. The screening programme also arranged for a live radio broadcast to take place from Heartlands Hospital Diabetes Centre. DJ Johnny Dean, from community station Switch FM, underwent a patient's journey at the centre discussing the importance of eye screening as he got screened live on air. Switch FM have listeners in excess of 100,000 people.

The community and media events attended by our screening team have been advertised on the Diabetic Eye Screening Facebook page and our Twitter page. Both the Facebook and Twitter accounts are also used to highlight useful information about diabetic retinopathy and diabetes in general to members of the public.

Facebook account: <https://www.facebook.com/pages/Diabetic-Eye-Screening-Birmingham-Black-Country-and-Solihull/283263961705905>

Twitter account: @EyeDilate

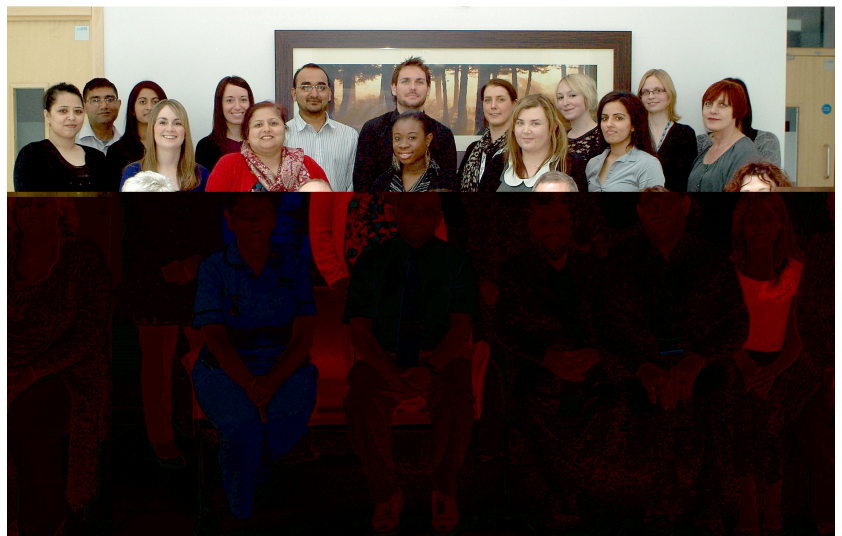
### Audits and Research:

Most members of the team will take on one or more diabetic retinopathy screening service audits. Clinical audits are an important part of our screening programme as they help us evaluate and improve the quality of the service we provide. Some subjects that have been covered recently have been:

- *How Accurate are Photographic Surrogate Markers used to Detect Macular Oedema in the English National Screening Programme?*
- Diabetic Retinopathy Screening in Adolescent Patients.
- *Diabetic Retinopathy Screening in Patients Aged 90 Years and over.*
- Is it Safe to Increase Diabetic Retinopathy Screening Intervals in Patients with no Background Diabetic Retinopathy?
- *Epiretinal Membrane and Macular Holes in Diabetic Retinopathy Screening.*
- Sight Threatening Diabetic Retinopathy in Patients with Type 2 Diabetes Undergoing Bariatric Surgery.
- *One Field versus Two Fields: Is a Macular Centred Photograph Adequate for Diabetic Retinopathy Screening?*
- An evaluation of a surveillance clinic with two fields digital photography for those who present with early signs of referable diabetic maculopathy over a 4 year follow up period.

**Our audits have been presented at local and national meetings as well as annual conferences such as Diabetes UK, Royal College of Ophthalmology, European Association for the Study of Diabetes, Eye Complications and Medical Ophthalmology Society UK.**

Our screening programme supports clinical research by working closely with Heartlands Hospital Medical Innovation Development and Research Unit and Aston University. Many of our screeners are research accredited and conduct photography and OCT on patients involved in clinical trials. Some of the clinical trials we are involved in at the moment include the use of eye drops as a prevention of DR, the use of a light mask worn during sleep to treat non-central DMO and the use of Lucentis in treating vein occlusions. We were also one of the centres who recruited patients for the Improving Screening for Macular Oedema (ISMO) study which looked at ways at improving the value of screening for DMO using surrogate photographic markers.



We are a part of the Heart of England Retinal Trials Group (HRTG) and undertake 7-fields photography, OCT and mfERG for clinical trials EUROCONDOR, CLEOPATRA, CRYSTAL, BRIGHTER and ROSA.

### Training:

Heart of England Diabetic Retinopathy Department of Training have been training screeners, graders, and clinicians since 2005, and have developed into the largest training provider in England. Paul Dodson is our head of clinical training and overseas development. We run courses for all levels of screener and grader, including clinical leads. Amazingly, despite the longevity of the training programme, we are still attracting large numbers of delegates every year. We have also trained overseas staff from the USA, UAE, Singapore, Malta, and Ethiopia.

Since 2006 we have had links with the Black Lions Diabetes Centre in Addis Ababa and have worked with the Ethiopian Diabetes Association (EDA) to raise the money to buy the hospital five retinal cameras and two Pascal lasers. Members of staff have travelled to Ethiopia on several occasions to carry out training for nurses and doctors and help to set up their new equipment.

As the UK is seen as the gold standard for diabetic eye screening, many countries look to us for guidance and development. If you would like any information about courses, please contact Karen, Programme Training Lead.

[www.retinalscreening.co.uk](http://www.retinalscreening.co.uk)

## Macular holes in a diabetic retinopathy screening programme

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**Running title:** Macular holes in diabetic retinopathy screening

**Keywords:** macular hole, diabetes, diabetic retinopathy screening,

No financial interest. Data presented at European Association for Study of Diabetes eye complications (EASDec) annual meeting, Padua May 2014.

### Macular holes in a diabetic retinopathy screening programme

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<sup>1</sup> Departments of Diabetes and Ophthalmology, Birmingham Heartlands Hospital, UK

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**Introduction:** Macular holes (MH) are a cause of serious loss of vision in elderly patients, but apart from an association with the complications of proliferative retinopathy it is uncertain whether MH are associated with diabetes mellitus.

**Methods:** Prevalence, clinical characteristics, visual acuity (VA using Snellen chart) and retinal appearances of MH were assessed in a retrospective analysis of patients in the Birmingham, Solihull and Black Country diabetic retinal screening service between 2008-2011 where MH had been noted and confirmed in an eye department. Diagnostic difficulties and prevalence were assessed.

**Results:** 246 known cases and 41 new cases were identified. Mean annualized prevalence was 0.38% (287/72165) and mean incidence of new patients was 9 per year (range 5-13). MH occurred more commonly in female patients (70.3%) with a mean age of 74.7yrs. 55% of patients with known MH and 42% of patients with new diagnosis of MH had a VA  $\geq 6/60$ . Difficulties in diagnosing MH using retinal photography included a normal retinal appearance or an altered macula without classic features. 73 patients (25.4%) were referred for surgery. Post-operative retinal photographs commonly showed vitreous opacities and cataract formation, and rarely a speckled appearance or retinal detachment.

**Conclusion:** Most MH cases were not identified by the screening programme. Newly diagnosed MH were rare in our diabetic retinopathy screening programme. Diagnosis of MH can be suspected on the finding of reduced VA and abnormal retinal photography.

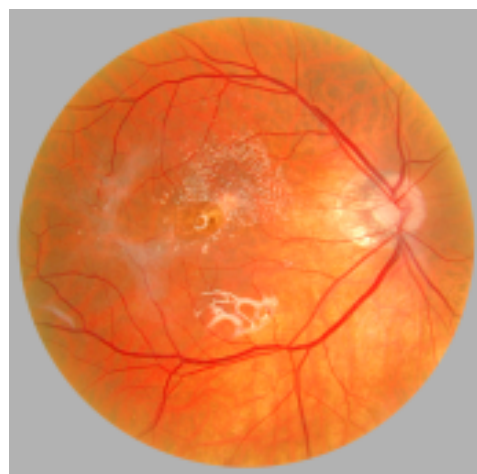
### Introduction

The NHS eye screening programme aims to reduce the risk of sight loss among people with diabetes. In the younger person diabetic retinopathy (DR) poses the greatest threat to vision. Diabetic maculopathy is only one of many serious conditions threatening vision in the older person. In a diabetic retinopathy screening programme these conditions may cause diagnostic and management problems. Macular holes (MH) are one of such problems, occurring more commonly in women than men and may be bilateral, but it is uncertain if they are associated with diabetes. The risk of MH may be increased by macular oedema, fibrovascular proliferation and by vitrectomy<sup>1</sup> occurring in diabetes.

Diagnosis of early MH can be suspected on retinal photographs (**fig. 1**) but imaging using optical coherence tomography (OCT) is required for a definitive diagnosis and for staging. Established full thickness MH are relatively easy to recognise by a characteristic rounded defect at the fovea, with yellow-white dots at the base and a surrounding grey cuff of subretinal fluid. Vision may be restored by vitrectomy and gas tamponade<sup>2</sup>. More recently proteolytic digestion of vitreo-macular adhesions with ocriplasmin has been reported<sup>3</sup>. Therapy or complications of therapy for MH may change the retinal appearance. We undertook an audit of the local DR screening programme to determine the prevalence and some of the clinical features of MH occurring in a diabetic retinopathy screening programme.



**Figure 1:**  
Early Macular Hole can be suspected on retinal photograph.



**Figure 2:**  
Post-operative retinal photograph showing vitreous opacities and a speckled appearance.

### Materials and Methods

A retrospective analysis was carried out on patients who were noted to have MH in the Birmingham, Solihull and Black Country diabetic retinal screening service between 2008 and 2012. Patients with poor quality images of the macula were excluded, as were those who had pseudoholes with a definite epiretinal membrane and good vision. Patient demographics, visual acuity and grading outcomes were recorded using the English national grading standards<sup>4</sup>. Images used were 2x 45° field fundus photographs from Topcon or Canon cameras, taken at accredited optometrists and hospital sites across the Birmingham, Solihull and Black Country area, after adequate mydriasis with tropicamide (1%), and phenylephrine (2.5%) where necessary. Grading was undertaken by qualified primary, secondary, arbitration and referral outcome graders in line with local and national protocols. Best corrected visual acuities were measured using a Snellen chart.

### Results

**Population:** Between 2008 and 2011, 287 patients were noted to have MH, 85 male (29.7%) mean age 74.7yrs (SD 9.5) and 202 female (70.3%) mean age 74.7yrs (SD 8.3). Bilateral MH were found in 21 patients (8%). The average number of patients screened each year was 72,165 giving a prevalence of MH of 0.38%. A new diagnosis of macular hole was made in 11 patients in 2008, 5 patients in 2009, 8 patients in 2010, and 13 patients in 2011, giving a mean incidence of 0.13% per annum.

**Visual acuity and diabetic retinopathy grading:** VA was seriously affected in the presence of MH with 55.4% of affected eyes having VA  $\geq$ 6/60. Grading accuracy was not significantly affected by MH with the use of a macula centred and a disc centred view.

**Surgical outcomes:** 73 patients (25.4%) were referred for surgery. Surgical outcomes were known in 43, and 20 of these operations were successful with an increase of between 1 and 5 lines on a Snellen chart. Post-operative retinal photographs often showed vitreous opacities (**fig. 2**) and sometimes a speckled appearance, retinal detachment and cataract formation.

## Discussion

MH were relatively uncommon in our diabetic retinopathy screening programme. Prevalence and incidence are only approximate as the total number of individuals screened in each year varied and it was not always possible to ascertain the date of diagnosis of MH. The prevalence of 0.38% was an underestimate having excluded patients with poor images and those already under hospital eye care who were not screened. Our findings were somewhat higher than other reports of incidence in the general population of 0.14%<sup>5</sup> and 0.17%<sup>6</sup>. The population with MH in our screening programme was typical being mainly elderly female patients and a small but significant proportion being bilateral. The latter finding is in keeping with other reports, for example where the estimated risk of fellow eye involvement was 15.6% (range, 8.4%–22.3%) in a 5 year follow up<sup>7</sup> emphasising the importance of a careful review of the fellow eye, preferably with OCT.

Reduction in VA is often the first sign of MH. MH may be suspected when the characteristic appearances of a rounded defect at the fovea, with yellow-white dots at the base and a surrounding grey cuff of subretinal fluid, together with significantly reduced VA. MH may be associated with retinal detachment in a high myope. VA may be used as an indicator of later stages of MH, but OCT is needed for early detection and definitive diagnosis. Diagnostic difficulty may arise in distinguishing a MH from a pseudo macular hole on retinal photography but preservation of near normal vision and the characteristic appearance of an epiretinal membrane help to distinguish pseudoholes from MH. When MH is suspected, OCT is essential for both diagnosis and staging. VA may not be seriously affected in the early stages of MH but there may be early changes at the fovea such as a yellow spot or foveal ring. Thus MH should be considered when the appearance of the macula has altered and vision reduced. Early detection with preserved vision is desirable if intravitreal ocriplasmin is a treatment option. Diabetic retinopathy grading was not affected by the presence of MH except occasionally post-operatively and in the presence of an epiretinal membrane. MH do not appear to be associated with diabetes except as a consequence of fibrovascular proliferation in diabetic retinopathy<sup>8</sup> and also after vitrectomy<sup>9</sup> though the reported incidence after such operations is only 0.24%<sup>10</sup>. The closure rate of MH following surgery in the absence of proliferative DR is similar in patients with diabetes as in the non-diabetic patients<sup>11</sup>.

The limitations of this study include absence of data on type of diabetes, duration of diabetes, glycaemic control and no staging of MH and very limited data on the association of MH and proliferative diabetic retinopathy. Information on refractive status was not available, in particular high myopia, which is associated with MH, and other lesions that may have affected vision. Results on surgical treatment are likely to be incomplete. In conclusion MH occurred in a typical elderly population with diabetes, in mainly female patients with poor visual acuity. Appearances were often characteristic but ophthalmic assessment and OCT were required to confirm diagnosis and for staging. MH were bilateral in a significant proportion of patients. Prompt recognition is important as new therapies develop which hopefully will improve visual outcome.

## Acknowledgements

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