

A Novel Optometry-Led Decision-Making Community Referral Refinement Scheme for Neovascular Age-Related Macular Degeneration Screening

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Background: The prevalence of neovascular age-related macular degeneration (nAMD) continues to increase. Hospital Eye Services are operating above capacity, innovative solutions to minimise the high proportion of false negative referrals, improve the care pathway and increase capacity for those patients who need ongoing care are essential.

Methods: A two-phase retrospective longitudinal analysis of all patients referred and assessed for nAMD between; April 2019 to March 2020 (Phase 1) n=394, and April 2020 to March 2021 (Phase 2) n= 414, within Swansea Bay University Health Board (SBUHB). All patients with suspect nAMD were referred to the hospital based nAMD clinic in phase 1, and a community optometry nAMD decision making pathway in phase 2. All clinical records were reviewed, and data collated for subsequent analysis. Age, sex, date of referral, diagnosis, and treatment date were all recorded and analysed.

Results: During phase 1, 104 new nAMD cases needing treatment were diagnosed with 85% (n=88) receiving treatment within 2 weeks of initial referral. During phase 2, 230 new nAMD cases requiring treatment were diagnosed with 94% (n=216) receiving treatment within 2 weeks of initial referral. Both the proportion of nAMD cases diagnosed ($\chi^2 = 70.8$; $p < 0.001$) and proportion of those treated within 2 weeks of initial diagnosis ($\chi^2 = 7.57$; $p < 0.05$) were significantly higher during phase 2.

Conclusion: There are advantages to a community optometry nAMD decision-making pathway with regard to 1) decreasing the number of patients requiring HES attendance, 2) increasing the number of patients able to access treatment for nAMD within 2 weeks of initial referral 3) an increased rate of diagnosis confirmation of nAMD and 4) a decrease in the rate of false-positive referrals.

Keywords: age-related-macular-degeneration, primary care, shared care, public health

Introduction

Neovascular age-related macular degeneration (nAMD) is a leading cause of vision impairment and as a result has a substantial socioeconomic cost.^{1,2} This is only expected to increase, with prevalence in Europe expected to increase by 15% over the next 30 years affecting up to 77 million affected individuals by 2050.³ Over the past 20 years, there has been the well-publicised revolution in prognosis for patients with nAMD owing to the advent of anti-vascular endothelial growth factor (anti-VEGF) therapies.^{2,4-6}

Briefly, anti-VEGFs provide direct antagonism to the various isoforms of VEGF and some to platelet-derived growth factor (PDF)^{4,7,8} This targets one of the key steps in the pathogenesis of neovascularisation in the context of AMD – the pro-angiogenic drive of VEGF and PDF.^{9,10} Under the conditions of established nAMD, this leads to the development of pathological new vessels in the form of, most commonly, a choroidal neovascular membrane (CNV) prone to leakage and haemorrhage.⁸ This can cause permanent visual impairment through accumulation of subretinal blood and eventual

irreversible scarring. Thus, reducing the levels of VEGF and PDF with timely delivery of intravitreal anti-VEGFs drastically reduces the size of the CNV and improves the visual prognosis.^{2,6,10,11}

Crucial to the clinical outcomes for patients is the timely referral to hospital, clinical assessment including investigation with optical coherence tomography (OCT) and fluorescein fundus angiography (FFA), and initiation of treatment.^{12,13}

For this, a robust system must be in place: the astute examination by optometrists in community and an established pathway for review in hospital eye services is required for those who meet treatment criteria to receive prompt anti-VEGF therapy.¹³

The Royal College of Ophthalmologists' guidelines set a target of eligible patients being offered intravitreal anti-VEGF therapy within 2 weeks of the initial referral.¹⁴ However, with the huge volume of patients seen in the community and considered at risk of nAMD, it has proven difficult for hospital eye services (HES) to review all patients in a timely manner.

As such, multiple centres have described systems in which community-based optometrists take OCT scans of patients for virtual review by an ophthalmologist in the hospital with this becoming a mainstay of diagnostic guidelines.^{14–23} While, reducing some burden on stretched medical retina HES teams, this still requires considerable time reviewing scans and arranging follow-up with FFA, if necessary, in outpatient HES clinics.

In the current study we present a novel system in which the decision-making process is led by a specifically trained community optometrist. Following clinical history, examination and OCT scanning, patients are 1) referred on for further assessment if nAMD is considered likely, 2) discharged or 3) followed up for monitoring by the optometrist themselves. Therefore, removing the requirement for the HES team to review patients for whom subsequent treatment is either not required or appropriate. We review the impact of this pathway with regard to 1) 2) 3).

Ethics

This study adhered to the tenets outlined in the Declaration of Helsinki. The study was discussed with Swansea Bay University Health Board Research and Development department. It was deemed that no further ethical approval was required, and patients were not required to provide informed consent as the data was collected during normal service delivery.

Methods

Study Design and Subjects

This was a two-phase retrospective longitudinal analysis of all patients referred and assessed for nAMD between April 2019 to March 2020 (phase 1) and April 2020 to March 2021 (phase 2) within Swansea Bay University Health Board (SBUHB). All consecutive patients were deemed eligible for the study if they were referred for assessment by the AMD service established in Singleton Hospital.

During phase 1, from April 2019 to March 2020, all patients (n=394) referred to secondary care due to suspect nAMD were assessed in the secondary care HES AMD screening clinic by a consultant ophthalmologist. If required, treatment was offered on the same day. Patients were followed up within the HES nAMD clinic.

During phase 2, from April 2020 to March 2021, all patients, inclusive of those requiring hospital transport (n=414) were referred to a community optometry nAMD decision-making pathway. This was either at point of referral from community optometrist or initiated from the HES if patients were seen within a speciality other than medical retina. Initially provided at one central optometry practice (Specsavers, The Kingsway, Swansea), from January 2021, an additional optometry practice was added as a further hub (Bater & Stout, Morriston, Swansea). The optometry practice would contact the patient to make a suitable appointment. In most cases appointments were offered within 24–48 h of referral, therefore not impacting on the Referral to Treatment target of 2 weeks, in the case where treatment was deemed to be necessary. In the case where the patient reported the need for hospital transport to attend an appointment, the patient was directed to the HES for assessment.

The patient pathway for phases 1 and 2 is outlined in Figure 1. Where treatment was not required, patients were followed up in the community optometrist nAMD practice.

All patients treated for nAMD within Swansea Bay are done so on a treat and extend basis. This was consistent through phases 1 and 2.

Training

Both optometrists who took part in the pathway held the College of Optometrists professional certificate in medical retina.²⁴ In addition to this, training was provided by local medical retina consultant ophthalmologist. This consisted of attendance at the HES nAMD clinic until the optometrist felt confident and the ophthalmologist was assured of competency in identification of nAMD. In the case of the two optometrists involved in the study, this consisted of attendance at three HES nAMD clinics where at least 10 patients were assessed in each clinic. An online case discussion was also presented by the consultant ophthalmologist.

Ongoing support was provided through the Consultant Connect platform.²⁵ This platform enables OCT videos and images to be uploaded and reviewed virtually by the consultant ophthalmologist. This software was utilised when the optometrist was confronted with a case where they felt they needed support in clinical decision-making.

Assessment

As in phase 1, in phase 2, initial assessment included for all patients, a thorough ocular and medical history, dilated slit-lamp biomicroscopy of the fundus and an OCT scan inclusive of a macular map and macular radial scan for each patient (Topcon). In phase 2, these findings and images were reviewed by the trained optometrists at the time of assessment. Optometrists were able to see patients promptly as a result of planning for capacity within their clinic model. They were reimbursed for each patient seen through a Welsh Government grant awarded to SBUHB for local enhanced services.

Following assessment, the patient was either 1) discharged back to the care of their normal optometrist, 2) reviewed after an interval in the community optometry nAMD practice or 3) referred on for an assessment inclusive of FFA (unless contraindicated) in the hospital eye services (HES) by a medical retina consultant to confirm the presence of disease meeting NICE guidelines for treatment.

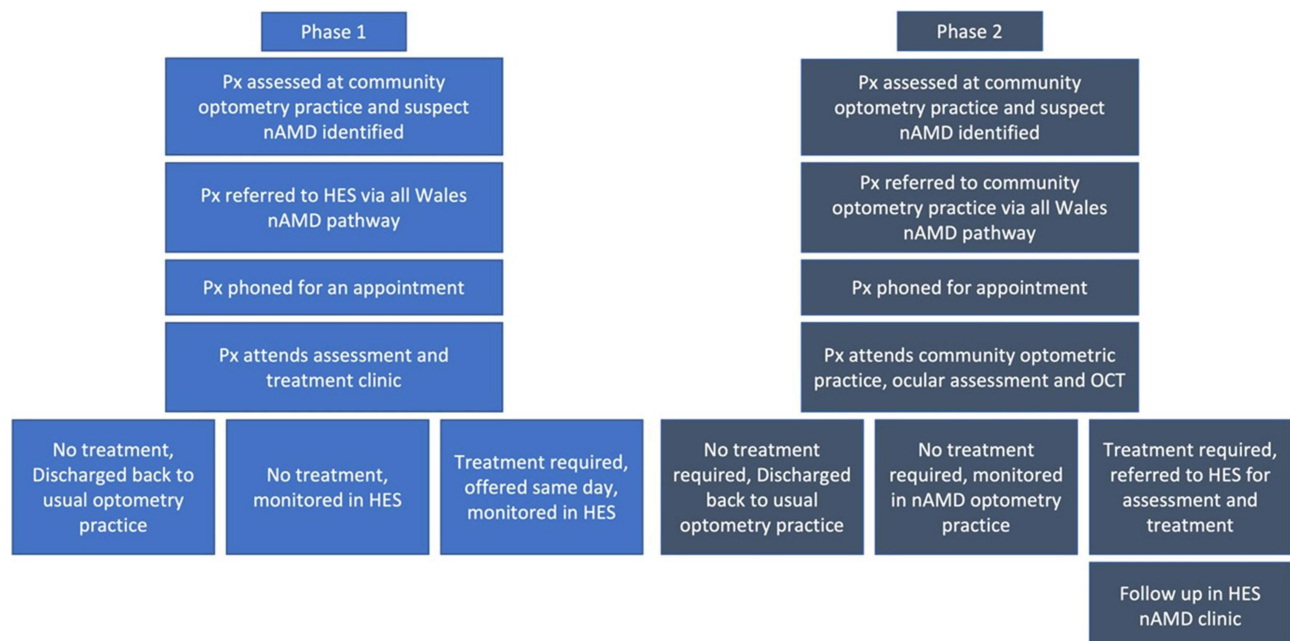


Figure 1 Description of patient pathway of care for phase 1 and phase 2 of the study. In phase 1 the optometrist refers directly to the HES when likely nAMD meeting NICE treatment guidelines is identified. For phase 2, the optometrist refers to the optometric community nAMD practice. The patient only attends the HES if it is identified that treatment is likely.

Measures

The clinical records of all patients who attended phases 1 (HES) and 2 (community optometry nAMD decision-making pathway) were reviewed and data collated from clinics contemporaneously for subsequent audit and analysis. Age, sex, date of referral, diagnosis, and treatment date were all recorded and analysed.

Statistical Analysis

Analysis of the total number of referrals and those with nAMD in phase 1 and 2 was performed. The equivalent incidence rate of nAMD was calculated for the population served by SBUHB and compared to the reported UK incidence of nAMD.²⁶ The referral rates, number of nAMD cases diagnosed (positive referral rate), and rates of treatment within 2 weeks of referral were compared using χ^2 analysis. The calculated incidences of nAMD for the SBUHB population were compared using Fisher's Exact test mid P due to the small incidence of nAMD relative to population size. Confidence intervals were calculated assuming the Central Limit Theorem and based on estimated standard error calculations. Statistical analysis was performed with R-4.2.2.

Public and Patient Involvement

Patients and public were involved in the design of the study via the Royal College of Ophthalmologists in Wales, through consultation with national organisations and local Eye Clinic Liaison Officers. Results of the study will be shared with the Wales Vision Forum and Wales Council for the Blind for dissemination to their members on publication.

Results

Patient Numbers and Demographics

During phase 1 (April 2019–March 2020), a total of 394 patients were reviewed in the medical retina services at SBUHB for screening of nAMD. During phase 2 (October 2020–September 2021) a total of 414 patients were referred for the same screening service and assessed in the community optometrist nAMD service. The percentage of female patients was the same between the two time periods at 62.2% and 61.0%, respectively. The ages of those referred was also not significantly different between the two time periods (Phase 1 77.5 ± 10.1 years; Phase 2 78.4 ± 10.4 years). Visual acuity data was not available for the routine data collected in phase 1. However, in phase 2 (October 2020 and September 2021) the average LogMAR best corrected visual acuity, where recorded, was 0.60 ± 0.32 (n=414).

Patient Outcomes

During phase 1 (April 2019 to March 2020) a total of 104 new cases of nAMD needing treatment were diagnosed of whom 85% (n=88) received treatment within 2 weeks of their initial referral. This equated to 26% of those referred from community optometry to the HES being diagnosed with nAMD and requiring treatment.

During phase 2 (October 2021–September 2021), a total of 230 new cases of nAMD requiring treatment were diagnosed of whom 93% (n=216) received treatment within 2 weeks of their initial referral. This equated to 56% of the total patients assessed by HES being diagnosed with nAMD and requiring treatment. Of those referred via the community optometrist nAMD pathway (n=296), 60% (n=179) were diagnosed with nAMD and required treatment, 93% (n=167) of whom received treatment within 2 weeks.

Both the proportion of nAMD cases diagnosed ($\chi^2 = 70.8$; $p < 0.001$) and proportion of those treated within 2 weeks of initial diagnosis ($\chi^2 = 7.57$; $p < 0.05$) were significantly higher following the instigation of the referral refinement scheme. These findings are outlined in [Table 1](#).

Reported Incidence of nAMD Within SBUHB

For the population of 390,000 served by SBUHB, the above numbers of diagnoses equated to an annual incidence of 26.7 per 100,000 for phase 1 (April 2019 to March 2020) (95% CI 22.3 to 31.1) and 59.0 per 100,000 for phase 2 (October 2020–September 2021) (95% CI 53.9 to 64.1).

Table 1 Overview of Total Patients Assessed for Suspect nAMD in HES. Patients Referred to the HES Requiring Treatment for nAMD and Patient Receiving Treatment Within 2 weeks of the Initial Referral. For Phase 1 April 2019–March 2020 and Phase 2 October 2020–September 2021

	Phase 1 April 2019– March 2020	%	Phase 2 October 2020– September 2021	%	p	χ ²
	N		N			
Total patients reviewed in HES for suspect nAMD	394 (seen within the HES)	100	414 (seen within the community optometrist nAMD practice)	100	-	-
Patients referred to HES requiring treatment	104	26	230	56	<0.001	70.8
Patients received treatment within 2 weeks of initial referral	88	85	216	94	<0.05	7.57

This was significantly lower in phase 1 (April 2019 to March 2020) ($p < 0.0001$; Mid-P Exact), when compared to the UK average of 59.6 per 100,000 (95% CI 35.5 to 102.3; REF). However, in phase 2 (October 2020–September 2021) the annual incidence of nAMD diagnosis was not significantly different from the UK average ($p=0.709$; Mid-P Exact). This suggests a significant underdiagnosis of nAMD within SBUHB during phase 1 when the system was not able to process as many referrals.

Community nAMD Optometrist and Ophthalmologist Agreement

Of the 370 reviews that were deemed not to be nAMD by the trained optometrist, a random selection of 53 OCT scans were reviewed by an experienced medical retina consultant who agreed that none of these demonstrated evidence of nAMD requiring review in the hospital eye services or that would benefit from treatment.

Discussion

This study illustrates the benefits of a community optometry nAMD decision-making pathway with regard to; 1) a decrease in the number of patients requiring HES attendance 2) the positive impact of freed up HES capacity on the number of patients receiving treatment for nAMD within 2 weeks of referral, and 3) an increased rate of diagnosis confirmation of nAMD and 4) a decrease in the rate of false-positive referrals within SBUHB.

HES are overburdened,²⁷ with a predicted 59% rise in cases of nAMD from 2015 to 2035¹⁴ and an estimated economic burden of sight loss in the UK of £28 billion,²⁸ innovative solutions for the care of patients are essential. Policy recognises this; the Pyott report outlines the needs for expansion of Ophthalmic Diagnostic and Treatment Centres (ODTCs),²⁸ while a “Healthier Wales” calls for services to be delivered closer to people’s home with people only attending HES when absolutely necessary²⁹ and is a driving force in the development and implementation of the new Wales General Ophthalmic Services Contract which, will see enhanced clinical roles delivered in primary care by optometrists.³⁰

These study findings are significant in offering an alternative pathway of care for patients requiring assessment for nAMD which has the potential to be implemented on a national basis. This model of care offers advantage over nAMD data gathering and virtual review by HES pathways in the removal of the need of HES resource in virtual review. Barriers to access to nAMD care are well documented and include inconvenience of HES appointments for care givers,³¹ delay in getting an appointment with a health care professional, patient availability for appointments,³² treatment location,³³ transport burden³⁴ and travel distance.³⁵ Expansion of the pathway would go some way in overcoming these barriers, therefore improving outcomes for patients with nAMD.

Furthermore, it is expected that with increasing accessibility to more advanced OCTa technology being available in primary care, ongoing training between optometrist and medical retina consultants and constant feedback and peer

review the advantages of this alternative pathway will be further realised with a further decrease in false-negative referrals from primary care optometry.

Previous studies exploring the views of health professional in shared care³⁶ show overall support of shared care to relieve burden on HES. However, perceived barriers include optometrist competency and issues relating to interprofessional trust.³⁷

In this study, the optometrist medical retina qualification and training provided by the consultant assured them of the optometrist competency. A thorough comparison of optometrists-ophthalmologist agreement was beyond the scope of this study, as the decision-making capability of optometrist with regard to identification of whether treatment is required for nAMD is already well documented.^{17,19,37,38} Review by consultant ophthalmologist of 53 cases deemed not to require treatment for nAMD by the optometrist was performed as a quality assurance measure. This saw 100% agreement between the nAMD trained optometrist and consultant ophthalmologist. Ongoing communication support and learning using consultant connect enhanced interprofessional trust and provided ongoing support and learning.

An additional perceived barrier to such a pathway has been reported as a potential delay in treatment to referral to secondary care if required.³⁸ However, in this study, in contrast to treatment being delayed, the pathway was successful in freeing up HES capacity to a degree where more patients were seen within 2 weeks from initial referral for treatment.

Limitations of the current study include lack of reporting of Patient Reported Experience Measures and cost-effectiveness of the pathway. Future work should explore these aspects, in addition to the practitioner reported experience (ophthalmologist and optometrist) of delivery of the pathway, and feasibility of the pathway being implemented on a national basis.

Conclusion

There are advantages to a community optometry nAMD decision-making pathway with regard to a decrease in the number of patients requiring HES attendance, an increase in the number of patients able to access treatment for nAMD within 2 weeks of initial referral and an increased rate of diagnosis of nAMD.

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Disclosure

The authors declare that they have no conflicts of interest.

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