Demonstrating the efficacy of using the Digital Surveillance pathway to monitor R2M0 grades and reduce referrals to hospital eye services.

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Introduction

The Arden, Herefordshire and Worcestershire DESP (AHW DESP) has been using the Digital Surveillance (DS) pathway to monitor R2M0 grades since 2016. The monitoring of people with diabetes (PWD) in the DS pathway is supplemented by the use of multiple field imaging. By undertaking multiple field imaging on standard retinal fundus cameras, AHW DESP has significantly reduced R2M0 referrals to Hospital Eye Services (HES) each year. This retrospective audit has been undertaken to demonstrate that PWD with R2M0 can be safely monitored in the DS pathway with multiple field imaging.

Purpose

● To retrospectively audit R2M0 outcome grades, both within Routine Digital Screening (RDS) (graded R2M0 at Referral Outcome Grade (ROG)) and within the DS pathway.

● To analyse the proportions of R2M0 grades requiring referral to HES or retention within DS for monitoring.

● To assess whether R2M0 grades can be safely monitored within DS with multiple field imaging.
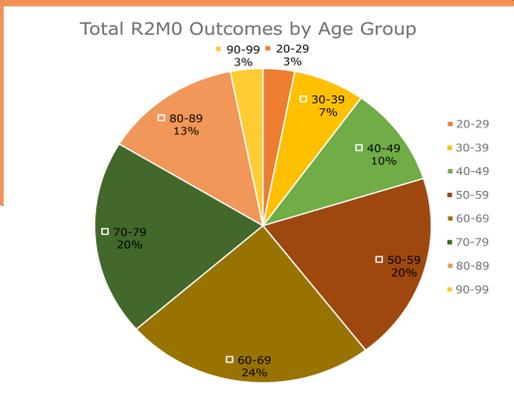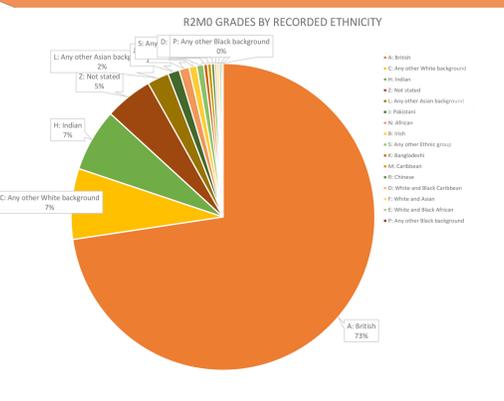
Rationale for Multiple Fields

Peripheral retinal ischaemia is known to be a prominent driver for the progression of diabetic retinopathy (DR) to the pre-proliferative and subsequent proliferative stages of the disease. The restricted view of the retina afforded by the current standard 2 x 45° central fields is acknowledged as one of the limitations of DES in terms of sensitivity. Monitoring R2M0 grades in DS with 2 field capture risks missing R3A features that might be present outside these fields. The use of standard 7 or 8 field imaging per eye allows a much greater coverage of the mid-peripheral retina, allowing R3A features to be detected in those who may only display R2M0 in the central fields. Multiple fields also allow for a better assessment of the severity and extent of R2 features, and thereby a more informed decision can be made on whether to refer to HES or to retain in DS.

Local protocols are in place to guide screeners as to when to take multiple fields and for ROG/DS graders as to what grading outcome to select depending on the extent and severity of each of the R2 grading features observed, i.e. 3/6/9 month DS recall or refer to HES.

AHW DES uses a 3-level DS grading pathway: primary, secondary and tertiary. ROG and DS graders comprise: 1 ophthalmologist, 1 optometrist and 3 experienced screener-graders, all overseen by the Clinical Lead.
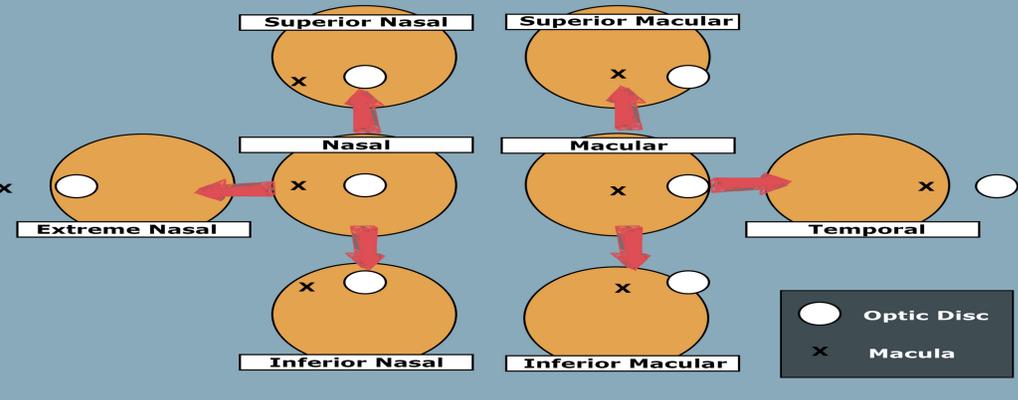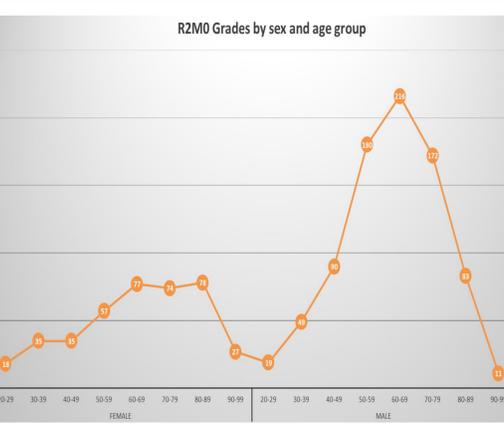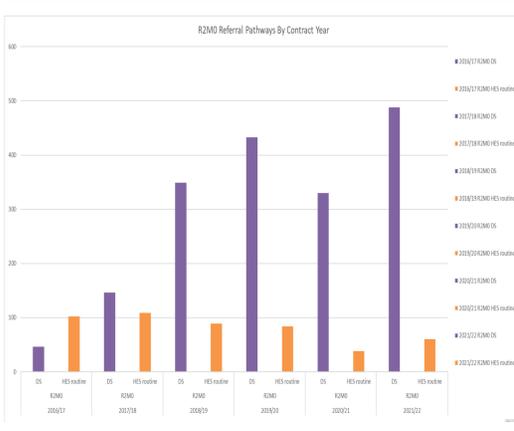
The Multiple Field Technique

All standard retinal fundus cameras are capable of capturing the additional fields used within the multiple field techniques used by the DESP to monitor R2M0 cases. Extra images are taken of each eye by moving internal target lights shifting focus to move the optic disc and macula. Below demonstrates the movements undertaken to capture the additional images.
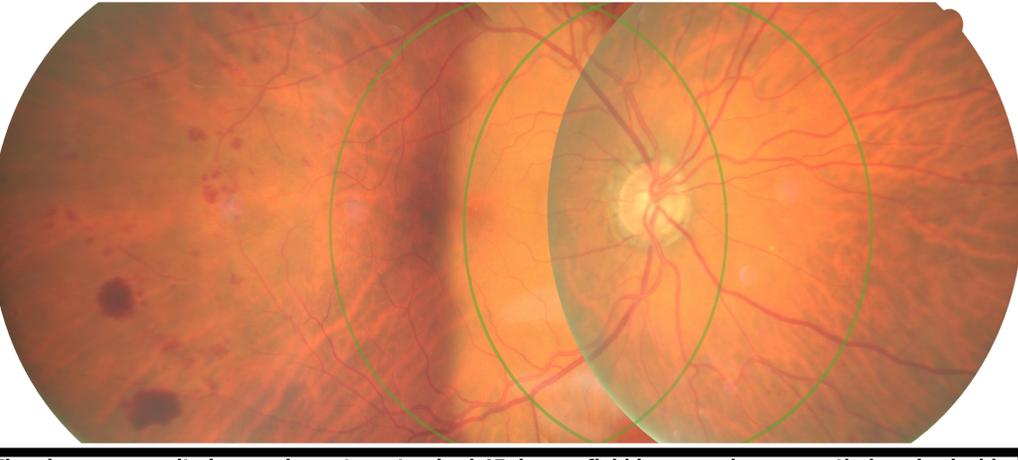

Methodology

● Data was analysed from screening years 01/04/2016 through to 31/03/2022. All information was obtained from the Screening Outcome tracker. The worst recorded outcome was used for the grade allocation. The "initial pathway screened in" was compared to the "pathway referred to" to understand the volume of referrals made to HES, compared to those retained in DS.

● Only R2M0 grades were included. R2M1 grades were excluded from this audit because NDES guidance is that R2M1 should be referred to HES and not retained within DS (NDES: OCT in surveillance pathway 08/07/2020).

● Demographic data was analysed for all PWD with R2M0 grades.

● A separate audit was conducted of all PWD who had not been referred by DES and who were in either an RDS or DS recall pathway, who were then subsequently moved directly into the care of HES following HES feedback, i.e. false negatives.

The above composite image shows two standard 45 degree field images where no pathology is visable. Only with additional images are R2 DR features seen.

Results

● There were a total of 1221 PWD who received a R2M0 grade outcome in the period under review.

● A total of 2274 R2M0 outcomes were recorded during the period. 480 repeat attendances. Only 63 cases out of the 480 (13.1%) repeat attendances in the DS pathway resulted in a referral to HES. The remaining 417 (86.9%) PWD continue to be monitored in DS.

● Male was the dominant sex (67% of R2M0 grades).

● PWD in the 50 - 80 age group were most at risk for the development of pre-proliferative DR (R2).

● British ethnicity was strongly predominant (73% of all R2M0 grades).

● Since AHW DESP commenced DS monitoring for R2M0 grades in 2016, the DS cohort has grown markedly, whilst the numbers being referred to HES have steadily reduced. The 2020/21 screening year was an exception with lower overall numbers of R2M0; this was due to PWD being unwilling to attend screening owing to their fears of contracting Covid-19. For the most recent 2021/22 screening year, there were a total of 548 R2M0 grades, of which 488 (89%) were retained within DS for monitoring, with only 60 (11%) being referred to HES.

● No cases were found of any PWD retained in DS for R2M0 who was subsequently also seen in HES and graded R2M0 or R3AM0 (referred via another route).

R2M0 worst outcome grades by recorded Ethnicity demographics within AHW DESP OptoMize

Total R2M0 Outcomes by Age Group

R2M0 worst outcome grades by age groups within AHW DESP OptoMize

R2M0 worst outcome grades by recorded Sex and Age Group within AHW DESP OptoMize

R2M0 referrals by pathway referred to each year - April - May NHS Annual reporting years

Discussion

● There is a heavy burden upon HES nationally with regard to disease monitoring, resulting in backlogs and delays within the system, placing patients at risk of sight loss through lack of timely follow-up. This includes a high number of PWD who meet the referral criteria from DES but who do not yet require treatment, simply closer monitoring and improvement of diabetes control.

● With a clearly defined local grading protocol, the majority of R2M0 grades can be monitored in a safe and timely manner within the DS pathway, using multiple field imaging.

● At commencement of R2M0 monitoring in 2016, initial numbers within DS were low. This was due in part to a cautious approach adopted by ROG/DS graders who were initially having to familiarise themselves with a new level of decision-making. The local grading protocol was regularly reviewed and updated during those early days. Gradually, ROG/DS graders became more confident in their decision-making ability.

● Building a chronological library of image sets for each PWD allows us to see the rate of progression/regression of R2M0 over time.

● The DES call and recall system and existing failsafe processes allow for PWD in the DS pathway to be tracked and recalled in a timely manner, with none unknowingly becoming overdue or lost to follow-up such as frequently happens within HES.

● Direct telephone engagement work is undertaken with non-attenders to educate and encourage re-attendance.

● Bespoke advice is given in letter notes to PWD and their GP at time of DS grading, to educate and encourage better diabetes control.

Limitations of this Study

● PWD screened in DS more than once per screening year are counted multiple times, according to the number of times they were screened.

● AHW DESP does not receive comprehensive HES feedback from all our referral centres, therefore it is possible that PWD may have presented at HES requiring treatment for R2 or R3A, of whom we are unaware.

● Referrals to HES for R2M0 have not been analysed to see whether treatment was required.

● Rates of non-attendance for the R2M0 cohort have not been analysed for either DS or referrals to HES.