Acceptability, adherence and economic analyses of a new clinical pathway for the identification of non-responders to glaucoma eye drops: a prospective observational study

Heather Waterman,1 Simon Read,1 James Edwards Morgan,2 David Gillespie,3 Claire Nollett,3 Davina Allen,1 Marjorie Weiss,4 Pippa Anderson5

ABSTRACT
Background/aims Assess whether a new clinical pathway for glaucoma was acceptable to patients and healthcare professionals and whether it provided useful clinical information on non-responsiveness and non-adherence to the treatment of elevated intraocular pressure with latanoprost eye drops.
Methods A single arm non-randomised prospective observational study incorporating new glaucoma/ocular hypertension patients. To assess issues of acceptability, qualitative observation and interviews were conducted with patients and healthcare professionals. To determine clinical responsiveness, intraocular pressures were measured before and 4 hours after a clinician-instilled eye drop over two distinct appointments. Adherence data were collected using a Medicine Event Monitoring System. Economic analyses compared the costs between novel and standard care pathways.
Results Of 72 patients approached, 53 entered the study (74.3%) and 50 completed all procedures (94.3%). Intraocular pressure was reduced more than 15% in 83 out of 92 study eyes by final visit (90.2%). The non-response rate was 5.1% once the effect of low adherence was minimised. For the 1376 drop instillation days under observation, eye drops were instilled as prescribed on 1004 days (73.0%), overstilled on 137 days (9.9%) and not instilled on 235 days (17.1%). The Cardiff Model of Glaucoma Care involved negligible cost, although acceptance for healthcare professionals showed variation.
Conclusions The Cardiff Model of Glaucoma Care offers novel clinical and adherence insights at marginal costs while acceptable to patients. Healthcare professionals felt that 4 hour and 4 week follow-up appointments could cause administrative problems. A streamlined version of the pathway has therefore been developed to facilitate clinical adoption.

Trial registration number ISRCTN75888393

INTRODUCTION
Xalatan (latanoprost) is commonly used as the first-line eye drop medication for treatment of glaucoma, the leading cause of permanent blindness worldwide.1 Prostaglandins lower intraocular pressure (IOP) by increasing uveoscleral outflow and have been shown to be safe and efficacious since their introduction in 1996.2 However, some patients do not respond to treatment with an ongoing debate regarding actual non-response rates (online supplementary table 1). When patients present in outpatient clinics with higher-than-expected IOP despite being prescribed ocular hypotensive eye drops, the physician is faced with a dilemma since IOP reflects (i) the patient’s physiological response to the eye drops (pharmacogenetics) and (ii) a patient’s level of adherence to eye drops (behaviour).3 4 Current clinical pathways do not usually distinguish between these pharmacogenetic and behavioural elements of IOP. Physicians commonly assume a poor response rather than poor adherence, adding alternate or additional medications to obtain the desired reduction in IOP. This approach is illogical in absence of information regarding the patients’ response to medication or their adherence level. Furthermore, this clinical approach can adversely affect the outcome if adherence is an issue, since adherence rates tend to fall with more complex medication regimes.5 6 Generally, the decision is based on a physician’s estimate of adherence, usually gathered from interactions within clinical consultations, which is known to be inaccurate.7 8 Since very little is done in routine clinical care to differentiate pharmacological and behavioural effects on treatment responsiveness, there is a pressing need to differentiate non-responders and poor adherence when assessing treatment efficacy. This study explored these issues through a new clinical pathway (Cardiff Model of Glaucoma Care, CMGC). We undertook feasibility, adherence, acceptability and economic analyses to determine the utility and feasibility of establishing patient non-response rates in the clinical setting.

MATERIALS AND METHODS
The study had the following objectives:
1. To recruit glaucoma patients who were shortly to commence eye drop treatment and process them through the CMGC.
2. To estimate the proportion of participants who receive the CMGC as intended.
3. To describe components of the intervention that were not received as intended, and reasons why (participant refusal, non-attendance, health professional deviation).
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4. To estimate variability in IOP at the various time points.
5. To estimate the proportion of responders to eye drop treatments.
6. To describe variation in participants’ adherence to eye drop therapy in the 4 weeks between the initial and follow-up visit.
7. To estimate key resource use.
8. To estimate key cost implications of the CMGC.

Study design, setting, sample, sample size

This was a single arm non-randomised prospective observational study with primary data collection. Participants were given study information sheets prior to obtaining written informed consent and all practices followed the guidelines of the Declaration of Helsinki.9 Participants were enrolled from four routine glaucoma clinics in Wales, UK. Patients were included if: aged 18 years or over; diagnosed with either primary open angle glaucoma, ocular hypertension, pseudoexfoliative glaucoma, an IOP equal to or greater than 21 mm Hg or normal tension glaucoma (NTG) and on the point of being prescribed glaucoma eye drops either for the first time or after a minimum period of 4 weeks’ discontinuation. Patients were excluded if they had any other physical conditions that might affect drop efficacy, such as severe arthritis or disability.

The study was designed to recruit 60 patient participants spread across participating clinics. As this was an observational study, a formal a priori power calculation was not possible.10 However, 60 participants would provide a level of precision around a 95% CI. For example, if 80% of participants received the CMGC as intended, the 95% CI could be estimated within +/-13% (ie, 70% to 90%). The widest the 95% CI would be, if the estimated percentage was 50%, was +/-13%.

Primary outcome measures were whether patients and glaucoma healthcare professionals (HCPs) would accept the CMGC format and whether, clinically, a non-response to latanoprost could be identified. Acceptability evaluation included data gathered from recruitment, appointment attendance and screening logs. We also used qualitative semi-structured interviews (patients, n=21, and glaucoma HCPs: doctors, optometrists, orthoptists and nurses, n=8), observations of 88 clinical consultations incorporating 50 patients and 10 healthcare professionals, as well as a further 52 field notes documenting administrative, logistical and organisational aspects to each site’s implementation. These data provided insight into the acceptability of implementing the CMGC and how the protocol might be amended if necessary. All interviews were digitally recorded and transcribed verbatim.

Intervention - CMGC

Patients attended two extra clinic visits: (i) within 2 weeks of diagnosis to initiate their treatment; and (ii) 4 weeks later. Patients were informed of the purpose of the CMGC and given their IOP readings at each consultation. At the first visit, baseline pressures were measured using calibrated Goldmann applanation tonometers before an HCP instilled eye drops and rechecked the IOP 4 hours later. While research has indicated that latanoprost offers maximal effect 8 to 12 hours post-instillation, Quaranta et al have noted significant IOP reductions at 2 hour that would indicate an efficacious response.11 12 A 4 hour gap between IOP measurements was therefore selected based on balancing the practicality of examining patients during core working hours, as well as the likelihood of detecting clinical efficacy. At 4 weeks, the patient returned to have their IOP measured and another eye drop instilled before being asked to come back 4 hours later for a further IOP check. Based on their change in IOP over these appointments, patients progressed through the CMGC algorithm towards an outcome scenario (figure 1). For example, scenario A indicates that patients were responsive to treatment within 4 hours of drop instillation and sufficiently adherent after 4 weeks to maintain a 15% drop in IOP from baseline. Patients were then informed of the outcome of the assessments and given follow-up appointments for their original clinic. This provided opportunity for non-responders to discuss alternative or additional treatment. The CMGC was conducted by a range of trained HCPs: physicians, optometrists, orthoptists and nurses and carried out in specialist glaucoma clinics or general ophthalmology clinics.

Exposures, endpoints and other variables

A case report form collected all research data prospectively; this was completed by either nurses, optometrists, doctors or the research team. All patients were prescribed latanoprost as first-line treatment and, between the two hospital visits, all were instructed to instil the eye drop at the same time each evening. All patients were given International Glaucoma Association booklets on glaucoma/ocular hypertension and advised to speak to their clinician if requiring further information.13 We defined non-response to latanoprost as less than a 15% reduction of baseline IOP. This level of IOP reduction exceeded diurnal variation and would suggest a useful response to treatment.14

The following demographic/patient data were collected: age, sex, type of glaucoma, primary hand, ethnicity, nationality, postcode, length of time with eye condition, occupation, smoker and an ophthalmic assessment: anterior segment, gonioscopy, posterior segment, optic nerve imaging including optical coherence tomography, corrected visual acuity. We also monitored the presence of instillation site irritation, nasopharyngitis and other ocular adverse events.

To collect study adherence data, participants were asked to store their eye drops within a container fitted with an electronic monitor in the lid (the Medication Event Monitoring System, MEMS),15 retrieving their eye drops from the bottle to take them each evening and replacing them afterwards. Patients were not informed of the purpose of the bottle. We considered participants to have initiated treatment (following their first visit) provided that the container was opened at least once. ‘Correct’ implementation was defined as instilling eye drops once per day. The MEMS bottles were study-specific data collection tools and not expected to be integrated more broadly into the CMGC pathway.

Health economics

To identify the required National Health Service (NHS) resources for the CMGC intervention as compared with standard glaucoma care, qualitative interviews, focus groups and observations were carried out in three of the four research sites.

Data management and statistical analyses

Statistical analysis

Continuous data were reported as means and SD, or medians and IQRs, as appropriate. Categorical data were reported as frequencies and proportions. Outcomes were estimated with associated 95% CIs. Using the MEMS16 we estimated: (i) the proportion of patients initiating their therapy after the first visit,16 and (ii) of those who initiated eye drops, we estimated daily adherence...
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Figure 1  Revised Cardiff Model of Glaucoma Care (CMGC) intervention algorithm. HCPs, healthcare professionals; IOP, intraocular pressure.

using a two-level logistic regression model, accounting for repeated observations of days within individuals. The best fitting model, as indicated by Akaike's information criterion, was a random intercept and random slope model, with a linear time variable fitted as a random effect. For each adherence element, we explored variability across clinics, health boards, age, gender and baseline IOP by including these as covariates in univariate regression analyses. We explored daily adherence separately for each of the CMGC responder types.

Health economics analysis
Data were costed and analysed using Unit Costs of Health and Social Care.17 A sensitivity analysis was also undertaken to reflect variation in staff combinations, ranging from the lowest costing qualified staff mix to a more costly, higher grade scenario. NHS resources involved in seeking additional clinical advice were also included in the analysis.

Qualitative data analysis
Qualitative data were analysed according to framework analysis, an explicit and systematic approach to qualitative data analysis.18 19

RESULTS
Study participants and baseline characteristics
Across the four research sites, 72 participants were screened between 12 June 2018 and 21 March 2019, providing 98 study eyes from 53 eligible participants (figure 2). The study was active for each participant over a follow-up period of 4 to 5 weeks, recruiting for 40 weeks in total. Table 1 outlines the key


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demographic and condition-based characteristics of the patient sample by study eye.

After enrolment, three participants (six eyes) were withdrawn due to adverse events or failure to attend follow-up appointments. All other participants completed the study. Five adverse events were recorded (1=cardiac issues, 1=blurred vision, 3=blepharitis) none of which were attributed to eye drop instillation.

Clinical IOP reduction

**Table 1** Baseline characteristics of participants by study eyes

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Single eye in study</th>
<th>Two eyes in study</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total no.</td>
<td>8</td>
<td>45</td>
<td>53</td>
</tr>
<tr>
<td>Sex, no. (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>5 (62.5)</td>
<td>24 (53.3)</td>
<td>29 (54.7)</td>
</tr>
<tr>
<td>Female</td>
<td>3 (37.5)</td>
<td>21 (46.7)</td>
<td>24 (45.3)</td>
</tr>
<tr>
<td>Ethnicity, no. (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian</td>
<td>0 (0.0)</td>
<td>1 (2.2)</td>
<td>1 (1.9)</td>
</tr>
<tr>
<td>Black</td>
<td>0 (0.0)</td>
<td>3 (6.7)</td>
<td>3 (5.6)</td>
</tr>
<tr>
<td>White</td>
<td>8 (100.0)</td>
<td>40 (88.9)</td>
<td>48 (90.6)</td>
</tr>
<tr>
<td>Other</td>
<td>0 (0.0)</td>
<td>1 (2.2)</td>
<td>1 (1.9)</td>
</tr>
<tr>
<td>Clinic, no. (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinic 1</td>
<td>5 (62.5)</td>
<td>27 (60.0)</td>
<td>32 (60.4)</td>
</tr>
<tr>
<td>Clinic 2</td>
<td>0 (0.0)</td>
<td>7 (15.6)</td>
<td>7 (13.2)</td>
</tr>
<tr>
<td>Clinic 3</td>
<td>0 (0.0)</td>
<td>6 (13.3)</td>
<td>6 (11.3)</td>
</tr>
<tr>
<td>Clinic 4</td>
<td>3 (37.5)</td>
<td>5 (11.1)</td>
<td>8 (15.1)</td>
</tr>
<tr>
<td>Age entering the study (years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>68 (SD: 6.4)</td>
<td>69 (SD: 10.6)</td>
<td>69 (SD: 10.0)</td>
</tr>
<tr>
<td>Median (range)</td>
<td>68 (57–78)</td>
<td>71 (45–91)</td>
<td>70 (45–91)</td>
</tr>
<tr>
<td>Eye condition, no. (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal tension glaucoma*</td>
<td>2 (25.0)</td>
<td>9 (20.0)</td>
<td>11 (20.8)</td>
</tr>
<tr>
<td>Ocular hypertension</td>
<td>3 (37.5)</td>
<td>20 (44.4)</td>
<td>23 (43.4)</td>
</tr>
<tr>
<td>Primary open angle glaucoma</td>
<td></td>
<td>16 (35.6)</td>
<td>19 (35.8)</td>
</tr>
</tbody>
</table>

*Normal tension glaucoma is detection of visual field loss in spite of IOP being lower than 21 mm Hg.

IOP, intraocular pressure.

**Table 2** Intraocular pressure (IOP) and IOP reduction in study eyes

<table>
<thead>
<tr>
<th>IOP Change (%)</th>
<th>Right eye</th>
<th>Left eye</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>48</td>
<td>50</td>
<td>98</td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>22.8 (SD: 4.2)</td>
<td>23.0 (SD: 4.5)</td>
<td>22.9 (SD: 4.1)</td>
</tr>
<tr>
<td>Median (min.–max.)</td>
<td>22.5 (13.7–32.7)</td>
<td>22.7 (11.7–32.3)</td>
<td>22.2 (12.7–30.5)</td>
</tr>
<tr>
<td>Mean IOP reduction from baseline (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visit 1.2</td>
<td>21.3 (SD: 14.2)</td>
<td>24.9 (SD: 12.9)</td>
<td></td>
</tr>
<tr>
<td>Visit 2.1</td>
<td>27.1 (SD: 16.2)</td>
<td>26.3 (SD: 14.1)</td>
<td></td>
</tr>
<tr>
<td>Visit 2.2</td>
<td>34.2 (SD: 15.4)</td>
<td>34.2 (SD: 13.7)</td>
<td></td>
</tr>
<tr>
<td>Eyes achieving &gt;=15% IOP reduction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right eye</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visit 1.2 (rc %)</td>
<td>32/47; (68.1)</td>
<td>35/49; (71.4)</td>
<td>67/96; (69.8)</td>
</tr>
<tr>
<td>Visit 2.1 (rc %)</td>
<td>38/46; (82.6)</td>
<td>39/48; (81.3)</td>
<td>77/94; (81.9)</td>
</tr>
<tr>
<td>Visit 2.2 (rc %)</td>
<td>42/45; (93.3)</td>
<td>41/47; (87.2)</td>
<td>83/92; (90.2)</td>
</tr>
</tbody>
</table>

After enrolment, three participants (six eyes) were withdrawn due to adverse events or failure to attend follow-up appointments. All other participants completed the study. Five adverse events were recorded (1=cardiac issues, 1=blurred vision, 3=blepharitis) none of which were attributed to eye drop instillation.

Clinical IOP reduction

**Table 2** outlines the baseline pretreatment mean IOP for treated eyes, as well as mean reductions in IOP following each visit. Data are available by clinic in online supplementary table 2. The final IOP re-measurement (visit 2.2) demonstrated a mean reduction from baseline of 34.2% in both right (SD: 15.4; Range: 12.7% increase to 65.3% reduction) and left eyes (SD: 13.7; Range: 3.4% reduction to 58.2% reduction). Table 2 indicates that 83 of 92 study eyes (90.2%) responded to treatment with an IOP reduction exceeding 15% of the baseline IOP.

Most patients (56.1%) fell into CMGC algorithm scenario A. The next largest group comprised those responding after 4 weeks who were non-responsive after 4 hours (scenario E; 18.4%). Those deemed non-responsive to treatment on all occasions

![Figure 2](https://example.com/figure2.png)

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**Clinical science**

Figure 2 Consolodiated standards of reporting trials diagram demonstrating the patient and study eye flow through the Cardiff Model of Glaucoma Care appointment structure through to data analysis. IOP, intraocular pressure.
accounted for 5.1% of the sample (online supplementary table 3).

**Participant adherence to eye drop therapy**

Valid electronic eye drop use data were available for 48/53 (90.6%) of participants. Invalid data were returned from three participants who used the MEMS cap incorrectly (eg, not storing their eye drops in the container) and a remaining two were lost to follow-up. Valid data were available for 1536 potential dosing events over 1576 days. For participants providing valid data, all initiated eye drop therapy. Of the 1576 days observed, eye drops were instilled as prescribed on 1004 (73% of observed days) meaning incorrect instillation on 372 days. Within individuals the percentage of adherent days ranged from 3.0% to 100%, and across centres there was minimal variation (online supplementary table 4). Where participants did not adhere on a given day, the primary indicator for this was that the MEMS cap had not been opened (63.2%, or 235/372 days). The MEMS cap was opened twice on the same day on 118/372 days (31.7%), and three, four and five times on 16, 2 and 1 day, respectively. Overall, there was no evidence of a difference in the odds of adhering over time (online supplementary table 5).

**Variability in 4 hour and 4 week assessments**

The target of 4 hour patient returns was largely met for both visits 1 and 2 (online supplementary table 6). The time between first and second visits was also recorded, the median deviation indicating most people returned after 4 and before 5 weeks. Those unable to return precisely 4 weeks after their initial visit reported conflicts with other clinical appointments, holidays or the lack of clinician availability.

**Patient and HCP acceptability of CMGC intervention**

Data collected from screening logs enabled the initial assessment of patient acceptability (figure 2). Of 72 eligible patients, 53 agreed to take part (73.6%). Refusal was more commonly associated with arranging a CMGC appointment within the required time frame rather than a perception of the CMGC as overly onerous. Additionally, once enrolled into the study most patients completed all study procedures (94.3%). During interviews and observations, patients considered the clinic to be worthwhile and were satisfied with their treatment. Although some patients had difficulties with the CMGC intervention because of employment, childcare and their distance from the hospital, they still considered the CMGC intervention worthwhile (see online supplementary table 7). Those unable to return precisely 4 weeks after their initial visit reported conflicts with other clinical appointments, holidays or the lack of clinician availability.

**Health economics: standard care versus CMGC costs**

The additional costs of integrating the CMGC into the health service ranged from US$11.20/£9.9 to US$22.40/£18.5, with US$16.17/£13.8 as the most plausible marginal cost (see online supplementary table 8). While the number of patients required more staff resources, one clinic felt their model of consecutive glaucoma clinics (morning and afternoon) holding one reserved place per clinic had no meaningful impact on workload or service provision. In services where glaucoma clinics were only held on half-days issues with staff availability and potential administrative burdens were reported.

**DISCUSSION**

Our study demonstrates the feasibility of introducing a new pathway in glaucoma clinics to determine whether patients respond to glaucoma eye drops. The sample size of 53 participants and 98 study eyes provided enough data to provide insights into the change in IOP and adherence. Although recruitment had been expected to be challenging based on patient-perceived burden of additional appointments, 73.6% of those approached entered the study and 94.3% of those completed all clinical procedures, suggesting broad acceptability.

In practice, the CMGC intervention was implemented as intended with only occasional deviation in relation to appointment timings. These were mostly patient-driven and based on difficulties in attendance through holidays, other hospital appointments or general unavailability. In such cases, patients returned at an alternative time to complete their care pathway. The level of recruitment between sites varied, with clinics 2, 3 and 4 each enrolling between six and eight patients, while clinic 1 offered 32 patients. This was due to issues associated with site openings and closures over the study duration but was not felt to compromise the sample, instead offering exposure to a wider range of sites and research settings than originally intended. The estimated additional costs for hosting the CMGC visits were marginal, ranging from US$11.20/£9.9 to US$22.40/£18.5 per patient across the sampled sites.

Streamlining the CMGC intervention and identifying the core aspects that can be readily integrated into existing health board structures would help in addressing issues with HCP acceptability. Feedback from clinicians suggested the prescribed nature of the model negatively affected its implementation potential, a key problem being the 4 weekly, rather than the more common 6 weekly, appointments. We have therefore modified the CMGC (figure 1) to maintain its key clinical functionality while reducing overly prescriptive aspects to offer smoother implementations. Additionally, we have identified that those patients achieving sufficient IOP reduction by visit 2.1 (scenarios A and E) need not attend visit 2.2 given that treatment efficacy and adherence are confirmed. Certainly, for sites where these issues were deemed to be less problematic, the benefits of the intervention for clinical data, patient experience and tuition, as well as the potential for reduction of future appointments were felt to outweigh the logistical problems.

The non-response rate to latanoprost in our sample was 5.1% following the removal of adherence as a confounder. This result is in line with previous research reporting rates of 4.1%, 13% and 21%, respectively, where adherence was controlled and the non-response rate cut-off point set at 15%. Our study demonstrates that the relationship between response to treatment and adherence is complex. Previous attempts to demonstrate the effect of an adherence intervention on IOP have neglected the impact of non-response to eye drops on study outcomes. Future studies on adherence intervention effectiveness will need to take account of non-response to treatment. Reliance on IOP as the primary endpoint for the efficacy of adherence intervention studies is also questionable in the absence of a robust relationship between adherence as measured by the MEMS and IOP. These observations suggest that a change in the rate of field loss or similar clinical output may be more appropriate.
The MEMS has known reliability and validity limitations, not least, that it can influence patient adherence since the white container can act as a memory aid. Several patients informed us they did not use it to store their drops thereby preventing the collection of adherence data for these patients. Some patients surmised the purpose of the MEMS and perceived it to be a ‘spy bottle’, possibly affecting its use. Finally, patients could have opened the MEMS each day but not instilled their eye drops or opened it multiple times each day but not instilled on every occasion. These issues could have affected the accuracy of the adherence data. However, in the absence of a gold standard measure it is the best available at present, and perhaps multiple measures should be employed to achieve a rounded picture of adherence.

One further discussion point relating to the MEMS is that the adherence data were collected once each patient had completed visit 2.2 after 4 weeks. This data was often used during patient interviews as a means of identifying potential causes for eye drops being missed, resulting in reports of social activities, holiday transportation and general forgetfulness as barriers to adherence. While the MEMS were not intended for the CMGC pathway beyond the study, the real-time monitoring of adherence through such technology may be helpful for patient interactions around their own self-medication. There are significant ethical issues related to adherence monitoring, though if this were posited as a negotiated educational exercise, it could offer an avenue to investigate and aid patient engagement with their treatment.

In conclusion, it was possible to identify patients not responding to latanoprost and thereby reconsider their treatment accordingly in routine glaucoma clinics. The non-response rate was 5.1% and patients instilled eye drops as per their prescription on 73% of observed days. Patients understood the purpose of the CMGC and were overwhelmingly prepared to attend. HCPs valued the knowledge that was gained from the CMGC but the logistical impact and engagement with the CMGC in each clinic was contingent on disruption to current workflows. The protocol for the CMGC has been amended in the light of staff feedback, making it easier to implement.

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Contributors Heather Waterman is a professor of nursing and ophthalmology with a background in patient self-care for long-term conditions. Simon Read is a sociologist with a research background in ageing, health and well-being. James Morgan is a consultant ophthalmologist and professor in ophthalmology with over 25 years experience. David Gillespie is a senior research fellow and statistician with an interest in adherence data. Claire Nollett is a trials researcher with a background in psychology and chronic conditions. Marjorie Weiss is a professor of pharmacy practice researching decision-making around the taking and prescribing of medicines. Davina Allen is a nurse and medical sociologist focussed on the organisation of work and service improvement. Pippa Anderson is an associate professor of health economics with a particular interest in resource allocation. All contributors were involved in the drafting and review process of the article.

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Competing interests None declared.

Patient consent for publication Not required.

Ethics approval Ethics Committee approval was obtained from West Midlands – Black Country Research Ethics Committee (IRAS Project ID: 232242).

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available upon reasonable request. The data sets used and/or analysed during the current study are available from the corresponding author on reasonable request.

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