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Referrals from community optometrists to the hospital eye service in England

Running title: Referrals from community optometrists

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Abstract

Purpose

In the UK, most referrals to the hospital eye service (HES) originate from community optometrists (CO). This audit investigates the quality of referrals, replies, and communication between CO and the HES.

Methods

Optometric referrals and replies were extracted from three practices in England. If no reply letter was found, the records were searched at each local HES unit, and additional replies or records copied. De-identified referrals, replies, and records were audited by a panel against established standards to evaluate whether the referrals were necessary, accurate, and directed to the appropriate professional. The referral rate (RR) and referral reply rate (RRR) were calculated.

Results

A total of 459 de-identified referrals were extracted. The RR ranged from 3.6-8.7%. The proportion of referred patients who were seen in the HES unit was 63-76%. From the CO perspective, the proportion of referrals for which they received replies ranged from 26-49%. Adjusting the number of referrals for cases when it would be reasonable to expect an HES reply, RRR becomes 38-62%. Patients received a copy of the reply in 3-21% of cases. Referrals were made to the appropriate service in over 95% of cases, were judged to be necessary in 93-97% and accurate in 81-98% of cases. The referral reply addressed the reason for the referral in 93-97% and was meaningful in 94-99% of cases. The commonest conditions referred were glaucoma, cataract, anterior segment lesions, and neurological/ocular motor anomalies. The CO/HES dyad (pairing) in the area with the lowest average household income had the highest RR.

Conclusions

In contrast with the joint statement on sharing patient information, CO referrals often do not elicit a reply to the referring CO. Replies from the HES to COs are important for patient care, benefitting patients and clinicians, and minimising unnecessary HES appointments.

Background

Nearly all primary eyecare consultations in the United Kingdom (UK) are carried out by community optometrists (COs) and over 70% are funded by the National Health Service (NHS) through the General Ophthalmic Services sight test (GOS-ST). Patients who are not eligible for a GOS-ST receive a private eye examination, which may include additional tests that are not typically included in a GOS-ST. 13.2 million GOS-STs were provided to patients in England during 2018-19, over 99% of which were undertaken by optometrists. Approximately 70% of adults in the UK wear refractive correction and the primary purpose of the GOS-ST is to detect, measure, and correct refractive error, thus optimising the population's visual acuity. Secondary goals of GOS-STs are to detect ocular and some systemic pathology (when it is evidenced in the eyes) and refer (to primary, enhanced, or secondary care services) as appropriate, and to detect orthoptic anomalies and correct or refer as appropriate.

All UK optometrists are licensed to use diagnostic pharmaceuticals. An increasing number of community optometrists in England (and other countries of the UK) also undertake enhanced services. Examples include examining patients referred from routine eyecare consultations or by general medical practitioners, dealing with minor and acute eye conditions, monitoring patients receiving glaucoma treatment, providing low vision assessments and aids, and examining children referred by school screening. These NHS-commissioned enhanced services are based on core competencies and typically require certified accreditations, not higher qualifications. Many optometrists also take higher qualifications and specialise in subjects such as independent prescribing (therapeutics), contact lenses, glaucoma, medical retina, low vision, paediatric eyecare, orthoptics, and learning difficulties. Nonetheless, routine primary eyecare, as outlined in the preceding paragraph, remains the most common optometric activity in the UK. For approximately 6% of UK optometrists, the main working environment is a hospital clinic rather community practice.

Most referrals to the hospital eye service (HES) originate from COs, but relatively little is known about these referrals. Previous studies of optometric referrals have typically studied those patients that reach the HES and provide no data on what proportion of optometric referrals to the HES are seen in the HES. A recent analysis of 664,480 GOS-ST forms reveals an overall referral rate of 5.1%, with patients aged 60 years and above being four times more likely to be referred than children. This research concentrated on the initiation of

referrals, and there is a dearth of studies that investigate optometric referrals from their initiation through to the HES appointment and any consequent correspondence.

Anecdotal feedback from some ophthalmologists is critical of COs for over-referring. This issue, and the relationship between primary and secondary care, is considered further in the Discussion. COs often do not receive a reply to referrals they make to the HES. One contributing factor may be the quality of referrals from COs, which has been criticised.

The lack of feedback to COs has important consequences, including a likely impact on public health. This is considered further in the discussion.

Discussions between the College of Optometrists and Royal College of Ophthalmologists led to a joint statement on the sharing of patient information in 2015. This noted that "Optometrists, as regulated professionals, are part of the healthcare team so it is usually in the patients' best interest for ophthalmologists to share clinical information with the referring optometrist" and concluded that hospitals should send copies of GP letters to the referring optometrist unless the hospital policy specifically prohibits this. The statement cites the Caldicott review as advocating good sharing of information, so it is perhaps surprising that the statement is not critical of hospitals whose policy prohibits this. In addition to advocating sharing between registered professionals, the Caldicott review states, "All communications between different health and social care teams should be copied to the patient".

There is a compelling need for further investigations of optometric referrals to the HES to provide information on whether referrals and replies achieve current standards, to investigate the referral rate, and generally to evaluate the effectiveness of communication between CO and HES. Ideally, studies in this field should review records both in the CO practice and in the HES unit.

An audit seeks to improve patient care and outcomes through systematic review of care against explicit criteria and implementation of change. The overarching aim of the present audit is to assess optometric referrals and replies, investigating whether these are in line with appropriate standards and advice.[1-3] The audit is a retrospective review of de-identified referrals and replies from optometric practices and HES units. The audit concentrates on optometric referrals to the HES, whether made via the GP or directly. The audit aims to investigate the appropriateness, necessity, and accuracy of optometric referrals; the proportion for which the optometrist receives a reply, and how often replies are copied to the patient. The audit also asks whether replies address the reason for referral and are

meaningful; and quantifies referral rate, the proportion of referrals that reach the HES, and referral reply rate.

Methods

The UK Health Research Authority (HRA) was consulted and confirmed that the study is considered an audit and does not require HRA review and approval. Approval from local R&D Departments was obtained as appropriate.

CO and HES dyads

A lengthy search was required to find pairings (dyads) of CO practice and HES clinics that were suitable for the audit and willing to participate. The target was three dyads in different areas of England and approximately 10 potential dyads were considered. The key requirements for participating practices and clinics are summarised in Table 1. In summary, typical CO practices and HES units were sought that would be supportive of the audit and did not have unusually strong links between the practice and HES. CO and HES dyads that met these requirements were contacted by the audit team and invited to participate.

Table 1. Summary of key requirements for audit clinics

Requirement	Details
Community optometric practice	
Representative of typical practices	Avoid outliers (e.g., "Harley Street" practice or exceptionally commercial practice)
Conventional referral pathway[4]	Wherever possible, avoid enhanced service schemes that involve optometric referrals undergoing triage with some being referred to Enhanced Services Optometrists (ESO)
1-to-1 referral dyad	A substantive proportion of referred patients are seen in one HES unit
Personnel	Co-operative practice team who are willing to provide access to records for de-identified copies to be taken by the audit team
Typical HES links	Practice should not have unusually close links with HES
Hospital eye service	
Representative of typical HES unit	Avoid specialist tertiary referral centres Avoid hospitals whose policy prohibits replies to optometric referrals
Personnel	Co-operative HES team who will provide access to records for de-identified copies to be taken by the audit team
Supportive	R & D department supportive of the audit

HES, hospital eye service; R & D, research and development.

CO practice data extraction

Once appropriate permissions had been obtained, members of the audit team visited each CO practice for 2-5 days to extract de-identified copies of referral letters and replies. The initial audit period was 18 months, ending at least 6 months before the first visit to the practice by the audit team This period was expanded (to further back in time) or shortened to obtain the target number of 150 referrals or 100 replies, whichever was reached sooner.

Each patient for whom there was a referral was identified solely using an “audit number”. For each referral letter and reply, a de-identified copy was obtained either by photographing hard copy letters with personal data obscured or by using software to mask personal data on digital letters. Before the audit team left the practice, data were checked to ensure no personal data were included inadvertently.

In addition, the audit team sought information on the total number of GOS-STs and private eye examinations completed in each practice during the audit period. The audit team lead kept a password protected spreadsheet containing the audit number, name, and date of birth of each patient. This spreadsheet was solely used to identify corresponding HES records (see below).

HES data extraction

Once appropriate permissions had been obtained, members of the audit team visited the HES unit to seek clinical records for all the referrals for which a reply had not been found in the records of the dyad CO practice. First, it was determined whether referred patients had been seen in the HES. For those that had, correspondence relating to the referral was sought, whether this was addressed to the GP, optometrist, or another practitioner. De-identified copies were obtained, as described above. For any referred patients who had been seen in the HES, but no report written, de-identified copies of the relevant appointment records were obtained.

Data analysis

A senior member of the audit team (dyad co-ordinator) took responsibility for the data from each dyad, that is each CO and HES pair. The co-ordinator entered the key data extracted from the de-identified copies of referrals and replies in a spreadsheet. These data analysis spreadsheets did not contain any personal data and only identified patients by their unique audit number. A separate password protected spreadsheet with personal data (name, date

of birth), cross-referenced with the audit number, was kept solely for finding HES records. This was stored securely.

The data that required a clinical judgement (outcomes 1-3 in Table 2 and additional information items 4a and 4b; see below) were left blank for subsequent grading by the audit team. The spreadsheet and de-identified referral and reply letters were securely shared with the audit team, together with any relevant information about the dyad (e.g., special referral pathways for cataract, AMD, glaucoma, etc).

For the first five cases at each dyad, the clinical judgements were made by all senior members of the audit team (BE, DE, RS, ZJ) after reviewing the referral letters and replies. For the other approximately 145 cases at each dyad, the de-identified letters and replies were graded by one senior member of the audit team and, for every sixth case, independently graded by a member of the expert panel (see below). Each outcome or additional information item was graded, using the guidelines described above, answering as yes, no, not applicable (N/A), or unknown. The gradings were carried out independently and collated by the dyad co-ordinator. Graders kept a note of any gradings about which they were uncertain and these, together with the first five (graded by senior members of the audit team) and any of the cross-checked gradings where there was disagreement, were discussed at meetings of at least four members of the audit team and expert panel. At these meetings, attendees reviewed the referrals and replies, and an agreement was reached by consensus.

Outcomes

The audit outcomes and the standards with which the results of the audit were compared are summarised in Table 2. Some of these outcomes refer to the College of Optometrists Guidance for Professional Practice, using the 2014 edition which is relevant to the period under investigation.[2]

Table 2. Summary of key outcomes and standards used in the audit.

	Audit outcome	Standard
1	Is the referral to an appropriate professional? (a) from the referrer's perspective (b) from an overall perspective	C.Optom guideline C152:[2] referrals should be "to a practitioner with the appropriate knowledge & skills"
2	Is the referral necessary?	C.Optom guideline C143:[2] refer "a sign or symptom of injury or disease which you cannot manage"
3	Is the referral accurate?	GOC rules (1999):[5] referral should be a written report "indicating grounds for thinking the person may be suffering from injury or disease of the eye"
4	What proportion of optometric referrals receive a reply? (referral reply rate; RRR)	Joint statement:[1] "ophthalmologists should send copies of GP letters to the referring optometrist"
5	Of optometric referrals that result in a letter to the GP and/or optometrist, for what proportion does the patient receive a copy?	Caldicott review:[3] "all communications between different health and social care teams should be copied to the patient"

C.Optom, College of Optometrists; GOC, General Optical Council; GP, general (medical) practitioner

Outcome 1, "Is the referral to an appropriate professional?", was considered in two ways. First, just considering the referrer's perspective, which is solely taking account of the information in their referral letter. Second, once any reply or the hospital record had been viewed, the question was asked again considering the overall perspective, including the HES findings. Outcomes 2 and 3 asked whether the referral is necessary and accurate; outcome 4 determined the referral reply rate (RRR); and outcome 5 asked what proportion of replies were copied to the patient.

To standardise the criteria used to interpret outcomes 1-3 (Table 2), a set of guidelines was created for 14 of the most commonly referred conditions. For each of these conditions, the authors listed common scenarios. For example, for the condition cataract, seven scenarios were considered: patient listed for surgery; surgery not necessary, patient discharged (cataract present, but visual acuity too good for surgery or vision not affecting activities of daily living); surgery not advised due to other ocular/systemic complications; surgery discussed at HES, patient elected not to have surgery and discharged because patient changed mind since saw CO; surgery discussed at HES, patient elected not to have surgery

and discharged but no evidence of patient changing mind since saw CO; patient to be monitored in the cataract clinic; and patient referred to another clinic. Each of these seven scenarios was mapped onto outcomes 1-3. For example, the scenario of cases referred by the CO but found in the HES not to require surgery because the visual acuity was acceptable and activities of daily living unaffected. In this scenario, the guideline specified that the referral was to the appropriate professional from the referrer's perspective, the referral was not necessary, but was accurate. The answer to the question about whether the referral was to the appropriate professional from the overall perspective, was classified as not applicable (N/A).

The guidelines were first drafted and reviewed by senior members of the study team (four optometrists with 15-40 years of experience of optometric practice & training), based on General Optical Council (GOC) standards, College of Optometrists guidelines, National Institute for Health and Care Excellence (NICE) guidelines, Association of Optometrists (AOP) publications, and other relevant documents. The draft guidelines were then reviewed by an expert panel, comprising two COs with considerable experience in community optometric practice (in the independent and corporate sectors), hospital optometry, and optometric education and training. The third member of the expert panel is a consultant ophthalmologist with experience of optometric education and training.

Whilst addressing the key outcomes, the following additional information also was gathered:

1. The proportion of GOS-STs and private eye examinations that result in a referral (referral rate; RR).
2. The proportion of optometric referrals whose ultimate destination was the HES and the proportion to other recipients (e.g., private ophthalmology; GP for blood pressure check, diabetes test, etc).
3. The proportion of optometric referrals directed to the HES that attend the HES.
4. Whether any reply to the referral (a) addressed the reason for the referral and (b) was meaningful.

All key proportions are calculated as percentages, followed by the 95% confidence interval (binomial "exact" method) in parentheses. Where Chi-squared tests have been carried out, p-values below 0.05 have been taken to be statistically significant.

Calculation of referral reply rate (RRR)

To facilitate comparison of this work with future studies that may not be able to gather all the data obtained here, from both CO and HES clinics, two different methods of calculating the RRR were applied. For any calculation of RRR, the number of referrals to the HES must be calculated. This ideally involves deducting the following from all referrals: duplicates of the same referral, those directed to the GP and not intended for the HES; private referrals, and referrals that are not to the HES (e.g., to neurologists).

The apparent RRR (aRRR) is from the perspective of the referring CO and is defined as the number of replies found in the CO records from any HES unit divided by the number of referrals to the HES. This is the only estimate available to studies without access to HES data.

For a second metric, the modified RRR (mRRR), the numerator is the number of replies from the audit HES unit found in the CO records. The denominator is adjusted by only including patients seen in the audit HES unit and by deducting the following: any replies that were found in the HES and clearly addressed or copied to the optometrist (even though a copy was not found in the CO practice), referrals not requiring a response to the referring optometrist, and replies that were sent after the date of the audit team visit to the CO practice. In every dyad, the number deducted for these reasons was very low.

Results

Demographics

The three England dyads are located between 10 and 150 miles from central London. They are situated in Outer London (Dyad 1), in the East of England (Dyad 2), and in the South of England (Dyad 3). Two of the practices are independent and one is part of a corporate chain of over 150 practices. The audit periods and demographics are summarised in **Error! Reference source not found.**.

The Office of National Statistics database was used to determine the most recently available (2016) gross disposable household income per head for the three local authorities where the dyads are located. These were approximately £24,500, £18,500, and £28,000 for Dyads 1, 2, and 3 respectively. In the ONS dataset, which covered 390 local authorities throughout the UK, the mean was £19,779 (95% CI, £9,038 to £30,520). Table 3 also shows the referral

rates (all referrals; see below). Precise breakdowns of ethnicity are not available, but Dyad 1 (Outer London) has a more diverse ethnicity than the other two dyads.[6]

Table 3. Audit periods and age (years) demographics of optometric referrals in the three practices. For each practice, the referral rate and the gross disposable household income (GDHI) for the practice location is given.

Practice	Audit period	Mean age	Median age	Min. age	Max. age	GDHI (£)	RR (%) (95% Confidence Interval)
1 (Outer London)	Mar 2016 to Jan 2018	66	71	4	93	24,500	3.6 (3.1-4.2)
2 (East England)	Aug 2015 to Oct 2017	64	69	4	92	18,500	8.7 (6.7-11.0)
3 (South England)	May 2015 to Nov 2017	66	72	3	93	28,000	6.5 (5.5-7.6)

Min., minimum; Max., maximum; GDHI, gross domestic household income per head; £, pounds sterling; RR, referral rate

The format of referral letters varied. In two venues, referral letters were all typed and in the third all were handwritten.

Numerical data

A total of 459 de-identified referral letters were extracted from the CO practices. Before any analyses could be carried out, the data were "cleaned" by removing duplicates, private referrals, and referrals just to the GP (e.g., requesting a blood pressure or diabetes test). The effect of this is summarised in Table 4, which shows other key numerical calculations and data, summarised below.

Table 4. Overview of data and calculation of referral reply rate. Key audit outcomes are highlighted in bold, with 95% confidence intervals in parentheses.

		Number at each dyad		
	Variable **Dyad**	**1**	**2**	**3**
a	Total referrals extracted	157	152	150
b	Duplicates	2	3	0
c	Private referrals	3	1	11
d	Referrals to HES not requiring reply (letter of info)	1	0	0
e	Referrals to GP, not for onward referral	10	6	12
f	Other non-ophthalmology referrals	0	1	0

g	Referrals intended for HES when reply appropriate (=a-b-c-d-e-f)	141	141	127
h	Replies from any HES unit found in CO practice	36	59	62
i	**Apparent referral reply rate: aRRR** (=h/g)	**25.5% (18.6-33.6%)**	**41.8% (33.6-50.4%)**	**48.8% (39.9-57.8%)**
j	Referrals directed to HES unit in audit	118	140	120
k	Referrals to a different HES unit	23*	1	7
l	Records sought in HES (=g-h)**	105	82	65
m	Records found in HES	52	48	32
n	Report sent to GP but not to CO practice	50	44	32
o	Reply sent to CO, but not found in audit visit	0	3	0
p	Record in audit HES unit, but not attended by date of audit	0	0	0
q	Reply sent to CO after audit visit	0	0	0
r	Total number known to HES (=h+m-p)	88	107	94
s	Patients who had appointments at HES unit in audit	84	106	76
t	% of patients referred to audit HES unit, who attended (=s/j)	71.2% (62.1-79.2%)	75.7% (67.8-82.6%)	63.3% (54.1-71.9%)
u	Replies in CO records from audit HES unit	32	59	47
v	Patients seen at HES audit unit where reply apposite (=s-o-q)	84	103	76
w	**mRRR** (=u/v)	**38.1% (27.7-49.3%)**	**57.3% (47.2-67.0%)**	**61.8% (50.0-72.8%)**
x	**% of patients who are sent a copy of the referral reply**	**6.0% (2.0-13.4%)**	**2.8% (0.6-8.0%**	**20.7% (12.9-30.4%**

*at this dyad, there were other proximal HES units and some patients were referred there.

**in some cases, patients who were referred to a different HES unit to the audit HES unit, were nonetheless seen in the audit HES unit (e.g., because of a shorter wait). Therefore, records were always sought in the audit HES unit, even if the patient's original referral destination was elsewhere.

HES, hospital eye service; GP, general (medical) practitioner; CO, community optometrist; aRRR, apparent referral reply rate (see text); mRRR, modified referral reply rate (see text).

Table 4 reveals that the aRRR varied from 25.5% (18.6-33.6%) to 48.8% (39.9-57.8%). A Chi-squared test confirms the aRRR differed significantly in the three dyads ($p<0.001$). Pairwise comparisons indicated statistically significant differences between Dyad 1 and Dyad 2 ($p=0.004$), Dyad 1 and Dyad 3 ($p<0.0001$), but not between Dyad 2 and Dyad 3 ($p=0.25$).

The mRRR varied from 38.1% (27.7-49.3%) to 61.8% (50.0-72.8%). A Chi-squared test confirms the mRRR differed significantly in the three dyads (p=0.005). Pairwise comparisons indicated statistically significant differences between Dyad 1 and Dyad 2 (p=0.009), Dyad 1 and Dyad 3 (p=0.003), but not between Dyad 2 and Dyad 3 (p=0.54). Table 4 also gives the proportion of patients who were sent a copy of the referral reply, which varied from 2.8% to 20.7%.

Of the 15 private referrals across all three CO practices, 73.3% (44.9-92.2%) received a reply to the referring optometrist. Very few of the referrals that were solely intended for the attention of a GP received a reply: zero out of 10 in Dyad 1, 1 out of 6 in Dyad 2, and 2 out of 12 in Dyad 3.

Referral rates (not included in Table 4) were calculated from GOS-STs and private eye examinations only, with the following other appointment types excluded: contact lens checks; return visits for dilation, visual fields, etc; and non-tolerance appointments[7]. The referral rate (RR) in Dyad 1 was 3.6% (3.1-4.2%) for all referrals and 3.2% (2.7-3.8%) just considering referrals to the HES. In Dyad 2, precise data on eye examination numbers that corresponded with the referrals audit were not available. Therefore, a sampling procedure was used to calculate the RR, which was based on 705 randomly selected GOS-STs and private examinations during the audit period. Of these, the overall referral rate (to any practitioner) was 8.7% (6.7-11.0%) and the referral rate to the HES was 8.4% (6.4-10.7%). In Dyad 3, the RR was 6.5% (5.5-7.6%) for all referrals and 5.5% (4.6-6.5%) for referrals just to the HES. A Chi-squared test of the RR (for all referrals) in the three dyads indicates they differed significantly (p<0.00001).

Content of referral letters and replies

The referral letters and replies were graded by senior members of the audit team and the expert panel, as described in the Methods. The results of these gradings are summarised in Table 5. In each dyad, the referral was to the appropriate professional (Table 2, Outcome 1a and 1b) in over 95% of cases and the referral was considered necessary in over 92% of cases. The referral was considered accurate in 97.5% (91.3-99.7%) of cases in Dyad 1, 81.1% (71.7-88.4%) of cases in Dyad 2, and 94.4% (87.4-98.2%) in Dyad 3. The reply addressed the reason for the referral in between 92.9% and 96.7% of cases and the reply was meaningful in 94.0% to 98.9% of cases. Chi-squared comparisons of the dyads were not possible for outcomes 1a and 1b because there were cells containing zero. For the other

outcomes in Table 5, only Outcome 3 (Is the referral accurate?) differed significantly between the three dyads ($p<0.001$).

Table 5. Summary of gradings of referral letters and replies

Audit outcome number		% at each dyad		
↓	**Audit outcome description** **Dyad:**	**1**	**2**	**3**
1a	Is the referral to an appropriate professional - referrer's perspective?	100.0 (97.6-100)	99.3 (96.3-100)	99.3 (96.3-100)
1b	Is the referral to an appropriate professional - overall perspective?	100.0 (95.4-100)	95.6 (89.0-98.8)	97.8 (92.2-99.7)
2	Is the referral necessary?	96.3 (89.7-99.2)	92.9 (86.0-97.1)	96.7 (90.6-99.3)
3	Is the referral accurate?	97.5 (91.3-99.7)	81.1 (71.7-88.4)	94.4 (87.4-98.2)
Add.	Do replies address the reason for referral?	92.9 (85.3-97.4)	96.4 (89.9-99.3)	96.7 (90.6-99.3)
Add.	Are replies meaningful?	94.0 86.5-98.0)	96.4 (89.9-99.3)	98.9 (94.0-100)

Add., additional information

Conditions referred

The most commonly referred conditions are shown in Table 6, with frequencies (the proportion of referrals in the dyad that were for each condition). The table also shows the p-value for the difference in proportions between each dyad calculated, for each condition, from a 3x2 table of dyad x number of people referred/not referred for that condition. The p-values should be viewed with caution in view of the number of comparisons. There were no cases referred for low vision assessment in any of the three practices.

Table 6. The proportion of referrals in each dyad that were for each condition (percentage, with 95% confidence intervals) and the p-values (Chi-squared) of the difference between dyads

Condition	Dyad 1	Dyad 2	Dyad 3	mean	P

Cataract	20 (14-27)	13 (8-19)	35 (27-44)	23	<0.0001
POAG or POAG suspect	15 (10-22)	20 (14-28)	12 (7-19	16	0.16
ACG or ACG suspect	5 (2-9)	15 (10-22)	7 (3-13)	9	0.005
Neurological (visual fields, headaches, papilloedema, suspect discs, ocular migraine)	6 (3-12)	13 (8-19)	5 (2-10)	8	0.020
Ocular motor anomalies/orthoptic (diplopia, convergence insufficiency, strabismus, decompensated phoria, nystagmus)	10 (6-16)	5 (2-10)	8 (4-14)	8	0.36
Macular lesions (dry ARM, wet ARM, CMO, macular hole)	8 (4-13)	5 (2-10)	7 (3-13)	7	0.53
Posterior capsular opacification	7 (4-12)	5 (2-10)	6 (3-12)	6	0.82
Retinal lesions (haemorrhages, vessel occlusions, degeneration, DR, FF, Hollenhurst plaques, retinal tears)	6 (3-12)	4 (2-9)	8 (4-14)	6	0.39
Other conditions (dry skin, unexplained blurred vision, giant cell (temporal) arteritis, balance issues, refractive error)	3 (1-7)	9 (5-15)	3 (1-8)	5	0.013
Lid anomalies (blepharitis, lid lumps & bumps, ectropion, entropion, ptosis)	8 (4-13)	4 (2-9)	2 (0-6)	4	0.044
Tear film anomalies (dry eye, watery eye, epiphora)	7 (4-12)	4 (2-9)	2 (0-6)	4	0.075
Corneal/conjunctival lesions (corneal dystrophies & disorders, foreign bodies, episcleritis, allergies)	5 (2-9)	2 (0-6)	6 (3-12)	4	0.30
Uveitis	1 (0-4)	0 (0-3)	0 (0-3)	0	N/A

POAG, primary open angle glaucoma; ACG, angle closure glaucoma; ARM, age-related maculopathy; CMO, cystoid macular oedema; DR, diabetic retinopathy; FF, flashes and/or floaters; N/A, not applicable.

The most commonly referred conditions in each dyad were collapsed into seven categories: glaucoma/suspect glaucoma (POAG or POAG suspect, ACG or ACG suspect), cataract or PCO, anterior eye (cornea, conjunctiva, lid, tear film), macula, neurological and ocular motor, posterior, and other (including uveitis). For these collapsed categories, the relative frequencies of the pooled data from all three dyads are shown in Figure 1.

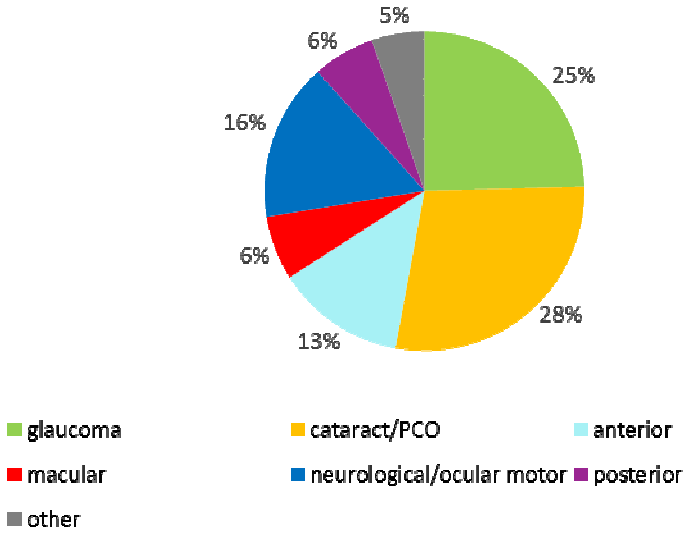

Figure 1. Relative frequencies of collapsed conditions (see text for details). PCO, posterior capsular opacification.

Discussion

Summary of results

This audit addresses a gap in the evidence base concerning the proportion of patients who community optometrists (COs) refer that are seen in the hospital eye service (HES). At least one quarter, in one case over one third, of those referred do not attend an appointment at the HES (Table 4, row t).

It is not surprising that optometric referrals in nearly every case were directed to an appropriate professional, since the referral pathway is usually unambiguous. In two practices, referrals were judged to be necessary and accurate in over 94% of cases. However, in one practice 7% of referrals were judged not to be necessary and nearly 20% to be inaccurate. This indicates room for improvement in optometric referrals. An inspection of the false positive referrals for this practice revealed no predominance of any particular condition(s). Twenty-two percent of the false positives were for suspected narrow anterior chamber angles but, since 20% of all referrals from this practice were for this condition (discussed below), this is not unexpected.

In some practices, the referring optometrist is unlikely to receive a reply to their referral and this is discussed further below. This falls short of the standard indicated in the joint statement, that the referring optometrist should receive a report of the HES findings.[1]

When replies are received, they are usually meaningful and address the reason for the referral. It is of some concern that in one dyad, 7% of referral replies did not address the reason for the referral. In that dyad the CO failed to receive a reply for six out of ten referrals, so the referring optometrist usually would be unaware that the reason for the referral had not been addressed.

In summary, this audit raises concerns about communication between community optometry and the hospital eye service and these are discussed further below.

Comparison of dyads

Although the dyads were in the south half of England, one was north of Birmingham and another south of London. Whilst three dyads cannot be representative of the whole country, they did span a large area of the country and both rural and urban environments. The mean gross disposable income in areas covered by the dyads encompassed a fairly wide range, and of course within each dyad there would have been a wide socio-economic profile.

The target number of 150 referrals or 100 replies from each practice was met or exceeded in every case. It is not surprising that the dyad in the area with highest disposable income is associated with the highest number of private referrals, 8% of this practice's referrals to ophthalmology.

The apparent referral reply rate (aRRR), which indicates the CO's perspective of the RRR, ranged from 26% to nearly twice that value. In Dyad 1, the low proportion of the number of referrals that were known to be seen in the HES is likely to reflect the fact that alternative HES units were quite close to this practice. It should not be assumed from this low figure that a high proportion of patients who were referred to the HES in this dyad were not receiving appointments. However, in Dyad 2 there was no other local HES unit and very few private referrals. It is therefore likely that most, if not all, of the approximately one quarter of referrals to the HES in this dyad who did not attend the HES unit, were not seen in any HES unit. It seems likely that, in some of these cases, sight loss would have resulted from this low take-up of referrals. The dyad associated with the lowest household income had the highest referral rate (RR). Other research reveals a poor uptake of General Ophthalmic Services sight tests (GOS-ST) by deprived communities,[8] and these factors could contribute to the association between deprivation and sight-threatening conditions.[9]

The mRRR, representing the proportion of replies for referrals that reach the HES where a reply is apposite, varies from just over one third to just under two thirds. Comparable data are currently being analysed from Scotland. It will be interesting to see if the progress in that country toward greater NHS use of CO and better integration with the HES is reflected in improved communication between CO and HES.

The relative proportions of commonly referred conditions varied between dyads. This is discussed further below.

Comparison with previous work

Anecdotal feedback from some ophthalmologists is critical of COs for over-referring. This debate between primary and secondary care is not singular to optometry and ophthalmology. Indeed, in December 2015 the British Medical Journal (BMJ) included an item entitled “Primary care is still treated with contempt” and this led to many comments on the different perspectives of community (GPs) and hospital practitioners about which cases should be referred. This highlighted a government suggestion that GPs should be paid for not making referrals. However, the relationship between community optometry and hospital ophthalmology is more problematic than that between GPs and hospital practitioners. This is because some ophthalmologists view optometrists as business people rather than clinical colleagues. This attitude may, in part, explain why optometrists often do not receive a reply to referrals they make to the HES. Another factor may be the quality of referrals from COs, which has been criticised. Nowadays, when many optometrists make direct referrals to the HES, it is particularly surprising that often the optometrist receives no reply, but the GP does receive a reply to a referral they did not initiate.

Previous audits and investigations of communications between CO and HES units have taken a limited (unilateral) approach, considering only referrals emanating from the CO practice, or only the information found in the HES.[10-20] A unique feature of the present work is that it examines communication from the perspectives of both primary and secondary care. This reveals two RRRs. From the perspective of the CO, the aRRR is simply the proportion of referral letters they write, for which they receive a reply. The mRRR is from the HES perspective, taking account of the fact that about a quarter of referrals do not attend the HES and some do not require a reply. Therefore, in each dyad the mRRR was 12-15% higher than the aRRR. This is important for other investigations in this field to consider.

Although it is known that most patients seen in the HES originate from optometric referrals, there has been surprisingly little work to indicate what proportion of community eye examinations result in referral (the RR). An often cited source dates back to 2015.[21] Recently, an analysis by Swystun and Davey of over 650,000 GOS-ST forms revealed an overall RR of 5.1%. A limitation of this approach is that COs may forget to tick the GOS-ST box indicating referral since the form is not part of their clinical records and this information from the GOS-ST is not regularly audited. Another difference from the present study is that Swystun and Davey only included GOS-STs, which are likely to be associated with a higher RR than private eye examinations. Nonetheless, Swystun and Davey's RR was within the range found in the present audit of 3.6% to 8.7%.

The approach taken by Swystun and Davey is useful for comparing different demographics, and patients aged 60 or over were found to be four times more likely to be referred than children. In the present work, RR was found to vary considerably between practices. This is unlikely to be explained by patient age, since the mean, median, and range of age of patients referred are similar in all three practices. A relevant factor may be socio-economic status since there is considerable variation in the gross disposable household income per head of the local authorities in which our dyads were centred. The practice in the area with the lowest gross disposable income had the highest referral rate, so it is possible that the referral rate reflects a higher proportion of pathology in low income areas. However, with only three practices, this is speculative.

There is a sparse literature concerning compliance with optometric referrals: the proportion who are actually seen in the HES. Theodossiades and colleagues compared glaucoma referrals from CO practices who had undergone special training with glaucoma referrals from control practices. The HES attendance rates were 82% and 70% respectively in these two groups. These figures are comparable with the present audit, where the proportion of CO referrals who attended the HES ranges from 63% to 76%. As noted below, the fact that approximately a quarter to a third of referrals are not seen in the HES is particularly worrying in view of the scarcity of replies.

Table 6 reveals statistically significant differences in the frequency of referral for various conditions across the three dyads. Cataract was referred much more frequently in Dyad 3 than Dyad 2, with Dyad 1 lying between the other dyads. It is possible that this is related to the higher gross disposable household income in Dyad 3 and lowest in Dyad 2, since more affluent individuals may have a lower threshold at which they request cataract surgery. Ethnicity could also be relevant, although detailed data on ethnicity were not available. Other

differences, such as the observation that in Dyad 2 narrow anterior chamber angles were referred two to three times more often than in the other dyads, may reflect variations in referral criteria between practitioners. Dyad 2 was not in a region that is associated with a high prevalence of Asian ethnicity, which is correlated with increased prevalence of narrow anterior chamber angles. Recent research identified unwarranted variation in optometric referrals and found that time since qualification has a significant influence on this variation.[22]

Optometric continuous professional development (CPD) is an obvious candidate for attempting to reduce variation. However, research using computerised vignettes reveals no significant effect of optometric training on referral management decisions. Generic advice in CPD will always lack the relevance of real cases and it seems likely that the best approach to raising the standard of optometric referrals is for those referrals to receive replies (Figure 2). In this way, the optometrist can take account of the ophthalmologist's opinion when they next consider referring a patient with a similar clinical presentation.

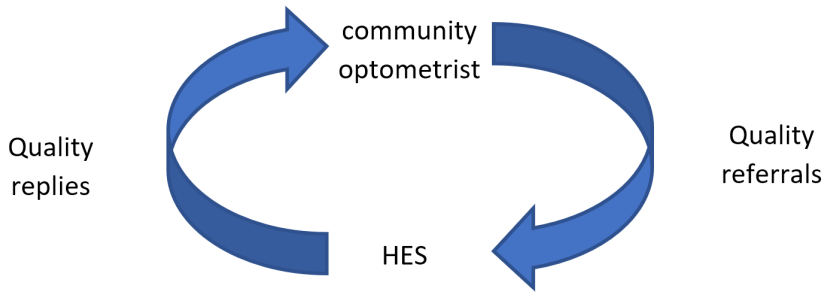

Figure 2. Model of best practice optometric referrals and replies.

To the best of the authors' knowledge, this study is the first systematic approach to calculating the RRR. As noted below, the study is likely to over-estimate the amount and quality of communication between CO and HES. Despite this, the audit revealed an aRRR of 25-50% and a mRRR of 38-62%. In other words, for some practices most optometric referrals do not receive a reply. In addition to an adverse impact on the quality of future referrals, perhaps the most important consequence of the lack of a reply is that the CO is unable to determine whether the problem for which the referral was made has been investigated and/or addressed. Additional consequences are considered below.

The patient perspective

The body of the Caldicott review "recommends that all communications between different health and social care teams should be copied to the patient or service user". Perhaps surprisingly in view of the explicit nature of this statement, it was not listed as one of the 26 formal recommendations of the Caldicott review report. Therefore, it was considered of

interest for the present audit to investigate how frequently correspondence was copied to patients. This audit of referral replies in England identifies only 2.8% to 21% of cases where there was an intention to send a copy of the reply to the patient. The images taken in the optometric practice, where time was limited, did not always allow the audit team to establish if the patient had been copied into the response. As a result, these figures concerning patient copies are an approximation. However, it seems safe to infer that correspondence is only infrequently copied to patients/primary carers. In view of the absence of a formal recommendation on this issue in the Caldicott review report, it would be inappropriate to be overly critical of the scarcity of copies to patients/guardians. However, noting the increasing emphasis on patient and public involvement as a central policy agenda in healthcare, which is undoubtedly desirable, it would seem that more needs to be done in this regard in the eyecare professions.

It is often only after patients have departed from a health consultation that they think of the questions they wished to ask the clinician. COs quite frequently have patients ask them to provide explanations about their HES diagnosis. Patients often are surprised that the CO has not received a reply to their referral and the absence of a reply means the explanation the CO can provide will be limited. Indeed, in the absence of a reply, the CO will have to ask the patient for information about the HES findings. This is likely to be some time after the HES appointment, so the information provided may be of limited value. From the patient's perspective, the absence of replies to the optometrist gives the impression of a disjointed, incohesive health service.

In the absence of referral replies, the paucity of useful information on the outcome of the referral will sometimes cause the optometrist to re-refer the patient. Sometimes, this referral will be unnecessary, resulting in increased anxiety and inconvenience for the patient, costs to the NHS, and a wasted HES appointment. This is particularly undesirable at the present time when, owing to COVID-19, there is great demand for HES appointments. Even before COVID-19, a survey of HES staff confirms that sight loss occurs whilst patients are on HES waiting lists. Therefore, the simple action of copying referral replies to the referring optometrist, through reducing unnecessary re-referrals, is likely to have an indirect effect of reducing sight loss as well as reducing patient anxiety at attending a hospital unnecessarily.

The finding that the reason for the referral is sometimes not addressed means that without evidence (from a reply) that the reason for the referral has been addressed, re-referral will sometimes be in the patient's best interest. For example, one of the patients in Dyad 2 was referred for a repeatable visual field defect. The referral reply, which was sent to the GP and

not copied to the optometrist, did not address the visual field defect. It is possible, the ophthalmologist did not receive a copy of the optometrist referral from the GP. Whatever the reason, because the CO did not receive a reply, they would not know that the reason for the referral does not appear to have been investigated. If the reason for the referral has not been addressed, this could cause an adverse clinical event.

Strengths and limitations

It is challenging to assess clinical practice and key methods have been reviewed elsewhere. A simpler approach to sampling CO's referral practice is to use vignettes or questionnaires. However, these approaches over-estimate performance. By obtaining de-identified copies of referral letters and replies, the present work has been able to assess the exact content of these documents.

This work involves a large sample size of over 450 referrals in England. A strength of the present work is that it follows referrals through to the HES and takes a bilateral approach to investigating the referral pathway.

The retrospective nature of the audit means that practitioners' referral behaviour would not have been altered by a knowledge that this was being studied. However, the grading of the quality of referrals and replies required an element of subjective judgement. Several features of this study were designed to minimise subjectivity: the development of guidelines based on the wide range of sources discussed in the introduction, a senior audit team with many years' experience, a multi-disciplinary expert panel, and discussion to resolve borderline cases. Indeed, many hours were spent in discussion of cases that were considered borderline and agreement was reached by consensus in every case.

In all three dyads, most CO referrals aimed at the HES were routed via the GP. In each referral, it is not known whether the GP forwarded the CO letter to the HES, although the content of many HES replies indicated this is commonplace. Even if, exceptionally, the CO letter had not been forwarded, details of the referring CO could still be obtained from the patient. In some dyads, there were direct referral pathways for certain conditions (e.g., glaucoma), and yet there is no evidence these attracted more replies.

It is also possible that routine direct referral from the CO to the HES, which is becoming more commonplace via online platforms, may result in a higher RRR. Anecdotal comments from COs, including the experience of some of the authors, is that this is not the case.

A limitation is that cooperation was required from both the CO and HES components of each dyad. Inevitably with studies of this type, poorly performing practitioners are unlikely to agree to participate. Similarly, clinics with a good relationship between the CO practice and HES would be more likely to participate than those with a poor relationship. Dyads were sought where the CO practice primarily referred to one HES unit. Such settings are probably more likely to have a good relationship than settings where a CO refers to several HES units. As a result of both these limitations, this audit is likely to have over-estimated the RRR and the quality of communication between CO and the HES. Another sampling limitation is that the audit team avoided areas with enhanced service schemes.[23, 24] These have become more commonplace since the audit was completed.

Conclusions

This audit is a systematic investigation of communication between CO practices and HES units in three areas of England. Over 450 CO referrals were followed through to the HES to discover what proportion of referrals arrive at the HES, what proportion attract replies, and to evaluate the content of referrals and replies. The audit finds an overall high but somewhat variable standard of optometric referrals and highlights a deficit in replies, although the reply rate varies amongst HES units. Referral replies are important to maintain high standards of patient care, avoid unnecessary re-referral, and to close the feedback loop and thus raise the standard of referrals. This is likely to be of greater importance following the COVID-19 pandemic, leading to a backlog in referrals, with COs assisting with some of the functions previously undertaken in the HES. The future is likely to see a greater implementation of online referral platforms alongside new ophthalmology electronic patient record (EPR) systems and these should be designed to ensure summary information from HES consultations is available to the referring optometrist as well as the GP.

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Disclosure

RS is an elected council member of the Association of Optometrists (AOP), one of the funding bodies. RS' role in the audit was not as a representative of the AOP, but as a researcher and academic. The funding bodies were not involved in the analysis of results, writing-up, or controlling publication of this work.

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