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Evaluation of a Minor Eye Condition Scheme delivered by community optometrists.

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ABSTRACT

Background: The establishment of Minor Eye Conditions Schemes (MECS) within community optometric practices provides a mechanism for the timely assessment of patients presenting with a range of acute eye conditions. This has the potential to reduce waiting times and avoid unnecessary referrals to hospital eye services.

Objective: To evaluate the clinical-effectiveness, impact on hospital attendances, and patient satisfaction with a minor eye service provided by community optometrists.

Methods: Activity and outcome data were collected for 12 months in the Lambeth and Lewisham Minor Eye Condition Scheme. A patient satisfaction questionnaire was given to patients at the end of their MECS appointment. A retrospective difference-in-differences analysis of hospital activity compared changes in the volume of referrals by GPs from a period before (April 2011 to March 2013) to after (April 2013 to March 2015) the introduction of the scheme in Lambeth and Lewisham relative to a neighbouring area (Southwark) where the scheme had not been commissioned. Appropriateness of case management was assessed by consensus using clinicial members of the research team.

Results: A total of 2123 patients accessed the scheme. Approximately two thirds of patients (67.5%) were referred by their General Practitioner (GP). The commonest reasons for patients attending for a MECS assessment were “red eye” (36.7% of patients), “painful white eye” (11.1%) and “flashes and floaters” (10.2%). A total of 64.1% of patients were managed in optometric practice and 18.9% were referred to the HES; of these 88.9% had been appropriately referred. First attendances to HES referred by GPs reduced by 26.8% (95% CI: -40.5% to -13.1%) more in Lambeth and Lewisham than in Southwark.

Conclusion: The Lambeth and Lewisham MECS demonstrates clinical -effectiveness, reduction in hospital attendances and high patient satisfaction and represents a successful collaboration between commissioners, local HES units and primary healthcare providers.

Strengths and limitations of this study:

- A case study approach lends itself to in-depth complex health service research and can yield powerful insights into aspects of health and healthcare delivery.
- The Lambeth and Lewisham MECS is one of the first enhanced service schemes to be comprehensively evaluated.
- Equivalent data was also obtained for a neighbouring commissioning area (Southwark) in which the scheme was not introduced, allowing a comparison between HES referrals in areas with and without the scheme.
- The appropriateness of the management of patients seen under the scheme was assessed by a consensus panel from the study team, and for patients referred to the HES by two ophthalmologists.
- The findings are not necessarily generalizable to other areas of the UK.

INTRODUCTION

The NHS General Ophthalmic Services (GOS) provides for routine sight testing across the United Kingdom (UK) through community optometry. In parallel to the availability of GOS, a number of enhanced service schemes (ESS) (also known as Community Eyecare Schemes) are currently delivered by optometrists. ESS have evolved over the last decade, following an amendment to the General Optical Council (GOC) '*Rules relating to injury or disease of the eye'*, which removed the obligation to refer patients with a disease or abnormality of the eye to medical practitioners, if there is no justification to do so[1] . Optometrists can also refer patients to another optometrist instead of a medical practitioner. These changes enabled many community optometrists to participate in ESS, furthering their professional development and building better relationships with the Hospital Eye Service (HES).[2]

Ophthalmology represents the eighth highest level of programme spend in England [3] and accounts for 9% of all NHS outpatient attendances[4] . The key potential benefits from ESS are saving HES resources, shorter waiting times for patients, and patient convenience.[5] Over the last decade, specialist ophthalmic Accident and Emergency (A&E) departments have reported that approximately 30% of patients presenting to A&E have non-emergency conditions that could be managed in the community.[6, 7] A recently introduced type of ESS is a Minor Eye Condition Scheme (MECS), which aims to reduce A&E and GP workloads. A number of MECS have been launched across the UK and have demonstrated clinical safety, reduced HES referrals, high patient satisfaction and GP trust.[8-12] However, there is limited evidence on the cost-effectiveness of such schemes; the Primary Eyecare Acute Referral Scheme (PEARS) in Wales has shown evidence of cost-effectiveness, [11] but other schemes have not been evaluated.

The aim of this mixed methods case study was to determine the clinical-effectiveness and impact on hospital attendances of the Lambeth and Lewisham MECS and to investigate patient satisfaction. MECS is an NHS funded service developed by Lewisham and Lambeth Clinical Commissioning Groups (CCG) to target those A&E referrals that could be managed in the community. The scheme represents a collaboration between a number of ophthalmic care providers in the Boroughs; ophthalmologists from Guy's and St Thomas's Hospital and King's College Hospital, community optometrists, GPs and the local CCGs were all involved in designing and maintaining the scheme.

METHODS

Scheme organisation

The scheme was launched in April 2013 as a 2-year pilot with a 1 year extension and 10 optometrists working in 13 community optometric practices participate. A map of the participating practices is shown in Figure 1.

Optometrists were trained and accredited using distance learning modules provided by the Local Optometric Committee Support Unit (LOCSU) and the Welsh Optometric Postgraduate Education Centre. Optometrists were also required to pass a practical station assessment, but a specialist prescribing qualification was not required, although certain medications could supplied using the Entry Level Medicines Act exemptions.[13] Optometrists also observed HES clinics and maintained a scheduled contact with consultant ophthalmologists at King's College Hospital or Guy's and St Thomas's Hospital, receiving feedback on their referrals. Participating optometrists were remunerated by the local CCG.

Two ophthalmologists from the collaborating HES also participated in the MECS. Each ophthalmologist had one session per week allocated to MECS as part of the pilot scheme, to review clinical records of patients seen through the scheme and review the outcome of all referrals to the HES. They also provided mentoring support and continuing education to participating optometrists.

Patients who presented to their GP with eye problems and satisfied certain inclusion criteria were referred to accredited MECS optometrists. The scheme was promoted to local GPs at a regional educational GP event. Patients could also refer themselves to MECS optometrists. Inclusion criteria encompassed red eye, loss of vision, trauma, headaches, painful white eye, and flashes and floaters. Patients were examined by optometrists within 48 hours and could be either managed within community optometric practice or referred directly to the HES. Patients could also be referred to their GP for systemic investigations.

Scheme monitoring – clinical-effectiveness

Scheme activity was closely monitored by the research team for 12 months from September 2013 to August 2014. Patients provided informed consent for their anonymised clinical data to be collected. Details of each MECS examination were entered on an electronic record by participating optometrists and uploaded onto a secure NHS server; key data were extracted and entered onto a password-protected database. The following data were extracted from clinical records: patients' age, first part of postcode, ethnicity, GP details, presenting complaint, vision and/or visual acuity, diagnosis, management, and, where applicable, the HES to which that referral was made, the urgency of referral and the HES diagnosis. The International Classification of Diseases codes published by the World Health Organisation were used for recording the diagnosis in community practice and/or the HES.[14]

To assess the clinical safety of MECS, a randomly selected sample of 220 MECS clinical records stratified by participating optometry practice were reviewed and independently graded by the four optometrist members of the research team (JL, DE, RH and EK). Clinical management was categorised as appropriate or inappropriate. In addition referrals to both of the collaborating HES were assessed by the ophthalmologist members of the team (SJ and GL). Each diagnosis by HES clinicians was made available and these were cross-referenced with MECS community optometrists' diagnoses. The ophthalmologists made a judgement on the appropriateness of referrals made by optometrists and the appropriateness of referral urgency.

Impact on hospital attendances

Administrative data describing the volume of patients being referred via MECS between 1st September 2013 and 30th August 2014 were obtained, as well as counts of first and follow-up outpatient attendances to the HES. The data were obtained for the financial years 2011/2012-2014/2015 from Hospital Episode Statistics. Equivalent data was also obtained for a neighbouring commissioning area (Southwark) in which the scheme was not introduced. The difference-in-differences (DiD) estimator was used to compare baseline data from 2011/12 and 2012/13 to data after the introduction of the scheme in 2013/14 and 2014/15. The DiD is the change over time in the number of attendances in the areas the scheme was operating minus the change over time in the number of attendances in the comparison areas. Linear regression was used including binary variables for each quarter to control for time trends and binary variables for each hospital to control for differences between providers.

Patient satisfaction

A patient satisfaction questionnaire was given to patients at the end of their MECS appointment. Patients were asked to complete the questionnaire and return it to the independent research team using a pre-paid envelope. The questionnaire consisted of 9 multiple choice questions and one open-ended question, addressing levels of patient satisfaction from their point of entry into MECS. Questionnaires were distributed during August 2014 and September 2014.

Statistical analysis

SPSS software (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp) and Stata (StataCorp. 2013. Stata Statistical Software: Release 13. College Station, TX: StataCorp LP) were used for statistical analysis. Pearson's correlation coefficient was used to investigate correlations and the two-proportion z-test to compare differences between proportions. $P<0.05$ was taken to be statistically significant for all tests.

The study was approved by the Research and Ethics committee of the School of Health Sciences, City University London and followed the principles of the Declaration of Helsinki.

RESULTS

Demographics and scheme activity

The scheme was monitored for 12 months; during which 2307 patient visits to MECS optometrists took place, with 2123 patients assessed at 13 community practices. The youngest patient seen through MECS was 1 year old and the oldest was 93 (median age 47 years, inter-quartile range 33-62 years); no data on patient gender were available. The scheme was accessed by people from a range of ethnic groups (Table 1), although 39.9% of patients who accessed the scheme did not reveal their ethnicity.

Ethnicity	% of patients
Not stated	39.9
British/Mixed British	23.8
Other white background	9.6
African	8.9
Caribbean	8.1
Other black background	1.9
Other ethnic category	1.9
Other Asian background	1.6
Indian/British Indian	1.0
Chinese	0.7
Irish	0.6
White & Black African	0.5
Other mixed background	0.3
Bangladeshi/British Bangladeshi	0.3
White & Black Caribbean	0.3
Pakistani/British Pakistani	0.3
White & Asian	0.1

Table 1 Ethnicities of the patients who accessed the Lambeth and Lewisham MECS

The average number of patient episodes per month was 188 (range 108-258); there was no significant correlation between the length of time the scheme had been running and the monthly volume of patients seen (R^2=0.23, p=0.1). Patient volume varied significantly between practices (p<0.001); the maximum

number of MECS patients seen by any practice in the 12 month study period was 483 and the minimum was 21; two practices accounted for 39.2% of all MECS patients, whilst one practice (practice 12) closed 7 months after the scheme commenced.

Approximately two thirds of patients (67.5%) were referred by their GP (range of GP referrals between practices 37.1-91.6%); a total of 118 GP practices referred patients to MECS (range of referred patients 1-83 per GP practice, not adjusted to practice list size). Approximately 78% of GP practices registered in Lambeth CCG and approximately 90% of practices registered in Lewisham CCG referred patients to MECS. A total of 26.8% of patients who used MECS were self-referred, 2.2% were referred by a pharmacist and 3.4% were patients who presented to the optometrist for a sight test, which was subsequently converted to a MECS appointment. There was no significant correlation between the length of time the scheme had been running and the referral source (GP referrals R^2=0.25, p=0.1, self-referrals R^2=0.01, p=0.8).

The commonest reason for a MECS assessment was "red eye" (36.7% of patients); "painful white eye" (11.1%), "flashes and floaters" (10.2%) and "loss of vision" (9.2%) were other common reasons for attending, whilst "headaches" (5.3%), "trauma" (1.7%) and "diplopia" (0.4%) were less common. A quarter (25.4%) of patients seen through MECS presented for reasons that did not fall under any of the pre-defined criteria; two thirds of these (66.2%) presented with anterior eye symptoms (e.g. dry or watery eyes, lid lumps, foreign body sensation).

Patient management and clinical safety

Of the patients seen through MECS 75.3% were retained in community practice; 64.1% were managed by community optometrists and 11.2% discharged with no ocular pathology identified. A total of 5.7% were referred to their GP. In total 18.9% of the patients were referred to the HES (Table 2); of these 49.1% were referred routinely, 22.6% urgently and 28.3% as an emergency.

Management decision following 1st visits	**% of patients (n)**
Management of ocular pathology in practice	64.1 (1359)
Discharge/no ocular pathology detected	11.2 (236)
Referral to King's College Hospital	10.4 (220)
Referral to Guy's and St. Thomas's Hospital	7.3 (154)
Referral to other HES	1.2 (26)
Referral to GP	5.7 (122)

Table 2 Management of patients after the 1st MECS visit

Of those patients initially managed in practice, 8.7% returned to MECS, either because the optometrist asked them to return or because their problem had not resolved; of those 61.4% were managed in

practice, 19.0% were discharged with their pathology resolved, 13.0% were referred to HES and 6.0% were referred to their GP. Practices varied significantly in terms of the proportion of patients who returned for a follow-up appointment (range 2.0-15.9%, p<0.001).

A topical or oral medication was supplied to 48.3% of MECS patients. Ocular lubricants were the most commonly supplied topical medication (29.7% of all patients seen through MECS), followed by local antibiotic drops (i.e. chloramphenicol or fusidic acid, 12.1%), topical and systemic anti-allergy agents (6.1%) and systemic analgesia (0.5%).

Referral rates varied significantly by practice and ranged from 5.2% to 30.8% (1st visits only, p<0.001) of patients seen through each practice (Figure 2). There was no significant correlation between the source of referrals into MECS and onward HES referral rates (p=0.36, R^2=0.07). There was no obvious difference in case mix between practices.

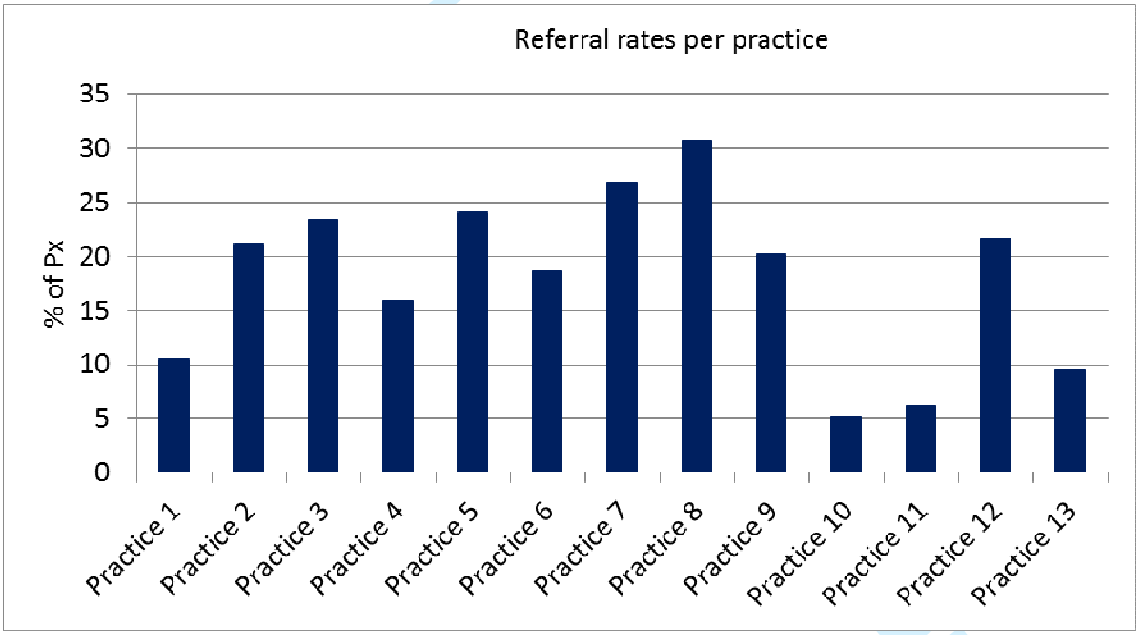

Figure 2 Percentage of patients referred by each practice during the 12 months that the scheme was monitored.

Based on a consensus panel of team members, a 10% stratified random sample of patients seen within the scheme was assessed and 95% of these patients were deemed to be appropriately managed. There were no major clinical safety issues arising from this evaluation. Data were available for 71.8% of the HES referrals. Of these, 88.8% were judged to have been appropriately referred and 76.7% were referred with appropriate urgency. In the case of HES referrals where urgency was classified as inappropriate, in over 90% of cases these were referred with greater urgency than required.

Impact on hospital attendances

First attendances to hospital ophthalmology referred by GPs dropped by 26.8% [95% CI -40.5; -13.1] more in the areas operating the MECS compared to the comparison area. Follow-up appointments at hospital ophthalmology (initially referred from GP) fell by 12.9% [95% CI -20.2; -5.6] more in the areas operating the MECS scheme compared to the comparison area (Southwark).

Patient satisfaction

There were 109 responses to the questionnaire (~28% response rate). All patients (100%) who completed the survey were satisfied with their visit to the optometrist and 99% would recommend the scheme to a friend; 95% of the patients reported confidence and trust in their MECS optometrist and 90% were satisfied with the location of the practices they attended.

DISCUSSION

The Lambeth and Lewisham MECS was designed to reduce ophthalmology referrals for two London Boroughs, after an audit by Lambeth CCG indicated that approximately 38% of the acute ophthalmology referrals could have been assessed and managed by either community optometrists or GPs.[15] This study monitored the pilot Lambeth and Lewisham MECS for 12 months, commencing the retrieval of patient records 6 months after the launch of the scheme. A strong clinical governance framework exists around this scheme: structured training is required for optometrists' participation, who have access to thorough clinical management guidelines provided by the College of Optometrists;[16] the scheme is being audited by the local CCGs and collaborating HES and is monitored by the Eye Group, a group of commissioners, optometrists, GPs, ophthalmologists and optometrists, who meet on a regular basis to discuss relevant issues. Results suggest that the Lambeth and Lewisham MECS reduces HES referrals relative to a neighbouring area (Southwark) where the scheme had not been commissioned, while ensuring appropriate HES referrals, patient safety and patient satisfaction.

The scheme was accessible to all ethnic groups residing in the two Boroughs, and the ethnic distribution of patients in MECS was similar to the ethnicity distribution in Lambeth and Lewisham as a whole[17, 18] over a 12 month period. The Lambeth and Lewisham MECS scheme provided ophthalmic care to 2123 patients, with a higher average number of patients per practice compared to the Welsh PEARS scheme and other MECS schemes previously evaluated in England.[8, 10, 12] There was a significant variation in the number of patients seen per practice; two practices accounted for ~40% of all patients seen through MECS, whereas one practice saw only 20 patients during the 12 months of monitoring. Similar variability in the number of patients seen by practices in ESS has been reported previously.[9] The freedom of patients to

self-refer, and GPs to refer to a practice of their choice may lead them to choose specific practices by virtue of location, ease of access and/or reputation.

In this study 67.5% of patients accessing MECS were referred from their GP, with a marked variability in the number of GP referrals between practices. Patient self-referral into MECS was less common and stable throughout the duration of the pilot scheme, suggesting that patients' healthcare-seeking behaviour favoured contacting the GP initially; this trend remained unchanged despite local advertising of the scheme. The significant GP engagement in the Lambeth and Lewisham MECS contributed to its success. Previous results on the experience and views of GPs on eye-related problems suggest that GPs may lack confidence in managing eye problems[19] and may favour assessment of patients by optometrists, which will improve the patients' journey, provide the patients with more choices and help GPs in hard to diagnose cases (e.g. red eyes and/or flashes and floaters).[2, 20]

Patients accessed the scheme with a variety of presenting complaints; red or painful eye, loss of vision and flashes and floaters (patients who might be at risk of a retinal detachment) were the most common. These presenting symptoms represent the commonest reasons for attendance reported in similar schemes, which commonly correspond to pathologies judged to be manageable by community services [6]. A total of 82.3% (n=1747) of patients (1st and follow-up visits) were retained in community optometric practices (either managed by community optometrists or discharged), compared to 66% of patients that accessed the Wales PEARS scheme[11] or other smaller schemes.[10, 12]

A total of 8.7% of patients returned to community optometric practice for a follow-up appointment. The average follow-up rate in similar ESS has been reported to be 22.13%,[8] with individual schemes reporting rates between 6.3 and 56.3%;[8-10, 12, 21] no data is available for the PEARS scheme in Wales.[11] HES referral rates for MECS schemes in the UK have been reported to average 19.3%;[8] 18.2% of patients accessing the PEARS scheme were referred to the HES, a rate similar to the Lambeth and Lewisham MECS (18.9%). Referral rates to GPs in the Lambeth and Lewisham MECS (5.7%) were below reported UK average for similar schemes (8.63%)[8] and lower than the PEARS scheme (16%).[11]

There was significant variability between practices in the proportion of follow-up visits and referral rates observed in this scheme. This variability may be related to the nature of the scheme; the Lambeth and Lewisham MECS does not have a specific protocol outlining referral or follow-up criteria for the various pathologies. Community optometrists were trained and attended A&E sessions at their local HES, whilst maintaining a scheduled contact with participating consultant ophthalmologists, receiving feedback on their referrals. The participating optometrists practiced according to the College of Optometrists Clinical Management Guidelines[16] and could exercise their clinical judgement. It could be argued that a detailed protocol might reduce referral variability between practices. Previous qualitative research on motivation for participation in this scheme has, however, indicated that "[…] participation in ESS would allow them (optometrists) to be exposed to more challenging clinical cases and consequently have opportunities to

use their clinical skills to a greater extent".[2] In order to attract community optometrists ESS need to maintain optometrists' interest and enhance clinical and decision-making skills, whilst providing patients with a safe service.

Although the optometrists participating in the Lambeth and Lewisham MECS did not have a non-medical prescribing qualification, medication was supplied to 48.3% of first and follow-up visits; patients were referred to secondary care due the seriousness of their condition and not as a result of a lack of prescribing rights, as might be the case elsewhere.[21] Approximately one quarter of patients who needed a prescription were prescribed antibiotic drops, with ocular lubricants being the predominantly prescribed ocular medication. It has been reported that GPs may overprescribe ocular antibiotics, due to a number of factors, with pressure from patients or inability to discriminate between viral and bacterial conjunctivitis being common reasons[22-24] The ophthalmic expertise of GPs and lack of availability of specialised equipment, as well as the need for further ophthalmic training is still under debate;[6, 25] the current findings indicate that optometrists are in a good position to differentiate between various ocular pathologies, prescribing appropriate medication.

Ninety five percent of patients seen within the scheme were assessed as being appropriately managed and there were no major clinical safety concerns in those inappropriately managed. Approximately 11% of referrals were judged unnecessary by ophthalmologists who monitored the scheme, compared to 17.7% reported in the PEARS scheme.[11] In total, 29.1% of referrals were sent to the HES with a greater urgency than the ophthalmologists considered appropriate. These findings indicate a safe service, despite some differences of opinion between optometrists and ophthalmologists regarding referral urgency.

The collaboration of the ophthalmologists has been crucial for the development of this pilot ESS, providing mentoring to community optometrists and feedback on the safety of HES referrals. A similar involvement in future schemes cannot be guaranteed, due to financial and time constraints. Equally, generalisability of such schemes is not guaranteed for other areas of the UK where similar schemes might be introduced, despite their success in Wales and South London. This study did not follow the principles of randomised controlled trials (RCT), since an observational pragmatic evaluation is more suitable for community healthcare services research.[26] Future evaluations could follow a stepped wedge or interrupted time series design; the latter was not possible in this study, due to a lack of historical data on referrals.

The Lambeth and Lewisham MECS is one of the first ESS to be comprehensively evaluated; results suggest that the scheme is safe for the patients, whilst providing a service that also benefits the NHS. Collaboration between eye care providers has promoted the scheme's popularity and increased its chances of sustainability. Appropriate training, support by the local CCG and ongoing collaboration between eye care providers are necessary to design and operate a safe and successful ESS that reduces hospital attendances.

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Contributors

The analysis and interpretation of the data was undertaken initially by EK and JGL, joined subsequently by DFE, RAH, MS, SJ and GL. The paper was drafted by EK and revised by JGL, RAH and DFE. All authors contributed to the design of the study and approved the final version of the paper.

Data sharing statement

No additional data available

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Ethics Approval

The study was approved by the Research and Ethics committee of the School of Health Sciences, City University London and followed the principles of the Declaration of Helsinki.

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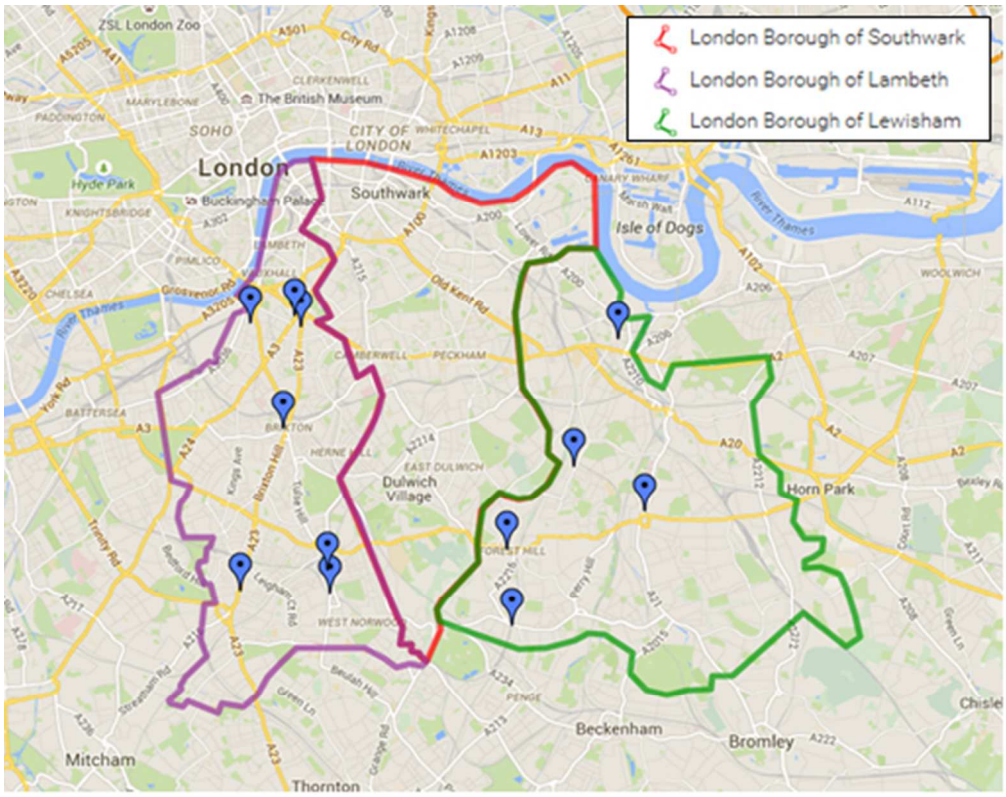
Figure Legends

Figure 1. Map of the community optometric practices participating in the Lambeth and Lewisham MECS. Only 12 practices are shown, as one practice closed 7 months after the commencement of the scheme.



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Evaluation of a Minor Eye Condition Scheme delivered by community optometrists.

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ABSTRACT

Background: The establishment of Minor Eye Conditions Schemes (MECS) within community optometric practices provides a mechanism for the timely assessment of patients presenting with a range of acute eye conditions. This has the potential to reduce waiting times and avoid unnecessary referrals to hospital eye services.

Objective: To evaluate the clinical-effectiveness, impact on hospital attendances, and patient satisfaction with a minor eye service provided by community optometrists.

Methods: Activity and outcome data were collected for 12 months in the Lambeth and Lewisham Minor Eye Condition Scheme. A patient satisfaction questionnaire was given to patients at the end of their MECS appointment. A retrospective difference-in-differences analysis of hospital activity compared changes in the volume of referrals by GPs from a period before (April 2011 to March 2013) to after (April 2013 to March 2015) the introduction of the scheme in Lambeth and Lewisham relative to a neighbouring area (Southwark) where the scheme had not been commissioned. Appropriateness of case management was assessed by consensus using clinicial members of the research team.

Results: A total of 2123 patients accessed the scheme. Approximately two thirds of patients (67.5%) were referred by their General Practitioner (GP). The commonest reasons for patients attending for a MECS assessment were “red eye” (36.7% of patients), “painful white eye” (11.1%) and “flashes and floaters” (10.2%). A total of 64.1% of patients were managed in optometric practice and 18.9% were referred to the HES; of these 88.9% had been appropriately referred. First attendances to HES referred by GPs reduced by 26.8% (95% CI: -40.5% to -13.1%) more in Lambeth and Lewisham than in Southwark.

Conclusion: The Lambeth and Lewisham MECS demonstrates clinical -effectiveness, reduction in hospital attendances and high patient satisfaction and represents a successful collaboration between commissioners, local HES units and primary healthcare providers.

Strengths and limitations of this study:

- A case study approach lends itself to in-depth complex health service research and can yield powerful insights into aspects of health and healthcare delivery.
- The Lambeth and Lewisham MECS is one of the first enhanced service schemes to be comprehensively evaluated.
- Equivalent data was also obtained for a neighbouring commissioning area (Southwark) in which the scheme was not introduced, allowing a comparison between HES referrals in areas with and without the scheme.
- The appropriateness of the management of patients seen under the scheme was assessed by a consensus panel from the study team, and for patients referred to the HES by two ophthalmologists.
- The findings are not necessarily generalizable to other areas of the UK.

INTRODUCTION

The NHS General Ophthalmic Services (GOS) provides for routine sight testing across the United Kingdom (UK) through community optometry. In parallel to the availability of GOS, a number of enhanced service schemes (ESS) (also known as Community Eyecare Schemes) are currently delivered by optometrists. ESS have evolved over the last decade, following an amendment to the General Optical Council (GOC) '*Rules relating to injury or disease of the eye'*, which removed the obligation to refer patients with a disease or abnormality of the eye to medical practitioners, if there is no justification to do so[1] . Optometrists can also refer patients to another optometrist instead of a medical practitioner. These changes enabled many community optometrists to participate in ESS, furthering their professional development and building better relationships with the Hospital Eye Service (HES).[2]

Ophthalmology represents the eighth highest level of programme spend in England [3] and accounts for 9% of all NHS outpatient attendances[4] . The key potential benefits from ESS are saving HES resources, shorter waiting times for patients, and patient convenience.[5] Over the last decade, specialist ophthalmic Accident and Emergency (A&E) departments have reported that approximately 30% of patients presenting to A&E have non-emergency conditions that could be managed in the community.[6, 7] A recently introduced type of ESS is a Minor Eye Condition Scheme (MECS), which aims to reduce A&E and GP workloads. A number of MECS have been launched across the UK and have demonstrated clinical safety, reduced HES referrals, high patient satisfaction and GP trust.[8-12] However, there is limited evidence on the cost-effectiveness of such schemes; the Primary Eyecare Acute Referral Scheme (PEARS) in Wales has shown evidence of cost-effectiveness, [11] but other schemes have not been evaluated.

The aim of this mixed methods case study was to determine the clinical-effectiveness and impact on hospital attendances of the Lambeth and Lewisham MECS and to investigate patient satisfaction. MECS is an NHS funded service developed by Lewisham and Lambeth Clinical Commissioning Groups (CCG) to target those A&E referrals that could be managed in the community. The scheme represents a collaboration between a number of ophthalmic care providers in the Boroughs; ophthalmologists from Guy's and St Thomas's Hospital and King's College Hospital, community optometrists, GPs and the local CCGs were all involved in designing and maintaining the scheme.

METHODS

Scheme organisation

The scheme was launched in April 2013 as a 2-year pilot with a 1 year extension and 10 optometrists working in 13 community optometric practices participate. A map of the participating practices is shown in Figure 1.

Optometrists were trained and accredited using distance learning modules provided by the Local Optometric Committee Support Unit (LOCSU) and the Welsh Optometric Postgraduate Education Centre. Optometrists were also required to pass a practical station assessment, but a specialist prescribing qualification was not required, although certain medications could supplied using the Entry Level Medicines Act exemptions.[13] Optometrists also observed HES clinics and maintained a scheduled contact with consultant ophthalmologists at King's College Hospital or Guy's and St Thomas's Hospital, receiving feedback on their referrals. Participating optometrists were remunerated by the local CCG.

Two ophthalmologists from the collaborating HES also participated in the MECS. Each ophthalmologist had one session per week allocated to MECS as part of the pilot scheme, to review clinical records of patients seen through the scheme and review the outcome of all referrals to the HES. They also provided mentoring support and continuing education to participating optometrists.

Patients who presented to their GP with eye problems and satisfied certain inclusion criteria were referred to accredited MECS optometrists. The scheme was promoted to local GPs at a regional educational GP event. Patients could also refer themselves to MECS optometrists. Inclusion criteria encompassed red eye, loss of vision, trauma, headaches, painful white eye, and flashes and floaters. Patients were examined by optometrists within 48 hours and could be either managed within community optometric practice or referred directly to the HES. Patients could also be referred to their GP for systemic investigations.

Scheme monitoring – clinical-effectiveness

Scheme activity was closely monitored by the research team for 12 months from September 2013 to August 2014. Patients provided informed consent for their anonymised clinical data to be collected. Details of each MECS examination were entered on an electronic record by participating optometrists and uploaded onto a secure NHS server; key data were extracted and entered onto a password-protected database. The following data were extracted from clinical records: patients' age, first part of postcode, ethnicity, GP details, presenting complaint, vision and/or visual acuity, diagnosis, management, and, where applicable, the HES to which that referral was made, the urgency of referral and the HES diagnosis. The International Classification of Diseases codes published by the World Health Organisation were used for recording the diagnosis in community practice and/or the HES.[14]

To assess the clinical safety of MECS, a randomly selected sample of 220 MECS clinical records stratified by participating optometry practice were reviewed and independently graded by the four optometrist members of the research team (JL, DE, RH and EK). Clinical management was categorised as appropriate or inappropriate. In addition referrals to both of the collaborating HES were assessed by the ophthalmologist members of the team (SJ and GL). Each diagnosis by HES clinicians was made available and these were cross-referenced with MECS community optometrists' diagnoses. The ophthalmologists made a judgement on the appropriateness of referrals made by optometrists and the appropriateness of referral urgency.

Impact on hospital attendances

Administrative data describing the volume of patients being referred via MECS between 1st September 2013 and 30th August 2014 were obtained, as well as counts of first and follow-up outpatient attendances to the HES. The data were obtained for the financial years 2011/2012-2014/2015 from Hospital Episode Statistics. Equivalent data was also obtained for a neighbouring commissioning area (Southwark) in which the scheme was not introduced. The difference-in-differences (DiD) estimator was used to compare baseline data from 2011/12 and 2012/13 to data after the introduction of the scheme in 2013/14 and 2014/15. The DiD is the change over time in the number of attendances in the areas the scheme was operating minus the change over time in the number of attendances in the comparison areas. Linear regression was used including binary variables for each quarter to control for time trends and binary variables for each hospital to control for differences between providers.

Patient satisfaction

A patient satisfaction questionnaire was given to patients at the end of their MECS appointment. Patients were asked to complete the questionnaire and return it to the independent research team using a pre-paid envelope. The questionnaire consisted of 9 multiple choice questions and one open-ended question, addressing levels of patient satisfaction from their point of entry into MECS. Questionnaires were distributed during August 2014 and September 2014.

Statistical analysis

SPSS software (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp) and Stata (StataCorp. 2013. Stata Statistical Software: Release 13. College Station, TX: StataCorp LP) were used for statistical analysis. Pearson's correlation coefficient was used to investigate correlations and the two-proportion z-test to compare differences between proportions. $P<0.05$ was taken to be statistically significant for all tests.

The study was approved by the Research and Ethics committee of the School of Health Sciences, City University London and followed the principles of the Declaration of Helsinki.

RESULTS

Demographics and scheme activity

The scheme was monitored for 12 months; during which 2307 patient visits to MECS optometrists took place, with 2123 patients assessed at 13 community practices. The youngest patient seen through MECS was 1 year old and the oldest was 93 (median age 47 years, inter-quartile range 33-62 years); no data on patient gender were available. The scheme was accessed by people from a range of ethnic groups (Table 1), although 39.9% of patients who accessed the scheme did not reveal their ethnicity.

Ethnicity	% of patients
Not stated	39.9
British/Mixed British	23.8
Other white background	9.6
African	8.9
Caribbean	8.1
Other black background	1.9
Other ethnic category	1.9
Other Asian background	1.6
Indian/British Indian	1.0
Other stated ethnicities	3.1

Table 1 Ethnicities of the patients who accessed the Lambeth and Lewisham MECS

The average number of patient episodes per month was 188 (range 108-258); there was no significant correlation between the length of time the scheme had been running and the monthly volume of patients seen (R^2=0.23, p=0.1). Patient volume varied significantly between practices (p<0.001); the maximum number of MECS patients seen by any practice in the 12 month study period was 483 and the minimum was 21; two practices accounted for 39.2% of all MECS patients, whilst one practice (practice 12) closed 7 months after the scheme commenced.

Approximately two thirds of patients (67.5%) were referred by their GP (range of GP referrals between practices 37.1-91.6%); a total of 118 GP practices referred patients to MECS (range of referred patients 1-83 per GP practice, not adjusted to practice list size). Approximately 78% of GP practices registered in Lambeth CCG and approximately 90% of practices registered in Lewisham CCG referred patients to MECS.

A total of 26.8% of patients who used MECS were self-referred, 2.2% were referred by a pharmacist and 3.4% were patients who presented to the optometrist for a sight test, which was subsequently converted to a MECS appointment. There was no significant correlation between the length of time the scheme had been running and the referral source (GP referrals R^2=0.25, p=0.1, self-referrals R^2=0.01, p=0.8).

The commonest reason for a MECS assessment was "red eye" (36.7% of patients); "painful white eye" (11.1%), "flashes and floaters" (10.2%) and "loss of vision" (9.2%) were other common reasons for attending, whilst "headaches" (5.3%), "trauma" (1.7%) and "diplopia" (0.4%) were less common. A quarter (25.4%) of patients seen through MECS presented for reasons that did not fall under any of the pre-defined criteria; two thirds of these (66.2%) presented with anterior eye symptoms (e.g. dry or watery eyes, lid lumps, foreign body sensation).

Patient management and clinical safety

Of the patients seen through MECS 75.3% were retained in community practice; 64.1% were managed by community optometrists and 11.2% discharged with no ocular pathology identified. A total of 5.7% were referred to their GP. In total 18.9% of the patients were referred to the HES (Table 2); of these 49.1% were referred routinely, 22.6% urgently and 28.3% as an emergency.

Management decision following 1st visits	% of patients (n)
Management of ocular pathology in practice	64.1 (1359)
Discharge/no ocular pathology detected	11.2 (236)
Referral to King's College Hospital	10.4 (220)
Referral to Guy's and St. Thomas's Hospital	7.3 (154)
Referral to other HES	1.2 (26)
Referral to GP	5.7 (122)

Table 2 Management of patients after the 1st MECS visit

Of those patients initially managed in practice, 8.7% returned to MECS, either because the optometrist asked them to return or because their problem had not resolved; of those 61.4% were managed in practice, 19.0% were discharged with their pathology resolved, 13.0% were referred to HES and 6.0% were referred to their GP. Practices varied significantly in terms of the proportion of patients who returned for a follow-up appointment (range 2.0-15.9%, p<0.001).

A topical or oral medication was supplied to 48.3% of MECS patients. Ocular lubricants were the most commonly supplied topical medication (29.7% of all patients seen through MECS), followed by local antibiotic drops (i.e. chloramphenicol or fusidic acid, 12.1%), topical and systemic anti-allergy agents (6.1%) and systemic analgesia (0.5%).

Referral rates varied significantly by practice and ranged from 5.2% to 30.8% (1st visits only, p<0.001) of patients seen through each practice. There was no significant correlation between the source of referrals into MECS and onward HES referral rates (p=0.36, R^2=0.07). There was no obvious difference in case mix between practices.

Based on a consensus panel of team members, an approximately 10% (220/2123) stratified random sample of patients seen within the scheme was assessed and 95% (208/220) of these patients were deemed to be appropriately managed. Of the remaining 12 patients, the panel classified four as inappropriate prescribing (three for unnecessary topical antibiotics), four as unnecessary referrals, two as referrals with greater urgency than required, and two as inappropriate management (one where pupil dilation was not carried out and one where intra-ocular pressure had not been recorded). However, there were no major clinical safety issues arising from this evaluation. Data were available for 71.8% of the HES referrals. Of these, 88.8% were judged to have been appropriately referred and 76.7% were referred with appropriate urgency. In the case of HES referrals where urgency was classified as inappropriate, in over 90% of cases these were referred with greater urgency than required.

Impact on hospital attendances

First attendances to hospital ophthalmology referred by GPs dropped by 26.8% [95% CI -40.5; -13.1] more in the areas operating the MECS compared to the comparison area. Follow-up appointments at hospital ophthalmology (initially referred from GP) fell by 12.9% [95% CI -20.2; -5.6] more in the areas operating the MECS scheme compared to the comparison area (Southwark).

Patient satisfaction

There were 109 responses to the questionnaire (~28% response rate). All patients (100%) who completed the survey were satisfied with their visit to the optometrist and 99% would recommend the scheme to a friend; 95% of the patients reported confidence and trust in their MECS optometrist and 90% were satisfied with the location of the practices they attended.

DISCUSSION

The Lambeth and Lewisham MECS was designed to reduce ophthalmology referrals for two London Boroughs, after an audit by Lambeth CCG indicated that ~38% of acute ophthalmology referrals could have been managed by either community optometrists or GPs.[15] This study monitored the pilot Lambeth and Lewisham MECS for 12 months, commencing retrieval of patient records 6 months after the scheme's launch. A strong clinical governance framework exists around this scheme: structured training is required for optometrists' participation, who have access to thorough clinical management guidelines provided by the College of Optometrists;[16] the scheme is being audited by local CCGs and collaborating hospitals and is monitored by the Eye Group, comprising commissioners, GPs, ophthalmologists and optometrists, who meet on a regular basis. Results suggest the Lambeth and Lewisham MECS reduces HES referrals relative to a neighbouring area (Southwark) where the scheme had not been commissioned, while ensuring appropriate HES referrals, patient safety and patient satisfaction.

The scheme was accessible to all ethnic groups residing in the two Boroughs, and the ethnic distribution of patients in MECS was similar to the ethnicity distribution in Lambeth and Lewisham as a whole[17, 18] over a 12 month period. The evaluated scheme provided ophthalmic care to 2123 patients, with a higher average number of patients per practice compared to the Welsh PEARS scheme and other MECS schemes previously evaluated in England.[8, 10, 12] There was significant variation in numbers of patients seen per practice; two practices accounted for ~40% of all patients seen through MECS, whereas one practice saw only 20 patients during 12 months of monitoring. Similar variability in the number of patients seen by practices in ESS has been reported previously.[9] The freedom of patients to self-refer, and GPs to refer to a practice of their choice may lead them to choose specific practices by virtue of location, ease of access and/or reputation.

In this study 67.5% of patients accessing MECS were referred from their GP, with marked variability in numbers of GP referrals between practices. Patient self-referral into MECS was less common and stable throughout the pilot scheme, suggesting that patients' healthcare-seeking behaviour favoured contacting the GP initially; this trend remained unchanged despite local advertising of the scheme. Significant GP engagement in the scheme contributed to its success. Previous results on the experience and views of GPs on eye-related problems suggest GPs may lack confidence in managing eye problems[19] and may favour assessment of patients by optometrists, which will improve the patients' journey, provide patients with more choices and help GPs in hard to diagnose cases (e.g. red eyes and/or flashes and floaters).[2, 20]

Patients accessed the scheme with a variety of presenting complaints; red or painful eye, loss of vision and flashes and floaters (patients who might be at risk of a retinal detachment) were the most common. These presenting symptoms represent the commonest reasons for attendance in similar schemes, which commonly correspond to pathologies judged to be manageable by community services [6]. A total of 82.3% (n=1747) of patients (1st and follow-up visits) were retained in community optometric practices (either managed by community optometrists or discharged), compared to 66% of patients that accessed the Wales PEARS scheme[11] or other smaller schemes.[10, 12]

A total of 8.7% of patients returned to community optometric practice for a follow-up appointment. The average follow-up rate in similar ESS has been reported to be 22.13%,[8] with individual schemes reporting rates between 6.3 and 56.3%;[8-10, 12, 21] no data is available for the PEARS scheme in Wales.[11] HES referral rates for UK MECS schemes have been reported to average 19.3%;[8] 18.2% of patients accessing the PEARS scheme were referred to the HES, a rate similar to the Lambeth and Lewisham MECS (18.9%). Referral rates to GPs in the Lambeth and Lewisham MECS (5.7%) were below the reported UK average for similar schemes (8.63%)[8] and lower than the PEARS scheme (16%).[11]

There was significant variability between practices in the proportion of follow-up visits and referral rates observed in this scheme. This variability may be related to the nature of the scheme; the Lambeth and Lewisham MECS lacks a specific protocol outlining referral or follow-up criteria for the various pathologies. Community optometrists were trained and attended A&E sessions at their local HES, whilst maintaining a scheduled contact with participating consultant ophthalmologists, receiving feedback on referrals. Participating optometrists practiced according to College of Optometrists' Clinical Management Guidelines[16] and could exercise clinical judgement. It could be argued that a detailed protocol might reduce referral variability between practices. Previous qualitative research on motivation for participation in this scheme has, however, indicated that "[…] participation in ESS would allow them (optometrists) to be exposed to more challenging clinical cases and consequently have opportunities to use their clinical skills to a greater extent".[2] To attract community optometrists ESS must maintain optometrists' interest and enhance clinical and decision-making skills, whilst providing patients with a safe service.

Although the optometrists participating in the Lambeth and Lewisham MECS did not have a non-medical prescribing qualification, medication was supplied to 48.3% of first and follow-up visits; patients were referred to secondary care due the seriousness of their condition and not as a result of a lack of prescribing rights, as might be the case elsewhere.[21] Approximately one quarter of patients who needed a prescription were prescribed antibiotic drops, with ocular lubricants being the predominantly prescribed ocular medication. It has been reported that GPs may overprescribe ocular antibiotics, due to a number of factors, with patient pressure or inability to discriminate between viral and bacterial conjunctivitis being common reasons.[22-24] The ophthalmic expertise of GPs and lack of availability of specialised equipment, as well as the need for further ophthalmic training is still under debate;[6, 25] the current findings indicate that optometrists are in a good position to differentiate between various ocular pathologies, prescribing appropriate medication.

Ninety five percent of patients seen within the scheme were assessed as being appropriately managed and there were no major clinical safety concerns in those inappropriately managed. Approximately 11% of referrals were judged unnecessary by ophthalmologists who monitored the scheme, compared to 17.7% reported in the PEARS scheme.[11] In total, 29.1% of referrals were sent to the HES with a greater urgency than ophthalmologists considered appropriate. These findings indicate a safe service, despite some differences of opinion between optometrists and ophthalmologists regarding referral urgency.

Ophthalmologists collaboration has been crucial for the development of this pilot ESS, providing mentoring to community optometrists and feedback on referral safety. A similar involvement in future schemes cannot be guaranteed, due to financial and time constraints. Equally, generalisability of such schemes is not guaranteed for other UK areas where similar schemes might be introduced, despite their success in Wales and South London. This study did not follow the principles of randomised controlled trials, since an observational pragmatic evaluation is more suitable for community healthcare services research.[26] Future evaluations could follow a stepped wedge or interrupted time series design; the latter was not possible in this study, due to a lack of historical data on referrals.

The Lambeth and Lewisham MECS is one of the first ESS to be comprehensively evaluated; results suggest the scheme is safe for patients, whilst providing a service that also benefits the NHS. Collaboration between eye care providers has promoted the scheme's popularity and increased its chances of sustainability. Appropriate training, support by local CCGs and ongoing collaboration between eye care providers are necessary to design and operate safe and successful ESSs that reduce hospital attendances.

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Contributors

The analysis and interpretation of the data was undertaken initially by EK and JGL, joined subsequently by DFE, RAH, MS, SJ and GL. The paper was drafted by EK and revised by JGL, RAH and DFE. All authors contributed to the design of the study and approved the final version of the paper.

Data sharing statement

No additional data available

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Ethics Approval

The study was approved by the Research and Ethics committee of the School of Health Sciences, City University London and followed the principles of the Declaration of Helsinki.

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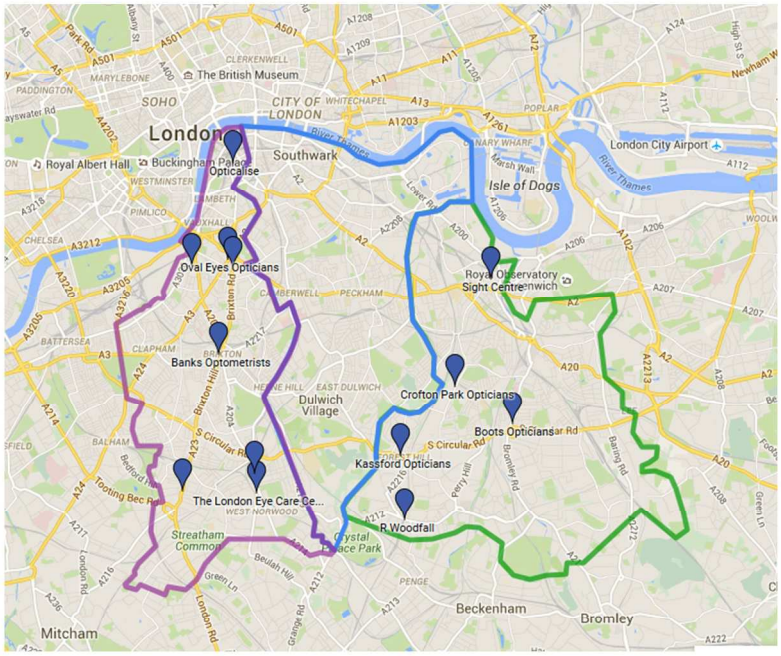
Figure Legends

Figure 1. Map of the community optometric practices participating in the Lambeth and Lewisham MECS. Only 12 practices are shown, as one practice closed 7 months after the commencement of the scheme.



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