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REVIEW PAPER

# Effectiveness of UK optometric enhanced eye care services: a realist review of the literature

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**Keywords:** commissioning, enhanced optometric services, enhanced service schemes, eye care services, ophthalmic disease, realist review

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## Abstract

**Purpose:** UK demographic and legislative changes combined with increasing burdens on National Health Service manpower and budgets have led to extended roles for community optometrists providing locally-commissioned enhanced optometric services (EOS). This realist review's objectives were to develop programme theories that implicitly or explicitly explain quality outcomes for eye care provided by optometrists via EOS and to test these theories by investigating the effectiveness of services for cataract, glaucoma, and primary eye care.

**Methods:** The review protocol was published on PROSPERO, and RAMESES publication standards were followed. Programme theories were formulated via scoping literature searches and expert consultation. The searching process involved all relevant electronic databases and grey literature, without restrictions on study design. Data synthesis focussed on questioning the integrity of each theory by considering supportive and refuting evidence from the source literature.

**Results:** Good evidence exists for cataract, glaucoma and primary eye care EOS that: with appropriate training, accredited optometrists manage patients commensurate with usual care standards; genuine partnerships can exist between community and hospital providers for cataract and glaucoma EOS; patient satisfaction with all three types of service is high; cost-effectiveness of services is unproven for cataract and primary eye care, while glaucoma EOS cost-effectiveness depends on service type; contextual factors may influence service success.

**Conclusions:** The EOS reviewed are clinically effective and provide patient satisfaction but limited data is available on cost-effectiveness.

## Introduction

With an ageing UK population, the debate on how best to meet the rising demand for eye care services is becoming more important. With the National Health Service (NHS) under tight budgetary restrictions, the need for more cost-effective services is increasingly impacting on health policy and service delivery. Ophthalmologists are overstretched and resource-heavy to train and therefore alternative providers and models of care are being explored. Expanding the role of the community optometrist has the potential

to reduce some of the burden relatively quickly and at a lower cost.

Notable changes in UK statutory legislation have extended the scope of optometric practice. In 1999, an amendment to General Optical Council 'Rules relating to injury or disease of the eye' allowed community optometrists, for the first time, to decide not to refer patients with a disease or abnormality of the eye to a medical practitioner if there was no justification to do so.<sup>1</sup> In 2005, the rules were further changed to allow referral to a more specialist optometrist colleague with appropriate qualifications and/

or expertise to manage the patient.<sup>1</sup> In parallel with these changes, amendments to medicines legislation have facilitated access to therapeutic agents. Consequently, the last decade has witnessed significant developments in UK optometrists' clinical practice, through the creation of new clinical roles together with an expansion of existing services.

Local commissioning organisations have the power to directly contract a wide variety of 'enhanced' community NHS services in response to local needs and priorities using a range of qualified providers. Across England, Wales and Northern Ireland (NI) a number of enhanced optometric services (EOS; sometimes referred to as 'community schemes') within primary ophthalmic healthcare are being increasingly delivered by optometrists outside the scope of the General Ophthalmic Services (GOS) contract, which provides for routine sight testing. EOS includes services for ocular hypertension (OHT) and glaucoma, low vision, cataract, and 'red eye'. The primary benefits and intended outcomes of these services largely depend on purpose. For example, some services were developed primarily to improve referral quality and reduce false positive referrals to the Hospital Eye Service (HES). Others aimed to ease HES capacity problems for typically chronic (but sometimes acute) disease management, by provision of access to local services for assessment and/or on-going monitoring of disease. In either scenario, another objective has been to make appropriate use of optometric expertise beyond that funded by traditional GOS mechanisms.

Proposed advantages of EOS include: access to timely assessment of patient needs, reduction in the number of GP (General Practitioner) appointments, reduction in the number of inappropriate referrals into secondary care, reduction in secondary care activity levels, possible increase in the skills of the optometric workforce, and ensuring the patient pathway is as short as possible with appropriate choice of service access.

### Rationale for the review

EOS are locally commissioned and designed to meet local population needs within the configuration of existing eye care. Services are therefore varied and not regulated by a single overarching authority. For currently running services, published peer-reviewed research evaluations are very limited and there is arguably an absence of any high-quality evidence as to their effectiveness. The College of Optometrists published a review of UK eye services in 2010,<sup>2</sup> which highlighted the need for a more detailed evidence-based review of the effectiveness of current EOS. Our review aims to provide a comprehensive and cohesive understanding of reasons for success or failure of services and inform both commissioners and providers of eye care. Scotland was

excluded from the review because since April 2006 a new GOS contract has been in operation, with notable differences from elsewhere in the UK. For example, a supplementary eye examination on a glaucoma suspect could be performed in Scotland under the GOS contract, but would fall outside the GOS in the rest of the UK.

### Objectives and focus of review

The objective and focus of this review is to develop programme theories that implicitly or explicitly explain quality outcomes for eye care services where optometrists work as substitutes for physicians in defined areas of ophthalmic care (enhanced services). The review uses realist review methodology to identify key statement theories. This theoretical framework can then be used to extract data from existing literature and test the literature findings against the framework. To facilitate comparison across the most commonly commissioned EOS, we have chosen to present the results of the evidence synthesis as a single review rather than as individual reports for each specific enhanced service.

### Materials and methods

The review protocol was registered and published on PROSPERO<sup>3</sup> and we have made no major changes to our review methodology. We followed the RAMESES publication standards when writing this report.<sup>4</sup>

### Realist review

A realist methodology is suited to areas where there is a diverse literature, which may have a variety of methods, components and outcomes. This methodology is concerned with explaining more fully the processes of interventions within the complexity of their contexts, rather than focusing on simple cause and effect deterministic theories. Realist reviews can contribute to programme understanding even when outcomes are not rigidly defined.

Empirically-driven systematic reviews are less suitable for assessing complex social interventions, having limited capacity to account for the effects of factors such as community, culture, geo-political contexts, and study design and program theory. To make maximum use of the evidence available we chose a realist approach<sup>5</sup> because it provides a rationale and tools for synthesising complex, difficult-to-interpret evidence from community-based programs.

Realist synthesis aims 'to articulate underlying programme theories and then to interrogate the existing evidence to find out whether and where these theories are pertinent and productive'.<sup>5</sup> *Table 1* describes the review process.

**Table 1.** Steps in the review process (adapted from Pawson and Tilley 2006<sup>6</sup>)

Step 1	Identifying the review question and development of the underlying theoretical framework
Step 2	Searching for primary studies
Step 3	Quality appraisal – assessment of relevance and rigour
Step 4	Extracting the data
Step 5	Evidence synthesis and theory testing

### Exploratory scoping of the literature

Our aim is to investigate the effectiveness of EOS in the management of ophthalmic disease. Concept mining and theory formulation were achieved by team 'brainstorming' and use of relevant reviews and health policy documents.<sup>7–9</sup> Three methods were used to develop a theoretical framework. First, expert consultation via an advisory panel of experts to contribute to the development of programme theories as to why, for whom and in what circumstances EOS work. Secondly, a search for past and current policies on eye care service delivery was performed, and thirdly preliminary literature searches were performed to clarify the review's scope and to contribute to development of programme theories. This iterative process allowed the development of six programme theories under four key areas (Table 2).

### Searching processes

The literature search was iterative and ongoing throughout the project. This process involved systematically searching literature to test the programme theories. Searches included all relevant electronic databases (MEDLINE, EMBASE, Cochrane Library, and Health Management Information Consortium (HMIC), Cumulative Index to Nursing and Allied Health Literature (CINAHL) and PsycINFO) and appropriate grey literature (e.g. websites, professional publications, and national guidelines). Keywords for searches included: Profession-specific terms: optometrist, ophthalmic optician, and ophthalmologist. Intervention-specific terms: enhanced services, shared care, co-management, delegated care and referral refinement. Condition (speciality)-specific terms: cataract, glaucoma, primary care. Searches were restricted by date (1995 to October 2014) and were restricted to articles/sources in English.

We reviewed multiple sources of evidence, placing no restriction on type of study design to be included. The review used purposive sampling, aiming to retrieve materials purposively to answer specific questions or test particular theories. This review was limited to the following EOS: cataract direct referral and/or post-operative management, enhanced glaucoma case-finding, management of suspect

**Table 2.** Programme Theories

1. Use and implementation of enhanced services	
Theory 1.	Optometrists working as substitutes for physicians in defined areas of ophthalmic care can maintain or improve the quality of care and outcomes for patients
Theory 2.	Developing genuine partnerships between community and hospital providers and the patient and carer both in service planning and delivery can improve access and choice, and deliver patients' aspirations for responsive and convenient services
2. Effectiveness	
Theory 3.	With further training and accreditation, together with the adoption of protocol-based care, optometrists can provide a standardised high-quality service that benefits the overall eye care pathway
Theory 4.	Enhanced services are more cost-effective than traditional care pathways
3. Acceptability of enhanced services	
Theory 5.	Enhanced services are accepted as an effective alternative to traditional models of care by patients, providers and other stakeholders
4. Barriers and enablers	
Theory 6.	Contextual factors will impact on the development, outcome and sustainability of enhanced services

or stable glaucoma, management of OHT, and primary eye care (first contact care for acute eye conditions and monitoring and/or palliation of chronic eye disease). This selection reflects EOS in which UK optometrists most commonly participate.<sup>10</sup>

There is no formal definition of an EOS. However, it could include any service within primary eye care delivered by optometrists outside the scope of the GOS contract using core clinical skills or following further training and/or accreditation. Where relevant, the comparator is 'usual' or standard care, provided by optometrists under the standard GOS contract or by physicians (GPs or ophthalmologists). The setting is primary care or the primary/secondary care interface. However, studies using specialist optometrists based in the HES were included if they added to theory development or testing. Details of included and excluded papers can be found in the online supplementary material. Among the excluded papers are seven publications which concerned enhanced services in countries other than the UK. These were excluded from the review because these services fell outside the research remit of this UK-focused project.

### Selection and appraisal of documents

Data were extracted independently by two reviewers (HB and GR) in terms of whether the evidence supported or refuted the programme theories. This extraction was independently checked by two further reviewers (RAH and DFE), and disagreements resolved by discussion. No supporting software was used during the data extraction process.

### Risk of bias (quality) assessment

Quality was not assessed formally using standardised assessment tools. However, evidence included in the review was assessed for rigour and relevance. A judgement was made whether a particular study addressed the theory under test and whether the particular inference drawn from the study had sufficient weight to make a methodologically credible contribution to the test of particular programme theories.

### Analysis and synthesis processes

Initial data synthesis was undertaken by DFE and JGL, although the results were regularly shared and discussed within the review team to ensure validity and consistency. Specifically we identified recurrent patterns of context, mechanism and outcomes in the data and then sought to apply these to the programme theories within the theoretical framework.

## Results

### Search results and study characteristics

The results of the searches are shown in the document flow diagram (*Figure 1*). Thirty-nine studies published between 1995 and 2014 were included in this review. Only one of these was a randomised controlled trial (RCT). The majority of included studies were non-experimental and generally consisted of retrospective evaluations of pilot or established EOS.

### Scope of enhanced services considered for this review

#### *Glaucoma enhanced case finding and monitoring services*

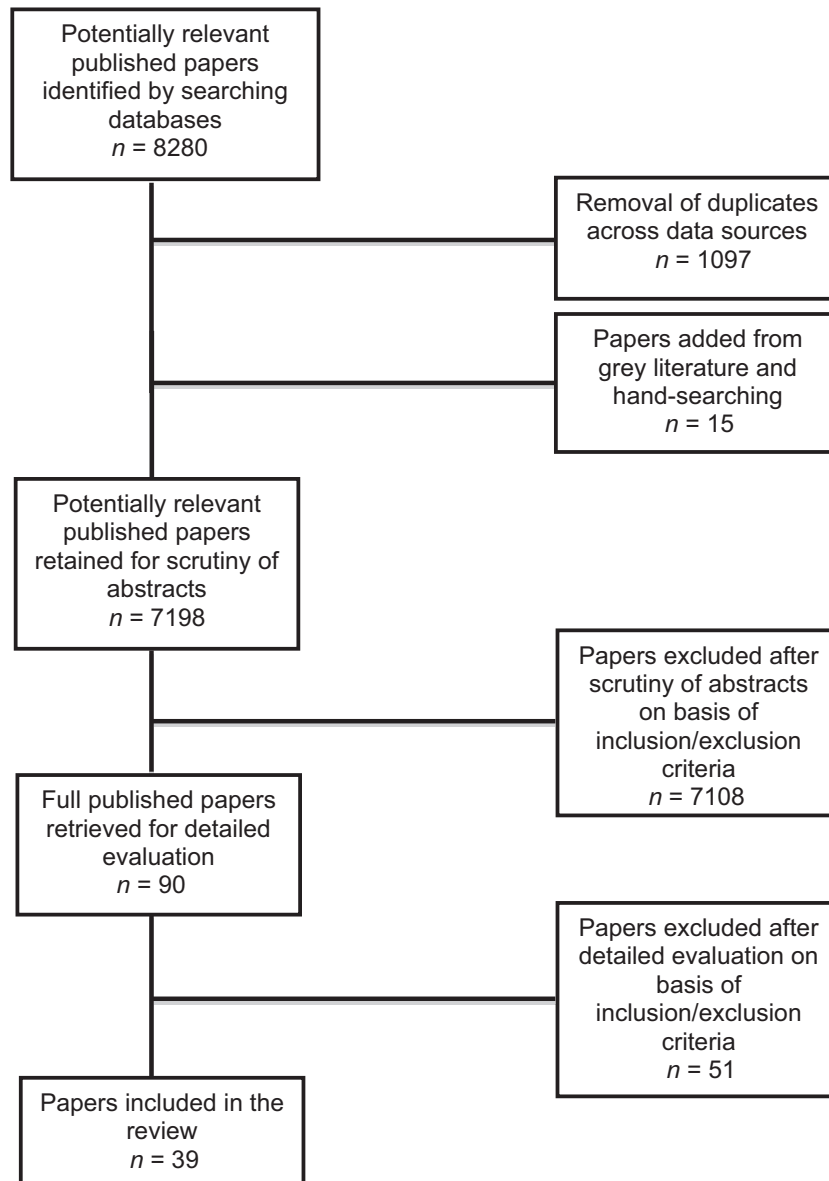
Detecting early glaucoma is clinically challenging because there is no ideal screening test or combination of tests to diagnose early disease. Detection is further confounded because glaucoma has a relatively low prevalence in the general population.<sup>11</sup> Consequently, referrals for suspect glaucoma from optometrists have historically been associated with a high proportion of false positives.<sup>11</sup> The publication of the National Institute for Health and Care excellence (NICE) guideline on the *Diagnosis and management of chronic open angle glaucoma and ocular hypertension*<sup>12</sup> inadvertently led to a surge in glaucoma referrals and an increase in first-visit discharge rates following HES review. The volume of care episodes for new and follow-up patients with glaucoma is rising in the UK, creating a considerable service provision challenge because glaucoma-related care episodes already use an estimated 25% of HES outpatient consultations. To address these problems initiatives have been developed where accredited community

optometrists repeat measurements prior to referral (repeat measures services), triage referrals (referral refinement services<sup>†</sup>) through further testing, and also manage low-risk patients with stable glaucoma or OHT in the community. Although many services were in operation before the publication of the NICE<sup>12</sup> and SIGN<sup>15</sup> guidelines, these guidelines influenced subsequent glaucoma EOS, particularly repeat measures services. There is a wide range of case complexity in glaucoma and glaucoma-related diagnoses, with potential visual outcomes varying from minimal lifetime risk of sight loss to high risk with imminent threat to vision. This range is reflected in commensurate wide variations in patient pathways, treatment, and clinical management plans, and in the level of training and skills required by participating optometrists and other clinicians.

#### *Services for cataract direct referral and post-operative management*

Most patients referred for possible cataract surgery in the UK are referred by community optometrists following routine eye examination<sup>16,17</sup> and until 2000 referral by optometrists to secondary care was via the patient's GP. By 2000–2001 the median waiting time for extra-capsular cataract surgery was 157 days.<sup>18</sup> To address this capacity issue *Action on cataracts*, published in 2000<sup>19</sup> contained recommendations including direct referral services for optometrists under locally-agreed protocols, removing the requirement for the optometrist to refer via the patient's GP. NHS funding became available to establish optometrist direct referral (or fast-track) services for cataract, many of which were pilots.<sup>20</sup> In 2004 the Department of Health's National Eye Care Services Steering Group proposed that direct referral should be the preferred method of referral for cataract.<sup>21</sup> The creation of the Local Optical Committee Support Unit (LOCSU) cataract pathway provided further impetus for new direct referral services.<sup>22</sup> These services operate outside the GOS and are locally commissioned. A minority of services include post-operative assessment by optometrists.<sup>20</sup>

<sup>†</sup>The NICE quality standard [QS7] published in 2011<sup>13</sup> defined a referral refinement service as follows: 'A referral refinement service involves the undertaking of tests sufficient for diagnosis of OHT and suspected COAG and the interpretation of these clinical findings, with specialist practitioners who are delivering this service independently, being qualified and experienced in accordance with NICE guidance.' It should be noted that many of the services included in the current review were established prior to the publication of the quality standard QS7 and some are described as 'referral refinement' when they would now be more appropriately termed 'enhanced case finding'. The newer definitions of different service levels and the required training and accreditation can be found within the Royal College of Ophthalmologists' Commissioning Guide (published in June 2016).<sup>14</sup>



**Figure 1.** Document flow diagram.

### Primary eye care services

Primary eye care corresponds to ‘first-contact’ care for patients presenting with a range of eye conditions, delivered in a variety of settings by a diverse workforce. GPs are the usual first port of call for UK patients with non-emergency eye problems, such as conjunctivitis, accounting for ~1.5% of general practice consultations.<sup>23</sup> Most GPs have received little formal postgraduate ophthalmology training and lack the confidence and necessary specialist equipment to conduct a detailed eye examination. Misdiagnosis of acute eye disease by GPs is therefore not uncommon.<sup>24,25</sup> In the UK, urgent and emergency eye care is provided by general accident and

emergency (A&E) departments or by dedicated eye casualty departments, typically staffed by specialty doctors and ophthalmologists in training.<sup>26</sup> Studies evaluating attendances at specialist eye casualty services found a significant proportion of patients present with non-urgent conditions that could potentially be managed in primary care by GPs with a specialist interest in ophthalmology or by community optometrists.<sup>27</sup> Several initiatives have been developed to utilise the skills and experience of optometrists to deliver primary eye care services, aiming to facilitate early assessment of acute ophthalmic conditions and to provide a ‘gate keeping role’ to potentially reduce inappropriate HES attendances.



## Evidence synthesis

Supportive and refuting evidence for the six programme theories for the three most commonly commissioned UK community optometry EOS follows:

### 1. Use and implementation of enhanced services

*Theory 1. Optometrists working as substitutes for physicians in defined areas of ophthalmic care can maintain or improve the quality of care and outcomes for patients.*

#### Glaucoma

There is good evidence that specialist optometrists, additionally trained in glaucoma, can make appropriate diagnostic and management decisions compared to a sub-specialist ophthalmologist reference standard.<sup>28–32</sup>

*Case finding.* Most community-based glaucoma schemes used accredited optometrists in a referral refinement/triage role. These initiatives consistently reduced the number of false positive referrals to secondary care and reduced the first visit discharge rate following HES review.<sup>33–39</sup> Additional benefits include a reduction in patient waiting and travelling times. Although there is generally good decision-making concordance with the consultant ophthalmologist<sup>36</sup> there are concerns that optometrists may miss subtle glaucomatous optic nerve changes and robust data on false negative rates is lacking.<sup>34,38,39</sup>

*Monitoring chronic disease.* EOS for community monitoring of patients with stable glaucoma or OHT have been evaluated.<sup>40–44</sup> These services are protocol-driven and generally overseen by the HES. A RCT, comparing community monitoring of patients with stable glaucoma to routine care in the hospital glaucoma clinic, found community optometrists could take clinical measurements of comparable quality to usual care<sup>40,43</sup> and there was no difference in patient outcomes between the two arms of the trial over a 2-year period.<sup>45</sup> Other studies, observational in design,<sup>41,42,44</sup> concluded that with further glaucoma training, community optometrists are an acceptable alternative to hospital care for selected glaucoma patients and those at increased risk of developing glaucoma. In summary, evidence from glaucoma services provides strong support for Theory 1.

#### Cataract

For direct referral services, there is strong evidence supporting Theory 1 in terms of the percentage of patients referred and subsequently listed for surgery,<sup>16,17,20,46–49</sup> and the proportion of inappropriate referrals was reduced compared with referrals via or from the GP.<sup>16,17,46,48,49</sup> Further supportive evidence was that services streamlined the

referral process by shortening the patient journey,<sup>16</sup> reducing waiting times,<sup>20,46,48,49</sup> reducing GPs' workload<sup>16</sup> and encouraging higher outpatient clinic attendance rates.<sup>49</sup> Clinical data in referral documentation was reliable.<sup>46</sup> In the Avon and South Gloucestershire scheme, referrals from optometrists provided better information on objective visual loss than those from GPs, however referrals from GPs provided better medical and drug information.<sup>47</sup> Outcomes of surgery following direct referrals were comparable with referrals via other routes.<sup>16,46,47,49</sup>

There was evidence to support the safety and quality of care in the two post-operative services.<sup>50,51</sup>

#### Primary eye care

Evidence comes from studies which audited pilot and established community schemes providing ophthalmic referral refinement and optometrist management of minor eye conditions.<sup>52–57</sup> These services, usually commissioned by local primary care organisations, effectively formalised a service provided informally by many community optometrists under GOS for many years.<sup>58</sup> Evaluation of primary eye care services varied in scope and quality. Only one study<sup>57</sup> provided a comprehensive scheme evaluation. Over 70% of patients referred to optometrists by GPs, or who accessed the services directly, were managed in primary care without onward referral. In two studies, where referrals to the HES were independently assessed, these were generally deemed appropriate with good agreement with the ophthalmologists' diagnosis.<sup>54,57</sup> In a prescribing audit only 32% of patients were managed pharmacologically by participating optometrists.<sup>53</sup> This finding contrasts with GP prescribing rates, where typically 70% of patients presenting with eye problems receive a prescription for eye drops, with high rates of antibiotic prescribing.<sup>23,59</sup> These data suggest that primary eye care EOS provides clinically effective ophthalmic triage and appropriate management of minor eye conditions. The vast majority of patients were seen by the optometrist within 48 h, and two studies that formally sought patient views on service quality reported high levels of satisfaction.<sup>55,57</sup>

*Theory 2. Developing genuine partnerships between community and hospital providers and the patient and carer both in service planning and delivery can improve access and choice, and deliver patients' aspirations for responsive and convenient services.*

#### Glaucoma

*Case finding.* Glaucoma referral refinement services were either locally developed through negotiation between Local Optical Committees (LOC) and healthcare commissioners<sup>37</sup> or were established and led by the HES.<sup>28,33,34,36,42,60</sup>

There is little evidence to suggest that patients or carers were significantly involved in service planning or delivery.

*Monitoring chronic disease.* Monitoring services for stable glaucoma or OHT (sometimes combined with referral refinement) generally used a shared care model. These services are typically initiated by local eye units attempting to increase hospital clinic capacity by transferring 'low-risk' patients' care to community optometrists. Ophthalmologists were involved in training and accreditation of participating optometrists, development of patient management protocols and overall quality assurance.<sup>36,41,42,44</sup>

#### *Cataract*

Some degree of partnership between community and hospital providers is essential for any scheme to develop and be successfully delivered, but evidence of the nature and extent of these partnerships is scarce. However, the Huntingdon scheme<sup>46,50</sup> is an exemplar in terms of genuine partnership between community optometry and secondary care, improving services from the perspective of increased patient convenience e.g. the wider choice of appointment times available from community optometrists for post-operative assessment.<sup>50</sup> There was collaboration between the LOC and PCT in development of the Stockport scheme,<sup>48</sup> and between the LOC, PCT, and the HES in development of a local enhanced Service Level Agreement to develop the post-operative Cambridgeshire scheme. Although patients and carers are inevitably involved as partners in the delivery of services, there is no evidence of their direct involvement in planning services. Patients' views on services, which have the potential to impact on future planning, have been reported.<sup>46,48–50</sup>

#### *Primary eye care*

Primary eye care services were generally introduced by local commissioning organisations. By contrast, the Welsh Government introduced a national Primary Eye care Acute Referral Scheme (PEARS) in 2003, providing an optometric primary care service facilitating early assessment of acute ocular conditions.<sup>57</sup> There was little evidence of the involvement of hospital providers or patients and carers in planning or redesigning primary eye care services.

## 2. Effectiveness

*Theory 3. With further training and accreditation, together with the adoption of protocol-based care, optometrists can provide a standardised high-quality service that benefits the overall eye care pathway.*

#### *Glaucoma*

Levels of training for glaucoma EOS were commensurate with the extra clinical responsibility within the scheme.

*Case finding.* Optometrist accreditation for referral refinement generally involved revalidating relevant core competencies. Training and accreditation was either developed locally by the LOC<sup>37</sup> or via bespoke training organised by the hospital glaucoma team.<sup>28,34–36</sup> Standard protocols for clinical assessment were established, with clear criteria for onward referral.

*Monitoring chronic disease.* Accreditation for monitoring services required greater training, including additional theory and practical clinical experience.<sup>44,61</sup> Strict protocols detailing criteria for re-referral into the HES were developed and usually virtual review by the hospital glaucoma team was initiated.<sup>41,42,44</sup>

#### *Cataract*

Levels of training and accreditation for community optometrists varied between services. Three services, Stockport<sup>48</sup> Huntingdon<sup>46,50</sup> and Cambridgeshire<sup>51</sup> included initial training, accreditation and maintenance of accreditation through ongoing training. Others had initial training without reporting any accreditation processes,<sup>16</sup> and two services reported no training or accreditation element.<sup>17,49</sup> All services used a protocol, often described as clinical 'guidelines',<sup>16,46–48</sup> and linked to a standardised assessment form/proforma submitted to secondary care. The positive outcomes in *Theory 1* are evidence of the effectiveness of training/accreditation and/or the development of guidance or protocols.

#### *Primary eye care*

Previous studies reported that with appropriate training, optometrists demonstrate accurate diagnostic and management decisions when assessing patients in eye casualty or hospital ophthalmic primary care clinics.<sup>62,63</sup> Most community-based EOS required optometrists to undergo further training for accreditation purposes. Although guidance was available for GPs regarding criteria for referral into the service, no details were provided to suggest that protocols were used to support the optometrists' role. In addition to retaining the vast majority of patients in primary care, the services provided high-quality referrals to the HES. Only one study evaluated the appropriateness of patients retained in optometric practice. Using a combination of clinical record review and patient interviews, 2.5% of a sample of 199 patients were inappropriately managed.<sup>57</sup>



Theory 4. *Enhanced services are more cost-effective than traditional care pathways.*

#### *Glaucoma*

*Case finding.* Cost savings from referral refinement/triage services for suspected glaucoma are based on the number of HES referrals prevented vs scheme costs. Using community optometrists with a specialist interest in glaucoma to refine referrals from other optometrists varies in cost-effectiveness from cost-neutral<sup>37</sup> to producing a small<sup>35,38</sup> or substantial<sup>34,60</sup> saving compared to equivalent HES care. Cost-effectiveness appears to depend on scheme activity and the assumptions in the financial model. By contrast, the introduction of a glaucoma repeat measurement scheme in South London, where the original referring community optometrist repeated test results to confirm abnormality prior to referral or non-referral to the HES, produced a 62% cost-saving compared to the HES tariff.<sup>37</sup>

*Monitoring chronic disease.* Community glaucoma monitoring services may be more expensive than if patients were monitored in the HES.<sup>64,65</sup> Factors contributing to higher community costs include: equipment costs, shorter monitoring intervals in the community, high rates of re-referral into the HES and high opportunity costs to cover lost income from spectacle sales. The business model of community optometry is highly dependent on this cross-subsidy to ensure profitability.<sup>66</sup>

#### *Cataract*

Although potential cost-benefits were identified in principle,<sup>20</sup> positive evidence for cost-effectiveness is lacking.

#### *Primary eye care*

Whilst several studies alluded to potential cost-savings, only one study conducted a formal cost-benefit analysis and, based on 2006 prices, calculated the net resource utilisation avoided (ie, the savings on unnecessary HES and GP consultations) was approximately £191 000.<sup>57</sup>

### *3. Acceptability of enhanced services*

Theory 5. *Enhanced services are accepted as an effective alternative to traditional models of care by patients, providers and other stakeholders.*

#### *Glaucoma*

There is limited data from glaucoma scheme evaluations on views of providers and other stakeholders, although a recent qualitative study found broad support.<sup>67</sup>

*Monitoring chronic disease.* A RCT comparing community monitoring with usual care demonstrated that glaucoma patients were significantly more satisfied with aspects of

their care in the community than in the study's HES arm, primarily due to higher ratings on waiting and travelling times rather than different perceptions of quality of care. Patients could choose whether to participate and approximately 40% opted to be excluded from the study.<sup>40</sup> A patient satisfaction survey conducted during an observational study of community glaucoma monitoring found high levels of patient satisfaction (72% return).<sup>44</sup>

#### *Cataract*

The Huntingdon direct referral scheme patient satisfaction survey<sup>46</sup> reported that the 'satisfaction rate was high for all areas'. Since 2005 this scheme included post-operative assessment and two surveys over a 5-year period reported that at least 98% of patients were 'satisfied' or 'very satisfied' with their care.<sup>50</sup> Patient questionnaire responses to the Kingston scheme were 'unanimously positive'.<sup>49</sup> Optometrists support and enthusiasm for services is evidence supporting Theory 5<sup>48,49</sup> as is that of GPs<sup>46,48</sup> and ophthalmologists.<sup>46</sup> There were no reports of patient dissatisfaction with a post-operative scheme in Cambridgeshire<sup>51</sup> and the scheme reduced unnecessary hospital visits with care delivered closer to home.

#### *Primary eye care*

High levels of patient satisfaction were reported for primary eye care services, with approximately 95% of patients being very satisfied with the service.<sup>55,57</sup> There is evidence that GPs value the development of minor eye conditions schemes and valued an 'expert' local opinion that could potentially reduce the number of secondary care referrals.<sup>67</sup>

### *4. Barriers and enablers*

Theory 6. *Contextual factors will impact on the development, outcome and sustainability of enhanced services.*

#### *Glaucoma*

The impact of contextual factors depended on the design of the scheme, nature of training and accreditation, and precise responsibilities of the optometrist. HES-led services required a high level of commitment from the hospital glaucoma team and administrators.<sup>41,44</sup> Lack of standardisation of equipment between community and hospital may be problematic.<sup>33,38</sup> Most services attempted to at least standardise the method of eye pressure measurement facilitating comparison with the Goldmann reference standard used in the HES.<sup>38</sup> Although evaluation periods were relatively short, there was evidence of a number of accredited optometrists leaving the scheme due to relocation or retirement. This issue should be considered for long-term scheme sustainability.<sup>44</sup>

### Cataract

Contextual factors or 'setting' are important to the success of services.<sup>20,46,48,50</sup> Supportive local consultant ophthalmologists<sup>46</sup> and optometrists<sup>46,48</sup> contributed to successful services, as did involvement of a stable, critical mass of optometrists.<sup>46</sup> However, insufficient uptake by local optometric practices to sustain a scheme can occur. Support for services from local GPs was 'essential to the continuing success' of the Huntingdon scheme<sup>46</sup> and GP support was noted in the report of the Stockport scheme.<sup>48</sup>

A PCT-funded hospital optometrist, employed to manage the scheme and liaise with community optometrists, was 'crucial' to the Huntingdon scheme. This scenario could lead to over-dependence on an individual, rendering the scheme vulnerable should that person leave and not be replaced or if post funding was terminated. The transient nature of central funding caused many local services to fold, despite their success in terms of the proportion of patients referred who underwent surgery.<sup>20</sup> Other reasons reported for services ceasing were lack of active scheme management and the need for each patient to have a unique booking reference number (UBRN) for Choose and Book services. Community optometrists can obtain a UBRN for their patients if they can connect to the NHS booking system, but this requires an N3 internet gateway, to which few optometrists have access. There are ways of circumventing this barrier, for example by the provision of an intermediate booking service.<sup>20</sup>

### Primary eye care

With the exception of the evaluation of the PEARS scheme in Wales<sup>57</sup>, most studies evaluated pilot studies or services commissioned for a fixed period, making it difficult to comment on long-term sustainability. Some studies reported large variation in referral rates between participating optometrists<sup>56</sup> and variation in the utilisation of the service by GPs.<sup>52</sup>

## Discussion

Community optometrists in the UK are increasingly being commissioned to provide EOS in a variety of areas of eye care including; management of minor eye conditions, repeating measurements for suspect glaucoma, referral refinement for suspect glaucoma and in some cases monitoring of chronic eye disease. However, the evidence-base for the clinical- and cost-effectiveness of these services has not been comprehensively evaluated and this is the first systematic review to investigate the effectiveness of enhanced optometric services. We have adopted a realist synthesis approach since this methodology is particularly suited to the evaluation of complex healthcare interventions, as it sets out to understand

'what works, for whom and in what circumstances'. Although several common themes were identified across each type of scheme, for clarity of presentation, the evidence for each type of EOS has been presented separately within the review and therefore they will be discussed using the same headings.

### Glaucoma

Many UK studies have evaluated community-based glaucoma referral refinement services, established in response to expected high false positive rates associated with glaucoma case-finding within the general population. There is strong evidence that the introduction of these services reduced false positive referrals and first-visit discharge rates (*Theory 1* and *3*). Participation in referral refinement services generally requires validation of relevant core competencies and adoption of standardised protocols for assessment and criteria for onward referral (*Theory 3*). The level of training, organisation and quality assurance of glaucoma refinement services is strongly influenced by whether the scheme originated at community-level or was HES-led. Additional training and accreditation, beyond entry level to the profession, is usually required before optometrists can become involved in recently established enhanced services for glaucoma. Some early repeat measures services did not require further training or accreditation. In many repeat measures services the training provided is validating the achievement of entry level core competencies as part of the accreditation process (*Theory 3*). The lack of a definitive reference standard for the diagnosis of glaucoma makes it possible that a small number of cases of early disease may be missed. Although a full economic evaluation for glaucoma referral refinement is lacking, it is very likely to be at least cost-neutral with the potential to be extremely cost-effective, depending on scheme activity (*Theory 4*).

There is also good evidence that with appropriate training, UK optometrists can participate in glaucoma community monitoring services and manage patients commensurate with usual care standards (*Theory 3*). These services are generally HES-led, requiring significant input from the hospital glaucoma team who provide training and participate in quality assurance (including in some cases virtual review of optometrist decision-making). Whilst these services can reduce the HES burden and provide care closer to home, a number of contextual factors may influence these services' success, notably the willingness of the HES to provide necessary resources to develop and maintain the scheme (*Theory 2*). Although patient satisfaction within community monitoring services is high (*Theory 5*), there is strong evidence that they may be significantly more

expensive than hospital monitoring, due primarily to higher community opportunity costs (*Theory 4*).

### Cataract

Evidence on direct referral services is generally supportive of the six programme theories. The notable exception is *Theory 4*, where no evidence is available to establish whether direct referral services or community post-surgical assessment services are cost-effective. An exemplar scheme for both pre- and post-surgery assessment is the Huntingdon scheme<sup>46,50</sup> which encapsulates many desirable features of a scheme including, rigorous training and accreditation, genuine partnerships between professions, and regular patient satisfaction surveys.

### Primary eye care

Studies evaluating primary eye care services (MECS or PEARS) varied in scope and quality. Only one<sup>57</sup> undertook a comprehensive evaluation, although a number of smaller published audits were identified. These services tended to be community-led and generally did not involve hospital providers in their planning and utilised a standardised training and accreditation model. Primary eye care services were effective in facilitating early assessment of acute ophthalmic conditions and were generally well-received by patients. Over 70% of cases were retained in the community. The remainder were either referred directly to the GP or to the HES. One study<sup>57</sup> validated clinical decision-making and reported that patients were appropriately managed, including the provision of high-quality referrals to the HES. Another study<sup>53</sup> incorporated an audit of prescribing, which suggested that optometrists were less likely than GPs to prescribe drugs (including antibiotics) for an equivalent case-mix. As with the other EOS, evidence for cost-effectiveness was limited.

There was some evidence that primary eye care services could provide clinically effective physician substitution acceptable to patients (*Theories 1, 3 and 5*). However, further work is required to demonstrate the cost-effectiveness of these services and their long-term sustainability.

### Strengths and weaknesses of the current review

The major strength of the review was the comprehensive search strategy employed, including an extensive search of relevant grey literature, to evaluate three of the most commonly commissioned EOS. The review was conducted and reported according to the criteria outlined by the realist and meta-narrative evidence synthesis (RAMESES) group.

A potential weakness is the possibility of publication bias. Very few services evaluated used a rigorous

experimental design incorporating a control intervention. Rather, services were established as service needs arose and generally evaluated retrospectively. It is therefore possible that evaluation of unsuccessful services may not have been reported, leading to bias in favour of successful services. However, we aimed to mitigate this by integrating data from several reports of each type of scheme conducted in a variety of settings. Another limitation is that these UK findings may not be generalisable internationally. Whilst the training and scope of practice of UK optometrists is similar to some other parts of the world, e.g. North America and Australasia, there are many countries where the scope of optometric practice is restricted to refraction and dispensing of optical appliances.

Given that three of the review team were optometrists, it could be argued that the interpretation of the evidence could be biased in favour of optometry practice. However, the theoretical framework underpinning the review was developed in consultation with an external multidisciplinary reference panel. Furthermore, all five review authors (who included a non-clinical qualitative researcher and a consultant ophthalmologist) were involved in the review of evidence supporting or refuting the six theories contained within the framework.

### Conclusions and recommendations

The review found consistent evidence for the effectiveness of EOS in reducing unnecessary referrals for suspect glaucoma to secondary care. The relatively low prevalence of this condition and difficulty in establishing a definitive diagnosis means that false positive referrals from primary care are high. In April 2006, a new national GOS contract was introduced in Scotland, where optometrists were remunerated to carry out a standard comprehensive ocular health examination with the option of further payment to perform supplementary tests on glaucoma suspects. This contract has led to an improvement in the quality of glaucoma referrals with a corresponding increase in the true positive rate.<sup>68</sup> The Eye Health Examination Wales (EHEW), introduced in 2013, also includes the option of accredited optometrists carrying out supplementary tests on glaucoma suspects, and allows for patients in some at-risk categories to obtain an extended eye examination.<sup>69</sup> Further research should model the cost-effectiveness of introducing a similar enhanced GOS contract throughout England and Northern Ireland.

A feature of most EOS is the provision of direct referral from community optometrists to the HES rather than the traditional referral pathway, which uses the GP as an intermediary. This feature has several potential advantages including: saving GP time, reducing patient waiting times

and loss to follow up, and potentially improving the quality of communication between optometrists and ophthalmologists.

Despite limitations in the evidence-base and lack of high quality evidence from well conducted RCTs there is consistent evidence that UK optometrists are able to work as substitutes for physicians in defined areas of ophthalmic care to maintain or improve the quality of care and outcomes for patients. EOS are generally well received by patients and other stakeholders. However, further work is needed to establish the cost-effectiveness, equity and long-term sustainability of these services.

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The authors report no conflicts of interest and have no proprietary interest in any of the materials mentioned in this article.

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