The Strategy Unit.

West Midlands Local Eye Health Network (LEHN)

Rapid Evidence Review

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Contents

Key messages

Introduction

This slide pack contains the findings from a rapid scan of the available evidence on:

- Eye disease prevalence;
- Living with sight loss;
- Interactions between eye health and other diseases;
- Demands in healthcare and variation in service provision;

Including a rapid review of the grey and peer-reviewed literature concerning strategic opportunities around eye health service provision and organisation, in addition to an overview of new interventions and treatments recommended by NICE.

This review is not intended to be exhaustive, as such, the following points should be considered:

- This is a rapid, high level review to comply with the timescales agreed and is intended to be reflective of the majority of ophthalmic care pathways; hence the focus on key conditions (glaucoma, cataract, AMD and diabetic retinopathy).
- There is considerable variation in definitions and composition of services; many of the interventions may be a composite of different interventions e.g. one stop clinics run by nurse practitioners.
- Interventions which have a weak or uncertain evidence base are not necessarily ineffective - the evidence is too limited to draw firm conclusions. This highlights the need for robust evaluation of local implementations to strengthen the evidence base;

Prevalence of major causes of sight loss

I. Glaucoma
II. Cataract
III. Diabetic Retinopathy (DR)
IV. Age-Related Macular Degeneration (AMD)

I. Glaucoma prevalence: UK level and West Midlands. (Estimated Number of People Living with Glaucoma)

Region	Estimated number of people living with glaucoma over 14 years				Estimated % Change (2015/16-2030)
	2016	2020	2025	2030	
UK	600,380	626,240	654,960	676,340	12
West Midlands	52,770	54,430	56,590	58,230	11

Data from Royal National Institute of Blind people (RNIB) Sight Loss Data Tool (2018)

II. Cataract prevalence: national level and West Midlands. (Estimated Number of People Living with Cataract)

Region	Estimated number of people living with cataract over 14 years				Estimated % Change (2016-2030)
	2016	2020	2025	2030	
UK	646,150	728,540	825,220	955,460	48
West Midlands	58,190	65,630	74,440	84,860	47

Data sourced from Royal National Institute of Blind people (RNIB) Sight Loss Data Tool (2018)

III. DR prevalence: national level and West Midlands. (Estimated Number of People Living with Diabetic Retinopathy [DR])

Region	Estimated number of people living with Diabetic Retinopathy, Severe DR and diabetes over 14 years					Estimated % change (2015-2030)
	Condition	2015/16	2020	2025	2030	
UK	Diabetes	4,089,340	4,252,763	4,525,400	4,745,710	17
	DR	1,295,610	1,315,220	1,360,350	1,405,780	8
	Severe DR	119,300	121,100	125,130	129,400	8
West Midlands	Diabetes	360,980	372,720	391,020	409,040	15
	DR	113,320	114,640	117,960	121,400	8
	Severe DR	10,420	10,560	10,870	11,170	8

Data sourced from Royal National Institute of Blind people (RNIB) Sight Loss Data Tool (2018)

IV. AMD prevalence: national and West Midlands. (Estimated Number of People Living with Age-related Macular Degeneration [AMD])

Region	Estimated number of people living with Early Age-related Macular Degeneration (AMD; Drusen), late-stage Wet & Dry AMD over 14/15 years					Estimated % Change (2015-2030)
	Condition	2015	2020	2025	2030	
UK	Drusen	2,679,560	2,943,090	3,253,740	3,565,260	34
	Wet	417,120	484,890	533,080	620,190	50
	Dry	202,770	225,190	258,090	297,220	48
West Midlands	Drusen	239,540	263,210	288,600	312,930	32
	Wet	37,440	42,920	48,140	55,230	48
	Dry	18,220	20,440	23,280	26,460	46

Data sourced from Royal National Institute of Blind people (RNIB) Sight Loss Data Tool (2018)

Living with sight loss

I. Prevalence data

II. Supporting the sight loss journey

I. Living with sight loss: prevalence

- Figures from RNIB's Sight Loss Data Tool provide context on the number of individuals living with sight loss (of varying severity) at the UK and local level (West Midlands).

Region	Severity of Sight Loss (SL)	2016	2020	2025	2030
UK	Mild	1,310,280	1,418,250	1,590,200	1,803,450
	Moderate	453,270	499,850	555,390	624,760
	Severe (Blindness)	268,700	290,100	331,810	381,570
	Total number of people living with SL (% PwSL Vs overall population)	2,032,360 (3.10%)	2,208,200 (3.24%)	2,477,400 (3.49%)	2,809,790 (3.81%)
West Midlands	Mild	116,990	126,260	140,750	158,760
	Moderate	40,490	43,600	48,040	53,580
	Severe (Blindness)	24,040	26,220	29,760	33,980
	Total number of people living with SL (% PwSL Vs overall population)	181,510 (3.03%)	196,080 (3.17%)	218,550 (3.41%)	246,320 (3.72%)

Legend:
%PwSL Vs Overall population = percentage of people with sight loss compared to those without sight loss in the general population

II Supporting the sight loss journey

RNIB provides unique insight into this journey: recruiting participants through collaboration with 22 local authorities they contacted those registered blind and partially sighted- where the findings were weighted to be representative of the general population of people registered blind or partially sighted (Flynn & Lord, 2015):

- Only 17 per cent of people experiencing sight loss were offered any form of emotional support in relation to their deteriorating vision.

Work by RNIB and Age UK(2015) highlights six themes relevant to the lived experience of older adults with sight loss:

1. Ease of access to co-produced services and support
2. Making services accessible
3. Delivering truly integrated services for people with sight loss.
4. Improving professional awareness (E.G many vision rehabilitation workers feel the importance of their work can sometimes be underappreciated by wider professionals)
5. Providing a single point of contact in the system (Including the provision of sight loss advisors and eye clinic liaison officers [ECLOs]- however, only 1/3rd of HES offer this service)
6. Empowerment and peer support. (E.G peer support groups as a source of emotional and practical support

II. Supporting the sight loss journey

A Recent editorial by three foundation year medics working at Birmingham City Hospital, discusses the need for a holistic vision support/rehabilitation service (Barrow et al., 2018):

- The areas of support most lacking, yet most highly valued by people living with sight loss relate to social and emotional wellbeing; including the provision of counselling which promotes independence, maintenance of employment and alternative means of communication.

Longitudinal peer-reviewed work commissioned by Thomas Pocklington trust also emphasises the importance of holistic support towards building resilience in those with visual impairment:

- Thetford et al. (2015) drawing on two linked sets of narrative interview data spanning 2007-2010, three case-studies were analysed via a framework approach based upon a social-ecological model of resilience and visual impairment.

> *"it is not merely the presence or absence of individual, social, and community resources – but how these resources interact with each other – that influences resilience and can create a risk to wellbeing. […] there is a co-dependency between these resources which requires the presence of other resources for resilience to be achieved."*
>
> Thetford et al. (2015)

II. Supporting the sight loss journey

The emphasis placed by the prior editorial and longitudinal work (Barrow et al., 2018; Thetford, 2015) on providing forms of support which have been typically viewed as peripheral to practical support, aligns well with views of people with sight loss presented by RNIB (Flynn & Lord, 2015) and RNIB and Age UK (2015), where recurrent themes highlighted independently by these pieces of work are:

- Supporting emotional and social well-being

- The importance of independence, employment advice and support and accessibility of information

Most crucially, the need for these types of support is highlighted well by recent data drawn from the Depression in Visual Impairment trial:

- This multicentre RCT, conducted over a 30 month period demonstrates that among 1323 adult patients attending low vision rehabilitation clinics, 43% had 'significant depression, where 74.8% of those were not receiving treatment for depression (Nollett et al., 2016).

Interaction, utilisation and variation

I. Interactions between eye-health and other conditions
   - Diabetes Mellitus
   - Mental health
   - Learning disability (LD)
   - Falls
   - Dementia

II. Demands in healthcare

III. Variation in service provision

Diabetes Mellitus

- Diabetes UK reports that Diabetes is the leading cause of preventable sight loss in the UK (https://www.diabetes.org.uk/guide-to-diabetes/complications/retinopathy).

- People with diabetes are at risk for diabetic retinopathy, cataract and glaucoma.

Diabetic retinopathy (DR)

- DR is the most common diabetic eye disease (Mathur et al., 2017a).

- In the UK, within 20 years of diagnosis nearly all people with type 1 and almost two thirds of people with type 2 diabetes (60%) have some degree of retinopathy (Mathur et al., 2017b).

- Compared to the general population, the risk of developing cataracts or glaucoma is doubled amongst individuals with DR (Mathur et al., 2017a).

- The largest study to date examining the burden of DR in the UK found Deprivation and minority ethnic groups associated with a higher risk of severe diabetic retinopathy amongst patients with Type 2 diabetes (Mathur et al., 2017b).

Diabetes Mellitus

Cataract

- Diabetes UK reports that diabetes makes you 3x more likely to get cataracts.

- Meta-analysis of 20,000 patients found an approximately doubled risk of age-related cataract in type 2 diabetics, with a younger age of onset compared to people who do not have diabetes (Li et al., 2014).

- Exploration of incidence rates in the UK found diabetes is associated with an approximately two-fold increased detection rate of cataract. With highest risk of cataract detection at younger ages (Becker et al., 2018).

Glaucoma

- Diabetes UK reports that diabetes makes you 1.5x more likely to get glaucoma.

- Recent UK meta-anlysis featuring seven prospective cohort studies found incidence of glaucoma markedly increased by 36% in patients with diabetes compared with individuals with no diabetes (Zhao and Chen, 2017).

Mental Health

- A UK review conducted for Thomas Pocklington Trust suggests that despite varying methodologies, the international literature gives clear indication that people with visual impairment are at an increased risk of depression. (https://www.pocklington-trust.org.uk/wp-content/uploads/2016/06/Visual-Impairment-Depression-and-Access-to-Psychological-Therapies.pdf)

- Longitudinal work in a cohort of 4216 participants suggests bi-directionality between depression and visual impairment (VI), where VI may amplify depressive symptoms and depression may amplify visual impairment (Carrière et al., 2013).

Age-related Macular Degeneration (AMD):

- A review from the US suggests older adults with AMD exhibit a higher risk of depression and anxiety than same aged peers without AMD (Cimarolli et al., 2016).

- Cross-sectional research undertaken in the Netherlands, drawing on telephone interviews with 615 older adults with VI (55.3% with AMD), indicates that rates of mental health issues for individuals with VI are significantly higher than normally sighted counterparts ($p < 0.05$) (van Der Aa, 2015)

Conversely, UK work based on systematic review of observational data, suggests that symptoms of depression are more prevalent than anxiety in AMD (Dawson et al., 2014).

Mental Health

Glaucoma:

- The first study to investigate depression and anxiety in a European cohort of glaucoma patients suggests similar rates of prevalence between the former and those without self-reported glaucoma; the authors attribute this to differences between their own cohort and previous study groups (Rezapour et al., 2018)

Cataract:

- Meta-analytic work suggests increased prevalence of depression in individuals with cataract (prevalence= 23%) (Zheng et al., 2017).

- Australian research drawing on population-based methods demonstrates that self-reported cataract is associated with higher rates of depression and anxiety (Eramudugolla, 2013).

- Retrospective cohort design demonstrates a significant reduction (18.80%; $p \leq 0.001$) in number of contacts with the mental health system for depression and/or anxiety one year after cataract surgery (Meuleners et al., 2013).

Learning Disability (LD)

- UK research by The Centre for Disability Research indicates that adults and children with LD are at a substantially higher risk of eye-disease than the general population (10 & 28 times more likely to have a visual condition, respectively) (Emerson & Robertson, 2011)

- In addition to higher prevalence, professional guidance suggests that these conditions are also more difficult to detect and manage in individuals with LD (Royal College of Ophthalmologists, 2015)

The Royal National Institute for Blind people's Sight Loss Data Tool (2018) gives a breakdown of the prevalence of co-occurring visual impairment/blindness and LD:

Region	Estimated number of adults with LD and visual impairment (partial sight)[2015]	Estimated number of adults with LD and blindness [2015]
UK	77,880	22,310
West Midlands	6,810	1,940

Learning Disability (LD)

Cataract:

- Cataract is one of the most common treatable causes of vision loss in LD populations; although there is limited published work on considerations for planning and outcomes of surgical intervention in this population (Royal College of Ophthalmologists, 2015).

Diabetic Retinopathy:

- Work by the Royal College of Ophthalmologists, in addition to separate work using localised data to monitor health needs relevant to people with LD, suggests that this population exhibits increased prevalence of diabetes, corresponding to an increased risk of DR (Glover, Emerson & Eccles, 2012; Royal College of Ophthalmologists, 2015)

Glaucoma:

- Findings from the Learning Disabilities Health and Care Project (Emerson et al., 2016) indicate that increased risk of diabetes may also confer increased risk of developing glaucoma in individuals with LD.

Age-related Macular Degeneration (AMD):

- A recent report by SeeAbility indicates that as individuals with LD grow older, they may be at an increased risk of developing age-related threats to eye sight, including AMD (SeeAbility, 2016).

Falls

- People with vision loss from eye conditions have a higher risk of experiencing falls more frequently, and with worse severity (Martin, 2013).

- Specifically, infographics featured in the College of Optometrists focus on falls report (2014) (originally produced by the Prevention of Falls Network Earth, 2013: http://profane.co/wp-content/uploads/2013/02/profane.co_Vision_Impairment_and_Fall_Prevention_Infographic.pdf) detail the rate of falls in older adults with VI to be 1.7 times higher than other older adults; with hip fractures being more strongly associated with VI than any other fall related injury.

Findings from RNIB's Sight Loss Data Tool (2018) provide further national and local insights into the prevalence and severity of sight loss related falls:

Region	Total number of falls in general population (Aged 65 and over; 2015)	Estimated number of falls amongst people with sight loss (Aged 65 and over; 2015)	Estimated number of falls directly attributable to sight loss	Estimated number of falls directly attributable to sight loss (requiring hospital treatment)
UK	3,083,543	247,917	117,175	9,105
West Midlands	278,442	22,385	10,580	825

Falls

Here, Dhital et al. (2010) review associations between visual conditions of interest (AMD, Cataract, Glaucoma) and falls:

AMD:

- Dhital et al. refer to a balance training visual rehabilitation intervention for patients with AMD (Radvay et al., 2007), stating that over half of patients with AMD had balance and visuomotor problems, conferring increased risk of falls.

Glaucoma:

- Coleman et al. (2007), a US multicentre prospective cohort study, demonstrated significantly increased odds of two or more falls with increasing binocular visual field loss ($p<0.001$);
    - Where severe binocular visual field loss was associated with frequent falls, accounting for confounds (Odds Ratio =1.50; 95%-CI = 1.110-2.020)

Diabetic Retinopathy:

- Dhital et al. note a surprising lack of evidence investigating the effects of DR on rates or severity of falls

Cataract:

- Cataracts may also be associated with increased risk of falling; where Dhital et al. draw on an earlier Canadian systematic review showing that waiting times of over 6 months for cataract surgery are associated with decrements in quality of life and increased rate of falls during that period (Hodge et al., 2007)

Dementia

A recent UK cross sectional prevalence study, known to be the largest population study of eye conditions in persons with dementia across a range of settings, demonstrated that individuals with dementia are at a higher risk of having treatable and serious vision problems than same aged members of the general population (Bowen et al., 2016):

- Around one-third of people with dementia have serious vision problems
- Around half of people with dementia living in care homes have vision problems

Here, RNIB's Sight Loss Data Tool (2018) provides insight at the national and local level as to the proportion of the general population with dementia and significant sight loss:

Region	Estimated number of people with dementia in the general population [2015]	Estimated number of people living with dementia that also have significant sight loss [2015]
UK	807,372	132,993
West Midlands	72,887	12,050

Dementia

Cataract:

- Prevalence of cataract in persons with dementia suspected to be high: where cataract was attributable to around half of the cases of continued visual problems despite correct spectacles (49/102 cases [48.0%; 95%-CI = 38.1% to 58.1%]) (Bowen et al., 2016)

Age-related Macular Degeneration (AMD), dementia & Alzheimer's disease (AD):

- Despite commonalities of histopathology between Alzheimer's disease and AMD (amyloid-β deposits in macula drusen and senile plaques in Alzheimer's disease), a recent UK cohort-based study using linked Hospital Episode Statistics (HES) concluded that the co-existence of AD and dementia after AMD at the individual level is no different from that expected by chance (Keenan et al., 2014).

Glaucoma:

- Using similar methodology, a more recent study determined that the coexistence of AD after primary open angle glaucoma (POAG) at the individual level was no different than that expected by chance
    - Conversely, the authors report a modest association between diagnosis of POAG and later development of vascular dementia, which the authors attribute to common vascular risk factors (Keenan et al., 2015).

Demands in healthcare

General demand:

Reportedly, for 2013/14, 8.5% of NHS outpatient appointments were for ophthalmology (The Macular Society, 2016).

The All Party Parliamentary Group (APPG, 2018) also indicate this as an area of high growth, such that the number of ophthalmology appointments has grown by over 10% over the last four years (APPG, 2018)

- The total cost of sight loss to the UK economy, spanning 2008-2013 has increased by ~£6 billion (APPG, 2018)

- Additional evidence also indicates a high cost associated with eye care: using a prevalence approach to cost measurement, recent work estimated the total economic cost of sight loss and blindness to be £28.1 billion in 2013 (Pezzulo et al., 2018)

Demands in healthcare

Indications of high demand and cost are congruent with the results of a staff survey conducted across UK eye clinics by RNIB (2013), indicating a struggle to keep pace with rising demand:

- 37% of respondents said patients were “sometimes” losing sight due to delays in treatment
- 80% of respondents noted that insufficient capacity to meet current demand in eye clinics
- Over half of respondents reported running extra clinics to keep up with demand
- 94% reported that “future capacity will not meet demand”

Glaucoma:

‘The way forward’ project produced by the Royal College of Ophthalmologists outlines key figure relevant to future demand for glaucoma services (Royal College of Ophthalmologists, 2015c):

- Glaucoma management is responsible for 20% of HES ophthalmology out-patient workload.
- From 2015 to 2035, the number of people in the UK with glaucoma will rise by 44% (22% rise from 2015 to 2025)
- Surveying medically trained eye care professionals, the Royal College of Ophthalmologists reports that 57% (25/44) of consultants indicate an existing backlog that is causing delays to patient follow-up

Demands in healthcare

Age-related Macular Degeneration:

AMD management consumes significant and increasing resources for the assessment and treatment of patients on a recurring basis.

- Rates of injection procedures for anti-VEGF therapy, and cost, between 2010-2015 have increased by 215% and 247%, respectively (Hollingwood et al., 2017; Royal College of Ophthalmologists, 2015a).

"Demand for wet AMD treatment is severely straining NHS ophthalmology departments. In 2013/14, 8.5% of all NHS outpatient appointments were in ophthalmology. Intravitreal injections have to be given in a sterile environment by a trained ophthalmologist or, increasingly, a nurse or theatre technician as there are insufficient ophthalmologists to provide the service."

The Macular Society (2016).

Demands in healthcare

Cataract:

- Cataract surgery represents 6% of all surgery in the UK and there is an expected 25% growth in next 10 years (Royal College of Ophthalmologists, 2015b).

Diabetic Retinopathy:

- The population with diabetic retinopathy is projected to increase by between 20 and 80% in the next 20 years. (Royal College of Ophthalmologists, 2015a)

Variation in service provision

Quantitative research using the Hospital Episode Statistics (HES) Database to examine variation in Ophthalmology service provision across England over the past five years (RNIB, 2018) found:

- The numbers of patients referred and treated in Ophthalmology in England over the past five years has increased year on year but there is a large variation across CCGs.
- The majority of activity occurs in outpatients settings. With growth from 2,868,903 patients in 2012/13 to 3,185,632 in 2016/17. This activity is driven by more patients having more appointments.
- The variation seen across CCGs is not consistent in that there may be growth in one disease area and a decline in another.
- A large number of appointments are reported as being cancelled by the hospital, but this varies by disease and across the country.
- How activity is recorded in hospitals should be consistent across the country, but it is not. Hospital Episode Statistics coding varies between providers due to services shifting to different care settings and in the way these services are commissioned, thus making it difficult to draw full conclusions.

Variation in service provision - cataracts

Variation in cataract service provision across England three years on (RNIB , 2016, revised 2017) found:

- Significant variation in second eye operation rates across the country
- Consistent reduction in the number of cataract operations in some areas
- Large variation in time to treatment across the country

The NHS Atlas of Variation (2015) looks at the rate of admission to hospital for cataract surgery in people aged 65 years and over per population by CCG. The Atlas shows:

- For CCGs in England, the directly standardised rate (DSR) of admission to hospital for cataract surgery in people aged 65 years and over ranged from 1596 to 4610 per 100,000 population (2.9-fold variation).
- When the CCGs with the five highest rates and the CCGs with the five lowest rates are excluded, the range is 1998–4199 per 100,000 population aged 65 years and over, and the variation is 2.1-fold.

Variation in service provision - cataracts

- The degree of variation observed is likely to be influenced by differences in:

a) › demography of local populations, e.g. ethnicity, deprivation;

b) › levels of need in local populations;

c) › access to NHS services;

d) › uptake of NHS services.

- The decrease in overall rates of admission for cataract surgery in England may reflect priorities for commissioning, and the ways in which services are commissioned.
- During the three-year period 2010–2013, the CCGs that had high admission rates and those that had low admission rates tended to be consistent.

Variation in service provision- AMD

Longitudinal research using the Hospital Episode Statistics (2005-2015) reports wide variation in the number of per patient injections for anti-vascular endothelial growth factor (anti-VEGF) therapy between CCGs, with the authors concluding that *"patients in England do not have equal access to the most cost-effective care"* (Hollingworth et al., 2017).

Delayed diagnosis and ineffective referral pathways (RNIB, 2013a)

- The Royal College of Ophthalmologists recommends no more than seven days between first contact with a health professional (usually either the optometrist or the GP) and receiving a diagnosis from a retinal specialist.

- However, less than one third (31 per cent) of patients achieved this.

- The research indicates a number of reasons for this. Prominent amongst these is a lack of awareness of rapid referral procedures for wet AMD amongst some optometrists and GPs. This may be due to different procedures being used in different parts of the country and new staff or locums not being informed of the local procedures.

- Another important reason for delayed diagnosis is inefficient referral pathways. In some parts of the country, optometrists are required to refer wet AMD patients to the eye clinic via their GP and this can introduce significant delays.

Variation by demographic

Learning Disability (LD):

- This population is at an increased risk of eye disease, however, research indicates large pockets of unmet demand in terms of the eye-health needs of people with LD (Pilling & Outhwaite, 2017).
- Influencing this variation may be the lack of free provision of eye tests for adults with LD; where cost may be a deterrent for adults with LD accessing eye services (SeeAbility, 2016).

Evidence of unmet need in children with LD comes from the findings of the 'Children in Focus: a clear call to action' project, where SeeAbility (2018) investigate the eye health needs of 923 pupils, confirming "a high prevalence and vast range of sight problems"- contradicting the Department of Education statistic showing that 1% of all pupils with LD in schools have a visual impairment:

- 4 out of 10 children had no previous history of eye care; where only 6.8% had previously accessed community optician services- additionally, many parents reported lack of awareness of the increased risk of eye conditions in LD.
- 28% had previously unidentified visual deficits, where 425 children had some visual deficiency.

Variation by demographic

Deprivation & socioeconomic status (SES):

- A systematic review by Knight and Lindfield (2014) found equal and weak evidence of reduced access to eye health services for low SES groups- the authors contextualise this finding relative to a low quality evidence base.

- Nationally produced work by RNIB draws attention to the trend spanning lack of awareness, access and concerns regarding cost of aids, such that people may delay attendance until they experience worse symptoms (preventing early detection) (Simkiss et al., 2016).

> *"There is evidence of a mismatch between populations of greatest need and location of optometry services. In urban settings, people, particularly the elderly, appear less likely to go for a sight test if the local optometrist is more than a 15-minute walk away "*
> (Simkiss et al., 2016).

Eye Health Service Provision:

I. Strategic opportunities

II. New interventions and treatments: NICE

III. Elective Care High Impact Interventions: Ophthalmology Failsafe Prioritisation

I. Strategic opportunities

Pathway stage	Interventions	Things to consider
Prevention	Interventions focussed on the preventing the development or progression of eye disease through: • Improving patient attendance for screening programmes	• Reasons for patient non-attendance reported by eye professionals, patients and relatives relate to system level factors such as miscommunication about where the patient lives. • Patient level factors for non attendance included such as anxiety and being misinformed about screening. • Including being unaware of the clinics location and misunderstanding about screening being unavailable as part of the standard eye test.
Before admission	Prevention focussed interventions Improve referral quality and number of false positives referred to secondary care through: • Repeated measures • Referral refinement scheme • E-referral and virtual review	• Community (enhanced) services by optometrists need commissioning as not covered by standard contracts • Implications to false-negative rate • Community schemes might not be transferable to all settings • Appropriate IT infrastructure is needed to support e-technology
Assessment	Streamline pathways through: • Risk stratification and low risk pathways • Non-ophthalmologist pre-assessment • One-stop clinics that combine appointments.	• Need to ensure unnecessary delay for high risk patients is minimised • Nurse practitioners may not be suitable for training, optometric community already geared towards independent working • Limited space / logistical issues can prevent service development e.g. one stop clinics • Patient acceptance of new ways of working
Surgery	Optimise secondary care efficiency through: • Better scheduling and management of theatres	• Scheduling needs to take into consideration complexity of patient as well as experience /speed of consultants • Increase in administrative time
Follow-up (inc. post operative care)	• Provide more efficient follow-up care through: • The use of extended health care professionals (HCPs) • Shared care schemes • Virtual follow-up	• Nurse practitioners may not be suitable for training • Non-ophthalmologist level of risk aversion e.g. more cautious decision-making • Non-ophthalmologist skill set e.g. customer service skills • Appropriate IT infrastructure needed • Non-attendance rates and costs in the community

Ophthalmology - Before hospital & prevention

Interventions for managing patient flow through the system, prior to hospital; this includes:

Prevention strategies Including:

Improving screening attendance: Intended to prevent the progression or development of disease by detecting cases of disease and treating them earlier, interventions include those designed improving screening attendance for conditions such as diabetic retinopathy and age-related macular degeneration.

Referral Management strategies including:

Repeat measures: *'Repeat measures' is a term specific to glaucoma that primarily describes the repeated measurement of eye pressures, but may also include repeated measurement of visual fields and other relevant ocular parameters when clinically necessary.* (Glaucoma in adults QS, NICE 2011)

Referral Refinement: *'Referral refinement' is a term specific to glaucoma management that describes a two-tier assessment in which initial evidence of abnormality during case-finding assessment or screening is validated by a subsequent enhanced assessment which adds value beyond that achieved through a simple 'repeat measures' scheme.* (Glaucoma in adults QS, NICE 2011)

E-referrals - virtual review: Sending referrals electronically (including images) between community optometrists and hospital eye clinics.

Prevention- guidance

Guidance

Aligning eye health and sight loss prevention strategies with other health priorities and broader initiatives aimed at tackling health inequalities could reduce duplication and improve outcomes for people with or at risk of sight loss.
(Simkiss et al., 2016- RNIB state of the nation report)

Although no examples were identified of health promotion messages reducing the risk of visual loss specifically, in view of the ~60% rise in AMD and DR expected over the next 20 years [...] The voices of ophthalmologists should be heard promoting potential avenues for prevention, and research into these options should be encouraged. "
Royal College of Ophthalmologists- The Way Forward AMD (2015a)

Prevention of disease is the best way to reduce the carbon footprint of the NHS and keep the population healthy. Therefore, this should be a key focus when developing sustainable ophthalmology services, with opportunities for brief intervention and follow-up for smoking and obesity in primary care, such as optometry services.
Royal College of Ophthalmologists- Ophthalmic Services Guides: Sustainability in Ophthalmology (2013).

Examples

"quality improvement interventions targeted at the person with diabetes, HCPs or the health-care system improve attendance by 12% on average compared with usual care. There was some evidence to indicate that a larger effect size could be anticipated in poor attenders. Current interventions are generally using appropriate Behavioural Change Techniques that mediate change in screening behaviour, with a high probability of being cost-effective."
Lawrenson et al. (2018)

Blood pressure control is [...] well established as a means by which patients can reduce their risk of developing and worsening of retinopathy, with the tight control group in UKPDS having a one third less retinopathy than their less well controlled counterparts.
Royal College of Ophthalmologists (2015a)

Improving screening attendance- evidence

Citation	Strutton et al., (2016). System-level and patient-level explanations for non-attendance at diabetic retinopathy screening in Sutton and Merton (London, UK): a qualitative analysis of a service evaluation. BMJ open, 6(5), e010952. https://bmjopen.bmj.com/content/6/5/e010952
Description	Qualitative analysis of a service evaluation of one South London diabetic eye screening programme, recruiting patients who had been registered with one screening programme for at least 18 months and who had never attended screening within the programme were contacted by telephone to ascertain reasons for non-attendance. Framework analysis was used to interpret responses.
Findings	• Of the 296 patients, 38 were not eligible for screening; of the 258 eligible patients, 159 were not contactable. • Reasons for non-attendance were obtained from patients/genera practices/clinical notes for 146 (57%) patients A number of patient-level and system-level factors were given to explain non-attendance Patient-level factors included: • having other commitments, • being anxious about screening, • not engaging with any diabetes care • being misinformed about screening. System-level factors included: • miscommunication about where the patient lives, • And their clinical situation and practical problems that could have been overcome had their existence been shared between programmes. Conclusion: Improved sharing of relevant information between providers has the potential to facilitate increased uptake of screening. Greater awareness of patient-level barriers may help providers offer a more accessible service.

Improving screening attendance- evidence

Citation	Sharafeldin et al., (2018). Review of economic evaluations of teleophthalmology as a screening strategy for chronic eye disease in adults. British Journal of Ophthalmology, https://www.ncbi.nlm.nih.gov/pubmed/29680803
Description	This study provides a systematic review of economic studies of teleophthalmology screening for diabetic retinopathy (DR), glaucoma and macular degeneration. • Structured search of electronic databases and full article review yielded 20 cost-related articles. Sixteen articles fulfilled the inclusion criteria and were retained for a narrative review: 12 on DR, 2 on glaucoma and 2 on chronic eye disease
Findings	• Teleophthalmology for DR yielded the most cost savings when compared with traditional clinic examination. • The study settings varied among urban, rural and remote settings, community, hospital and health mobile units • The most important determinant of cost-effectiveness of teleophthalmology was the prevalence of DR among patients screened, indicating an increase of cost savings with the increase of screening rates. • The required patient pool size to be screened varied from 110 to 3500 patients. • Other factors potentially influencing cost-effectiveness of teleophthalmology were older patient age, regular screening and full utilisation of the equipment. • Teleophthalmology for glaucoma was more cost-effective compared with in-person examination. Similarly, increasing number of glaucoma patients targeted for screening yielded more cost savings. Author's Conclusion: This economic review provides supportive evidence of cost-effectiveness of teleophthalmology for DR and glaucoma screening potentially increasing screening accessibility especially for rural and remote populations. Special selection of the targeted screening population will optimise the cost-effectiveness of teleophthalmology.

Improving screening attendance- evidence

Citation	Lawrenson et al., (2018). What works to increase attendance for diabetic retinopathy screening? An evidence synthesis and economic analysis. Health Technology Assessment, 22(29). http://openaccess.city.ac.uk/19913/
Description	Evidence synthesis and economic analysis of the effectiveness of quality improvement interventions for diabetic retinopathy screening attendance; description of interventions to increase DRS attendance in terms of QI components and Behaviour Change Techniques which target patients, healthcare professionals and healthcare systems Three phases: • Phase 1: systematic review of RCTs evaluating interventions to increase DRS attendance and coding of intervention content to classify QI components and BCTs • Phase 2: review of studies reporting factors influencing attendance, coded to theoretical domains • Phase 3: mapping BCTs (phase 1) to theoretical domains (phase 2) and an economic evaluation determining the cost-effectiveness of BCTs or QI components.
Findings	• Phase 1: 7277 studies screened (1988-2017) : 66 RCTs reviewed: Overall, interventions increased DRS attendance by 12% [risk difference (RD) 0.12, 95% confidence interval (CI) 0.10 to 0.14] compared with usual care, with substantial heterogeneity in effect size. Both DRS-targeted and general QI interventions were effective, particularly when baseline attendance levels were low. All commonly used QI components and BCTs were associated with significant improvements, particularly in those with poor attendance. Higher effect estimates were observed in subgroup analyses for the BCTs of 'goal setting (outcome, i.e. consequences)' (RD 0.26, 95% CI 0.16 to 0.36) and 'feedback on outcomes (consequences) of behaviour' (RD 0.22, 95% CI 0.15 to 0.29) in interventions targeting patients and of 'restructuring the social environment' (RD 0.19, 95% CI 0.12 to 0.26) and 'credible source' (RD 0.16, 95% CI 0.08 to 0.24) in interventions targeting HCPs. • Phase 2: 3457 studies were screened, of which 65 non-randomised studies were included in the review. The following theoretical domains were likely to influence attendance: 'environmental context and resources', 'social influences', 'knowledge', 'memory, attention and decision processes', 'beliefs about consequences' and 'emotions' • Phase 3: QI components were unlikely to be cost-effective whereas BCTs with a high probability (≥ 0.975) of being cost-effective at a societal willingness-to-pay threshold of £20,000 per QALY included 'goal-setting (outcome)', 'feedback on outcomes of behaviour', 'social support' and 'information about health consequences'. Cost-effectiveness increased when DRS attendance was lower and with longer screening intervals.

Informing screening attendance- evidence

Citation	Kawaguchi et al., (2018). Tele-ophthalmology for age-related macular degeneration and diabetic retinopathy screening: a systematic review and meta-analysis. Telemedicine and e-Health, 24(4), 301-308. https://www.ncbi.nlm.nih.gov/pubmed/28783458
Description	Synthesis of high quality evidence comparing in-person screening and tele-ophthalmology screening. (Systematic review & meta-analysis) • Only RCTs included concerning interventions of any type of tele-ophthalmology, including screening of diseases using remote devices • Studies involved patients receiving care from any trained provider via tele-ophthalmology, compared with those receiving equivalent face-to-face care. • 237 full-text records assessed. • 6 RCTs fulfilled criteria for inclusion in the review • 4 studies involved participants with diabetes, 2 examined choroidal neovascularisation in AMD • Only data of detection of disease and screening programme participation data were included in the meta-analysis
Findings	• Tele-ophthalmology had a 14% higher odds to detect disease than traditional examination; however, the result was not statistically significant (n = 2,012, odds ratio: 1.14, 95% confidence interval (CI): 0.52–2.53, p = 0.74). • Meta-analysis results show that odds of having DR screening in the tele-ophthalmology group was 13.15 (95% CI: 8.01–21.61; p < 0.001) compared to the traditional screening program. Author's conclusions: Current evidence suggests that tele-ophthalmology for DR and AMD is as effective in as face-to-face examination, with the potential to increase patient participation/attendance in screening/

Repeat measures - guidance

Guidance

People with elevated IOP alone are referred to an appropriately qualified healthcare professional for further assessment on the basis of perceived risk of progression to COAG. There are agreements in place for repeat measures.

(Glaucoma in adults QS, NICE 2011)

Commissioners should ensure they commission services that allow people with OHT or suspected glaucoma (visual field defects or suspicious optic nerve head appearance) to be appropriately assessed in the community before timely referral to a consultant ophthalmologist if glaucoma is still suspected.

Commissioning Guide: Glaucoma, Royal College of Ophthalmologists 2016)

Repeat measurement schemes involving community optometrists should be established as a priority. They can significantly reduce false-positive referrals into the hospital eye service and are relatively easy to introduce.

(Commissioning better eye care: Glaucoma, The College of Optometrist and Royal College of Ophthalmologists 2013)

Examples

In Bexley Care Trust Repeat Measures by community optometrists (repeating IOPs with contact applanation tonometry on up to two occasions and/or repeating visual fields on a separate occasion) resulted in 76% of patients not being referred and demonstrated substantial cost benefits while onward referral for refinement by an accredited optometrist was essentially cost neutral (Parkins & Edgar, 2011). Overall savings of up to 62% against the hospital eye service tariff and a full year saving of £32,500; equating to £15,000 per 100,000 population (NHS Evidence: QIPP case study 2011). The risk of false negatives in repeat measure schemes, where a patient with glaucoma is not referred to the hospital eye service, appears to be low (Devarajan et al, 2011).

(Commissioning better eye care: Glaucoma, The College of Optometrist and Royal College of Ophthalmologists 2013)

Issues

It is to be noted that the structure of the General Ophthalmic Services (GOS) contract for the NHS sight test does not fund optometrists to perform repeat measures by applanation tonometry. If only working under this contract, optometrists will refer patients on having seen them only once. Community (enhanced) services by optometrists are commissioned by Clinical Commissioning Groups.

(Commissioning better eye care: Glaucoma, The College of Optometrist and Royal College of Ophthalmologists 2013)

Repeat measures - evidence

Citation	Parkins and Edgar (2011) Comparison of the effectiveness of two enhanced glaucoma referral schemes. Ophthalmic Physiol Opt. 31(4):343-52 https://www.ncbi.nlm.nih.gov/pubmed/21615447
Description	Comparison of enhanced glaucoma repeat measurement (EGRM) scheme in which the referring optometrist conducted the repeated tests him/herself prior to referral or non-referral, and a refinement pathway (RCAS) using a small team of accredited community optometrists.
Findings	• During the full year commencing April 2007, repeat measures using the EGRM scheme resulted in 76% of patients not being referred. • Financial review demonstrated that the EGRM achieved 62% savings when compared with HES tariff while RCAS resulted in a saving of 3.5% • Using a primary care repeat measurement scheme to support referral decision-making demonstrated substantial cost benefit while onward referral for refinement by accredited optometrists was essentially cost-neutral compared with HES tariff.

Repeat measures - evidence

Citation	El-Assal et al., (2015). A comparative study of glaucoma referrals in Southeast Scotland: effect of the new general ophthalmic service contract, Eyecare integration pilot programme and NICE guidelines. *BMC ophthalmology*, *15*(1), 172. https://bmcophthalmol.biomedcentral.com/articles/10.1186/s12886-015-0161-5 ***NB:* this is relevant to preventative and repeat measures, as well as referral refinement**
Description	Retrospective case analysis using a glaucoma electronic patient record, encompassing two six year periods, 2000-2006 (group A), 2007-2012 (group B) The purpose of this study was to evaluate accuracy and outcome of community optometry referrals before and after implementation of the new general ophthalmic service contract in 2006, the Eyecare integration Programme pilot in 2008 and the effect of NICE guidelines in 2009, over 12 years.
Findings	• 1622 new patient records analysed. • Waiting times reduced from 12.3 to 9.4 weeks • Significantly more patients kept first appointments in group B (p = 0.0002) • Glaucoma symptoms significantly more in group A (p <0.0001) and only 3 patients lost Snellen visual acuity before appointment in group B compared to 12 in group A • Documentation of IOP was made in 74.1% of group A and 75.9% of group B, optic disc appearance in 85.4% of group A, and 93% of group B; visual fields in 84.4% of group A and 81.3% of group B. • Significantly fewer 'normal' patients(p <0.0001), more cases of suspect glaucoma (p < 0.0001), more open angle glaucoma (p = 0.0006) and fewer other conditions (p = 0.0024) were present in group B, compared to group A Authors Conclusions: • Patients referred earlier, with shorter waiting times for hospital appointments under the new Scottish general Ophthalmic service and Eyecare Integration Programme. • Fewer false positive referrals with more diagnosis of glaucoma related disease.

Referral refinement - guidance

Guidance

People are referred to a consultant ophthalmologist for further assessment and definitive diagnosis if the optometrist or other healthcare professional suspects COAG. There are local agreements in place for referral refinement.
(Glaucoma in adults QS, NICE 2011)

Consider a referral refinement scheme to further reduce false positive referral rates from community optometrists. To improve the quality of referral refinement services, the College of Optometrists recommends that optometrists involved undertake a Professional Higher Certificate in Glaucoma from one of its accredited providers.
(Commissioning better eye care: Glaucoma, The College of Optometrist and Royal College of Ophthalmologists 2013)

Examples

Evaluation of data in Stockport, Bexley and North of Tyne PCTs shows that a reduction in referrals of up to 76% following implementation of scheme provided by community optometrists. The scheme assumes savings of £87 per patient resulting from averted hospital referrals.
(Commissioning better eye care: Glaucoma, The College of Optometrist and Royal College of Ophthalmologists 2013)

The Bridlington Eye Assessment Project (BEAP) found that 5.2% of the 1,643 people surveyed were found to have a pressure >21mmHg using GAT, and would therefore be expected to be referred for suspected glaucoma. This 5.2% referral rate was found to be open to substantial reduction by application of the Joint College Guidance on the referral of glaucoma suspects by community optometrists (with or without the addition of corneal pachymetry). The guidance states that consideration be given to not referring OHT suspects where the patient is felt to be at low risk of significant visual-field loss in their lifetime (i.e. patients aged over 80 with IOP< 26mmHg (or over 65 years with IOP< 25mmHg) and normal discs, fields and Van Herrick), and by itself achieved a reduction of 63% in the referrals which increased to 85% when Central corneal thickness (CCT) was also taken into account.
(The Way Forward Glaucoma, Royal College of Ophthalmologists 2017)

Issues

A robust continuing evaluation process must be instituted to ensure value as GRFS might not work in all settings. One department collaborated to set up a GRFS that reduced first visit discharge rate to 9%, but after a few years and the introduction of NICE guidelines in 2009, the rate had risen to 21%, bringing into question the value of the scheme in eliminating false positives.
(The Way Forward Glaucoma, Royal College of Ophthalmologists 2017)

It may be a large leap to instigate a GRFS from scratch in the community, but starting in a HES department can make initial training, equipment and clinical governance issues much easier to navigate. The scheme can then be moved out into the community when established.
(The Way Forward Glaucoma, Royal College of Ophthalmologists 2017)

Referral refinement - evidence

Citation	Gunn, et al., (2018). Clinical effectiveness of the Manchester Glaucoma Enhanced Referral Scheme. British Journal of Ophthalmology, bjophthalmol-2018. http://openaccess.city.ac.uk/20751/1/Gunn%20et%20al%20bjophthalmol-2018.pdf
Description	Evaluation of the clinical effectiveness of the Manchester Glaucoma Enhanced Referral Scheme featuring estimation of false positive (FP) and false negative (FN) rates of referral: • Outcome data collected for patients newly referred through the scheme and assessed in "usual-care" clinics to determine FP rate. • For FN rate, glaucoma suspects deemed not requiring referral following GERS assessment were invited to attend a "reference standard" exam, including all elements of assessment recommended by NICE, performed by a glaucoma specialist optometrist. • A separate 33 caases comprising randomly selected and non-referred cases were reviewed independently by two consultant ophthalmologists with specialism in glaucoma to validate the reference standard assessment.
Findings	• 1404 patient were evaluated in GERS • 651 (46.3%) were referred to the HES and 753 (53.6%) were discharged. • The FP rate in 307 assessable patients was 15.5% • 131 (17.4%) of those not referred through the GERS scheme were reviewed- 117 (89.3%) were confirmed as not requiring HES follow-up; 14 (10.7%) required follow-up including 5 (3.8%) offered treatment • Only one patient (0.8%) met the GERS referral criteria and was not referred (True FN) • No cases of missed glaucoma or non-glaucoma pathology identified. Authors' conclusion: "It is clear that GERS is highly successful in reducing the FP rate from community referrals for suspect glaucoma. The FN evaluation in this study shows that GERS is clinically effective and very safe, offering reassurance to commissioners wishing to implement community pathways."

Referral refinement - evidence

Citation	Devarajan et al., (2011) The Carmarthenshire Glaucoma Referral Refinement Scheme, a safe and efficient screening service. Eye. 25(1): 43–49. https://www.ncbi.nlm.nih.gov/pmc/articles/pmid/20966973/
Description	Carmarthenshire Glaucoma Referral Refinement Scheme (CGRS): patients deemed not to warrant onward referral to HES were reviewed by a smaller group of trained optometrists with optic disc imaging facilities after 12 months as a form of additional refinement, and were either referred at that stage or discharged back to the source of referral.

Findings	The scheme resulted in a 53% reduction in the total number of referrals to HES with a cost saving of £117 per patient.
	
	A sample of 100 CGRS patient not referred to HES found:
	• 98% of the images were deemed acceptable and 2% were of insufficient quality for proper assessment.
	• Out of the 98 acceptable images, consultant ophthalmologists were in agreement with the referring optometrist 50% of the time:
	  • 35% overestimation of CDR
	  • 15% underestimation of CDR

Risks	Of the 15 patients underestimated, 2 showed changes that merited recall to the HES for further investigation. Neither of these was started on ocular antihypertensives. This translates as a false-negative rate of between 3 and 10%.

Referral refinement - evidence

Citation	Bourne et al. (2010) Can a community optometrist-based referral refinement scheme reduce false-positive glaucoma hospital referrals without compromising quality of care? The community and hospital allied network glaucoma evaluation scheme (CHANGES). Eye. 24(5):881-7. https://www.ncbi.nlm.nih.gov/pubmed/19648892
Description	The scheme involves specifically trained optometrists in the triage of patients suspected as having glaucoma (referral refinement phase) and, more recently, co-management of high-risk glaucoma suspects (shared-care phase) in the community setting. The referral refinement phase of the CHANGES scheme commenced in August 2006: • All glaucoma-related GOS-18 (General Optical Services-18) referral letters are scrutinized by the hospital-based optometrist and categorized as either low or high risk according to a protocol. • The patients with low-risk referral letters were sent an information pack that contained a copy of the original referral letter and contact information for a choice of eight OSIs, and were invited to make an appointment within a month. Patients who failed to make an appointment were reminded by telephone or by mail. • The OSI then examined the low-risk patients according to a protocol and discharged or referred the patient depending on their findings.
Findings	• 138 (27%) of a total of 512 glaucoma-related referrals were deemed 'low risk'. • 121 out of the low risk category (87.7%) were seen by an OSI, 16 (11.6%) patients never made an appointment (despite repeated attempts on behalf of the hospital) with an OSI, and 1 (0.7%) chose a different hospital provider. • Out of the 121 patients seen by OSI, 40 (35%) were discharged. • The consultant agreed (virtually) with the decision to discharge with 28 (70%) and disagreed with 12 (30%).

Referral refinement - evidence

Citation	Barrett, et al., (2018). Glaucoma referral refinement in Ireland: managing the sensitivity-specificity paradox in optometric practice. Ophthalmic and Physiological Optics. https://www.ncbi.nlm.nih.gov/pubmed/29492992
Description	Glaucoma Referral Refinement (GRR) established in Dublin, investigating the clinical viability of GRR pathway outside the UK's NHS structures and away from the influence of NICE guidance. • Glaucoma suspect patients were recruited into the scheme following referral from community optometrists in the greater Dublin area. • The GRR exam protocol was designed in consultation with the participating ophthalmology department. • The refinement scheme optometrist, trained through apprenticeship style experience at a hospital outpatient clinic, made a tentative management decision after carrying out the GRR exam. • The final management decision was made in a 'virtual clinic' by a glaucoma specialist consultant ophthalmologist.
Findings	• 225 glaucoma suspect patients were seen in the scheme. • After their first GRR visit, 28% were discharged back to their own optometrist, 42% were monitored in the GRR clinic, and 30% were referred to ophthalmology. • After monitoring, this cohort were further assessed: a total of 38% of the patients seen within the scheme required referral to ophthalmology. • 16% of the total participant group (n = 225) were lost to follow up. Cohen's κ was used to determine the level of agreement between the scheme optometrist and ophthalmologist.: • There was substantial agreement, with κ = 0.63 for the first visit management decisions (n = 225). • Agreement increased for subsequent monitoring visits with κ = 0.85 for second visits (n = 65), and κ = 0.69 for all management decisions within the scheme (n = 301). • management outcomes for 44 of the 86 patients referred to ophthalmology were received. • Of these 44, 57% received medical treatment for glaucoma, 34% were monitored without treatment, 2% were discharged, and 7% had comorbidities that were assessed and managed. Authors' conclusion: • 62% patients did not require onward referral to ophthalmic services, releasing significant majority of hospital clinic slots which might previously have been required for the examination of such patients • high level of inter-professional decision agreement likely reflects the benefits of pre-scheme apprenticeship style training and ongoing hospital clinic participation by the scheme optometrist.

Electronic referrals and virtual review - guidance

Guidance

Considerations for further action: Offer to do virtual review of potential glaucoma referrals from community optometrists if they can send you images where adequate IT links exist.
(The Way Forward Glaucoma, Royal College of Ophthalmologists 2017)

Many optometrists already have fundus cameras and other imaging equipment and enabling electronic referrals and telemedicine would increase the quality and value of referrals for posterior segment lesions.
(Primary Eye Care Framework for first contact care, Clinical Council for Eye Health Commissioning 2016)

Examples

A sample of 27 eye departments found that 63% were running Virtual AMD clinics . Virtual clinic models differed in their construction (see Appendix 1). Decisions about treatment are made by the consultant at a virtual reporting session or by the HCPs directly where trained for case-mix.
(The Way Forward AMD Report, Royal College of Ophthalmologists, 2017)

Moorfields Eye Hospital NHS Foundation Trust uses virtual clinics for diagnosing and managing glaucoma.
(Appendix C, Monitor 2015)

A sample of 32 diabetic eye services found that 53% reported using virtual review (OCT) of referable maculopathy cases detected at screening. This referral refinement can occur as part of the diabetic retinopathy service in HES clinic or community setting. Patients are then directed back to screening for active surveillance or for treatment.
(The Way Forward AMD Report, Royal College of Ophthalmologists, 2017)

Issues

Appropriate IT infrastructure is needed to support e-technology (e.g. optometrists having access to NHS.net).
(Commissioning better eye care: Glaucoma, The College of Optometrist and Royal College of Ophthalmologists 2013)

IT provision is a determinant of a department's ability to provide virtual services. Electronic patient records, standardised letters to patients/GP and rapid image handling all make a virtual clinic a time efficient model. Some services have not been able to start due an absence of IT, whilst others have had to shut down due slow IT making it unworkable.
(The Way Forward AMD Report, Royal College of Ophthalmologists, 2017)

The number of images that one consultant can review in a 4 hour session were typically reported at 30-35 (AMD and DM). The concentration over a full dedicated 4 hour virtual review session may not easy, such that as with glaucoma virtual clinics, the strong tendency is to break this work up into 30-60 minute chunks, which are more digestible and can be fitted around the working day rather than done en-bloc.
(The Way Forward AMD Report, Royal College of Ophthalmologists, 2017)

Electronic referrals and virtual review – evidence

Citation	Cameron et al., (2009) Impact of direct electronic optometric referral with ocular imaging to a hospital eye service. Eye. 23, 1134–1140. https://www.nature.com/eye/journal/v23/n5/full/eye2008196a.html
Description	Three optometry practices sent consecutive referrals with images through the NHS Net to the HES.
Findings	• A total of 346 electronic referrals were received over 18 months. 218 (63%) were classified as requiring and 128 (37%) as not requiring a HES appointment. • Those classified as not requiring a HES appointment were subsequently examined with unexpected pathology found in three cases (glaucoma, macular pigment epithelial detachment, and possible peripheral retinal tear) • Electronic referral with images to the HES is safe, speedy, efficient, and clinically accurate given some limitations and avoids unnecessary consultation in 37% of referrals.

Citation	Amoaku et al. (2012) Action on AMD. Optimising patient management: act now to ensure current and continual delivery of best possible patient care. Eye.26:S2–21. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3292344/
Description	An e-referral link between community optometrists and hospital eye clinics in Fife allows optometrists to send clinical images of patients with potentially serious eye problems (such as wet AMD) directly to ophthalmologists, enabling them to decide on the same day whether the person needs a hospital ophthalmology appointment.
Findings	• Development of this service is expected to reduce the time between patients visiting the optometrist and receiving an appointment from the HES and lead to fewer unnecessary hospital attendances. • In the pilot study (Cameron et al., 2009) patients visiting one of three optometry practices with existing non-mydriatic cameras were charged a small fee for fundus photography, and the images were forwarded by email to the HES using NHSmail, accompanied by the electronically redesigned referral form. Each referral was assessed by a consultant ophthalmologist whose telemedicine assessment was based solely on the information and image provided in the referral. The decision for requiring an appointment within the HES was communicated to the optometrist by email, and to the patient and GP by letter.

Electronic referrals and virtual review – evidence

Citation	Kotecha et al., (2017). A technician-delivered 'virtual clinic' for triaging low-risk glaucoma referrals. Eye, 31(6), 899. https://www.ncbi.nlm.nih.gov/pubmed/28211881
Description	Purpose of this study is to describe the outcomes of a technician-delivered glaucoma referral triaging service, featuring 'virtual review' of data arising from the service by a consultant ophthalmologist • The Glaucoma Screening Clinic reviewed new optometrist or GP-initiated glaucoma suspect referrals into a specialist ophthalmic hospital. • Patients underwent testing by three ophthalmic technicians in a dedicated clinical facility. • Data were reviewed at a different time and date by a consultant glaucoma ophthalmologist. • Approximately 10% of discharged patients were reviewed in a face-to-face consultant-led clinic to examine the false-negative rate of the service
Findings	• From 1st March 2014 to 31st March 2016, 1380 patients were seen at the clinic • Patients discharged following consultant virtual review: 882 (62%) • Positive predictive value of onward referrals was 84% • 3/82 patients recalled for face-to –face interviews were deemed to require treatment (this translates to a negative predictive value of 96%) • Technician delivered glaucoma referral triage clinic, featuring virtual review, significantly reduced onward referrals into glaucoma outpatient departments
Risks	This type of virtual refinement model relies on a solid IT infrastructure and the ability to securely share information between different healthcare providers.

Electronic referrals and virtual review – evidence

Citation	Trikha et al., (2012) The Portsmouth-based glaucoma refinement scheme: a role for virtual clinics in the future? Eye. 26(10): 1288–1294. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3470903/
Description	Portsmouth-based glaucoma refinement scheme: All glaucoma referrals passed to one 'named' consultant (a glaucoma specialist) who then determines: a) whether the referral required an immediate HES appointment; or b) if the patient was appropriate to be sent to the refinement scheme. Refinement scheme conducted by optometrist; digital images, along with the field test and additional findings (including an IOP measurement) are sent digitally to the named consultant. Following assessment in the 'virtual clinic', one of the three outcomes is registered: 1. patient is discharged completely; 2. given an appointment in the Hospital glaucoma service; or 3. followed up by community optometrists.
Findings	• 11% of referrals into the virtual clinic were subsequently given an appointment in the hospital eye service (glaucoma clinic). 89% did not require a hospital glaucoma outpatient appointment. • The positive predictive rate is 0.78 (95% CI 0.65–0.87) for the refined scheme compared with 0.37 (95% CI 0.25–0.49) for the unrefined scheme. • The scheme has increased patient capacity, releasing over 1400 clinic slots per year, which were then used for improved patient monitoring with existing glaucoma and ocular hypertension, and has produced a cost saving of £244 200 per year for Portsmouth Hospitals NHS Trust. • The virtual clinic utilised 4 h of the consultants' time per week, representing 10% of their workload and was at a cost of approximately £5000 per annum to the Trust.

Electronic referrals and virtual review – evidence

Citation	Jeganathan et al., (2017). Electronic referrals and digital imaging systems in ophthalmology: A global perspective. Asia-Pac J Ophthalmol;1:3–7 http://www.apjo.org/Apjo/pdf/id/454.html
Description	The recently developed Scottish Eyecare Integration Project involves an electronic referral system from community optometry to the hospital ophthalmology department using National Health Service (NHS) email with digital ophthalmic images attached, via a virtual private network connection. This model of electronic referral retains the crucial involvement of the GP but does not require him/her to triage and forward the referral onto the HES, and is thus beneficial in terms of time and resources. • This study is a perspective article drawing on the experience of the Scottish Eyecare Integration Project, featuring discussion of the global applications of virtual referral technology and other advances in ophthalmology.
Findings	• Currently in Scotland, approximately 75% of all referrals are electronic from community to hospital. • The Scottish Eyecare Integration Project is globally the first of its kind and unique in a national health service. • Such speedy, safe, and efficient models of communication are geographically sensitive to service provision, especially in remote and rural regions. • Along with advances in teleophthalmology, such systems promote the earlier detection of sight-threatening disease and safe follow-up of non–sight-threatening disease in the community
Risks	Despite all the advancements, telemedicine also carries risks, such as: • communication between the doctor and the patient potentially being jeopardized.22 • Not all aspects of remote ophthalmic care are well suited to remote diagnosis. In the field of glaucoma, for example, gonioscopy assessment is a procedure for which technicians are usually not trained, limiting the remote diagnostic accuracy. • Additionally, a degree of caution is always necessary when interpreting 2-dimensional ophthalmic images and there is an acceptance that a full clinical examination is the gold standard for many conditions.

Ophthalmology – Assessment

Risk Stratification: Triage of patients into low, medium and higher risk categories. Lower-risk patients are assigned to less complex pathways with a reduced number of patient contact points and adjusted skill mix along the pathway to meet patient need.

Pre-operative assessment : Using non-ophthalmologists HCPs such as Optometrist and Nurse practitioners in the pre-operative pathway (e.g. cataract).

One-Stop clinics: Streamlining appointments so patients receive tests, diagnostics and in some cases treatment within a single appointment in one location, reducing the total number of appointments required

Risk stratification and low-complexity pathways - guidance

Guidance

Monitor recommend stratifying patients by risk and creating low-complexity pathways for lower risk patients. *(Improving productivity in elective care, Monitor 2015)*

Key to organising a glaucoma service for a multi-disciplinary team (MDT) depends on stratification of patients into low, medium and higher risk categories. These have been defined in the NICE accredited Royal College of Ophthalmologists glaucoma commissioning guideline, along with the training and qualifications appropriate for caring for people in these risk categories:

- Low (OHT/Suspects) and medium ('stable' treated glaucoma patients) risk patients can be managed via a virtual service or by HCPs clinic with consultant input provided as required.
- Medium risks patients can be managed independently by HCPs who have a glaucoma qualification (CoO Diploma in Glaucoma level) either without or with consultant presence.
- High risk, complex cases are seen by ophthalmologists, commonly with a sub-specialty interest.

(The Way Forward Glaucoma, Royal College of Ophthalmologists 2017)

Examples

OLGA (Optometrist Lead Glaucoma Assessment) clinics have run for many years seeing medium risk patients, and engagement of the trained optometrist or other HCPs in the management of high risk patients also provides opportunities for direct clinical teaching by the consultant promoting job satisfaction as well as boosting capacity for higher risk patients.
(The Way Forward Glaucoma, Royal College of Ophthalmologists 2017)

Triage of referrals into Red, Amber, and Green in another department permits low risk "Green" new patients to go directly to the virtual clinic and ensures the "Red" get an early senior opinion.
(The Way Forward Glaucoma, Royal College of Ophthalmologists 2017)

Issues

All new glaucoma referrals could be passed to a GRFS, but many feel that there is utility in triaging referrals to GRFS such that "high risk" cases are directly referred to HES to minimise unnecessary delay (Ratnarajan et al., 2013)
(The Way Forward Glaucoma, Royal College of Ophthalmologists 2017)

Risk stratification and low-complexity pathways– evidence

Citation	Ratnarajan et al., (2013) The effectiveness of schemes that refine referrals between primary and secondary care—the UK experience with glaucoma referrals: the Health Innovation & Education Cluster (HIEC) Glaucoma Pathways Project http://bmjopen.bmj.com/content/3/7/e002715
Description	Comparison of glaucoma referral refinement schemes (GRRS) in the UK: The outcomes of clinical examinations by optometrists with a specialist interest in glaucoma (OSIs) were compared with optometrists with no specialist interest in glaucoma (non-OSIs). Data from Huntingdon and Nottingham assessed non-OSI findings, while Manchester and Gloucestershire reviewed OSI findings.
Findings	The first-visit discharge rate (FVDR) for all time periods for OSIs was 14.1% compared with 36.1% from non-OSIs (difference 22%, CI 16.9% to 26.7%; $p<0.001$). Author conclusions: "*Patients with a high chance of being diagnosed with glaucoma based on the examination findings of the non-specialist optometrist should be referred directly to secondary care and those at lower risk could effectively be reviewed by a specialist trained optometrist carrying out a comprehensive eye examination.*"

Risk stratification and low-complexity pathways– evidence

Citation	NICE Shared Learning (2014) Reducing avoidable sight loss from glaucoma through a reduction in delays to glaucoma patient follow-up appointments and patients lost to follow up. https://www.nice.org.uk/sharedlearning/reducing-avoidable-sight-loss-from-glaucoma-through-a-reduction-in-delays-to-glaucoma-patient-follow-up-appointments-and-patients-lost-to-follow-up
Description	Stratifying service delivery and effective use of different staff across three sites: • Moorfields: Glaucoma patients ranked as high/medium/low risk of disease progression. • Manchester: Glaucoma patients flagged on the patient record so can be easily identified. High risk patients seen in separate clinics from low risk patients. Glaucoma service tailored according to severity of glaucoma and risk of progression. Patients with high risk of advanced disease are seen within the consultant led clinics, lower risk patients are seen in the optometry-led glaucoma clinics or the Glaucoma Evaluation Clinic. • Sheffield: Patients routed into different clinics according to clinical need. Patients at risk of progression seen by ophthalmologists while stable glaucoma or ocular hypertensives have their tests taken by technicians in Glaucoma Unit: test results are reviewed by a consultant.
Findings	• Moorfields: Through nurses taking intraocular pressure tests capacity is freed up. • Manchester: The different pathway streams have allowed Manchester to maximise capacity for seeing glaucoma patients and those at risk of glaucoma without compromising care. Optometrists are employed as part of the glaucoma team under a consultant to help to monitor stable patients. • Sheffield: clinicians can review considerably more patient data per session and can see patients in a ratio of at least 4:1. Setting up the Glaucoma Monitoring Unit requires little supervision. Release of consultant time for traditional clinics increases capacity and contributes to the low Sheffield DNA rate of 2%.
Barriers	• Moorfields: cost of clinical and clerical staff time to review existing patients. • Manchester: relies on ophthalmologists identifying patients and clerks remembering to flag patients.

Pre-operative assessment - guidance

Guidance

The final decision to operate and confirmation of consent should be taken by an ophthalmologist as the responsibility for identifying and mitigating any operative risk always lies with the surgeon.
(The Way Forward Cataract Report , Royal College of Ophthalmologists 2017)

Examples

In many cataract services, community optometrists are commissioned to deliver much of the preoperative and postoperative phases of the cataract pathway, though commissioning arrangements may vary depending on geographical factors and the needs of the local population.
(Commissioning guide: Cataract surgery, Royal College of Ophthalmologists 2015)

Of the 42 departments represented at interview, 9 (21%) had HCPs (6 Optometrist, 2 nurse practitioners and one both) seeing patients referred with cataract and listing them for surgery such that the first time the patient sees an ophthalmologist is on the day of surgery.
(The Way Forward Cataract Report, Royal College of Ophthalmologists 2017)

Issues

Nurse practitioners may not be suitable for training: *"One unit previously had nurse practitioners seeing pre-op cataracts, but as they only achieved 4/5 per clinic, the service was discontinued as it was not cost effective"*
(The Way Forward Cataract Report, Royal College of Ophthalmologists 2017)

This may not be satisfactory for patients who need to discuss the surgery with their surgeon and slows up the process on the day of surgery as the surgeon requires time to review and speak to the patients pre-operatively. It also does not comply with the Royal College of Ophthalmologists standards or commissioning guidelines.
(The Way Forward Cataract Report, Royal College of Ophthalmologists 2017)

Pre-operative assessment - evidence

Citation	Tey et al. (2007) Redesign and modernisation of an NHS cataract service (Fife 1997-2004): multifaceted approach. BMJ. 334(7585): 148–152. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1779879/
Description	One stop cataract clinics organised so that cataract nursing staff would initially assess patients and then the consultant would make a decision on the same day as to the necessity and suitability of the patients for day care surgery.
Findings	• The initial experience and study in 2000 of 100 patients showed the clinics to be cost effective. • The cost of a hospital appointment to the Queen Margaret Hospital in 2000 was estimated at £68; therefore the saving of even one extra hospital appointment per 100 patients resulted in a saving of £6800. • From these clinics 85% of patients were listed for cataract surgery. • The waiting time for patients to be seen at the clinic never exceeded 12 weeks. • A patient satisfaction questionnaire showed that over 97% were extremely satisfied with the clinic's service. • After the success of the one stop clinic the Scottish Executive Office granted the trust a one-off payment of £250 000, which was matched by the Fife NHS Trust. In December 2002 a rebuild at a cost of £500 000 (capital) was completed in a vacated area of the Queen Margaret Hospital. The new cataract unit had the feasibility for complete preoperative and postoperative assessment and surgery. Four extra cataract nursing staff, at a cost of £100 000 per annum, were also employed (recurrent trust annual expenditure).

One-Stop clinics - guidance

Guidance

Streamlining outpatients and diagnostics makes possible one-stop assessment and preparation for surgery.
(Appendix A, Monitor 2015)

"One-stop" pathways where all measures are taken to minimize the number of steps in the pathway can promote capacity.
(The Way Forward AMD Report, Royal College of Ophthalmologists 2017)

Examples

One stop clinic for wet age-related macular degeneration (AMD) - Newcastle Upon Tyne: Initial assessment and same day treatment. 25 injections per 4-hour clinic
(Appendix C, Monitor 2015)

Out of a sample of 27 hospital eye department, 30% of consultants had managed to configure their service so that most patients referred with potential nAMD, could be assessed, investigated and treated in one initial visit.
(The Way Forward AMD Report, Royal College of Ophthalmologists 2017)

Issues

Limited space can prevent patient-centred one-stop service development e.g. lacking physical space to run injection lists at the same time as clinical assessments can effect ability to establish one-Stop clinics for intra-vitreal injections
(The Way Forward AMD Report, Royal College of Ophthalmologists 2017)

Out of a sample of 34 diabetic eye services, only 12% of consultants were able to routinely offer same day focal or grid laser due to time constraints or logistical difficulties with availability of lasers which make this impossible for many to realise.
(The Way Forward AMD Report, Royal College of Ophthalmologists 2017)

Argument against one-stop clinics for intra-vitreal injections include: patient uncertainty causing anxiety; inevitable variation in the number of injections being required can waste capacity – injector standing idle at times; and two stop service can permit the creation of efficient high volume injection lists.
(The Way Forward AMD Report, Royal College of Ophthalmologists 2017)

One-Stop clinics - evidence

Citation	Amoaku et al. (2012) Action on AMD. Optimising patient management: act now to ensure current and continual delivery of best possible patient care. Eye.26:S2–21. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3292344/
Description	• A one-stop AMD clinic service in Gloucestershire provides assessment and treatment clinics running in parallel. Non-consultant staff—particularly nurse practitioners and optometrists—take key roles, helping to maximise capacity and maintain monthly follow-up of patients. • Initial assessment of new patients is led by optometrists and nurse practitioners. As the nurses and optometrists gain experience, they are able to make clear 'observe' and obvious 're-treat' decisions. If intravitreal treatment is required, a second retinal specialist administers the injection, assisted by two nurses who assist with injection preparation. • All clinical data is recorded electronically, allowing clinicians to make rapid treatment decisions for new and returning wet AMD patients using information on patient electronic medical records. If necessary, clinicians can also view previous OCT scans and examine the patient themselves. • If, after 18 months from first referral, a patient has not required an intravitreal injection for at least 6 months, they are moved to an optometrist-led stable AMD clinic to ease pressure on the assessment clinic.
Findings	Expanding the roles of non-consultant clinical staff maximises capacity and facilitates monthly follow-up.

One-Stop clinics– evidence

Citation	Hughes et al., (2001) 'One-stop' cataract surgery: the Bristol Eye Hospital experience 1997-1999. https://www.nature.com/eye/journal/v15/n3/pdf/eye2001100a.pdf
Description	One-stop cataract clinic on basis of living a long distance from the ophthalmic unit and/or reasonable general health as indicated by the GP referral letter Initial assessment in the morning with biometry and consultation with an ophthalmology SHO before being seen by the consultant who performed the surgery that afternoon.
Findings	• There is a high level of patient satisfaction with a 'one-stop' cataract service which reduces hospital attendance from three visits to one. • The unpredictable nature of the clinic content meant that although on average 82% of patients had surgery on the day, this could be as low as 50%, leading to inefficient use of theatre time. • The problem of inefficiency was overcome to an extent later in the programme by adding a few non 'one-stop' patients to the clinic who were warned that there was a chance of surgery that day and to come prepared for this possibility. These non-'one-stop' patients could fill in gaps where fewer than 8 'one-stop' patients required surgery. • Authors conclusion: *"this system may have little overall advantage over sameday diagnosis/pre-assessment clinics with a later date for surgery."*

Ophthalmology – Surgery

Optimised scheduling and management: Measuring, communicating and managing the number of procedures per hour per surgeon and theatre team to increased throughput in theatres.

Optimised scheduling and management - guidance

Guidance

Monitor recommend increasing throughput in theatres by explicitly measuring, communicating and managing the number of procedures per theatre session.
(Improving productivity in elective care, Monitor 2015)

Action on Cataracts (2000) and the 2015 Royal College of Ophthalmologists/Monitor report recommended one case every 30 minutes for routine training lists with the ability to offer slightly longer slots for very junior surgeons or very complex cases.
(The Way Forward Cataract Report , Royal College of Ophthalmologists 2017)

Examples

City Hospitals Sunderland NHS Foundation Trust optimise scheduling and management of cataract surgery by separating teaching lists and service lists. Teaching lists have six cataracts per list and service lists have 10 to 12 cataracts per list. List do not run in parallel. Schedules are based on individual surgeon's speed (e.g. 5 cataracts per list for some surgeons, 12 per list for others) with complex cases directed to specific consultants. No simultaneous cataract surgeries are performed. Patients also have staggered starts, arriving 30 to 60 min before procedure.
(Appendix C, Monitor)

Worcestershire Acute Hospitals NHS Trust incentivise surgical teams to use theatres efficiently. Surgeons have targets for the number of procedures per four hour list (two complex + six simple cases). When the target is met, the surgeon (and surgical team) may finish early and are allowed a break – to ensure quality of care and to avoid fatigue
(Appendix C, Monitor)

Issues

Scheduling needs to take into consideration complexity of patient as well as experience /speed of consultants. For services already achieving good practice (eight procedures per four-hour session for cataract surgery) stretch targets might be more appropriate. Some sites are able to deliver 12 to 15 procedures per four-hour theatre session.
(Improving productivity in elective care, Monitor 2015)

Optimised scheduling and management - evidence

Citation	NICE Shared Learning (2014) Reducing avoidable sight loss from glaucoma through a reduction in delays to glaucoma patient follow-up appointments and patients lost to follow up. https://www.nice.org.uk/sharedlearning/reducing-avoidable-sight-loss-from-glaucoma-through-a-reduction-in-delays-to-glaucoma-patient-follow-up-appointments-and-patients-lost-to-follow-up
Description	Delayed and DNA'd appointments monitored and clinic capacity regularly reviewed: • Moorfields: clerks cannot close clinic until all patients assigned outcome: "discharged" "rebooked" or for DNAs "follow up with GP". All patients booked into appropriate clinic on departure from their previous appointment regardless of capacity. Clinic capacity then reviewed prior to clinic date and appointments re-scheduled if needed. Thus, clerks can track when patients should have been seen and re-book their appointment within an appropriate time frame (appropriate as predefined by ophthalmologists) • Manchester: Clerks use partial booking system and maintain Review List database of patients awaiting appointments. Clinics booked 6 weeks in advance when clerks and clinical staff can be sure of staffing levels. • Sheffield: the Patient Administration System has a review list of patients awaiting appointments with due date. All patients remain on review list until they are booked: if there are patients on the review list whose scheduled appointment month has passed, they are visibly overdue. Appointments are prioritised according to clinical need
Findings	• Avoidable sight loss is reduced through delayed and DNA'd appointments being recorded/ monitored. Ensuring patients are given a follow up outcome (follow-up/DNA) means that patient lists are accurate and contain only active patients; patients cannot be accidentally lost to follow up, and DNAs are chased via their GP. • Accurate monitoring of capacity ensures that clinics have useful information to share with commissioners and can plan services effectively and put on extra clinics if needed. • Appointments are prioritised according to clinical need - if capacity is an issue then patients with a high risk of disease progression can be seen in a timely manner.
Barriers	Moorfields: Backlog of patient records must be cleared and assigned an outcome costing staff time.

Ophthalmology – follow-up (inc. post-operative care)

Extended team: Extended nurse/other Health Care Professionals (HCPs) trained to undertake tasks usually performed by consultants.

Shared care: Could include community or hospital based shared care. Transfer of stable / low risk patients to the community / extended team for ongoing management or post operative follow-up.

Virtual Clinics: Could include community or hospital based virtual follow-up. Uncomplicated patients followed up in community or extended hospital eye service team with virtual review by consultant.

Extended team - guidance

Guidance

Monitor recommend extending clinical roles to enable lower-grade staff to undertake routine tasks in theatre or outpatients usually performed by consultants.
(Improving productivity in elective care, Monitor 2015)

Royal College of Ophthalmologists have developed four competency frameworks including cataract assessment, glaucoma and medical retina.
(Competency frameworks, Royal College of Ophthalmologists 2016)

Final review can be provided by ophthalmologists, nurses, optometrists or orthoptists working within the unit to agreed guidelines or by accredited optometrists working outside the unit.
(Cataract Surgery Guidelines, Royal College of Ophthalmologists 2010)

Examples

The recently stated Royal College of Ophthalmologists response to the Monitor Report on productivity in elective care indicates that the final decision to operate is made by an experienced ophthalmologist, however many eye units in the UK have devolved the decision making process concerning cataract surgery to trained HCPs using defined protocols and pathways.
(The Way Forward Cataract Report , Royal College of Ophthalmologists 2017)

Local anaesthetic is provided by anaesthetic physician assistants (band 7 - approx. 1/3 cost of consultant) for cataract surgery at Royal Devon and Exeter NHS Foundation Trust. Initially, only straightforward cataract surgery (no sedation) was undertaken based on Royal College of Ophthalmologists guidelines 2012 but now expanding remit to include more complex cases, glaucoma, etc, and administration of IV sedation when needed (outside Royal College of Ophthalmologists guidelines).
(Appendix C, Monitor 2015)

Senior nurses are trained to deliver injectable treatments for neurovascular AMD at Moorfields Eye Hospital NHS Foundation Trust. This has allows the service to become a 'one-stop' service where the injection is given on the same day the decision is made. The use of this expanded role has increased volume of IVT delivered at Moorfields by 50%; with ~50% provided by nursing staff.
(Appendix C, Monitor 2015)

Issues

Experience with glaucoma nurse practitioner found that the throughput, quality of decision making and capacity to work independently was inadequate to make the service sustainable so they had been closed down. A move to recruiting optometrists has been seen, as they are already conversant with full slit lamp examination, tonometry, and fundoscopy.
(The Way Forward Glaucoma, Royal College of Ophthalmologists 2017)

Consultant ophthalmologists are more likely to opt for longer follow up intervals than other grades of ophthalmologist or other HCP. Thus consultant involvement promotes optimisation of capacity by avoiding unnecessarily early reviews.
(The Way Forward Cataract Report , Royal College of Ophthalmologists 2017)

Extended team - evidence

Citation	Amoaku et al. (2012) Action on AMD. Optimising patient management: act now to ensure current and continual delivery of best possible patient care. Eye.26:S2–21. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3292344/
Description	• A rapid access clinic led by a nurse consultant has been set up in Sheffield. A two-stop model allows the workload to be planned and is suitable for the urban Sheffield area, as most patients only travel short distances. • New referrals are examined at a weekly nurse-led rapid access clinic, with any overflow being booked into the doctors' clinic. Patients are assessed, diagnosed, and triaged by the nurse and referred appropriately. Information about intravitreal treatment is given to the patient by the nurse, where appropriate. • For wet AMD patients, images and notes are discussed in a weekly reporting session (virtual clinic) involving a multidisciplinary team, during which treatment decisions are made. If appropriate, patients are then booked in for intravitreal anti-VEGF treatment by the clinic coordinator. Treatment is administered by a retinal consultant in a dedicated minor operations theatre. Four-weekly photographic reviews are carried out in a nurse-led clinic with dedicated ophthalmic imaging room and a team of ophthalmic photographers, allowing for multiple patients to be examined simultaneously. Images are reviewed by the medical consultants and nurse consultant at the weekly reporting session, allowing timely and appropriate management. Where necessary, some patients may receive photographic review and intravitreal injection on the same day.
Findings	This clinic allows new patients to be triaged to the appropriate clinic on the basis of initial assessments, allowing the consultant ophthalmologist's time to be utilised more effectively. In addition, nurses also lead the photographic review clinic for returning patients, helping to relieve clinical workload of large numbers of monthly follow-up patients.

Extended team - evidence

Citation	Michelotti, M. M., Abugreen, S., Kelly, S. P., Morarji, J., Myerscough, D., Boddie, T., ... & Sioras, E. (2014). Transformational change: nurses substituting for ophthalmologists for intravitreal injections–a quality-improvement report. Clinical ophthalmology (Auckland, NZ), 8, 755. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3998867/
Description	Dramatic increase in demand for anti-VEGF therapy, coupled with lack of an equivalent increase in ophthalmologists equates to a patient-safety risk. • This study aimed to increase capacity for intravitreal therapy (IVT) by utilising nurse injectors • Multidisciplinary prospective service- improvement process undertaken at two geographically close hospitals in the northwest of England. • IVT injections by nurses was the principal component • Subsequent to institutional approval, experienced ophthalamic nurses were trained, supervised and assessed to deliver IVT. • With direct ophthalmologist supervision for the first 200 injections; with a retinal specialist on site at all times.
Findings	• 3,355 IVTs undertaken between June 2012-November 2013. • Minimal rates of minor adverse events (0.3% subconjunctival haemorrhage and corneal abrasion); with no patient complaints at either site. Author's conclusion: IVT by nurses was well accepted by patients and staff. Hospital A trained three nurses sequentially for improved flexibility in scheduling. Novel use of appropriately trained non-medical staff can improve efficiency and access in an overburdened service with time-sensitive disease.

Extended team - evidence

Citation	Rasul et al. (2016). Non-physician delivered intravitreal injection service is feasible and safe-a systematic review. Dan Med J, 63(5), A5229. http://ugeskriftet.dk/files/scientific_article_files/2018-11/a5229.pdf
Description	Systematic review of non-physician delivered intravitreal injections • Literature searched on 22 September 2015 using PubMed, Embase, the Cochrane Library, CINAHL • and the Web of Science. • Eligible studies had to address any outcome based on non-physician delivered intravitreal therapy regardless of the study design. • Being non-physician was defined as the injecting personnel not being a physician, but no further restrictions were made
Findings	• Five studies were included with a total of 31,303 injections having been performed by 16 nurses. Having nurses perform the intravitreal injections produced to a short-term capacity improvement and liberated physicians for other clinical work. • Training was provided through courses and direct supervision. • The rates of endophthalmitis were 0-0.40‰, which is comparable to reported rates when the intravitreal therapy is given by physicians. • Other major adverse events were uveitis, traumatic cataract, vitreous haemorrhage, retinal detachment and retinal pigment epithelial tears, which were reported at an even lower rate than endophthalmitis Author's conclusion: Non-physician delivered IVT seems feasible and safe
Issues and limitations	• few published studies on non-physician intravitreal injection therapy services exist and hence only five studies could be included in this review. • conclusions of this review are based on results from studies with either no comparison groups or comparison groups with a severe selection bias. • Participating nurses were experienced nurses, and results using inexperienced nurses may be different.

Shared care - guidance

Guidance

New ways to transfer the management of stable glaucoma and OHT into the community have been proposed, including shared care models. NICE notes that services can be commissioned from a range of providers including the hospital eye service and community ophthalmology and optometry services (NICE CMG44).

(Commissioning better eye care: Glaucoma, The College of Optometrist and Royal College of Ophthalmologists 2013)

Independent monitoring of patients with a diagnosis of glaucoma (which must be established by a consultant ophthalmologist) is permitted and encouraged by NICE for those optometrists and other HCPs with training, skills and experience to the level of the CoO Professional Diploma in Glaucoma.

(The Way Forward Glaucoma, Royal College of Ophthalmologists 2017)

Examples

Shared care and decentralisation - Stable and low risk patients can be reviewed on a shared care, or hub and spoke, basis with suitably trained and qualified community optometrists or in hospital clinics run by HCPs. A survey from 2006 found ~50% of eye departments to have some form of shared glaucoma care although only 14/66 (21%) were in the community, the majority being in-house.73

(The Way Forward Glaucoma, Royal College of Ophthalmologists 2017)

Issues

Good communication and clear hand-over of care is essential where the cataract pathway is shared between secondary care and primary care providers.

(Commissioning guide: Cataract surgery, Royal College of Ophthalmologists 2015)

Sharing the care of patients at relatively low risk of progression between the hospital eye service and suitably trained community providers has the potential to reduce costs but needs shared clinical information & the right IT infrastructure.

(Commissioning better eye care: Glaucoma, The College of Optometrist and Royal College of Ophthalmologists 2013)

Any service set up to care for low-risk patients, such as virtual clinics or shared care schemes (see below), comes at the risk of retaining patients who ought to be discharged.

(The Way Forward Glaucoma, Royal College of Ophthalmologists 2017)

The incentive to keep reviewing patients at minimal risk of glaucomatous reduction in life quality by independent sector ophthalmology providers is also significant; clinics full of easy patients remunerate at the same rate as the complex ones seen in traditional NHS providers.

(The Way Forward Glaucoma, Royal College of Ophthalmologists 2017)

Shared care - evidence

Citation	Roberts et al. (2014) The Peterborough scheme for community specialist optometrists in glaucoma: results of 4 years of a two-tiered community-based assessment and follow-up service. Curr Eye Res. 40(7): 690–696. http://www.tandfonline.com/doi/abs/10.3109/02713683.2014.957326?journalCode=icey20
Description	Community-based specialist optometrists in glaucoma (SOG). There are two tiers of SOG, whereby tier 2 SOGs have increased levels of autonomy. All optometrist assessments were reviewed by a consultant ophthalmologist, and levels of agreement were calculated for assessment of optic nerve head appearance, Humphrey visual field test interpretation, diagnosis and outcome.
Findings	• 1639 new patients were assessed by SOGs over a 4-year period. • After first appointment, over 60% of patients were classified as low-risk and remained within the SOG scheme. Rates of frank disagreement between SOG and consultant regarding diagnosis and proposed outcome were 5.6 and 10.4%, respectively, for tier 2 SOGs and 15.3 and 28.6%, respectively, for tier 1 SOGs.

Citation	Roberts et al. (2016) Patient satisfaction in the Peterborough community specialist optometrist in glaucoma shared-care scheme. Eye. 30(8): 1149–1150. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4985679/
Description	• Community optometrist glaucoma scheme. Questionnaires were sent to 120 patients attending the community scheme and 120 patients in the hospital glaucoma service. Patients were questioned about the clinician they saw, and their satisfaction with the service overall.
Findings	• Response rate was 57%. • 75% of patients were satisfied the community scheme overall compared to 73% with the hospital service overall • Patients in the community scheme were asked whether they would like to continue with the scheme, whereas patients in the hospital service were asked if they would be happy to be transferred to the community scheme. Sixty-two out of 66 patients in the community scheme were happy to remain, whereas only 33/65 of hospital patients would be happy to be transferred to the community optometrist scheme.

Shared care - evidence

Citation	Reeves et al., (2016) Effectiveness of Community versus Hospital Eye Service follow-up for patients with neovascular age-related macular degeneration with quiescent disease (ECHoES): a virtual non-inferiority trial. BMJ Open http://bmjopen.bmj.com/content/6/7/e010685.full
Description	The Effectiveness of Community versus Hospital Eye Service follow-up for patients with quiescent nAMD (ECHoES) trial was designed to test the hypothesis that, after uniform training, decisions about the reactivation of nAMD lesions previously classified as quiescent made by optometrists working in the community are not inferior to decisions made by ophthalmologists working in the HES.
Findings	• Optometrists' ability to make nAMD retreatment decisions is not inferior to ophthalmologists' ability, however they made more cautious decisions. • Shared care with optometrists monitoring quiescent nAMD lesions has the potential to reduce workload in hospitals.
Risks	• Compared to ophthalmologists, optometrists were less likely to classify a reactivated lesion as quiescent or suspicious and more likely to classify a quiescent or suspicious lesion as reactivated. • More cautious decision-making may be desirable, since it minimises the risk of false-negative misclassifications; furthermore, it is consistent with community optometrists' obligation under their service contract to refer any suspected pathology, although it limits the potential for community monitoring to reduce the HES workload and be cost-effective.

Shared care - evidence

Citation	Mandalos et al., (2011) Shared care of patients with ocular hypertension in the Community and Hospital Allied Network Glaucoma Evaluation Scheme (CHANGES). Eye. 26:4 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3325570/
Description	The Community and Hospital Allied Network Glaucoma Evaluation Scheme (CHANGES) used accredited community-based optometrists with a special interest (OSIs) in glaucoma to monitor ocular hypertensive (OHT) patients under virtual supervision of the Hospital Glaucoma Service (HGS).
Findings	• CHANGES freed up capacity within a busy HGS. • Cost savings were not specified.
Risks	Improvements need to be made regarding non-attendance rates in the community.

Shared care - evidence

Citation	Voyatzis et al. (2014) Cambridgeshire cataract shared care model: community optometrist-delivered postoperative discharge scheme. BMJ. 98(6):760-4 http://bjo.bmj.com/cgi/pmidlookup?view=long&pmid=24515987
Description	Community optometrist-delivered postoperative discharge scheme in patients who underwent same day discharge from the hospital eye service (HES) following cataract surgery. At Addenbrooke's Hospital (Cambridge, UK), the postoperative cataract service pathway was redesigned to provide cataract surgery follow-up in the community by using the established skills of community-based optometrists with specific training, accreditation and provision for feedback under a service level agreement (SLA).
Findings	• Over a 23-month period, a total of 1492 of 2461 (60.6%) Cambridgeshire patients were discharged to the community on the day of cataract surgery. • Complete postoperative feedback was available in 96.85% of these patients. Uneventful postoperative recovery was recorded in 93.77% of patients with 2.95% of patients re-referred. Rates of cystoid macular oedema, uveitis and raised intraocular pressure were 0.6%, 1% and 0.1%, respectively. No patients had sight-threatening complications in this study.

Shared care - evidence

Citation	Sharma et al. (2012). An economic comparison of hospital-based and community-based glaucoma clinics. Eye. 26, 967–971. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3396173/
Description	Community optometrists received structured training with a subsequent formal accreditation assessment in glaucoma care. Once accredited they alternated between running half day glaucoma clinics in their own High Street practices (with hospital patients attending), and assisting in a hospital-based glaucoma clinic session.
Findings	• The estimated cost per patient attendance to the hospital clinic was £63.91 and the estimated cost per attendance to the community clinic was £145.62. • For patients the combined direct and indirect cost to attend the hospital clinic was £6.15 and the cost to attend the community clinic £5.91. • Time requested to next appointment was similar for the two clinics.
Risks	The principal reason for the higher cost in the community clinic was higher overhead costs in the community. Re-referral to the hospital system only occurred for 9% of patients and was not a large contribution to the increased cost. Sensitivity analysis shows a strong effect of increasing patients seen per clinic. It would, however, require 25 patients to be seen per clinician per day in the community in order to make the costs comparable.

Shared care - evidence

Citation	Baker et al. (2016) Effectiveness of UK optometric enhanced eye care services: a realist review of the literature. Ophthalmic Physiol Opt. 36: 545–557. http://onlinelibrary.wiley.com/doi/10.1111/opo.12312/pdf
Description	Enhanced optometric services (EOS; sometimes referred to as 'community schemes') covering: cataract direct referral and/or post-operative management; enhanced glaucoma case-finding; management of suspect 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.
Findings	• 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.

Virtual follow-up - guidance

Guidance

Monitor recommend providing virtual follow-up for uncomplicated patients.
(Improving productivity in elective care, Monitor 2015)

There are no clear guidelines for the development of these services. The minimum standards for the development and implementation of virtual clinics for glaucoma management in the secondary care setting have been set out by Royal College of Ophthalmologists.
(Standards for Virtual Clinics in Glaucoma Care in the NHS Hospital Eye Service , Royal College of Ophthalmologists 2016)

Examples

One department set up a virtual review system with photos and OCT taken for patients who had required no treatment for 3 months or more, and these are reviewed by a consultant; this virtual service is also used to review patients at the end of their 3 injection loading phase for treat and extend.
(The Way Forward AMD Report, Royal College of Ophthalmologists 2017)

Out of a sample of 39 eye departments more than a quarter reported discharging patients straight from theatre after uncomplicated surgery to community optometry; half of these using the standard GOS, but half having this service attract an enhanced tariff. Two departments reported a hybrid with "nurse practitioners seeing first eye post-ops but we discharge from theatre for the second eye so they just go to their normal optometrist when they finish their drops".
(The Way Forward Cataract Report, Royal College of Ophthalmologists 2017)

Issues

The cost saving for secondary care could potentially increase costs incurred to the wider health care economy if the number of GOS or enhanced optometry visits is increased. No cost analysis study of different pathways had been done, but schemes utilising the usual GOS sight test process are at little risk of increasing the overall financial burden on the wider health economy, as it can probably be reasonably assumed that most patients will attend for a GOS sight test following cataract surgery, whether or not they had a post-operative clinic visit to HES.
(The Way Forward Cataract Report, Royal College of Ophthalmologists 2017)

Some might express concern about this concept as it removes the human element of clinical decision making, such as discussion of compliance or explaining the disease or the treatment. However, those running virtual services feel this is not the case. Some felt that patients preferred it to a traditional glaucoma clinic as the total visit duration was less, and where attention to the dangers of the potential "facelessness" has been paid, the attending HCP might cover details about compliance and drop side-effects more effectively than is achievable in a late-running consultant face to face clinic.
(The Way Forward Glaucoma, Royal College of Ophthalmologists 2017)

Virtual follow-up – evidence

Citation	Wright and Diamond (2015) Service innovation in glaucoma management: using a web-based electronic patient record to facilitate virtual specialist supervision of a shared care glaucoma programme. Br J Ophthalmol. 99: 313–317. http://bjo.bmj.com/content/99/3/313
Description	Technicians collect data and optometrists triage patients receiving online supervision from glaucoma specialists. The optometrist assessing the patient categorised them according to a five-step glaucoma management algorithm: • 'Normal', with no evidence of glaucoma (to be discharged). • 'Stable', glaucoma with a low risk of lifetime blindness (to be reviewed in 12 months). • 'Low risk', stable glaucoma with a moderate risk of lifetime blindness (to be reviewed 6 months). • 'Unstable' glaucoma (requiring prompt evaluation by a glaucoma specialist within 6 weeks). • 'High-risk' glaucoma (requiring urgent assessment by a glaucoma specialist within 24 h).
Findings	In general glaucoma specialists tended to classify patients into less urgent categories reducing the number of review appointments required (2.4%); • 3084 patients were classified into less severe categories by the specialist; and • 1631 were classified into a more urgent category. A reduction of 2.4% in reviews sourced to 2.4 million glaucoma attendances throughout England equates to 57 600 fewer glaucoma review appointments per year and a saving to the National Health Service (NHS) of nearly £3 million (assuming a net additional cost of about £50 per appointment and including cost of the virtual review). It must be noted that this study does not include a cost–benefit analysis and no comment can be made about the cost–benefit of a virtual glaucoma clinic compared with traditional in hospital care. 6.5% (838 of 12 892) of patients thought to be low risk by the optometrist who were actually found to be unstable and thus requiring a clinical review within 6 weeks. Delay in these patients seeking a prompt face-to-face consultation with a glaucoma specialist could result in delayed treatment and unnecessary loss of vision.

Virtual follow-up – evidence

Citation	Kotecha et al., (2015) Experiences with developing and implementing a virtual clinic for glaucoma care in an NHS setting. Clinical Ophthalmology. 9 1915–1923 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4610880/pdf/opth-9-1915.pdf
Description	Technician-delivered service with virtual consultant review glaucoma stable monitoring service (SMS) (within the glaucoma service of a specialist ophthalmic hospital). SMS was open to all stable "low risk early" to "low risk moderate" glaucoma and glaucoma suspect patients who were existing patients of the glaucoma outpatient department.
Findings	• Patient journey time within the SMS averaged 51 minutes, compared with 92 minutes in the glaucoma outpatient department. • Patient satisfaction with the new service was high. • There exists a discrepancy between patient management decisions of reviewers, suggesting that some may be more risk averse than others when managing patients seen within this model.
Risks	Challenges to implementation of virtual clinic include: • staffing issues: technician skill development required e.g. customer service skills; and • use of information technology problematic - could not move the service off site as reviewers needed access to patient records.

Virtual follow-up – evidence

Citation	Tsaousiset et al., (2016) The concept of virtual clinics in monitoring patients with age-related macular degeneration. Acta Ophthalmol.94(5):e353-5. https://www.ncbi.nlm.nih.gov/pubmed/26385270
Description	Model of follow-up without physical contact ('virtual') with retina specialists. In 'virtual' clinics, patients had a visual acuity test and OCT scan during their visit without clinician's consultation. Two independent retinal specialists reviewed 196 OCT images (3D OCT-1000, Topcon Corporation, Tokyo, Japan) of 196 patients treated for neovascular AMD (121 female, mean age 80.5 ± 7.78 years). Treatment decisions were based on the presence of subretinal fluid (SRF), intraretinal fluid (IRF), central retinal thickness (CRT) as well as the patients' best corrected visual acuity.
Findings	• Overall, the strength of agreement is considered to be 'very good'. Decisions concerning anti-VEGF treatment were different in 12 of 196 (6.12%) cases. • The mean time interval between two appointments was 5.3 weeks following the implementation of the 'virtual' clinics compared to 6.9 weeks in the previous period of regular appointments. • The average time a patient spent for a conventional visit was 71.4 ± 24.1 min, and the respective time needed in the virtual clinic was 47.3 ± 18.6 min. • Following evaluation of the interobserver study of two retinal specialists in the management of neovascular AMD with anti-VEGF factors, Leicester Royal Infirmary have implemented non-doctor lead virtual AMD clinics since January 2012 after obtaining a relevant permission from the ethical committee of the trust. Patients recruited in 'virtual' clinics were relatively stable during the past time, and for safety issues they did not appointed more than two consecutive virtual visits for each patient meaning that the maximal time without clinician's consultation was approximately 3–4 months.

Virtual follow-up – evidence

Citation	Clarke, J., Puertas, R., Kotecha, A., Foster, P. J., & Barton, K. (2017). Virtual clinics in glaucoma care: face-to-face versus remote decision-making. British Journal of Ophthalmology, 101(7), 892-895. http://europepmc.org/abstract/med/27729310
Description	This study examined agreement in clinical decision making regarding glaucoma status made in a virtual glaucoma clinic with those made during face-to-face consultation • Trained nurse and technicians entered data prospectively for 204 patients into a proforma • Subsequent face-to-face clinical assessment was completed by either a glaucoma consultant or fellow • Proformas were remotely reviewed by one of two additional glaucoma consultants and 12 months after by the clinicians who had undertaken the original clinical • examination. • Inter-observer and intra-observer decision making agreement of virtual assessment versus standard care were calculated.
Findings	• adverse disagreement between face to face and virtual review in 7/204 (3.4%, 95% CI: 0.9%, 5.9%) patients, where virtual review failed to predict a need to accelerated follow-up identified in face to face review. • Mis-classification events were rare, occurring in 1.9% (95% CI: 0.3% and 3.8%) of assessments. Inter-observer kappa [95% confidence intervals; CI] showed only fair agreement (0.24 [0.04 to 0.43]); this improved to moderate agreement when only consultant decisions were compared against each other (k = 0.41 [0.16 to 0.65]). • The intra-observer agreement kappa [95% CI] for the consultant was 0.274 [0.073 to 0.476], and for the fellow was 0.264 [0.031 to 0.497]. Author's conclusion: Low rate of adverse mis-classification, in combination with the slowly progressive nature of most glaucoma pathology, along with regular re-assessment suggests virtual clinics as a safe, logistically viable option for selected glaucoma patients.

New interventions and treatments: NICE

Glaucoma: https://www.nice.org.uk/advice/mib150/chapter/Summary

ORA (ocular response analyser) G3 (MIB150; 2018):

- Used to measure corneal hysteresis (CH), currently the only device capable of this
- Proposed use in diagnosis, management and monitoring of suspected or established glaucoma (in addition to standard care/ ophthalmic tests such as Goldmann applanation tonometry

Evidence:

- 5 observational studies (4 in the US; 1 in Korea) with a combined total of 635 adults recruited from Glaucoma clinics [results demonstrate lower levels of corneal hysteresis are associated with the development and progression of glaucomatous disease]

Uncertainties & Cost:

Are published studies applicable to NHS settings? Is corneal hysteresis a reliable risk factor for glaucoma?

- Cost of ORA G3 is £11,995 per unit (excluding VAT), plus additional costs for maintenance and consumables. [Resource impact would be greater than standard care, but may yield long-term savings if measurement of CH facilitates earlier treatment and diagnosis

Age-related Macular Degeneration (AMD): https://www.nice.org.uk/advice/mib154

The eyemax mono an intraocular lens (IOL) for use in people with age related macular degeneration (AMD). (MIB154; 2018): *NICE have temporarily withdrawn this medtech innovation briefing to correct factual errors in the text.*

New interventions and treatments: NICE

Diabetic Retinopathy (DR) & Diabetic Macular Oedema (DMO):

https://www.nice.org.uk/advice/mib144/chapter/Summary

Noctura 400 Sleep Mask for diabetic retinopathy and diabetic macular oedema: (MIB144; 2018):

- Non-invasive treatment delivering light to the back of the eyes while a person is sleeping or in a darkened room
- Intended therapeutic applications would be as an add-on treatment, alongside intravitreal injections of anti-vascular endothelial growth factor or laser photocoagulation in patients with late-stage DR or DMO- or as a preventative measure for those with early-stage DR.

Evidence:

- 4 observational studies using different versions of the device (2 in the UK, 2 in Europe) including 151 adults in secondary care.
- They show that Noctura 400 Sleep Mask is a usable technology for people with DMO and mild to advanced non-proliferative DR, as well as early proliferative DR.

Uncertainties & cost:

Limited evidence in quantity and quality and cost-effectiveness, with no randomised comparative studies assessing effectiveness vs standard care.

- Costs up to £1,250 per patient per year (excluding VAT), Overall resource impact is uncertain due to lack of comparative evidence and paucity of published cost-effectiveness assessments

New interventions and treatments: In development

Cataracts:
https://www.nice.org.uk/guidance/conditions-and-diseases/eye-conditions/cataracts

- Dexamethasone intracanalicular insert for treating inflammation and pain after cataract surgery (GID-TA10198; TBC)

Glaucoma:
https://www.nice.org.uk/guidance/conditions-and-diseases/eye-conditions/glaucoma

- High-intensity focused ultrasound for glaucoma (GID-IPG10102, TBC)

Diabetic Retinopathy (DR) and Diabetic Macular Oedema (DMO):
https://www.nice.org.uk/guidance/conditions-and-diseases/eye-conditions/macular-oedema-and-retinal-vein-occlusion#panel-technology-appraisal-guidance

- Fluocinolone acetonide intravitreal implant for treating chronic diabetic macular oedema (part review of TA301, TBC)

New guidance:
New quality standard in development Serious Eye Disorders [GID-QS10058]:- Expected publication date: 12/02/19.

Elective Care High Impact Interventions: Ophthalmology Failsafe Prioritisation.

Recently, NHS England (NHSE, 2018) has developed a draft specification detailing recommendations for complementary, high impact interventions with relevance to meeting future demand and improving quality in ophthalmic services- describing priority actions and steps, as part of a wider intervention aimed at minimising future discrepancies between capacity and demand, and reducing the risk of avoidable sight loss due to chronic eye disease.

To ensure implementation in all localities, high impact interventions will feature regional teams collaborating across local boundaries with major commissioning and provider structures (E..G STPs, ICSs, LEHNs).

The following slides give an overview of the three actions outlined by the Elective Care Transformation Programme towards implementing the Ophthalmology High Impact Intervention (NHSE, 2018), including a brief description, rationale behind and guidance for achieving each action ('What, Why, How').

This features two case studies, one reproduced from the draft specification (NHSE, 2018) and one more recent case study, both detailing the implementation of actions

Elective Care High Impact Interventions: Ophthalmology Failsafe Prioritisation.

Action 1: 'develop failsafe prioritisation processes (FSPs) and policies' (NHSE, 2018)	
What	FSP refer to a model for ensuring those with chronic conditions receive appropriate follow-up review and treatment, featuring two 'distinct but interdependent elements': • Prioritisation of patients with chronic eye conditions, based on their intended date for follow up and risk of avoidable harm from treatment delay • Implementation of 'closed loop' failsafe processes to safeguard against errors which may result in patients being 'lost to follow-up' or experiencing treatment delay. (LDTF: lost to or delayed follow up)
Why	FSPs may produce improvements in patient outcomes and safety through: • Reduction of avoidable vision loss • Reduction of risk of LDTF • Reducing appointment cancellations and 'did not attend's (DNAs)
How	• Stratify all patients according to clinical risk of harm, while specifying a follow-up date based on diagnosis and presentation at each patient attendance. • Prioritise patients for appropriate follow up review/ treatment based on clinical risk of harm and intended follow-up date • Document and highlight diagnosis, risk and intended follow up date for each patient Appointment of a 'failsafe officer' at each site to ensure and audit the implementation of FSPs.

Elective Care High Impact Interventions: Ophthalmology Failsafe Prioritisation.

Action 2: 'undertake a clinical risk and prioritisation audit (CRPA) of existing ophthalmology patients' (NHSE, 2018)	
What	Clinical risk and prioritisation audit, involving examination of patient records and data to establish and record how many patients are awaiting follow up, delays to follow up and LDTF patients. • Davis et al. (2017): undertaking CRPA involves multiple clinical and administrative stages, where administrative review enables services to begin understanding current need and outstanding backlog [Clinical review also guides actions to address backlog/delays).
Why	• CRPAs enable the identification of those patients at most risk of serious irreversible harm so that appropriate plans can be put in place to review and treat them
How	Identify and record: a) number of patients awaiting follow up; b) LDTF patients; c) DNA rates; NHSE (2018) also adapt several recommendations for achieving this action from Davis et al. (2017), for example: • Administrative review of all patients to identify those without a follow up appointment booked [featuring discharge of those patients known to have died or who have received a discharge letter but not been discharged from the system. • Administrative review of a significant sample of patients with follow up appointments currently booked to identify whether their follow up is overdue [Prioritisation and rebooking patients where appropriate] • Clinical review of electronic records of remaining patients [including discharge of those patients where there is sufficient information to make this decision.] • Clinical review of paper records of remaining patients [Discharge or transfer or care to appropriate community services, where clinically indicated.] • Prioritisation and rebooking of remaining patients to ensure follow up appointments take place.

Elective Care High Impact Interventions: Ophthalmology Failsafe Prioritisation.

	Action 3: 'undertake local eye health capacity reviews' (NHSE, 2018)
What	Eye Health Capacity Reviews (EHCRs) may enable local areas to understand current activity levels and utilisation of eye health services, with the goal of minimising the discrepancies between capacity and demand in ophthalmology services. Broadly, the aim of undertaking EHCRs is to improve equitable access to eye services.
Why	• Such reviews can identify opportunities to improve provision and develop Hospital Eye Services, primary eye care and community ophthalmology services to help manage demand, using clinical risk stratification to ensure that patients see the right person, in the right place, first time.
How	• Undertaking local EHCRs may involve collaboration across local systems and structures, such as between Local Eye Health Networks, provider organisations and wider stakeholders. • Local EHCRs may also focus on determining future drivers of service activity or assessing and improving efficiency of ophthalmic referral pathways. • Achieving this may necessitate ensuring that strategies are in place to reduce unnecessary new attendances, such as: targeted continuing professional development for community practitioners, advice and guidance on pathways, efficient discharge policies and reliable, high quality feedback to referrers.

Elective Care High Impact Interventions: Ophthalmology Failsafe Prioritisation.

Case studies:

A recent case study from the University Hospitals Derby and Burton NHS Foundation Trust (unpublished) details progress of implementation for actions one and two outlined in Ophthalmology High Impact Intervention draft specification (NHSE, 2018).

Actions:

- Failsafe Prioritisation structures were developed locally (including administrative job roles to oversee functionality and processes, with robust systems are in place to ensure this function operates year round).
- The preliminary aim was to audit 10% of the identified undated backlog, with the first agreed action being to assess whether there was any harm to patients. Here, a risk stratification pivot table was developed to aid interpretation.
- Consultant led virtual clinicals reviewed identified patients to establish levels of risk- with high and medium risk patients being given face-to-face appointments.

Results and Lessons Learned:

- Number of patients listed as delayed to follow-up reduced from 4,927 in Aug 2018 to 3,600 in Dec 2018- with high levels of clinical buy in from staff
- Authors of the case study advise addressing the backlog proactively, however, local pressures such as staffing levels and existing capacity may mean this is unavoidable
- They also advise the use of available technology to support audit and reducing the backlog, such as the use of telemedicine or virtual clinics.

Elective Care High Impact Interventions: Ophthalmology Failsafe Prioritisation.

A case study from Manchester Eye Hospital (NHSE, 2018) also provides insight into meeting the challenges presented by: increasing demand for ophthalmic service and the need for high risk patients to receive frequent outpatient review. The actions undertaken align with the development of a risk stratification pathway and structures to support this.

Actions:

- Developed a multidisciplinary team featuring a visual scientist and lead optometrist collaborating with a consultant grade ophthalmologist.
- Training of optometrists in Hospital Eye Services procedures relevant to assessing and managing glaucoma; training of nurses in patient education.
- Risk stratification of patients (high, low and medium risk), featuring:
  - Virtual clinics for those classified as low risk.
  - Interim virtual clinics used to address backlog and see patients who had waited a long time for an appointment.
  - Optometrist led glaucoma clinic for patients classified as medium risk.
  - Consultant led clinics were also set up for the most high risk or complex cases.

Results and Lessons Learned:

- Triage of new referrals led to free up capacity taken up by first appointments, ensuring patients are seen by an appropriate clinicians.
- These actions also allowed for the more efficient use of clinician time.

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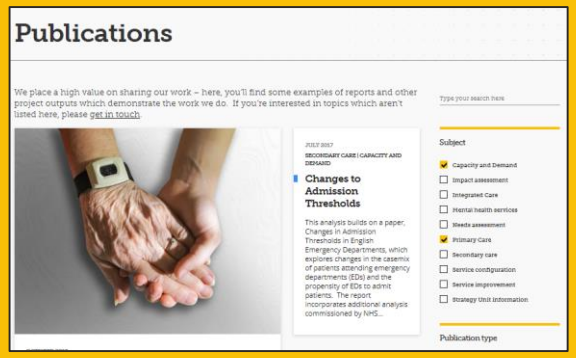

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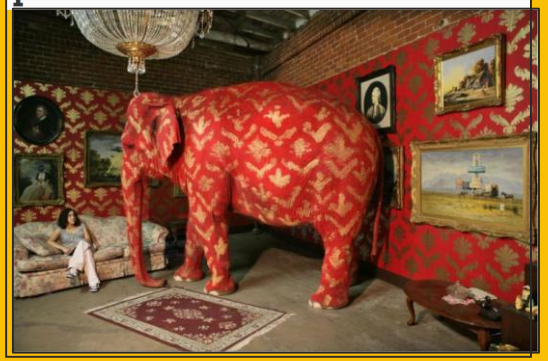

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