A review of Cochrane systematic reviews of interventions relevant to orthoptic practice

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Word count: 2164

Figures: 1

Tables: 5

Running head: Use of Cochrane reviews in orthoptic practice

Declarations: All authors are members of the Cochrane Eyes and Vision editorial group. IG and AS are employed by CEV UK.

Abstract

Aim: To present an overview of the range of systematic reviews on intervention trials pertinent to orthoptic practice, produced by the Cochrane Eyes and Vision group (CEV).

Methods: We searched the 2016 Cochrane Library database (31.03.2016) to identify completed reviews and protocols of direct relevance to orthoptic practice. These reviews are currently completed and published - available on *www.thecochranelibrary.com* (free to UK health employees) or via the CEV website *http://eyes.cochrane.org/*.

Results: We found 27 completed CEV reviews across the topics of strabismus, amblyopia, refractive errors and low vision. Seven completed CEV protocols addressed topics of strabismus, amblyopia, refractive errors, low vision and screening. We found three completed Cochrane Stroke reviews addressing visual field loss, eye movement impairment and age-related vision loss.

Conclusions: The systematic review process presents an important opportunity for any clinician to contribute to the establishment of reliable, evidence-based orthoptic practice. Each review has an abstract and plain language summary that many non-clinicians find useful, followed by a full copy of the review (background, objectives, methods, results, discussion) with a conclusion section which is divided into implications for practice and implications for research. The current reviews provide patients/parents/carers with information about various different conditions and treatment options, but also provide clinicians with a summary of the available evidence on interventions, to use as a guide for both clinical practice and future research planning. The reviews identified in this overview highlight the evidence available for effective interventions for strabismus, amblyopia, refractive errors and low vision or

stroke rehabilitation as well as the gaps in the evidence base. Thus, a demand exists for future robust randomised controlled trials of such interventions of importance in orthoptic practice.

Keywords:

Cochrane Library; Systematic review; Protocol; Strabismus; Refractive error; Amblyopia; Low vision; Stroke

Introduction

Systematic reviews and meta-analyses of published medical literature are considered the highest level of evidence above randomised controlled trials, cohort, case control and cross section studies. The Cochrane Library consists of multiple specialty groups (figure 1), each of which works with mainly voluntary authors and the group prepare, publish and disseminate systematic reviews of the effectiveness of health care interventions using randomised controlled trials (RCTs). Cochrane reviews are updated on a regular basis and so give an ongoing analysis of available evidence.

Cochrane Eyes and Vision (CEV) produce systematic reviews of interventions for the treatment or prevention of eye diseases or visual impairment. CEV consists of CEV UK and CEV US, and both have international functions. CEV UK is funded by National Institute for Health Research (NIHR) and is based at the London School of Health and Tropical Medicine. CEV US is funded by National Eye Institute (NEI), National Institutes of Health (NIH) and is based at the Johns Hopkins Bloomberg School of Public Health. The CEV editorial base consists of two co-ordinating editors, a managing editor, information specialist, statistical editor and international editors. The editors on CEV are from all over the world and include ophthalmologists, orthoptists and optometrists.

In addition to intervention reviews, CEV undertakes reviews of diagnostic test accuracy (DTA). DTA reviews compare diagnostic tests ability to detect disease, i.e. reference test versus index test. The study designs included in DTA reviews are prospective and retrospective cohorts and case control studies. Data to be extracted includes sensitivity and specificity.

The purpose of this study was to explore the CEV library to extract and overview protocols and reviews of relevance to orthoptic practice.

Materials and methods

We completed a full database search of the 2016 Cochrane Library (available on *www.thecochranelibrary.com*: free to UK health employees or via the CEV website *http://eyes.cochrane.org/).* The search was completed on 30th March 2016.

We identified completed reviews and protocols of direct relevance to strabismus practice; specifically those relating to strabismus, ocular motility, amblyopia, low vision, stroke and refractive error (table 1).

Results

We identified and extracted 27 completed CEV reviews and seven completed CEV protocols. Within the Cochrane Stroke library, we extracted three completed reviews.

Refractive error

One protocol and four reviews were identified. These related to optical correction of refractive error in computer users, spectacle correction for prevention of strabismus, myopia progression and vision screening (table 2).

Strabismus

Four protocols and twelve reviews were identified. These related to psychosocial interventions, diagnostic tests for strabismus, timing of strabismus surgery, types of surgery, interventions for nystagmus, dissociated vertical deviation, infantile esotropia, intermittent exotropia and eye movement disorders, and botulinum toxin for strabismus (table 3).

Amblyopia

One protocol and eight reviews were identified. These related to acupuncture, occlusion, refractive correction, optical penalisation, timing of surgery and vision screening for amblyopia (table 4).

Low vision

One protocol and nine reviews were identified. These related to screening of young or older individuals, use of reading aids, telerehabilitation, adaptive technologies, visual field loss and sight impairment (table 5).

Discussion

The process of a Cochrane systematic review includes title registration, protocol preparation, editorial and peer review of the protocol, publication of the protocol, systematic review preparation, editorial and peer review of the systematic review, publication of the systematic review and updating the systematic review.

The conclusions reached by the refractive error reviews were, typically, that there were limited trials or no robust trials to draw conclusions from. Furthermore, effects may have been chance findings, or due to bias. Due to the high risk of bias and poor reporting of included trials, the true effects are uncertain. There is, therefore, clearly a need for well-planned RCTs to be undertaken in various settings so that the potential benefits and harms can be measured.

The systematic reviews for strabismus concluded that, as there are limited or no RCTs currently available in specific review topics and the best existing evidence is only from non-randomised studies, there is a need for prospective trials to investigate strabismus surgery options across various types of strabismus (with or without amblyopia) and ocular motility conditions. No reliable conclusions could be reached regarding which technique (adjustable or non-adjustable sutures) produces a more accurate long-term

ocular alignment following strabismus surgery or in which specific situations one technique is of greater benefit than the other. High quality trials are thus needed to obtain clinically valid results and to clarify these issues. Clarification is required as to the effective use of botulinum toxin as an independent treatment modality.

The conclusions reached by the amblyopia reviews were that both conventional occlusion and atropine penalisation produce visual acuity improvement in the amblyopic eye. Atropine penalisation can be used as first line treatment for amblyopia. Occlusion, whilst wearing necessary refractive correction, appears to be more effective than refractive correction alone in the treatment of strabismic amblyopia. In some cases of unilateral refractive amblyopia it appears that there is a treatment benefit from refractive correction alone. Where amblyopia persists there is evidence that adding occlusion further improves vision.

The systematic reviews for low vision concluded that, in the absence of RCTs for most of the reviews, there is a need for future trials to provide high quality evidence regarding assistive technologies and low vision aids to inform the choice that clinicians and patients/families make. There was limited trial evidence for reading aids or orientation and mobility training for low vision, and for visual scanning training for visual field loss.

Conclusions

There are a number of benefits to clinicians, including orthoptists, optometrists and ophthalmologists from the Cochrane library. There is the opportunity for any of these clinicians to contribute to the establishment of reliable, evidence-based orthoptic practice, specifically for strabismus, ocular motility, amblyopia, low vision, refractive errors and stroke. A full copy of the review with a conclusion section can be accessed.

Each review contains implications for practice and implications for research. There is a summary of the available evidence on interventions, a guide for clinical practice and future research planning information.

Benefits to patients are that each review has an abstract and plain language summary. Current reviews provide patients/parents/carers with information about various different conditions and treatment options which allow for informed patient choices. For free online access to the Cochrane library:

http://www.cochranelibrary.com/app/content/browse/page/?context=editorial-group/Eyes%20and%20Vision%20Group

A key occurring recommendation from all RCTs reviewed in this overview, is the need for further robust, high quality RCTs of interventions for conditions of strabismus, ocular motility disorders, amblyopia, low vision, refractive error and stroke-related visual impairment. This will improve the evidence base for orthoptic practice.

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Figure 1 Cochrane Review Groups

Table 1 Categories of CEV protocols/reviews

Co-existing diseases	Ocular motility disorders*
Conjunctival diseases	Optic nerve diseases
Corneal diseases	Orbital diseases*
Eye haemorrhage	Refractive errors*
Eye injuries	Rehabilitation*
Eye neoplasms	Retinal degeneration
Eyelid diseases	Retinal diseases
Glaucoma	Retinal vascular occlusion
Iris diseases	Scleral diseases
Lacrimal diseases	Uveal and choroid diseases
Lens diseases	Various (CI, ABI, screening)*

* Categories containing relevant protocols and reviews

Table 2 Refractive error protocols and reviews

Authors	Title: Protocol	Objectives
Li et al. 2012 [1]	Optical correction of refractive error for preventing and treating eye symptoms in computer users	The primary objective of this review is to assess the effectiveness, safety and applicability of optical correction of refractive error for the reduction and prevention of eye symptoms in computer users.

Authors	Title: Reviews	Objectives	Conclusions
Jones-Jordan et al. 2014 [2]	Spectacle correction versus no spectacles for prevention of strabismus in hyperopic children	To assess the effectiveness of prescription spectacles compared with no intervention for the prevention of strabismus in infants and children with hyperopia.	Although children who were allocated to the spectacle group were less likely to develop strabismus and less likely to have visual acuity worse than 20/30 children allocated to no spectacles, these effects may have been chance findings, or due to bias. Due to the high risk of bias and poor reporting of included trials, the true effect of spectacle correction for hyperopia on strabismus is still uncertain.
Wei et al. 2011 [3]	Acupuncture for slowing the progression of myopia in children and adolescents	To assess the effectiveness and safety of acupuncture in slowing the progression of myopia in children and adolescents.	No conclusions can be drawn for the benefit of co-acupressure for slowing progress of myopia in children. Further evidence in the form of RCTs are needed before any recommendations can be made for the use of acupuncture treatment in clinical use. These trials should compare acupuncture to placebo and

			have large sample sizes. Other types of acupuncture (such as auricular acupuncture) should be explored further as well as compliance with treatment for at least six months or longer. Axial length elongation of the eye should be investigated for at least one year. The potential to reduce/eliminate pain from acupuncture experienced by children should also be reviewed.
Walline et al. 2011 [4]	Interventions to slow progression of myopia in children	To assess the effects of several types of interventions, including eye drops, undercorrection of nearsightedness, multifocal spectacles and contact lenses, on the progression of nearsightedness in myopic children younger than 18 years. To compare the interventions of interest with each other, to single vision lenses (SVLs) (spectacles), placebo or no treatment.	The most likely effective treatment to slow myopia progression thus far is anti-muscarinic topical medication. However, side effects of these medications include light sensitivity and near blur. Also, they are not yet commercially available, so their use is limited and not practical. Further information is required for other methods of myopia control, such as the use of corneal reshaping contact lenses or bifocal soft contact lenses (BSCLs) with a distance center are promising, but currently no published randomized clinical trials exist.

Powell et al. 2004 [5]	Vision screening for correctable visual acuity deficits in school-age children and adolescents	The objective of this review was to evaluate the effectiveness of vision screening programmes carried out in schools in reducing the prevalence of undetected, correctable visual acuity deficits due to refractive error in school-age children.	At present there are no robust trials available that allow the benefits of school vision screening to be measured. The disadvantage of attending school with a visual acuity deficit also needs to be quantified. The impact of a screening programme will depend on the geographical and socio-economic setting in which it is conducted. There is, therefore, clearly a need for well-planned randomised controlled trials to be undertaken in various settings so that the potential benefits and harms of vision screening can be measured.

Systematic reviews may appear across multiple tables (tables 2-5) where the content is relevant to different orthoptic conditions.

Table 3 Strabismus protocols and reviews

Authors	Title: Protocol	Objectives
Hancox et al. 2015 [6]	Psychosocial interventions for improving quality of life outcomes in adults undergoing strabismus surgery	To investigate the effects of psychosocial interventions versus no intervention on quality of life and psychosocial outcomes in adults undergoing strabismus surgery.
Tailor et al. 2014 [7]	Tests for detecting strabismus in children age 1 to 6 years in the community	To assess and compare the accuracy of tests, alone or in combination, for screening for strabismus in children aged one to six years, in a community setting by lay screeners or primary care professionals.
Theodorou & Karim 2014 [8]	Non-surgical interventions for nystagmus developing in the first year of life (infantile nystagmus)	To assess the efficacy and safety of non-surgical interventions for nystagmus developing in the first year of life.
Rowe et al. 2014 [9]	Interventions for eye movement disorders due to acquired brain injury	To assess the effects of any intervention and determine the effect of timing of any intervention in the treatment of strabismus, gaze deficits and nystagmus due to acquired brain injury in order to align visual axes in primary and/or secondary gaze positions.

Authors	Title	Objectives	Conclusions

Hatt et al. 2015 [10]	Interventions for dissociated vertical deviation (DVD)	The objective of this review was to determine the effectiveness and safety of various surgical and non-surgical interventions in randomized controlled trials of participants with DVD.	The four trials included in this review assessed the effectiveness of five different surgical procedures for the treatment of DVD. Nevertheless, insufficient reporting of study methods and data led to methodological concerns that undermine the conclusions of all studies. There is a pressing need for carefully executed RCTs of treatment for DVD in order to improve the evidence for the optimal management of this condition.
Jones-Jordan et al. 2014 [2]	Spectacle correction versus no spectacles for prevention of strabismus in hyperopic children	To assess the effectiveness of prescription spectacles compared with no intervention for the prevention of strabismus in infants and children with hyperopia.	Although children who were allocated to the spectacle group were less likely to develop strabismus and less likely to have visual acuity worse than 20/30 children allocated to no spectacles, these effects may have been chance findings, or due to bias. Due to the high risk of bias and poor reporting of included trials, the true effect of spectacle correction for hyperopia on strabismus is still uncertain.
Korah et al. 2014 [11]	Strabismus surgery before versus after completion of	To study the functional and anatomic (ocular alignment) outcomes of strabismus surgery before completion	As there are no RCTs currently available and the best existing evidence is only from non-randomized studies, there is a need for prospective RCTs to investigate

	amblyopia therapy in children	of amblyopia therapy as compared with surgery after completion of amblyopia therapy in children under seven years of age.	strabismus surgery in the presence of strabismic amblyopia. The optimal timing of when to perform strabismus surgery in children with amblyopia is unknown.
Minakaran & Ezra 2013 [12]	Rituximab for thyroid-associated ophthalmopathy (TAO)	The aim of this review was to investigate the effectiveness and safety of rituximab for the treatment of TAO.	There is currently insufficient evidence to support the use of rituximab in patients with TAO. There is a need for large RCTs, investigating rituximab versus placebo or corticosteroids in patients with active TAO to make adequate judgement on the efficacy and safety of this novel therapy for this condition.
Haridas et al. 2013 [13]	Adjustable versus non-adjustable sutures for strabismus	To examine whether adjustable or non-adjustable sutures are associated with a more accurate long-term ocular alignment following strabismus surgery and to identify any specific situations in which it would be of benefit to use a particular method.	No reliable conclusions could be reached regarding which technique (adjustable or non-adjustable sutures) produces a more accurate long-term ocular alignment following strabismus surgery or in which specific situations one technique is of greater benefit than the other. High quality RCTs are needed to obtain clinically valid results and to clarify these issues. Such trials should ideally a) recruit participants with any type of strabismus or specify the subgroup of participants to be studied, for example,

			thyroid, paralytic, non-paralytic, paediatric; b) randomise all consenting participants to have either adjustable or non-adjustable surgery prospectively; c) have at least six months of follow-up data; and d) include re-operation rates as a primary outcome measure.
Elliott & Ayad 2013 [14]	Interventions for infantile esotropia (IE)	The objective of this review was to assess the effectiveness of various surgical and non-surgical interventions for IE and to determine the significance of age at treatment with respect to outcome.	The main body of literature on interventions for IE are either retrospective studies or prospective cohort studies. It has not been possible through this review to resolve the controversies regarding type of surgery, non-surgical intervention and age of intervention. There is clearly a need for good quality trials to be conducted in these areas to improve the evidence base for the management of IE.
Hatt & Gnanaraj 2013 [15]	Interventions for intermittent exotropia	The objective of this review was to analyse the effects of various surgical and non-surgical treatments in randomised trials of participants with intermittent exotropia, and to report intervention criteria and determine the	The available literature consists mainly of retrospective case reviews, which are difficult to reliably interpret and analyse. The one randomised trial included found unilateral surgery more effective than bilateral surgery for basic intermittent exotropia. However, across all identified studies, measures of severity and thus criteria for intervention are poorly validated, and there appear to

		significance of factors such as age with respect to outcome.	be no reliable natural history data. There is therefore a pressing need for improved measures of severity, a better understanding of the natural history and carefully planned clinical trials of treatment to improve the evidence base for the management of this condition.
Rowe & Noonan 2012 [16]	Botulinum toxin for the treatment of strabismus	To evaluate the efficacy of botulinum toxin in the treatment of strabismus compared with alternative treatment options, to investigate dose effect and complication rates.	The majority of published literature on the use of botulinum toxin in the treatment of strabismus consists of retrospective studies, cohort studies or case reviews. Although these provide useful descriptive information, clarification is required as to the effective use of botulinum toxin as an independent treatment modality. Four RCTs on the therapeutic use of botulinum toxin in strabismus have shown varying responses ranging from a lack of evidence for prophylactic effect of botulinum toxin in acute sixth nerve palsy, to poor response in patients with horizontal strabismus without binocular vision, to no difference in response in patients that required retreatment for acquired esotropia or infantile esotropia. It was not possible to establish dose effect

			information. Complication rates for use of Botox or Dysport ranged from 24% to 55.54%.
Rajendram et al. 2012 [17]	Orbital radiotherapy for adult thyroid eye disease	To assess the effectiveness and adverse events of orbital radiotherapy in thyroid eye disease. The effectiveness was dependent on the level of 'success' of the intervention predefined in each randomised controlled trial (RCT).	This review found that orbital radiotherapy is more effective than sham radiotherapy for the treatment of mild-to-moderate thyroid eye disease. In a single trial no difference between radiotherapy and steroid monotherapy was found. A meta-analysis of our secondary outcome of disease severity was not possible but results from individual trials suggest a better outcome with combination treatment with steroids versus steroids alone. No significant changes in quality-of-life scores following treatment with radiotherapy versus alternative treatments were found. Short-term adverse events related to radiotherapy that were reported were local and mild but long-term data were lacking and development of retinal changes following radiotherapy was not reported on.
Boboridis & Bunce 2011 [18]	Surgical orbital decompression for thyroid eye disease	To review current published evidence for the effectiveness of surgical orbital decompression for disfiguring	A single study showed that the transantral approach for orbital decompression was related to more complications than the endoscopic transnasal technique which is

		proptosis in adult thyroid eye disease and summa rise information on possible complications and the quality of life from the studies identified.	preferred by Ear, Nose and Throat (ENT) surgeons, usually as an adjunctive procedure. Intravenous steroids were reported in a single trial to be the most efficient intervention for dysthyroid optic neuropathy. The majority of published literature on orbital decompression for thyroid eye disease consists of retrospective, cohort, or case series studies. Although these provide useful descriptive information, clarification is required to show the relative effectiveness of each intervention for various indications. The two RCTs reviewed are not robust enough to provide credible evidence to our understanding of current decompressive surgery and to support recommendations for clinical practice. There is evidence from currently available uncontrolled studies that removal of the medial and lateral wall (balanced decompression) with or without fat removal may be the most effective surgical method related to only a few complications. There is a clear need for randomised studies evaluating the balanced two-wall, three-wall and orbital fat

			decompression techniques. Comparison with other surgical techniques for orbital decompression or with immunosuppression in cases of compressive optic neuropathy would also be important. These studies should primarily address the reduction of exophthalmos, disease severity, complication rates, quality of life and cost of the intervention.
Scheiman et al. 2011 [19]	Non-surgical interventions for convergence insufficiency	To systematically assess and synthesize evidence from RCTs on the effectiveness of non-surgical interventions for convergence insufficiency.	Current research suggests that outpatient vision therapy/orthoptics is more effective than home-based convergence exercises or home-based computer vision therapy/orthoptics for children. In adult population, evidence of the effectiveness of various non-surgical interventions is less consistent.
Pollock et al. 2011 [20]	Interventions for disorders of eye movement in patients with stroke	To determine the effects of interventions for eye movement disorders on functional ability following stroke.	There is insufficient evidence to reach conclusions about the effectiveness of interventions for patients with eye movement disorders after stroke. High quality research in the form of well-designed randomised trials are urgently required.

Systematic reviews may appear across multiple tables (tables 2-5) where the content is relevant to different orthoptic conditions.

Table 4 Amblyopia protocols and reviews

Authors and date	Title: Protocol	Objectives
Liu et al. 2011 [21]	Acupuncture for amblyopia in children	To assess the effectiveness and gather evidence on safety from randomised controlled trials (RCTs) of acupuncture for unilateral amblyopia in children.

Authors	Title	Objectives	Conclusions
Tailor et al. 2015 [22]	Binocular versus standard occlusion or blurring treatment for unilateral amblyopia in children aged three to eight years	To determine whether binocular treatments in children age three to eight years with unilateral amblyopia result in better visual outcomes than conventional occlusion or pharmacological blurring treatment.	Further research is required to allow decisions about implementation of binocular treatments for amblyopia in clinical practice. Currently there are no clinical trials offering standardised evidence of the safety and effectiveness of binocular treatments, but results from non-controlled cohort studies are encouraging. Future research should be conducted in the form of RCTs, using acknowledged methods of visual acuity and stereoacuity assessment with known reproducibility. Other important outcome measures include outcomes reported by users, compliance with treatment, and recurrence of amblyopia after cessation of treatment.

Antonio-Santos et al. 2014 [23]	Occlusion for stimulus deprivation amblyopia (SDA)	To evaluate the effectiveness of occlusion therapy for SDA in an attempt to establish realistic treatment outcomes. To examine evidence of any dose response effect and to assess the effect of the duration, severity, and causative factor on the size and direction of the treatment effect.	We found no evidence on the effectiveness of any treatment for SDA. Future randomized controlled trials are needed in order to evaluate the safety and effectiveness of occlusion, duration of treatment, level of vision that can be realistically achieved, effects of age at onset and magnitude of visual defect, optimum occlusion regimen, and factors associated with satisfactory and unsatisfactory outcomes with the use of various interventions for SDA.
Korah et al. 2014 [11]	Strabismus surgery before versus after completion of amblyopia therapy in children	To study the functional and anatomic (ocular alignment) outcomes of strabismus surgery before completion of amblyopia therapy as compared with surgery after completion of amblyopia therapy in children under seven years of age.	As there are no RCTs currently available and the best existing evidence is only from non-randomized studies, there is a need for prospective RCTs to investigate strabismus surgery in the presence of strabismic amblyopia. The optimal timing of when to perform strabismus surgery in children with amblyopia is unknown.

Taylor & Elliott 2014 [24]	Interventions for strabismic amblyopia	By reviewing the available evidence we wish to establish the most effective treatment for strabismic amblyopia. In particular this review aims to examine the impact of conventional occlusion therapy for strabismic amblyopia and to analyse the role of partial occlusion and optical penalisation for strabismic amblyopia.	Occlusion, whilst wearing necessary refractive correction, appears to be more effective than refractive correction alone in the treatment of strabismic amblyopia. The benefit of combining near activities with occlusion is unproven. No RCTs were found that assessed the role of either partial occlusion or optical penalisation to refractive correction for strabismic amblyopia.
Taylor et al. 2012 [25]	Interventions for unilateral and bilateral refractive amblyopia	Evaluation of the evidence of the effectiveness of spectacles, occlusion or both in the treatment of unilateral and bilateral refractive amblyopia.	In some cases of unilateral refractive amblyopia it appears that there is a treatment benefit from refractive correction alone. Where amblyopia persists there is evidence that adding occlusion further improves vision. Despite advances in the understanding of the treatment of amblyopia it is currently still not possible to tailor individual treatment plans for amblyopia. The nature of any dose/response effect from occlusion still needs to be clarified. Partial occlusion appears to have the same treatment effect as glasses alone when

			started simultaneously for the treatment of unilateral refractive amblyopia. Treatment regimes for bilateral and unilateral refractive amblyopia need to be investigated further.
Li & Shotton 2009 [26]	Conventional occlusion versus pharmacologic penalization for amblyopia	To assess the effectiveness and safety of conventional occlusion versus atropine penalization for amblyopia.	Both conventional occlusion and atropine penalization produce visual acuity improvement in the amblyopic eye. Atropine penalization appears to be as effective as conventional occlusion, although the magnitude of improvement differed among the three trials. Atropine penalization can be used as first line treatment for amblyopia.
Powell & Hatt 2009 [27]	Vision screening for amblyopia in childhood	The objective of this review was to evaluate the effectiveness of vision screening in reducing the prevalence of amblyopia.	The lack of data from randomised controlled trials makes it difficult to analyse the impact of existing screening programmes on the prevalence of amblyopia. The absence of such evidence cannot be taken to mean that vision screening is not beneficial; simply that this intervention has not yet been tested in robust trials. To facilitate such trials normative data on age-appropriate vision tests need to be available and a consensus reached regarding the definition of amblyopia. In addition, the consequences of living with untreated amblyopia

			have yet to be quantified and a cost-benefit analysis carried out.
Powell et al 2004 [5]	Vision screening for correctable visual acuity deficits in school-age children and adolescents	The objective of this review was to evaluate the effectiveness of vision screening programmes carried out in schools in reducing the prevalence of undetected, correctable visual acuity deficits due to refractive error in school-age children.	At present there are no robust trials available that allow the benefits of school vision screening to be measured. The disadvantage of attending school with a visual acuity deficit also needs to be quantified. The impact of a screening programme will depend on the geographical and socio-economic setting in which it is conducted. There is, therefore, clearly a need for well-planned randomised controlled trials to be undertaken in various settings so that the potential benefits and harms of vision screening can be measured.

Systematic reviews may appear across multiple tables (tables 2-5) where the content is relevant to different orthoptic conditions.

Table 5 Low vision protocols and reviews

Authors	Title: Protocols	Objectives
Langelaan & van Nispen 2007 [28]	Multidisciplinary rehabilitation and monodisciplinary rehabilitation for visually impaired adults	The objective of this review is to assess the effectiveness of monodisciplinary and multidisciplinary rehabilitation programmes in improving quality of life in visually impaired adults.

Authors	Title: Reviews	Objectives	Conclusions
Thomas et al. 2015 [29]	Assistive technology (AT) for children and young people with low vision	To assess the effect of electronic assistive technologies on reading, educational outcomes and quality of life in children and young people with low vision.	High-quality evidence about the usefulness of electronic AT for children and young people with visual impairment is needed to inform the choice healthcare and education providers and family have to make when selecting a technology. Randomised controlled trials are needed to assess the impact of AT. Research protocols should carefully select outcomes relevant not only to the scientific community, but more importantly to families and teachers. Functional outcomes such as reading accuracy, comprehension and speed should be recorded, as well as the impact of AT on independent learning and quality of life.

Barker et al. 2014 [30]	Optical reading aids for children and young people with low vision	To assess the effect of optical low visual aids on reading in children and young people with low vision.	There is a lack of good quality evidence regarding the use of optical low vision aids in children and young people. As such, no implications for practice can be drawn. We believe future research should include functional outcome measures such as reading speed, accuracy and comprehension, as well as the effect of low vision aids on quality of life, in order to truly assess and compare the effect of these devices on a child's life and development.
Bittner Et al. 2014 [31]	Telerehabilitation for people with low vision	Our goal is to systematically review the literature on telerehabilitation's effectiveness for improving vision-related quality of life and/or reading speed compared to face-to-face (e.g., in-office or inpatient) low vision rehabilitation services in patients with low vision or visual function loss due to any ocular condition. Secondary objectives are to evaluate compliance with	We did not find any evidence on whether the use of telerehabilitation is feasible or a potentially viable means to remotely deliver rehabilitation services to individuals with low vision. Given the disease burden and the growing interest in telemedicine, there is a need for future pilot studies and subsequent clinical trials to explore the potential for telerehabilitation as a platform for providing services to people with low vision.

		scheduled rehabilitation sessions, VAE device abandonment rates, and/or patient satisfaction ratings in the same studies.	
Skelton et al. 2013 [32]	Environment and behavioural interventions for reducing physical activity limitation in community-dwelling visually impaired older people	To assess the effectiveness of environmental and behavioural interventions in reducing activity limitation and impaired quality of life amongst visual impaired older people	Behavioural interventions delivered by occupational therapists were shown to reduce the rate of falls. However, unable to conclude if this was due to reduced activity restriction (increased mobility) or reduced activity (lessened exposure to risk).
Virgili et al. 2013 [33]	Reading aids for adults with low vision	To assess the effects of reading aids for adults with low vision	There is insufficient evidence on the effect of different types of low-vision aids on reading performance. It is necessary to investigate which patient characteristics predict performance with different devices. Better quality research needs to focus on the assessed sustained long-term use of each device.

Pollock et al 2012 [34]	Interventions for age-related visual problems in patients with stroke	The aim of this review is to determine if interventions for age-related visual problems improve functional ability following stroke.	There are no implications for practice arising from this review. Evidence relating to the management of patients (from the general population) with age-related visual problems is available from other Cochrane reviews and is likely to be the best evidence available for making treatment decisions about individual patients. Subgroup analyses within these reviews to explore the effect of interventions for age-related visual problems in patients with stroke are recommended. We recommend that the objectives and selection criteria for this Cochrane review are amended and clarified prior to any future updates.
Pollock et al 2011 [35]	Interventions for visual field defects in patients with stroke	To determine the effects of interventions for people with visual field defects after stroke.	There is limited evidence which supports the use of compensatory scanning training for patients with visual field defects (and possibly co-existing visual neglect) to improve scanning and reading outcomes. There is insufficient evidence to reach a conclusion about the impact of compensatory scanning training on functional activities of daily living. There is insufficient evidence to reach generalised conclusions about the benefits of visual restitution training (VRT) (restitutive

			intervention) or prisms (substitutive intervention) for patients with visual field defects after stroke.
Virgili & Rubin 2010 [36]	Orientation and mobility training for adults with low vision	To assess the effects of orientation and mobility training, with or without associated devices for adults with low vision	Little evidence was available on which type of orientation and mobility training is better for people with low vision. Randomised controlled trials are required. A consensus is needed on the adoption of standard measurement instruments of mobility performance, such as questionnaires and performance-based tests.
Smeeth & Iliffe 2006 [37]	Community screening for visual impairment in the elderly	To assess the effects of vision on mass screening of older people for visual impairment	No evidence that community-based screening of asymptomatic older people results in impairment in vision.

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