

UK NATIONAL SCREENING COMMITTEE

Screening for vision defects in children aged 4 to 5

21 November 2013

Purpose

This paper provides background on the UK NSC policy recommendation concerning vision screening in children aged 4 to 5

Background

Childhood vision screening is a well-established practice and pre-dates the formation of the UK NSC. In 2005, the Child Health Subgroup considered the issue in a context informed by concern about unnecessary screening before and after 4 – 5 years of age. The current policy reflects this.

More recently the concerns about unnecessary screening have been raised within the ophthalmology community, the need for the standardisation of screening has been raised in parliamentary questions and questions regarding the practical commissioning of screening have been raised at service level.

Current policy

The current policy position is that:

‘The UK NSC agreed with the recommendation in Health for All Children (4th edition), that screening for visual impairment between 4 and 5 years of age should be offered by an orthoptic-led service. Once this is in place, screening for vision defects in 7 year old children can be discontinued.

Vision defects include amblyopia, refractive error and strabismus.’

This was based on a review in 2005 undertaken by the Child Health Subgroup. The review found that not all the screening criteria were met, for example the level of visual impairment requiring intervention was uncertain making a test cut off difficult to define. There was no agreed diagnostic pathway or policies covering which individuals should be treated.

However the target conditions, refractive error, strabismus and amblyopia, were considered an important health issue, there was emerging evidence from RCTs that screening and intervention reduced morbidity and the Subgroup considered the opportunity cost of screening to be justified if it was confined to the 4 to 5 age group.

Current review

The current review was considered at the March and October 2013 FMCH meetings. It suggests that some criteria have been addressed since the previous review, for example a test cut off is considered to have been defined.

However the review suggests that detection of amblyopia would be the main outcome of screening and it is uncertain whether this should be considered an important health problem. The review was also uncertain about the long term benefits of treatment, whether screening is cost effective and whether RCTs demonstrate benefit.

Nevertheless the review recommends that work should be undertaken to standardise screening in the 4 to 5 age group whilst addressing some of the key ambiguities highlighted by the review.

Consultation

A consultation ran between 28th May and 29th August 2013. The following stakeholders were contacted directly: British and Irish Orthoptic Society, College of Optometrists, Communication Trust, Royal College of GPs, Royal College of Ophthalmologists' Paediatric Sub-committee, Royal National Institute of Blind People, UK Vision Strategy, Vision Checks, Vision 2020 UK.

12 responses were received. These were submitted by: British and Irish Orthoptic Society, British and Irish Orthoptic Society (Scotland), College of Optometrists, Royal College of Ophthalmologists' Paediatric Sub-committee, Royal National Institute of Blind People, Vision Checks Ltd, Children's Community Services (Central Manchester University Hospitals Trust), Chair of specialised commissioning for paediatric ophthalmology Clinical Reference Group, Dr Alison Bruce (Bradford Teaching Hospitals NHS Foundation Trust), Orthoptic manager's forum Northern Ireland, Janet Sidaway, Dr Richard Oliver. These are attached.

The following issues are raised by the responses:

- i) an acknowledgement that there has been a shift of emphasis regarding the conditions to be detected since the last review and that an emphasis on amblyopia weakens the certainty of the case for screening,
- ii) a concern that this emphasis is caused by a lack of clarity in the review that reduced vision is the screening target and amblyopia only one of several diagnostic outcomes,
- iii) an objection to the exclusion of strabismus, refractive error and other outcomes from the outcomes of a screening programme,
- iv) broad consensus that the current screening policy should be strengthened with the development of a standardised screening methodology, agreed audit and monitoring arrangements and research goals.

The responses have been critiqued by the reviewers and this was included in the meeting papers.

FMCH meeting, 29 October 2013

The FMCH considered that, overall, the review's conclusions should be supported with an emphasis on maintaining the current policy position and generating outcome data. The development of national standards and programme management arrangements would require further consideration in the context of other UKNSC priorities.

Proposal

It is proposed that the policy recommendation should be:

Screening for visual impairment between 4 and 5 years of age should be offered by an orthoptic-led service.

Although refractive error and strabismus would be detected by screening, amblyopia is the most likely condition to be detected in this age defined population.

Action

The UK NSC is asked to consider the above statement.

In addition the Committee may wish to discuss whether a statement on the commitment of resources to develop standards and implement, or strengthen, the programme is required given the uncertainties in the evidence base on key issues.



UK National Screening Committee

Vision Screening in Children aged 4-5 years - an evidence review

Consultation comments

There were a few comments sent in response to the evidence review consultation. All of these are listed below:

Organisation:	RNIB		
Name:	Helen May	Email address:	XXXXXXXXXXXXXXXXXXXXXXXXXXXX
Section and / or page number	Text or issue to which comments relate	Comment	
		<i>Please use a new row for each comment and add extra rows as required.</i>	
Introduction (Page 3)	'Screening for reduced vision in children aged 4 – 5 years is primarily undertaken, as part of the NHS Healthy Child Programme, to detect individuals with	We are very concerned that the recent review does not present the full evaluation and evidence for visual impairment screening in children. The current NSC policy (2005) specifies	

	amblyopia.' 'Whilst refractive error and strabismus may result in reduced vision due to amblyopia, and require treatment as part of the management of amblyopia, they do not in themselves constitute an impairment of visual acuity.' 'Disorders other than amblyopia have not been considered specifically in this review for the following reasons: • significant bilateral visual impairment in otherwise healthy children would be expected to be detected before age 4 – 5 years due to the absence of normal visual behaviour / visual responsiveness/visual attention • many disorders causing significant vision impairment are associated with co-morbidity such that affected children would be under the care of health professionals by age 4 – 5 years. In addition, disorders associated with amblyopia, such as strabismus or refractive error, which are of sufficient severity as to negatively impact on visual development and require intervention, would be identified through the detection of the resultant	that screening 'should identify visual impairment in children between 4 and 5 years of age. Vision defects include amblyopia, refractive error and strabismus.'¹. We believe that the omission of other causes of visual impairment in this review does not fully update the relevant research and provides insufficient evidence for the children's vision screening guidance to be reviewed and updated. Refractive error was found to be the biggest cause of reduced vision in children in the study by Robaei et al (2005), which has been referenced in the review². Refractive error is correctable with prescribed glasses, but without identification and treatment can cause reduced vision. It is therefore a preventable and significant cause of sight loss in children. The fundamental role of a screening programme is 'a process of identifying apparently healthy people who may be at increased risk of a disease or condition'¹. Reduced vision can be an effect of a range of ocular and developmental conditions. Amblyopia is one cause of reduced vision. The screening programme is not intended to identify and diagnose amblyopia alone. We believe it is fundamentally important that the identification of reduced vision, regardless of the cause, is made by the screening programme and the review should also reflect the scope of reduced vision. Diagnosis should be made by appropriate professionals in primary and/or secondary care.
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	amblyopia.'	
Introduction (Page 3)	'The current NSC policy, last reviewed in 2005, is that all children should be screened for reduced vision between 4 and 5 years of age, with testing undertaken by orthoptists (specialists in the assessment of vision in childhood) or by other professionals in an orthoptic-led service (i.e. trained and supported by orthoptists).'	RNIB and Which? performed a freedom of information act in 2009/10^{3,4} which demonstrated that there were still areas in the UK which had no provision for children's screening. The information also showed a significant variation of programme standardisation, provision and uptake of children's screening. It was reported in England and Scotland 48% and 42% of children screening programmes had an orthoptist involved in the programme. It is important that the recommendations made by the Hall report (4th edition) are implemented uniformly across the UK.
Criteria 1: Description of the condition (Page 6)	'Many disorders causing significant vision impairment are associated with co-morbidity such that affected children would be under the care of health professionals by age 4 – 5 years'	There are a significant number of those with learning difficulties who have a delayed diagnosis and/or their co-morbidity masks their visual problems ⁵ . Professionals are in agreement that a full visual assessment is more appropriate for children with complex needs ⁶ , but may not necessarily have been completed before 4-5 years of age.
Criteria 1: Socioeconomic outcomes (Page 12)	'There are statutory occupational vision requirements in many countries. For example, in the UK vision of worse than 0.18 logMAR in the worse eye precludes employment in the Royal Air Force, worse than 0.3 precludes occupation as a pilot, and worse than 0.4 precludes occupation in the other armed forces, police or jobs necessitating the driving of large vehicles.(50) However, there is a limited robust evidence base for these recommendations.'	We agree that there is a lack of evidence-based reasoning for visual criteria for specific vocational employment and/or job roles in the UK. However they do exist and are rigorously adhered to. Lack of identification and intervention for children with visual defects which can be treated means that they are not given the opportunity or option to pursue these specific vocations in life.
Conclusion:	'There is some evidence of variation in	The RNIB freedom of information request ³ identified areas

Implications for policy and practice (Page 34)	implementation in the UK and thus there is a need for those commissioning and providing screening services to promote adoption of existing national guidance on the content of the programme. In order to standardize and optimize the programme, there is a pressing need for further national guidance from the NSC and Royal College of Ophthalmologists in relation to • Specific choice of crowded LogMAR acuity test for screening • Diagnostic pathways following detection of reduced vision at screening • Audit and governance of the screening service, Standardisation of approaches would provide the context for a well-designed evaluation to address areas of incomplete evidence such as acceptability of vision testing to children/their families, stability and long term visual outcomes in both treated and untreated children.'	with no or inadequate vision screening programme across England and Scotland. We believe it is important that there should be children's screening programmes in all areas of the UK, which adhere to the recommendations of the Hall report. We also support the development of diagnosis pathways, audit and governance of the screening programme, in order to enhance the screening programme in line with current integrated and effective work of multi-disciplined professionals.
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References

1. UK National Screening Portal. *UK NSC policy on vision defects screening*. [Online] Available at: www.screening.nhs.uk/vision-child [Accessed 7 August 2013].
2. Robaei D, Rose KA, Ojaimi E, Kifley A, Martin FJ, Mitchell P. (2006). Causes and associations of amblyopia in a population-based sample of 6-year-old Australian children. *Archives of Ophthalmology*, 124(6), pp.878-884.

3. McLaughlin B. 2009. *Screening children's eyes. Study finds gaps in provision*. [Online]
Available at: www.vision2020uk.org.uk/core_files/What'snewchildren.doc [Accessed 23 August 2013].
4. Pearl J. 2011. *Schools, open your eyes and offer kids eye tests*. [Online]
Available at: <http://conversation.which.co.uk/consumer-rights/child-vision-screening-eyesight-school-primary-care-trusts/> [Accessed 23 August 2013].
5. Rahi JS, Cumberland PM, Peckham CS. (2010). Improving Detection of Blindness in Childhood: The British Childhood Vision Impairment Study. *Pediatrics*, 126, pp.e895-e903.
6. Woodhouse M, Ryan B, Davies N, McAviney A (2012) A clear vision: Eye care for children and young people in special schools in Wales. RNIB Cymru and the School of Optometry and Vision Sciences, Cardiff University.



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From the Professional Standards Department

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Mr Chris Lloyd FRCOphth, **Chairman – Paediatric Ophthalmology Sub-committee**, sent a letter saying:

My apologies for the late reply to this consultation on the evidence review.

Having considered the thorough evidence review, the College fully supports the need to retain an orthoptic led service screening for amblyopia in the pre-school population. The review currently supports the continuation of the existing screening programme and the Sub-committee hopes that the eventual result will be for the screening programme to be strengthened across England as it is currently implemented in only some local authorities.

Organisation:	Children's Community Services, Central Manchester University Hospitals Trust		
Name:	Vivien Fathy	Email address:	XXXXXXXXXXXXXXXXXXXXXXXXXXXX
Section and / or page number	Text or issue to which comments relate	Comment	
		<i>Please use a new row for each comment and add extra rows as required.</i>	
Page 3, Point 1	The condition should be an important health problem	Late detection of refractive error can interfere with a child's education – 80% of learning is done via vision The incidence of vision defects is normally higher in low socio-economic groups, such as inner cities.	
Page 3, Point 5	There should be a simple, safe, precise and validated screening test	Vision screening in Manchester is at school entry and is done by school nurse assistants. The accuracy of vision tests is poor	
Page 4, Point 8	There should be an agreed policy on the further diagnostic investigation of individuals with a positive test result...	This is currently provided in many areas by the Community Orthoptic Service	

Organisation:	Chair of specialised commissioning for paediatric ophthalmology Clinical Reference Group		
Name:	Alison Davis	Email address:	XXXXXXXXXXXXXXXXXXXX
Section and / or page number	Text or issue to which comments relate	Comment	
		<i>Please use a new row for each comment and add extra rows as required.</i>	
General comment		This is a well-researched and presented review of the current evidence base re vision screening. Screening is outside the remit of specialised commissioning, however, it does form part of the integrated pathway between CCGs and specialised services that need to be developed. One of the key components for this is equity of access and I would agree with the need for clear guidance re screening methodology, audit and clinical governance. The screening programmes in each area can then be critically evaluated and decisions based on evidence made. Further longitudinal research would be well placed within a continuing but tightened up universal screening programme.	

Organisation:	Vision Checks Ltd		
Name:	Catherine Butcher	Email address:	XXXXXXXXXXXXXXXXXXXXXXXXXXXX
Section and / or page number	Text or issue to which comments relate	Comment	
		<i>Please use a new row for each comment and add extra rows as required.</i>	
General	Background of company and author	Vision Checks is a company that offers vision screening to CCG for school entry children. The company was formed to improve the quality of current vision screening provision by offering Orthoptic led vision screening with an appropriate LogMAR test, clear referral pathways and audit process. I am the Director of Vision Checks and I am a practicing Orthoptist with over 23 years experience and I have set up several screening programmes within the NHS and abroad. I currently work in two acute Trusts, one with Orthoptists performing the screening and referring all failures to the Hospital Eye Service and another that has no screening at all. I am a member of the British and Irish Orthoptic Society Vision Screening Special Interest Group and the Vision 2020 UK children's screening group. I write my response as an experienced Orthoptist with a keen interest in vision screening. I have an interest in the outcome of this consultation in that Vision Checks is a company formed to provide vision	

		screening.
Overview	Target Condition	The external review tends to concentrate on amblyopia, but this is a diagnosis and not a risk factor. In the consultation, screening is defined as <i>“Screening is a process of identifying apparently healthy people who may be at increased risk of a disease or condition.”</i> The risk factor in preventing sight problems in children is ‘reduced vision’. The definition continues to say <i>“They can then be offered information, further tests and appropriate treatment to reduce their risk and/or any complications arising from the disease or condition.”</i> I understand this to mean that the condition should be treatable to ensure the screening is viable. By making the risk factor ‘reduced vision’, this will detect amblyopia, refractive error and if the child has amblyopia as a result of a squint, a squint will also be detected.
	Orthoptic led service	The external review addresses the literature against the appraisal criteria but this does not address who should be performing the vision screening. There is an assumption that due to the professional training of an Orthoptist and their experience with testing a child’s visual acuity that this profession should lead the programme. As an Orthoptist and a trainer, I believe that the screening should be Orthoptic-led and that healthcare professionals

		undertaking the acuity testing should be trained by the Orthoptist to a competency level that is monitored and reviewed regularly. There are areas in the UK who claim to have an Orthoptic-led service but the Orthoptist is purely a nominated role and does not actually perform the training or assess the vision testers. Since the last review, audit processes have been put into place across the UK and at the next UKNSC review there should be more evidence about who should lead the screening.
	Detection of bilateral poor vision Pg. 6 “significant bilateral visual impairment in otherwise healthy children would be expected to be detected before age 4 – 5 years due to the absence of normal visual behaviour / visual responsiveness/visual attention”	Many congenital defects of vision can be detected when a baby does not reach normal milestones or the carers suspect that the child does not perform like their peers. There are still incidences of detecting visual impairment at the screening process aged 4-5 years as a child will adopt compensatory mechanisms and may go unnoticed by their carers. Recently a child was referred from an Orthoptic screening programme to an acute Trust in which I work with significant reduced vision. The child was found to have ocular albinism with significant nystagmus and poor vision. This cannot be treated but if undetected, it would have been a significant barrier to their education. To add weight to the need for screening, it is a process to mop up congenital conditions that had been missed at the developmental checks.
	Detection of squint and refractive error	Some screening programmes include a cover test to detect a

	Pg. 6 “In addition, disorders associated with amblyopia, such as strabismus or refractive error, which are of sufficient severity as to negatively impact on visual development and require intervention, would be identified through the detection of the resultant amblyopia. Thus, the detection of childhood refractive error or strabismus in the absence of amblyopia has not been considered.”	squint. I am of the view that if a squint has caused amblyopia, it will be detected by vision testing alone. Some children will have squints but demonstrate equal vision, often because they alternate between eyes. If this is cosmetically poor, the carer or a healthcare professional would seek an expert opinion, hopefully at an early age. If it is cosmetically acceptable and not affecting vision, it will not require treatment and falls out of the criteria for screening. As discussed previously, refractive error cannot be detected by the lay person and should be a target condition, the risk indicator being reduced vision.
	Prevalence of Amblyopia. Pg. 6	The paper addresses the prevalence of Amblyopia and settles for 1-4%. This does not include refractive error which is the main cause of reduced vision. This may have been excluded as it is easily treatable and many will respond to treatment later in life outside of the critical period of development by prescribing the correct prescription. Screening is to reduce their risk of suffering complications in later life; if refractive error goes untreated, a child's access to education is impaired having a long term effect on their quality of life. By excluding refractive error and concentrating on amblyopia, the evidence for vision screening is less compelling.
	The Impact pg. 10, 11.	The authors acknowledge that there is still little evidence that untreated amblyopia has an impact on a child's future life. I think the challenge with collecting this evidence is identifying children and adults that go onto suffer because of their reduced vision in one eye. Every practicing Orthoptist could provide an anecdote about

		how this has impacted on a patient's life. This may be through meeting a young patient's parent who will articulate the challenges they have faced and determination that their own child will be assessed and treated and not suffer in the same way. We will see adults that require their good eye to be patched through injury and treatment and can no longer work or drive until the good eye recovers. There are the aging population suffering from progressive glaucoma or age related macular degeneration who mourn the fact that treatment for their lazy eye was not available in their childhood. Finally, to give a specific example. Vision Screening was stopped in Somerset for a period of three years, when it was recommissioned, they screened all the years that had been missed. I managed a boy aged 7 who was found to be significantly long sighted and amblyopic. Patching was attempted, he found it very stressful but was compliant, after intensive patching there was no improvement and his school work was suffering, so it was stopped. The parents were angry that he had not been detected earlier but in an attempt to reassure them, I told them that the chances of anything happening to his good eye was very small according to the literature. He was recently reviewed with a view to discharging him, his good eye had reduced a little and an examination revealed a retinopathy that has since been diagnosed as a progressive childhood retinopathy. The expectation is that he will soon be registered visually impaired. The difficulty is that this is a tragic personal story from which lessons should be learnt but will not be published as evidence.
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	Which test? Pg. 16 Criteria 5.	The authors compare the numerous tests available and state in their summary that “<i>there is evidence for the superiority of crowded LogMAR testing (over uncrowded test)....</i>” I believe that this should be written into the UKNSC recommendation as some areas of the UK continue to use a single optotype test.
	What's a fail? Pg. 18 Criteria 6.	The UKNSC state that children “<i>should be referred to specialist services for further assessment if they do not achieve 0.2 in both eyes (roughly equivalent to 6/9 on a Snellen based linear chart), despite good cooperation.</i>” This should continue to be clearly stated in the new policy as some areas of the UK have set their own failure level.
Summary		The opinions given are of an Orthoptist who screens, assesses and treats a child with reduced vision throughout their care pathway. My opinions have been formed by reading relevant literature but also by personal experience. It is a weakness of the Orthoptist that so much of our practice is based on reflective practice and case studies that remain unpublished, but this is being addressed in several areas and the profession is becoming more proactive in its collection of national data and evidence. As concluded in the external review there are knowledge gaps in this area which have occurred due to poor audit of systems in place and the haphazard creation and evolution of various programmes. I fully support the authors’ recommendation that there should be audit and governance of any screening service and this should be part of the vision screening process and included in the guidelines. The ideal outcome for this review would be that school entry vision screening should gain national programme status.

		Maybe if lessons can be learned from this review the evidence will be in place for the next.
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Organisation:	Bradford Teaching Hospitals NHS Foundation Trust		
Name:	Dr Alison Bruce	Email address:	XXXXXXXXXXXXXXXXXXXXXXXXXXXX
Section and / or page number	Text or issue to which comments relate	Comment	
		<i>Please use a new row for each comment and add extra rows as required.</i>	
Page 4	"A literature search was undertaken using the Medline, Embase and PsychINFO databases and the Cochrane library."	The literature search does not include the British and Irish Orthoptic Journal which although peer reviewed is not published online. Over the last 5 years there have been a number of papers published in BIOJ on vision screening relating to the review which could inform the debate. I would suggest that a manual search of this journal should be included in the literature review.	
Page 6	"-significant bilateral visual impairment in otherwise healthy children would be expected to be detected before age 4-5 years due to the absence of normal visual behaviour/ visual responsiveness/visual attention." (Reference 3)	This is based on the number of children registered as visually impaired, the process of which is carried out by the consultant ophthalmologist within the hospital eye service (HES). It does not address the number of children that have a significantly reduced vision with no additional pathology or additional co-existing condition who do not enter the HES. Using the updated WHO definition, revised in order to recognise a significant underestimation of the prevalence of VI caused by uncorrected refractive error "...a presenting vision as defined by the VA (worse than 0.4 logMAR) in the better eye using currently available refractive correction, if any." a local Bradford study (in publication) reviewed uptake and attendance from a 4-5year old vision screening programme. The prevalence of visual impairment using the WHO definition was 1.4%. This is similar to that found in a study of 6-7 year old children in Northern Ireland. The implication of a 1.4%	

		prevalence of VI in the community is that a significant number of children are visually impaired on school entry despite having a potentially treatable condition. References: Resnikoff S, Pascolini D, Mariotti S, Pokharel G. Global magnitude of visual impairment caused by uncorrected refractive errors in 2004. <i>Bull World Health Organ</i> 2008;86:63-70. O'Donoghue L, McClelland JF, Logan NS, Rudnicka AR, Owen CG, Saunders KJ. Refractive error and visual impairment in school children in Northern Ireland. Br J Ophthalmol. 2010 Sep;94(9):1155-9. Bruce A, Outhwaite L. Uptake, referral and attendance: Results from an inner city school based vision screening programme. <i>Br. Orthopt J</i>. 2013 (in publication).
Page 7	These prevalence estimates for the UK are within the reported ranges from the diverse population based studies from other countries....	None of the 22 studies reporting prevalence represent the multicultural British population, including the 2 UK studies which are based in predominantly white, middle class communities. Approx 6% (in some areas of London 30%) of the British population is of South Asian origin, yet none of the studies reflect this population. In Bradford where 20% of the population is of South Asian origin a birth cohort study is currently being undertaken (Born in Bradford (BiB)). We are currently working towards linking the data from our 4-5 year old vision screening programme with the collected BiB epidemiological data in order to report on prevalence of amblyopia, strabismus, refractive error and VI. The first children (approx. 4000) from the cohort to enter school have

		been screened this academic year (2012-13) and we aim to analyse this initial data in Oct 2013.
Page 18 (criterion 5).	There remains no national guideline on which acuity test to use.	The British & Irish Orthoptic Society (BIOS) Special interest group (SIG) for vision screening is currently developing a training package for Health Care workers who perform vision screening. Based on current Orthoptic practice in the UK, the test of choice to perform 4-5 year vision screening is the Keeler crowded logMAR test.
Page 18 (criterion 7).	There is no robust evidence (such as studies of uptake to screening) to support this.	A local Bradford study, examining uptake of a 4-5 year school vision screening programme, currently in publication may be of interest. Reference: Bruce A, Outhwaite L. Uptake, referral and attendance: Results from an inner city school based vision screening programme. <i>Br. Orthopt J.</i> 2013 (in publication).
Page 31 (criteria 18 and 19).	There is no national guidance on how screening programmes should be managed or monitored. ...no national mapping of facilities or manpower or assessment of their adequacy.	The BIOS SIG is currently creating a library of Orthoptic led vision screening services throughout the UK; the next step in this process will be to develop national guidance and setting standards for Orthoptists providing screening services. Where national screening services are recognised as mandatory, such as the Newborn Hearing Screening programme, national audit and quality assurance programmes have been established. However, unless vision screening is made a mandatory service rather than “recommended” it is unlikely national monitoring will occur.

Organisation:	BIOS Scottish Branch – pre-school vision screening group		
Name:	Gladys Henderson	Email address:	XXXXXXXXXXXXXXXXXXXXXXXXXXXX
Section and / or page number	Text or issue to which comments relate	Comment	
		<i>Please use a new row for each comment and add extra rows as required.</i>	
Introduction	Opening sentence state: Screening primarily undertaken to detect individuals with amblyopiaclinical scenario of reduced vision affecting one eye (or very rarely both eyes) Paragraph 5 page 3 states NSC policy is that all children should be screened for reduced vision	Throughout the review most of the evidence and conclusions relate to uniocular amblyopia yet the recognised purpose of vision screening programmes is to identify children with reduced vision in one or both eyes. The majority of children referred from screening have reduced vision in both eyes which is “correctable” with glasses. As stated later in the review (page 19 criterion 8) amblyopia can be diagnosed only after further clinical testing.	
1. the condition should be an important health problem	Page 5 the vast majority (>97%) of children with significant reduced vision.....	It would have helpful to have ‘significant’ defined. Though published evidence may not be available, individual screening programmes have figures to show that children with bilateral reduction of vision of poorer than 0.700 are picked up. On page 11 in 2 studies visual impairment is defined as worse than 0.3 ie a high proportion of the children who fail screening.	
3. Cost –effective primary prevention	Criterion not applicable as there is no effective intervention for primary prevention of amblyopia	Wearing glasses to correct anisometropia does prevent development of amblyopia/aid improvement vision of an amblyopic eye	
5. screening test	Currently no UK recommendation	A recommendation of a specific LogMAR test would be welcomed. Standardisation across vision screening programmes would allow more meaningful data to be collected and therefore robust comparisons.	

Organisation:	British and Irish Orthoptic Society (BIOS)		
Name:	Dr Helen Griffiths & Dr Sarah Shea	Email address:	XXXXXXXXXXXXXXXXXXXXXXXXXXXX
Section and / or page number	Text or issue to which comments relate	Comment	
		<i>Please use a new row for each comment and add extra rows as required.</i>	
Introduction	Opening sentence states: Screening..... primarily undertaken..... to detect individuals with amblyopiaclinical scenario of reduced vision affecting one eye (or very rarely both eyes)..... Paragraph 5 page 3 states NSC policy is that all children should be screened for reduced vision	Throughout the review most of the evidence and conclusions relate to unocular amblyopia yet the recognised purpose of vision screening programmes is to identify children with reduced vision in one or both eyes. Many children referred from screening have reduced vision in both eyes. As stated later in the review (page 19 criterion 8) amblyopia can be diagnosed only after further clinical testing.	
Page 3	'systematic review of evidence'	We acknowledge that the British and Irish Orthoptic Journal is not on Medline but it is a peer reviewed annual journal. Orthoptists are prominent professionals in the field of vision testing / screening in children. A search of this journal would have highlighted papers relevant to the search terms used, and these may have warranted inclusion in the literature review.	
Page 4	'A literature search was undertaken using the Medline, Embase and PsychINFO databases and the Cochrane library.'		
Page 5	The majority of disorders that cause bilateral visual impairment or blindness in children in the UK are present from birth or early infancy (3;4) and the vast majority (>97%) of children with significantly reduced vision affecting both eyes are diagnosed early in childhood because of the concerns	This is based on the number of children registered as visually impaired, by the consultant ophthalmologist within the hospital eye service (HES). It does not address the number of children that have a significantly reduced vision with no additional pathology or additional co-existing condition who do not enter the HES. It would be helpful to have 'significant' defined. Though published evidence may not be available, local audits of Orthoptic-led screening programs show that children with bilateral reduction of vision are identified. On page 11, the studies are cited as defining	

		visual impairment as vision in the better eye of worse than 0.3 i.e. a high proportion of the children who fail screening.
Page 6	2nd paragraph discussing period of plasticity	Whilst there is evidence that amblyopia can be treated in later childhood, the outcome of amblyopia treatment is improved if started at a younger age and the dosage (or occlusion hours) required is greater in children older than 6 years – See: - Holmes et al. <i>Arch Ophthalmol</i>. 2011;129(11):1451-1457. - Fronius M et al. Graefes Arch Clin Exp Ophthalmol. 2009 Oct;247(10):1401-8. - Stewart CE et al; MOTAS Cooperative. Invest Ophthalmol Vis Sci. 2007;48(6):2589-94.
Page 6	‘ ‘ - significant bilateral visual impairment in otherwise healthy children would be expected to be detected before 4 – 5 years due to the absence of normal behaviour / visual responsiveness / visual attention	The World Health Organisations (WHO) definition of visual impairment in relation to those with uncorrected refractive errors is vision of worse than 6/18 in the better eye. Bilateral moderate to high refractive errors that significantly impact on the level of vision of each eye (potentially leading to ametropic amblyopia) can go undetected by parents and teachers in young children. Anecdotal evidence through local audits of Orthoptic-led screening programs highlights that this reduced vision is frequently detected through the vision screening provided at 4 – 5 years of age.
Page 7	These prevalence estimates for the UK are within the reported ranges from the diverse population based studies	The 22 studies reporting prevalence of amblyopia are not representative of the multicultural variations in population across UK;

	from other countries....	for example approximately 6% of the population is of South Asian origin, but in some areas of London it is 30%. In Bradford 20% of the population is of South Asian origin, and a birth cohort study linking epidemiological data with the prevalence of amblyopia, strabismus, refractive error and visual impairment is currently underway
Page 15	'As such, screening for reduced vision at 4 – 5 years enables those with established amblyopia to be detected at a sufficiently early stage to allow effective treatment to be provided' Criterion 21, page 32	We support this statement and Criterion 21 which relates to this point. The purpose of the screening should be to detect reduced vision which if left untreated may result in a life long deficit. Visual impairment has been classified as 'presenting visual acuity' (WHO). The use of reduced vision as the marker for a deficit, detects amblyogenic factors of uncorrected refractive error and strabismus that with treatment may lead to an improvement in vision. There is no evidence that screening to identify refractive error <i>per se</i> at age 4 – 5 years is necessary, and no evidence that detecting refractive error that does not reduce vision, and intervention with glasses is beneficial and cost-effective. In addition there is no robust evidence to support the inclusion of other tests, for example the 'blur test' or stereotests into screening programmes. There is still no quality evidence of any causal relationship between low errors and reading difficulties, reduced visucognitive / visumotor skills and / or intelligence scores (Hulme C. 1998. <i>Cogn Neuropsychol</i> . 5: 369-74; (Leat S. 2011. <i>Clin Exp Optom</i> 2011; 94: 6: 514–527).

		The assumptions made for correction of refractive error in adults do not always translate to children. The development of visual acuity and the change in refractive status with age must be considered, (Leat S. 2011, <i>Clin Exp Optom</i> 2011; 94: 6: 514–527; Royal College Of Ophthalmologists 2010 <i>Guidelines for the management of amblyopia</i>). A major difficulty with research into refractive error is that prevalence estimates depend on the study population, age, the lack of a standard definition of ‘significant error’ and non-uniform refractive techniques’, which make comparison of studies difficult (WHO 2012; Dunaway & Berger v2020 <i>e-resource.org</i>; Kleinstein et al., 2003 <i>Arch Ophthalmol</i> 1221:1141-1147). The public health significance of refractive errors that do not reduce vision is not known. Until there is robust population-based data on the prevalence of refractive error there is no evidence to screen for refractive error in children aged 4 - 5 years.
Page 16	Vision testing in children is a safe, relatively simple procedure which can be performed by suitably trained non-specialist staff....	We agree with this statement where training is undertaken by Orthoptists with the service audited and monitored by Orthoptists. BIOS has produced a training programme specifically designed to deliver a structured theoretical and practical course on vision testing and vision screening to the healthcare staff who undertake the vision screening. It is intended to provide Orthoptists with a BIOS recognised, training package for training healthcare staff, thereby ensuring standardised training, assessment and monitoring of competence by the Orthoptic profession. Published recommendations regarding who should administer visual screening programmes are supportive of Orthoptist led programmes (Hall 2003; National Screening Committee 2005; Royal College of Ophthalmologists July 2011). Orthoptists are recognised as experts

		in children's eye care and work across community and acute hospital settings. Orthoptists in the UK are coordinating school vision screening programmes. Many utilise trained health care support workers to deliver the screening. The Orthoptist trains, monitors and supports the health care staff, facilitates the referral process, and locally agreed follow-up care pathway and undertakes an annual audit of screening efficiency and effectiveness. A screening programme is of no value if a child is not seen for a full ocular examination after failing the vision screening. As experts in children's vision Orthoptists are ideal professionals to lead and coordinate all aspects of the vision screening programme.
Page 16	Several different logMAR based crowded letter/picture charts exist.	The authors do not mention the Crowded logMAR test (produced by Keeler; previously known as the Glasgow Acuity Cards) which was specifically designed for use in vision screening of children aged 3 – 5 years and is widely used in the UK within the HES and for vision screening. Published literature on this test includes the design and validity of the test including test-retest reliability, comparison with other vision tests, and normative age defined data (mean vision and ranges) for children in clinical and screening populations. - McGraw & Winn; 1993; <i>Ophthalmic and Physiol Optics</i>. 13:400-404 - McGraw & Winn; 1995; <i>Ophthalmic and Physiol Optics</i>. Vol 15 Suppl 1. ppS11-S17. - Simmers et al; 1997; <i>Br J Ophthalmol</i>; 81:465-9 - McGraw & Winn; 2000: <i>Ophthalmic and Physiol Optics</i>. 20:173-184 - Stewart 2000; <i>Br J Orthopt</i>; 57:32-8 - Jones et al; 2003; <i>Ophthalmic and Physiol Optics</i>; 23:541-6 - Stewart; 2006; <i>Br Ir Orthopt J</i> ; 3:9-13

		- Shea & Gaccon; 2006; <i>Br J Ophthalmol</i> ; 90:40-3
Page 18	There remains no national guidance on which acuity test to use	We agree there should be national guidance on the test used for the vision screening. On the published evidence-base available the Keeler Crowded logMAR would be the BIOS test of choice for vision screening at 4 - 5 years.
Page 18	From recent UK and US studies, it is estimated that the mean visual acuity at 4 - 5 years old is between 0.08 and - 0.075 using crowded logMAR testing. The distribution of test values in the target population should be known and a suitable cut-off level defined and agreed.	There is a need to acknowledge the age-related normative data when determining referral criteria. Stewart (2000) reported a mean acuity of 0.09, with a range of 0.00 to 0.400, for children aged 4 – 6 years using the Crowded logMAR test; <i>Br Orthoptic J</i>; 57:32-8 Jones et al; (2003) reported a mean acuity of 0.04, with a range of -0.125 to 0.300, for children aged 3 – 5 years using the Crowded logMAR test. <i>Ophthalmic and Physiol Optics</i>; 23:541-6 Shea & Gaccon (2006) considered acuity and refractive data to determine age-related norms and reported a mean acuity of 0.140, with a range of -0.025 to 0.300 , for children aged 4½ years, using the Crowded logMAR test; <i>Br J Ophthalmol</i>; 90:40-3 On the basis of this data, the current referral criteria of 0.200 or less on the Crowded logMAR test appears to be a correct balance for identifying reduced VA in children of 4 – 5 years. There does remain a likelihood of a small number of false referrals due to variance in ability in the screened population.

		If the level of acuity is set too high (i.e., better than 0.200 in one or both eyes) a greater proportion of children will 'fail', many of whom would not need, or not benefit from glasses. The possibility that these children are treated for a physiological degree of refractive error has been highlighted (Clarke M.P. 2004 <i>Binocular Vision & Strabismus Quarterly</i>. 19:6-7). There is some evidence that compliance with prescribed glasses can be predicted by the uncorrected visual acuity, with compliance being reduced in children with acuity better than 0.300; (Messer et al., 2012. <i>Optom Vis Sci</i>; 89:19-26; Manny et al., 2012. <i>Optom Vis Sci</i>; 89:892-900.). If the acuity level is set too low (i.e., lower than 0.300 in the better eye) only those with defined visual impairment (as cited on page 11) will be detected.
Page 18	The test should be acceptable to the population There is no robust evidence (such as studies of uptake to screening) to support this.	The uptake of screening is considered in: Bruce A, Outhwaite L. Uptake, referral and attendance: Results from an inner city school based vision screening programme. 2013; <i>Br Ir. Orthopt J</i>.
Page 19	there is a need for uniformity through a national policy and care pathway for the further investigation of children who fail the screening test at age 4 – 5 years.	We agree with this statement and suggest this can be produced through collaboration between BIOS, the Royal College of Ophthalmologists (RCO) and College of Optometrists.
Page 25	...at present no evidence from RCTs that stereoacuity improves with amblyopia treatment....	Although it is not an RCT, a recent study did report improvement in stereoacuity in children being treated for amblyopia: Stewart et al; 2013; <i>JAAPOS</i>: 17(2):166-173
Page 26	The long term stability of visual acuity in children treated for amblyopia is unclear.	Visual acuity was reported to be relatively stable over a mean follow up period of 6.6 years (range 1 – 18 years); Garoufalidis et al. 2007; <i>Binoc Vision Quarterly</i>; 22(1):49-56. The combination of strabismic and anisometropic amblyopia is reported to be the only significant factor predicting non-stability of vision in the treated eye e.g. age and degree of amblyopia were not

		found to be significant. Tacagni, Stewart, et al. 2007; <i>Graefes Arch. Clin. Exp. Ophthalmol.</i> 245 (6): 811-6.
Page 26 criterion 12	There have been no national audits of the management or outcomes of the screening and treatment of amblyopia from which variations in practice can be assessed or addressed. This is a significant gap in the current evidence base	We agree that there is a gap in the evidence base. The majority of the UK Orthoptic-led screening programs have an annual audit cycle of the screening and referral outcome. This data is not reported or published nationally. BIOS have previously identified the need for national data collection and are in the process of identifying how to: - Collate the local audit data currently collected across the UK in order to produce a national audit data set. - Identify and collect the key data needed to inform the debate surrounding this gap in evidence.
Page 27	This highlights the potential value of universal screening of a 'captive' population at school entry in addressing inequalities in access or provision.	We agree with the need for universal screening of a 'captive' population at school entry at age 4 – 5 years. Raising parental awareness of the importance of children's eye care is beneficial. However, the school screening is likely to be the only opportunity of a deficit being detected in the lower socio-economic status groups as parents will not perceive the need for eye care; without the vision screening at school entry these children are at risk of having an undiagnosed visual defect that may be life long if not treated.
Page 28	Criterion 14	This is an area that BIOS is working to encompass by establishing a national audit data set of current Orthoptist-led screening programs (see earlier comment)
Page 31	There is no national guidance on how screening programmes should be managed or monitored, and there are no high quality studies in this area	BIOS agrees, and is currently working towards professional recommendations for the delivery of Orthoptic-led screening programmes, which will include the setting of standards in addition

		to the collection of a national audit data set mentioned previously. Where national screening services are recognised as mandatory, such as the Newborn Hearing Screening programme, national audit and quality assurance programmes have been established as part of the program. However, unless vision screening is made a mandatory service rather than “recommended” it is unlikely that screening will be provided across the UK and with national monitoring. Without a mandatory national vision screening program the regional variation in delivery (in some areas absence of any screening), the variations in the test used and referral criteria will continue and the evidence base will continue to be weak.
Page 31	Criterion 19	BIOS are due to launch a map of provision of Orthoptic-led vision screening services at the Societies annual conference in September. The map will be completed and reviewed after a 6 month period
Page 31-32	...lack of information to parents....	BIOS agree with the importance of clear and informative information being provided to patients / parents and its value in concordance with treatment. The paper cited related to data collected in 2008/09 and there has been much improvement in this area since the data was collected. BIOS is currently collating information leaflets submitted by UK departments, to develop BIOS recommended patient / parent information leaflets. Information on vision screening should be available to enable parents to make an informed choice.
Page 32	Criterion 21	BIOS agree fully that there is no justification for changing the current recommendation. BIOS are working with its membership to highlight this, and working

		to ensure delivery of equitable vision screening programmes to children in the UK.
Page 33, 4 Para	LogMAR....there is presently insufficient evidence to guide the precise choice from the different crowded logMAR tests available for us in children aged 4 – 5 years.	As stated earlier, on the published evidence-base available for the Keeler Crowded logMAR, this would be the test of choice for vision screening at 4 - 5 years, and a 0.200 referral criterion is a fair balance based on age-related normative data for this test. Given the available comparison data for vision tests, if 'any' crowded logMAR test could be used for the screening, then the referral criterion will need to be based on the age-related normative data for the individual test and not one arbitrary criterion applied across all tests, as tests are not comparable.
Page 34	There is some evidence of variation in implementation in the UK and thus there is a need for those commissioning and providing screening services to promote adoption of existing national guidance on the content of the programme.....pressing need for further national guidance from the NSC and RCO in relation to: - specific choice of crowded logMAR acuity test for screening - Diagnostic pathways following detection of reduced vision at screening - Audit and governance of the screening service	BIOS supports the need to have a standardised approach to the delivery of vision screening of 4 - 5 year old children, and is working with its membership to achieve this in areas that provide vision screening. However, with the current financial challenges within the NHS and the commissioning arrangements for screening there are significant restraints on establishing and / or maintaining the delivery of screening programmes and care pathway. BIOS agree with the 3 priorities specified on page 34 and support the need for national guidance on these. There is a need for a mandatory uniform national programme for vision screening for reduced vision in state and private schools for children aged 4 - 5 years, with robust reporting and auditing mechanisms. There is a need to ensure that the vision of children with special needs, in special schools and units is included in this

		programme. It is essential that the benefit of the screening programme is evaluated. Auditing of performance should include clinical outcome, for example the proportion of children screened who needed spectacles and / or patching treatment and / or other treatment; the number prescribed glasses who actually wear them, and the number of children whose vision has been improved as a result of the programme. It is also necessary to evaluate the effect of the screening in terms of parental and child satisfaction; also the educational, social and economic benefits of the programme. Auditing of performance should be collated centrally in order to inform changes to the National standards as more robust evidence becomes available as a result of this process.
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Organisation:	Orthoptic manager's forum Northern Ireland		
Name:	Patrick mccance	Email address:	XXXXXXXXXXXXXXXXXXXXXXXXXXXX
Section and / or page number	Text or issue to which comments relate	Comment	
		<i>Please use a new row for each comment and add extra rows as required.</i>	
Page 14	We have not identified any incidence studies of amblyopia in the UK or in similar population	With the introduction of an Orthoptic-led universal school entry vision screening programme in Northern Ireland and standardised treatment modality one might be able to glean information on prevalence, type and severity of amblyopia.	
Page 19	There should be an agreed policy on further diagnostic investigation.....	Fully support the development of a national policy. Whilst the numbers are small of those children with amblyopia who don't improve following occlusion therapy, I think we need to further investigate the cause, if only to ensure the correct treatment is prescribed and avoid unnecessary / inappropriate treatment.	
Page 26	12. Clinical management of the condition and patient outcomes should be optimised in all health care providers.....	With the introduction of an Orthoptic-led universal school entry vision screening programme in Northern Ireland and standardised treatment modality one might be able to glean information on the management , outcomes of the screening programme and treatment regime	
Page 27	13. there should be evidence from high quality randomised controlled trials.....	One could compare the data from the universal vision screening programme in Northern Ireland with a similar geographical and socio economical area in another part of the UK to ascertain if screening is effective in reducing morbidity	
Page 28	14. There should be evidence that the complete programme.....	One could ascertain the acceptability of the universal vision screening programme in Northern Ireland by the public and concerned parties as a method of gauging whether criterion	

		14 has been meet
Page 25	15. The benefits from the screening programme should outweigh the physical and psychological harm.....	Northern Ireland Orthoptists have an agreed care pathway for the refractive adaptation and treatment of amblyopia. With academic support, the questions raised in criterion 15 could be addressed
Page 29-30	The opportunity cost of the screening programme.....	Using the screening programme adopted in Northern Ireland one might be able to gauge the cost effectiveness of such a programme
Page 31	18. There should be a plan for managing and monitoring the screening programme.....	Would fully support national guidance on the management, monitoring and quality assurance of a vision screening programme
Page 31	19. Adequate staffing and facilities.....	Support a national mapping of manpower and facilities in relation to vision screening as most Orthoptic-led vision screening services are delivered by school nurses/ assistants and are an add on to other screening programmes and at the mercy of one off vaccination programmes
Page 31	20 Evidence based information.....	I think the quote from a recent survey of Orthoptists is misleading, as most, if not all, Orthoptists will give verbal explanation of the test, investigation and treatment plan, whilst offering both patient and parent every opportunity to discuss the management at every consultation

Organisation:	Individual (works at University Hospital North Staffordshire)		
Name:	Janet Sidaway	Email address:	XXXXXXXXXXXXXXXXXXXXXXXXXXXX
Section and / or page number	Text or issue to which comments relate	Comment	
		<i>Please use a new row for each comment and add extra rows as required.</i>	
Page 6	Children with severe bilateral reduced vision have not been included as these will be detected earlier.	I have found several children at screening that have moderately reduced vision and their school work has dramatically improved after glasses were issued. Unfortunately, probably have difficulty finding evidence.	

Dr Richard Oliver, Clinical Director, Orthoptic led eye Screening service in Sheffield wrote:

Email address: XXXXXXXXXXXXXXXXXXXX

Message:

Dear John, we have been running an orthoptic led eye screening service in Sheffield for 2-3 years now. This has been tied in to a joint service between secondary care and community optoms whereby refractive errors are sent to a trained community optom rather than the hospital. Cost effective, clinically effective and popular with the parents! Would more information help?

Organisation:	College of Optometrists (jointly with the Optical Confederation, Optometry Northern Ireland, Optometry Scotland, Optometry Wales and LOCSU)		
Name:	Bryony Pawinska	Email address:	XXXXXXXXXXXXXXXXXXXXXXXXXXXX
Section and / or page number	Text or issue to which comments relate	Comment	
		<i>Please use a new row for each comment and add extra rows as required.</i>	
General	General	This is a joint response from all the organisations representing optometry and optics in the UK. The College of Optometrists is the professional, scientific and examining body for optometry in the UK. The Optical Confederation acts for UK optical professionals, manufacturers, retailers, distributors and importers. It brings together: the Association of British Dispensing Opticians, the Association of Contact Lens Manufacturers, Association of Optometrists, Federation of Manufacturing Opticians, and the Federation of (Ophthalmic and Dispensing) Opticians. Optometry Northern Ireland represents all community optometrists, opticians and dispensing opticians across Northern Ireland. Optometry Scotland represents the views of the entire optometry sector of Optometrists, Dispensing Opticians and Optical Bodies Corporate to the Scottish Parliament, the Scottish Government Health Directorates and other relevant stakeholders. Optometry Wales represent all community optometrists, opticians and dispensing opticians across Wales. LOCSU provides quality, practical support to Local and	

		Regional Optical Committees (LOCs/ROCs) in England and Wales to help them to develop, negotiate and implement local objectives in respect of primary ophthalmic services. It is a key interface between the optical, representative bodies and the LOCs/ROCs, facilitating robust lines of communication between the national organisations and the grass roots of the professions.
General	General	In summary, our response makes two points: 1. The evidence review is not fit for purpose because it is incomplete. The NSC defines visual defects as including “amblyopia, refractive error and strabismus”¹ but the review only focuses on amblyopia. 2. Given the evidence that is included in the review, we suggest the NSC consider a change to their policy on children’s screening. We recommend that the policy be amended so that screening be “undertaken and led by competent professionals” rather than being solely “orthoptic-led”. Our response then flags up a technical error made in the review about how visual acuity is measured.
Introduction, page 3 Appraisal against NSC criteria, page 6	“Screening for reduced vision in children aged 4 – 5 years is primarily undertaken, as part of the NHS Healthy Child Programme, to detect individuals with amblyopia”. “Disorders other than amblyopia have not been considered specifically in this review for the following reasons: - significant bilateral visual impairment in otherwise healthy children would be expected to be detected before age 4 – 5 years due to the absence of normal visual behaviour / visual responsiveness/visual	It is not clear what the evidence review set out to evaluate. The opening line of the introduction to the expert review implies it will evaluate the evidence for “screening for reduced vision” (page three). The NSC policy on its website mentions screening for “poor vision”, “visual impairment” and “vision defects”. Only the term vision defects is properly defined: “vision defects include amblyopia, refractive error and strabismus”². If the NSC’s objective with the review was to systematically evaluate the evidence for “screening for reduced vision” where “vision defects include amblyopia, refractive error and strabismus”³ then it is incomplete.

	attention -many disorders causing significant vision impairment are associated with co-morbidity such that affected children would be under the care of health professionals by age 4 – 5 years(3;4) In addition, disorders associated with amblyopia, such as strabismus or refractive error, which are of sufficient severity as to negatively impact on visual development and require intervention, would be identified through the detection of the resultant amblyopia. Thus, the detection of childhood refractive error or strabismus in the absence of amblyopia has not been considered”.	The decision to exclude causes of reduced vision other than amblyopia results from two assumptions (page 6, left) that dictate the structure of the review, the evidence included and how that evidence is evaluated. Firstly, the review assumes that refractive error alone cannot be considered a visual impairment or sufficiently severe a cause of reduced vision to merit intervention unless it is associated with amblyopia. Secondly, it makes the assumption that children are unlikely to have undetected reduced vision from causes other than amblyopia at age 4-5 because parents, carers or clinicians would notice a bilateral visual impairment through the child’s behaviour and seek treatment. We question both those assumptions. Assuming that refractive error cannot be considered a source of reduced vision unless it is associated with amblyopia is at odds with internationally accepted definitions of visual impairment. The World Health Organisation amended its definition of visual impairment from a classification based upon “best corrected visual acuity” (typically meaning how clearly one can see wearing corrective lenses) to one using “presenting visual acuity”(how well someone can see given how they currently live, be that with or without corrective lenses). The WHO case for changing the definition noted that: <i>“Many recent studies have shown that the use of “best corrected” vision overlooks a large proportion of persons with visual impairment, including blindness, due to uncorrected refractive error, a common occurrence in many parts of the world. Uncorrected refractive error is now considered to be a major cause of visual impairment and estimations are under way to calculate the loss in terms of DALYs (disability-adjusted life years) resulting from this cause. The correction of refractive error is a cost effective</i>
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		<i>intervention and is one of the priorities under the disease control component of the Global Initiative for the Elimination of Avoidable Blindness (VISION 2020, the Right to Sight)</i>⁴. The International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD-10) Version for 2010 also classifies visual impairment using “presenting visual acuity”. Under these definitions, refractive error can be a cause of visual impairment if it is not diagnosed and corrected. Furthermore, the 2005 study by Robaei et al found that uncorrected refractive error (in particular astigmatism) was the biggest cause of reduced vision within a large population-based sample of children with amblyopia the next most common cause⁵. That a significant proportion of children who fail screening are likely to need corrective lenses due to refractive error is demonstrated by other studies^{6,7}. This assumption that refractive error is not a significant cause of reduced vision unless associated with amblyopia would be less material if the second assumption “that significant bilateral visual impairment in otherwise healthy children would be expected to be detected before age 4 – 5 years due to the absence of normal visual behaviour/visual responsiveness/visual attention” held true. However, it is our clinical experience that this is not the case and a significant number of children treated in paediatric eye health services present after age 4-5 with uncorrected refractive errors and significant bilateral impairments. Neither do we agree with the decision to exclude refractive error from the review based upon the assumption that only refractive error severe enough to manifest as amblyopia will
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		“negatively impact on visual development and require intervention”. This assumption is not adequately explained by the review of the evidence cited. On the contrary, the NSC website section <i>More about vision defects</i> states that “poor vision can impair learning and it is important that every child’s vision is checked when they are between 4 and 5 years old”⁸. Therefore the NSC seems to acknowledge that vision defects (which includes amblyopia but also strabismus and refractive error without amblyopia) can have a negative impact on educational and developmental outcomes. If these assumptions are flawed, then it follows that the case for screening for reduced vision has not been properly evaluated. Evidence relating to refractive error which is severe but is not associated with amblyopia has not been considered. Therefore the review is incomplete, not fit for purpose and may understate the case for screening.
Introduction, page 3	The current NSC policy, last reviewed in 2005, is that all children should be screened for reduced vision between 4 and 5 years of age, with testing undertaken by orthoptists (specialists in the assessment of vision in childhood) or by other professionals in an orthoptic-led service (i.e. trained and supported by orthoptists).	It is our view that the evidence presented in the review is not strong enough to support the policy that screening should be ‘orthoptic-led’. A policy based upon competencies rather than professional boundaries would be supported by the evidence, reflect developments in the general NHS and public health workforce and potentially improve programme delivery without presenting any clear risk to the quality or efficiency of screening. Profession-based service descriptors are inflexible and out of step with developments across the healthcare where competence-based service definitions are now the norm. We believe a competency-based policy would be easier to implement across the UK without any negative impact on outcomes. We recommend changing the policy to “all children should be screened for reduced vision between 4 and 5 years of age,

		with testing undertaken and led by competent professionals”.
Introduction, page 4	The gold standard scale for acuity in ophthalmic practice is now the LogMAR (Logarithmic Minimum Angle of Resolution) system, in which each ‘line’ of optotypes (symbols on vision chart comprising letters or pictures) corresponds to a unit of 0.1 and represents a 10 fold difference in acuity compared to the adjacent line;	This is a technical misunderstanding of how visual acuity is measured. Each line does not represent “a 10 fold difference in acuity compared to the adjacent line”. The progression between the lines is based on a logarithmic scale and the magnitude of the difference in the visual angle subtended at the eye of letters presented on adjacent lines is considerably less than 10.

1 Quote taken from <http://www.screening.nhs.uk/vision-child>, accessed on 30/7/13.

2 All quotes in this paragraph are taken from UK NSC policy on Vision defects screening in children, <http://www.screening.nhs.uk/vision-child>, accessed on 30/7/13.

3 Both quotes taken from <http://www.screening.nhs.uk/vision-child>, accessed on 30/7/13.

4 <http://www.who.int/blindness/Change%20the%20Definition%20of%20Blindness.pdf>

5 Robaei, D et al (2005) Visual Acuity and the Causes of Visual Loss in a Population-Based Sample of 6-Year-Old Australian Children, *Ophthalmology*, Volume 112, Issue 7, July 2005, Pages 1275-1282, <http://dx.doi.org/10.1016/j.ophtha.2005.01.052>

6 Donaldson, L. A. , Karas, M. P. , Charles, A. E. and Adams, G. G. W. (2002), Paediatric community vision screening with combined optometric and orthoptic care: a 64-month review. *Ophthalmic and Physiological Optics*, 22: 26–31. doi: 10.1046/j.1475-1313.2002.00001.x

7 Newman, D.K et al (1996) Preschool vision screening: outcome of children referred to the hospital eye service. *British Journal of Ophthalmology*, 80, 1077-1082.

8 Quote taken from <http://www.screening.nhs.uk/vision-child>, accessed on 30/7/13.