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Amblyopia treatment: an evidence-based approach to maximising treatment outcome

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The basis of treatment for amblyopia (poor vision due to abnormal visual experience early in life) for 250 years has been patching of the unaffected eye for extended times to ensure a period of use of the affected eye. Over the last decade randomised controlled treatment trials have provided some evidence on how to tailor amblyopia therapy more precisely to achieve the best visual outcome with the least negative impact on the patient and the family. This review highlights the expansion of knowledge regarding treatment for amblyopia and aims to provide optometrists with a summary of research evidence to enable them to better treat amblyopia.

Treatment for amblyopia is effective, as it reduces overall prevalence and severity of visual loss in this population. Correction of refractive error alone significantly improves visual acuity, sometimes to the point where further amblyopia treatment is not required. Atropine penalisation and patch occlusion are effective in treating amblyopia. Lesser amounts of occlusion or penalisation have been found to be just as effective as greater amounts. Recent evidence has highlighted that occlusion or penalisation in amblyopia treatment can create negative changes in behaviour in children and impact on family life. These complications should be considered when prescribing treatment because they can negatively affect compliance. Studies investigating the maximum age at which treatment of amblyopia can still be effective and the importance of near activities during occlusion are ongoing.

Key words: amblyopia, anisometropia, compliance, disability, natural history, prevalence, strabismus, treatment

Amblyopia (poor vision due to abnormal visual experience early in life) affects approximately three per cent of the population[1,2] and carries a projected lifetime risk of visual impairment to less than 6/12 visual acuity of 1.2 per cent.[3] This review aims to provide an update on recent research on treatment of amblyopia that may influence how optometrists employ evidence-based practice to treat amblyopia, where evidence-based medicine is defined as the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients. A fuller discussion of the prevalence, risk factors, natural history and disability associated with amblyopia can be found in other recent reviews.[4,5]

Amblyopia presents with varying levels of severity and usually affects one eye only, although the non-amblyopic eye often has an array of small but measurable deficits.[5] The reduced visual acuity results from an amblyogenic factor influencing post-natal neuro-development of vision. The most common amblyogenic factors are strabismus (causing disruption of binocular visual development), refractive error (particularly anisometropia or hyperopia) or, more rarely, media opacification causing reduction in image quality (such as congenital cataract). There may be a loss of connections or distortion or rearrangement of connections with the visual cortex.[6] The neuro-physiological adaptations

vary with the deficit because the compensation in the central nervous system is specific to the optical or motor problem that causes the amblyopia.[6]

Clinically, amblyopia is usually defined by two or more lines difference in visual acuity (VA) between the eyes,[7] without visible ocular or visual pathway pathology. Usually, it is classified according to the underlying aetiological condition (strabismic, anisometropic, mixed if both these conditions are present, or deprivation).

Initially, amblyopia is treated by correcting the underlying amblyogenic condition, followed by occlusion or penalisation of the dominant eye. This acts to enhance neurological processing of visual input from the amblyopic eye. Occlusion involves blocking all images from the better eye. Penalisation may take the form of image degradation by instillation of atropine drops, refractive blur or translucent patching of the better eye.

The prognosis for obtaining and maintaining essentially normal vision in an amblyopic eye depends on many factors, including the age of the patient at detection, the cause and severity of amblyopia, the presence of complicating factors, the duration of abnormal visual experience, compliance with treatment and the speed of tapering of treatment.

The aim of this review is to present recent research regarding the efficacy of treatment and its impact on the patient and strategies for maximising outcomes of treatment of amblyopia. In the treatment, risk factors that have been studied include patient age, aetiology, severity, fixation and binocular status. Treatment factors have included type and dose of treatment, compliance and treatment duration. The maximum age at which intervention will still be effective has not yet been determined.[8]

CAN AMBLYOPIA BE TREATED AND SHOULD IT BE TREATED?

When evaluating the effectiveness of a treatment, we should ask the following questions:

- Does intervention reduce later prevalence of the condition?
- Does intervention reduce severity of the condition?
- Would the condition have improved anyway without intervention?
- Does the treatment produce results that are better than those that would have occurred naturally?

These questions have been answered in favour of treatment in recent randomised controlled treatment trials,[9,10] which, together with reviews of patients who have not been compliant with treatment,[11–14] indicate that amblyopia does not spontaneously recover. Intervention is clearly required to maximise visual performance of the affected eye.

The most recent population studies of amblyopia suggest a prevalence of approximately three per cent in untreated childhood and current adult populations.[1,7,15,16] With detection and treatment of amblyogenic conditions before five years of age, the prevalence of clinically significant amblyopia reduces to around two per cent. With detection and treatment before three years of age, the prevalence of clinically significant amblyopia reduces to around one per cent.[15,16] These results suggest that early screening for and treatment of amblyogenic conditions reduce the prevalence of amblyopia in school-aged children and in the population as a whole.

HOW IS AMBLYOPIA TREATED?

Amblyopia is treated by correction of the underlying predisposing condition followed by a period of occlusion or penalisation of the dominant eye to promote normal visual experience for the amblyopic eye. Refractive correction is required for strabismic patients with accommodative esotropia and for patients with anisometropia. The results of randomised controlled treatment trials for various aspects of refractive correction and occlusion/penalisation therapy are now available.

Refractive correction

Correction of any underlying refractive error has long been established as critical in amblyopic treatment.[17] More recently, the extent to which correction of refractive error alone might reduce amblyopia has been specifically explored.[18–21] In the randomised controlled treatment trial of Clarke and colleagues[9] a significant improvement in VA was found during the 'spectacle adaptation' phase of the study. Visual acuity improved to the extent that nearly 30 per cent of participants were no longer classified as amblyopic (VA better than 6/9) after six weeks of spectacle wear. In their pilot study (n = 8), Moseley and associates[18] demonstrated that amblyopic visual performance improved significantly during a refractive correction pre-occlusion treatment phase, whereas further gains seen during occlusion were not sustained. Stewart and co-workers[19] showed that correction of refractive error alone in newly diagnosed amblyopic children (n = 65; mean age 5.1 years) for a period of 18 weeks resulted in significant improvement in amblyopic visual acuity (mean improvement of 0.24 logMAR). This improvement did not significantly differ as a function of amblyopia type or age of the patient.[19] From these studies we can conclude that refractive adaptation is a distinct component of the treatment of amblyopia and that the beneficial effects of refractive adaptation need to be fully identified.

Recently, the Pediatric Eye Disease Investigator Group[22] (PEDIG) reported the results of its prospective study of the treatment of anisometropic amblyopia in children aged three to seven years with spectacle correction alone. Spectacles were prescribed based on a cycloplegic refraction using cyclopentolate 1%. Anisometropia, astigmatism and myopia were fully corrected. Hyperopia greater than 3.00 D spherical equivalent was either fully-corrected or symmetrically undercorrected by not more than +1.50 D in both eyes. Hyperopia less than 3.00 D was corrected at the investigator's discretion. The authors concluded that refractive correction alone improves VA in many cases and results in resolution of amblyopia in at least one third of three- to seven-year-old children with previously untreated anisometropic amblyopia. The average three-line improvement in VA found in their group supports the suggestion that

initial treatment with spectacles may lessen the requirement for subsequent penalisation or occlusive therapy for those with denser levels of amblyopia.[22]

Prescribing the spectacle correction from the cycloplegic refraction varied between studies, however, in general, anisometropia, astigmatism, myopia and hyperopia less than 3.00 D were fully corrected and higher hyperopia may have been symmetrically under-corrected by up to +2.00 D in both eyes.[19,22]

The implication for clinical practice is that after a period of spectacle wear alone, there can be a significant improvement in amblyopic visual acuity. In some cases moving on to patching or penalisation therapy may no longer be necessary or a child may start occlusion with better visual acuity in the amblyopic eye, possibly enhancing compliance with amblyopia therapy.[23]

Correction of abnormal ocular alignment or opacity

It has been conservatively estimated that 17 per cent of patients with amblyopia will undergo strabismus surgery, 1.5 per cent require cataract extraction and 1.5 per cent require ptosis surgery.[24] In a population-based cross sectional study, the Sydney Paediatric Eye Study[25] described *prevalence* of strabismus and associated factors in a representative sample of six-year-old Australian children (n = 1,739). Strabismus was diagnosed in 48 children (2.8 per cent of the population), five of whom had previously undergone surgical correction; 26 children (54 per cent) had esotropia, 14 (29 per cent) had exotropia, seven (15 per cent) had microstrabismus and one child had VIth cranial nerve palsy. Prematurity was associated with a five-fold increase in the risk of esotropia. Visual impairment was significantly more common in children with (22.9 per cent) than without (1.3 per cent) strabismus ($p < 0.0001$). The presence of strabismus was significantly associated with hyperopia, astigmatism, anisometropia and *amblyopia* ($p < 0.0001$).[25]

A study[24] that investigated costs associated with amblyopia estimated from case reports and anecdotal experience that approximately 60 to 75 per cent of strabismic amblyopes are accommodative, with 60 per cent of accommodative esotropes being not fully-correctable with spectacles and requiring surgery for ocular alignment. The subgroup of strabismus patients with amblyopia who will undergo alignment surgery was estimated to be between 48 and 62 per cent of all amblyopic patients who have strabismus.

Occlusion and penalisation

The mainstay of treatment of amblyopia for the last 250 years has been occlusion of the better eye by an opaque patch, however, therapeutic regimens have lacked standardisation, with the length of patching ranging from a few minutes a day to all waking hours and in some cases treatment may last many months. Recent studies[26] that have investigated the relative merits of occlusion and atropine penalisation have commented on the considerable variation in treatment practices with regard to the number of hours of patching prescribed. While the number of hours prescribed had no relationship to patient age, it was found to be related to the acuity in the amblyopic eye (that is, depth of amblyopia). On average, optometrists prescribed fewer hours of patching than ophthalmologists.[26]

Recent randomised controlled clinical trials have aimed to evaluate different treatment modalities for different levels of amblyopia. Trials of occlusive treatment by PEDIG have concluded that both atropine penalisation and patch occlusion are effective treatments for moderate amblyopia in children aged three to seven years,[27] that when patching is prescribed, two hours of daily patching is as effective as six hours for moderate amblyopia (VA 6/12 to 6/30); and that for severe amblyopia (VA 6/30 to 6/120), six hours of daily patching is just as effective as full-time patching.[28] Weekend atropine provides an improvement in VA of a magnitude similar to that of the improvement provided by daily atropine in treating moderate amblyopia in children three to seven years old.[29]

While atropine penalisation may appear an attractive alternative to patching due to forced compliance once the drug is instilled and better cosmetic acceptance, atropine does have systemic side-effects, including dry mouth, palpitations, psychosis, photophobia, ocular pain, headache and lowered seizure threshold. In the PEDIG study that compared atropine and patching in children with moderate amblyopia, an ocular adverse effect was reported at least once in 26 per cent of patients, most commonly light sensitivity (18 per cent), lid or conjunctival irritation (four per cent) and ocular pain or headache (two per cent). Facial flushing was reported for two of 194 patients using atropine (one per cent).[27] Advice regarding side-effects and how to compensate for them is essential when prescribing this treatment. For example, advice regarding minimising photophobia and UV exposure through the use of sunglasses and wearing a hat should be part of patient education with this treatment modality.

The costs and benefits of atropine penalisation versus patch occlusion[30] are summarised in Table 1.

When prescribing a regimen of occlusion, it is important to remember that the wearing schedule prescribed by the clinician may not be equal to the actual dose of patching undertaken by the patient. When occlusion is objectively (electronically) monitored, the overall compliance with prescribed patching treatment has been found to be 48 per cent, with considerable variation within and between participants.[23] When six hours of patching per day was prescribed, on average the patient actually received a 'dose' of 2.8 hours, with only 14 per cent of families actually patching to within 30 minutes of the time prescribed.[23]

From these occlusion-monitored studies, dose-response functions have been derived based on how much patching the patient actually received and the initial and final visual acuity levels. From these dose response functions, the relationship between visual acuity and treatment dose has been found to be monotonic, with 82 per cent of the improvement in VA being achieved by six weeks of patching, with some further improvement up to 12 weeks. Dose rates of two to six hours per

	Patching	Atropine
Cosmetic impact on patient	Obtrusive	Unobtrusive
Reversibility	Immediate	Effects last up to two weeks
Local side-effects	Irritation and allergy if use adhesive patch	Light sensitivity and allergy, photophobia (possible increased UV exposure)
Systemic side-effects	None	Rare but dangerous (possibly more common in trisomy 21): dry skin and mouth, tachycardia, fever, flushing, irritability, lowers seizure threshold
Compliance	Easy for child to remove	Compliance is assured once drop is instilled
Binocularity	Impaired during treatment	Peripheral binocularity allowed
State of child distress while treated	Could be high	Rarely more than very low

Table 1. Comparison between atropine and patching treatments for amblyopia. Adapted from Holmes and Clarke 2006[30]

day resulted in the same final outcomes, although those with a high dose achieved a successful outcome more rapidly.[23]

CAN WE TREAT OLDER PATIENTS?

While randomised controlled treatment trials have shown occlusion and penalisation therapy to be successful in treating amblyopia in children younger than seven years, the question of the upper age limit for successfully treating amblyopia has not been fully addressed. Accepted clinical practice has dictated that treatment of amblyopia is effective only within the 'critical period' of visual development, usually defined as up to about eight years of age, and indeed, the younger the child is when treatment commences, the more rapid the response to treatment and the better the visual outcome. In an earlier study on strabismic amblyopia, the rate of improvement in those treated with full-time occlusion fell steadily from more than 90 per cent at age 28 to 33 months to near zero when therapy was initiated at age 12 years.[31]

These historical beliefs have been brought into question by studies that confirm that older patients with amblyopia can be successfully treated[32] and by psychophysical studies that have demonstrated improvements in various visual functions in adult amblyopic subjects. Individual patients may achieve improved visual acuity after the age of 10 years, with reports of improvement with treatment or after loss of the non-amblyopic eye even into adulthood.[33]

Following a pilot study of treatment in children aged 10 to 18 years, which indicated that visual acuity can be improved in older children and adolescents,[8] PEDIG[34] reported a randomised trial to evaluate the effectiveness of treatment of amblyopia in older children. The results demonstrated that amblyopia improves with optical correction alone in about one-quarter of patients aged seven to 17 years, although most patients who were initially treated with optical correction alone still required additional treatment for amblyopia.[34] A follow-up study of this group of patients is underway to evaluate the extent to which these improvements in acuity are sustained.

DO SPECIFIC ACTIVITIES DURING PART-TIME PATCHING HELP?

The issue of whether patients should perform specific visual activities while undergoing occlusive treatment is under debate. In its pilot study PEDIG found an average of one logMAR line extra improvement when patients performed near versus non-near activities during occlusion or penalisation,[35] however, the benefits of active versus passive therapy during occlusion are yet to be confirmed by a larger scale randomised controlled treatment trial. An earlier observational study suggested that binocular performance is significantly better when vision therapy is included in the treatment regimen[36] and preliminary results of binocular computer-based visual activity have demonstrated significant improvements in VA in previously non-compliant patients after short sessions of intensive activity.[37] Again, these findings are yet to be confirmed by randomised controlled trials.

In adults, preliminary studies have indicated that the use of video display treatment and biofeedback can achieve improvements in amblyopic visual acuity, however, nearly all of the improvement in visual acuity achieved with treatment appears to regress, if patients are followed over an 18-month period.[5]

ARE TREATMENT OUTCOMES SUSTAINED?

Numerous studies have examined the visual acuity outcomes that can be achieved with treatment for amblyopia,[9,38–42] however, there is the possibility that visual acuity may regress after treatment is completed. A recent prospective study, which monitored the level of visual acuity following the finalisation of treatment, concluded that approximately one-quarter of successfully treated amblyopic children experience a reduction in visual acuity within the first year after treatment.[43] This recurrence rate was similar among patients who had previously been treated by

patching and those who had been treated by penalisation with atropine and occurred more frequently during the first 13 weeks following commencement of treatment. Other studies[44,45] have shown that about two-thirds of both strabismic and anisometropic amblyopes maintain or even improve visual acuity more than four years after treatment finished, however, anisometropia of greater than 1.5 dioptres appears to be a risk factor for regression.[46] The implication for clinical practice is that patients should be monitored for at least 12 months following the completion of occlusion or penalisation treatment. Further randomised clinical trials are needed to investigate the long-term risk of recurrence of amblyopia.

The quality of binocular vision can be used as an outcome indicator. In a retrospective study of the outcomes of occlusive therapy, stereopsis was found to improve linearly with improved amblyopic visual acuity irrespective of the cause of the amblyopia.[47] In comparison, in a large-scale study of adults with amblyopia or with a history of risk factors for amblyopia, 90 per cent of those who were believed to have had disruption of binocular vision during early visual development (that is, those with a history of strabismus) failed tests of binocular function, even if visual acuity was within normal limits. By comparison, 64 per cent of adults with anisometropia and 35 per cent of amblyopes with anisometropia passed these binocular tests.[38]

HOW DOES TREATMENT IMPACT ON THE PATIENT?

Emotional impact of treatment

Many parents of children undergoing occlusion for amblyopia, even for relatively short periods, report distress or an increase in conflict at home. Most parents associated occlusion with a reduction in confidence seen in their child due to poor vision under occlusive conditions.[48] While not all parents report that their children's activities are affected, the degree of compliance with treatment and observations of changes in patterns of behaviour have been found to differ depending on the level of amblyopia.[49]

No evidence of significant developmental delay or increased behavioural problems was found in a case-controlled study of patients with congenital monocular cataract, who had extensive patching for a significant percentage of their early childhood years. In this study, the sample size was limited and the use of siblings for the control group introduced the possibility of parental bias in their subjective assessment of the two children.[50] A recent study, using semi-structured interviews with amblyopic children and their parents, reported that dealing with the stigma and the perceptions and responses of peers was of central significance to the experience of amblyopic therapy and that this had adverse consequences for some children's identity and psychosocial well-being.[51]

In a study that recorded carer's perception of stress and psychosocial well-being of the child prior to and following commencement of treatment, carers of children undergoing occlusive therapy did not experience significantly more stress or perceive their children as exhibiting less psychosocial well-being than the non-occluded group. In addition, within the occluded group, carers' stress levels and children's psychosocial well-being did not significantly change following onset of occlusion.[52] Similarly, the PEDIG group found that both patch occlusion and atropine penalisation were well tolerated by the child and family, although treatment impact scores were consistently worse in the occlusion group compared with the atropine group.[53]

Recent randomised controlled studies confirm that treatment of amblyopia creates negative changes in behaviour in many children and has an impact on family life.[54] These changes appear to be more profound in children with a greater level of amblyopia. Whether this is due to greater visual impairment under penalised conditions or due to a longer duration of penalisation has not been established.

While the levels of distress and difficulty reported by parents in these more recent studies were low,[54] the behaviour of the children under penalisation conditions influences compliance with treatment. The degree of compliance and observations of changes in patterns of behaviour differ depending on the level of amblyopia,[49] which raises the possibility that the efficacy of treatment could be reduced by poor compliance in those children with the greatest need.

Functional impact of treatment

While often cited as the reason for poor compliance with occlusion or penalisation, the ability to perform everyday tasks under monocular conditions with reduced visual acuity has not been documented in children with amblyopia. Studies that have investigated performance on fine motor tasks under monocular versus binocular conditions suggest that performance would be impaired by the occlusion or penalisation phase of treatment due to loss of residual binocular vision.[55] It is likely that if amblyopic acuity is less than 6/12, functional tasks would be further impaired when the better eye is occluded. There is a lack of studies specifically investigating functional disability in areas of importance to children of the age most likely to be treated for amblyopia.

Future studies need to identify the disability imposed by amblyopic treatment, especially performance under impaired monocular conditions imposed by occlusion or atropine penalisation. Also, once children have completed treatment they may still have some anomaly of visual function, such as reduced stereopsis, abnormal accommodation or poor ocular-motor function. The impact of these binocular visual anomalies on tasks important to children warrants further investigation.

HOW CAN WE MAXIMISE COMPLIANCE WITH TREATMENT?

Compliance with occlusive therapy is essential for optimal outcome and has been the subject of numerous studies.[56–59] The level of compliance is negatively influenced by patient age,[57,58] social deprivation,[14,59] level of visual acuity,[58] parental understanding of the condition and

treatment[60] as well as by the financial and emotional cost to patient and family.[53,54,61] Strategies used to enforce wearing a patch include encouraging, ordering, pleading, threatening, bribery, in-hospital administration, arm restraint by use of plaster cast and eye lid suturing.[56,62] Beardsall, Clarke and Mill[63] found that most parents of children with amblyopia are highly motivated to undertake the recommended treatment after becoming aware of the reduced visual acuity at the initial vision examination. As non-compliance with treatment sometimes delays effective treatment, Beardsall, Clarke and Mill[63] suggest an occlusion protocol aimed at giving maximum support for parents in the early stages of treatment.

The suggestion of providing support for parents of children undergoing treatment for amblyopia was endorsed by Searle and associates,[61] who found parental compliance improved if they believed treatment was producing positive results and decreased if there was perceived restriction of the children's activities by patching. Similarly, it has been suggested that increased parental awareness of the rationale and urgency of occlusive treatment, with reinforcement of details of the regimen, would help to reduce non-compliance.[60] This has been tested in a randomised controlled trial of written information, which concluded that a large proportion of patients would benefit by increasing parental knowledge in key areas, such as the critical period, importance of occlusion and potential negative consequences of not treating amblyopia.[64]

When designing a treatment plan for the patient with amblyopia, the clinician needs to weigh the evidence regarding optimal visual acuity outcomes in a plan that maximises compliance. For example, part-time patching in a school-aged child has specific benefits over any other treatment. Part-time patching can be done at home rather than in public or at school and could be combined with homework, or computer or video games as the near activity. Atropine potentially affects schoolwork and full-time patching has potential social and educational complications, particularly if the acuity in the amblyopic eye is very poor (less than 6/12). Specific advice regarding the number of hours of patching is necessary as well as a specific schedule for review.

SUMMARY

Recent randomised controlled trials of early screening and treatment of amblyopia have provided evidence regarding the natural history of amblyopia and efficacy of treatment. These studies indicate that, when detected, amblyopia should be treated because of the reduced prevalence of amblyopia and better final visual acuity in the amblyopic eye. Spectacle wear before commencement of occlusion or penalisation may have significant benefits for the child, such as starting occlusion or penalisation with better visual acuity, and in some cases patching may be unnecessary. Dose-response functions derived during monitored studies of occlusion indicate that the majority of VA improvement occurs in the first six weeks of occlusion and higher dose rates of occlusion may achieve successful VA outcomes more rapidly than lower dose rates. Occlusion or penalisation in amblyopia treatment can create negative changes in behaviour in children and have an impact on family life, more so in children with greater levels of amblyopia. As a child's behaviour can influence compliance, it is essential to address this issue with the patient and the carer supervising the treatment.

The PEDIG studies have provided clinicians with more distinct guidelines with respect to the 'how' and 'when' of occlusion and penalisation therapy in amblyopia. Randomised treatment trials in child and adolescent age groups (older than that traditionally considered the sensitive period within which treatment is effective) are ongoing. Similarly, the outcome of ongoing randomised trials examining the influence of near activity during patching will provide guidance regarding whether 'active' or 'passive' patching provides optimal VA outcomes. The importance of parental education and support to maximise compliance with treatment has now been established and should be part of the treatment plan.[64]

Evidence-based treatment plans for amblyopia secondary to anisometropia, strabismus or both can be derived from the randomised trials and observational studies discussed. Considerations for treatment regimens include:

1. Prescribe refractive correction as first course of treatment.
2. Wear spectacles full-time and monitor visual acuity until VA is stable.
3. If patching treatment is used, start with the dose appropriate for the level of VA deficit (for example, six hours per day for amblyopia greater than 6/12; two hours per day for amblyopia less than 6/12) and monitor visual acuity every six to 12 weeks. Consider patient age and other activities (for example, school) when planning patching routine.
4. If atropine treatment is given, start with twice-weekly dose and monitor visual acuity every six to 12 weeks. Be aware of systemic and ocular side-effects.
5. Taper treatment with occlusion or penalisation once VA plateau is reached for less recurrence.
6. Concentrated task activity during occlusive therapy may improve treatment outcome.
7. Consider treating patients older than traditionally considered critical period, particularly if patient is motivated and likely to be compliant.
8. Specific attention should be given to patient and carer education regarding treatment to improve compliance and therefore improve outcomes. Be aware that the dose of occlusion achieved is likely to be less than the dose prescribed.
9. Monitor for recurrence of amblyopia for at least 12 months after occlusive or penalisation therapy is complete.
10. If improvement stops and VA deficit remains, consider increasing treatment or switching treatment. Check compliance with treatment prescribed. Confirm that there are no other conditions limiting visual potential (that is, if eccentric fixation is present, patient may not be using fovea and the best VA may be limited

by the resolution at the peripheral fixation point).

Investigations in various aspects of amblyopia are ongoing and will continue to add to the body of evidence on which the optometrist can draw when formulating evidence-based treatment plans.

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