



Kansas City

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Orthoptic Training for the Treatment of Vision or Learning Disabilities

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Origination: 12/2011

Last Review: 3/2014

Next Review: 3/2015

Policy

Blue Cross and Blue Shield of Kansas City (Blue KC) will provide coverage for orthoptic training when it is determined to be medically necessary because the criteria shown below are met.

Note: Orthoptic training may be excluded in some contracts. Verify benefits prior to review of Medical Necessity.

When Policy Topic is covered

Office-based vergence/accommodative therapy may be considered **medically necessary** for patients with symptomatic convergence insufficiency if, following a minimum of 12-weeks of home-based therapy (e.g., push-up exercises using an accommodative target; push-up exercises with additional base-out prisms; jump to near convergence exercises; stereogram convergence exercises; recession from a target; and maintaining convergence for 30-40 seconds), symptoms have failed to improve.

When Policy Topic is not covered

Orthoptic eye exercises are considered **not medically necessary** for the treatment of learning disabilities.

Orthoptic eye exercises are **investigational** for all other conditions, including but not limited to the following:

- Slow reading
- Visual disorders other than convergence insufficiency

Considerations

This policy addresses office-based orthoptic training. This policy does not address standard vision therapy with lenses, prisms, filters or occlusion (i.e., for treatment of amblyopia or acquired esotropia prior to surgical intervention).

Up to 12 sessions of office-based vergence/accommodative therapy, typically performed once per week, has been shown to improve symptomatic convergence insufficiency (CI) in children aged 9 to 17 years. If patients remain symptomatic after 12 sessions of orthoptic training, alternative interventions should be considered.

A diagnosis of convergence insufficiency is based on asthenopic symptoms (sensations of visual or ocular discomfort) at near point combined with difficulty sustaining convergence.

Convergence insufficiency and stereoacuity is documented by:

- Exodeviation at near at least 4 prism diopters greater than at far; AND
- Insufficient positive fusional vergence at near (PFV < 15 prism diopters blur or break) on PFV testing using a prism bar; AND
- Near point of convergence (NPC) break of > 6 cm; AND

- Appreciation by the patient of at least 500 seconds of arc on stereoacuity testing.

Description of Procedure or Service

Orthoptic training is a technique of eye exercises intended to improve eye movements and/or visual tracking. In addition to its use in the treatment of convergence insufficiency (CI), orthoptic training has been investigated for treatment of attention deficient disorders, dyslexia, dysphasia, and reading disorders.

Background

Convergence insufficiency (CI) is a binocular vision disorder in the ability for the eyes to turn inward towards each other (e.g., when looking at near objects). Symptoms of this common condition may include eyestrain, headaches, blurred vision, diplopia, sleepiness, difficulty concentrating, movement of print, and loss of comprehension after short periods of reading or performing close activities. Prism reading glasses, home therapy with pencil push-ups, and office-based vision therapy and orthoptics have been evaluated for the treatment of convergence insufficiency.

Some learning disabilities, particularly those in which reading is impaired, have been associated with deficits in eye movements and/or visual tracking. For example, many dyslexic persons may have unstable binocular vision and report that letters may appear to move around, causing visual confusion.

Orthoptic training is a technique of eye exercises intended to improve eye movements and/or visual tracking. Orthoptic training is being investigated for the treatment of attention deficient disorders, dyslexia, dysphasia, and reading disorders. Also known as vision therapy or ocular pursuit, the treatment may include the use of training glasses, prism glasses, or tinted or colored lenses.

Rationale

This policy was originally based on a 1996 TEC Assessment, (1) which offered the following observations and conclusions:

If visual problems have a causal relationship to reading disorders, then it would follow that successful treatment of such visual anomalies might result in an improvement in reading. However, if visual anomalies are the result of a central processing deficit, orthoptic training would not be effective and might possibly be harmful. For example, atypical eye movements might be a compensatory response among persons with reading disorders to obtain sensory information in a manner that they can process. Finally, if eye movement anomalies are uncorrelated to reading disorders, then the presence of a reading disorder would not be an indication for orthoptic intervention.

Three scientific issues must be addressed in the evaluation of orthoptic training: 1) whether available evidence supports the proposition that visual defects have a role in the development or maintenance of reading disorders; 2) whether orthoptics alters the identified visual defects; and most importantly, 3) whether treating the visual defects results in improved reading comprehension. The TEC Assessment concluded that the evidence available at that time did not support the conclusion that orthoptic training improves reading comprehension. (2-5) Specifically, the study populations in the available published reports were not well-defined, and while the subjects were reported to be "poor readers," it could not be determined whether they had a verifiable diagnosis of a reading disorder. In addition, objective outcomes of reading comprehension were lacking in the published studies.

Updated Literature Reviews

Since the 1996 TEC Assessment, updated literature searches using the MEDLINE database have been performed on a periodic basis, the most recent through December 4, 2013.

Following is a summary of key literature to date.

Convergence Insufficiency

Systematic Reviews. At least two systematic reviews have been completed on this topic. A 2005 systematic review of the applicability and efficacy of eye exercises found that small controlled trials and a large number of cases support their use in the treatment of convergence insufficiency (CI). (6)

A 2011 Cochrane review by Scheiman and colleagues evaluated the evidence on non-surgical interventions for convergence insufficiency in 2011. (7) Six trials (3 in children and 3 in adults) with a total of 475 participants were included in the review, which searched the literature through October 2010. The 3 trials in children (described below) and 1 of the trials in adults were conducted by the multicenter Convergence Insufficiency Treatment Trial (CITT) study group. (The lead author of this Cochrane review is also the Principal Investigator of the 4 CITT trials.) Scheiman and colleagues concluded that current research suggests that outpatient vision therapy/orthoptics is more effective than home-based pencil push-ups or home-based computer vision therapy/orthoptics for children. In the adult population, evidence of the effectiveness of various non-surgical interventions is less consistent. A number of gaps in current knowledge, including whether different therapy combinations or durations of therapy might be more effective, were identified in this systematic review.

Randomized Controlled Trials. In 2008, the CITT study group reported a randomized controlled trial (RCT) of 221 children (9 to 17 years of age) with symptomatic CI. (8) The children were randomly assigned to 1 of 4 treatment conditions: home-based pencil push-ups; home-based computer vergence/accommodative therapy and pencil push-ups; weekly office-based vergence/accommodative therapy with home exercises; or weekly office-based placebo exercises with home reinforcement of the placebo exercises. Blinded evaluation following 12 weeks of treatment (99% completion rate) showed successful (<16 on the Convergence Insufficiency Symptom Survey [CISS], with a normal near point of convergence [NPC] and normal positive fusional vergence [PFV]) or improved outcomes (10 or more points on the CISS and at least a normal NPC, or improvement in NPC of more than 4 cm, normal PFV or an increase in PFV of more than 10 prism diopters) for 73% of patients treated with office-based therapy, 43% with home pencil push-ups, 33% with home computer exercises, and 35% of patients in the placebo-control group. For office-based orthoptic training, the average CISS improved from 30 at baseline to 15 at the final assessment, which was significantly better than the other 3 groups. The group practicing pencil push-ups at home improved from an average CISS score of 28 to 21 at 12 weeks; similar scores were obtained for the home computer exercise group (from 32 to 25) and the office-based placebo group (from 30 to 22). At completion of the 12-week treatment programs, patients were classified as either asymptomatic (CISS <16) or symptomatic. Symptomatic patients were offered alternative treatment at no cost. Asymptomatic patients were assigned to home maintenance therapy for 15 min per week for the initial 6 months after treatment. At 1-year follow-up, 88% of the 32 children who were asymptomatic at the completion of the 12-week office-based treatment program remained successful or improved; 67% of the home-based pencil push-up group remained successful or improved. (9) A limitation of this RCT is that near-point exercises generally consist of more than pencil push-ups (e.g., push-up exercises with or without base-out prisms; jump-to-near-convergence exercises, stereogram convergence exercises; recession from a target; and maintaining convergence for 30 to 40 seconds).

Subsequent to the publication of the main results of the CITT trial, a number of re-analyses have been performed. The effectiveness of these forms of vision therapy (pencil push-ups, home computer exercises, and office-based vision therapy) in improving accommodative amplitude in 164 of the children (74% of 221) who had co-existing accommodative dysfunction with convergence insufficiency was reported by the CITT study group in 2011. (10) Of the 164 children with accommodative dysfunction, 63 (29%) had a decreased amplitude of accommodation, 43 (19%) had decreased accommodative facility (latency and speed of the accommodative response), and 58 (26%) had both. After 12 weeks of treatment, increases in amplitude of accommodation were significantly greater in the 3 active groups (range of 5.8 to 9.9 D) compared to office-based placebo therapy (2.2 D). The percentage of children who no longer showed decreased amplitude of accommodation was 91.4% for office-based therapy, 79.3% for home computer therapy, 74.1% for home pencil push-ups, and 35.7% for placebo treatment. Accommodative facility improved by 9.4 cycles per minute (cpm) for office-based therapy, 7.0 cpm for home computer-based therapy, 5.0 cpm for home pencil push-ups, and 5.5 cpm

for office-based placebo therapy; only the office-based therapy was significantly greater than in the office-based placebo therapy group. One year after completion of therapy, decreased accommodative amplitude recurred in 11% of 44 children, and accommodative facility recurred in 12.5% of 32 children who did not undergo subsequent treatment.

The effect of successful treatment of CI on parent's perception of academic behavior in the 218 children who completed this study was also reported by the CITT group. (11) Participants were classified as successful (n=42), improved (n=60), or non-responder (n=116) after 12 weeks of treatment. This study used the Academic Behavior Survey (ABS), a 6-item survey developed by the CITT study group that quantifies parents' perceptions of the frequency of adverse behaviors exhibited by their children when reading or performing school work (5 questions) and overall parental concern about the child's academic performance (1 question). The mean ABS score at baseline was 12.85 out of a total possible of 24 points and improved by 4.0, 2.9, and 1.3 points in children classified as successful, improved, and non-responder, respectively. The improvement in the ABS score was correlated with reduction in symptom level ($r=0.29$), but not to changes in measures of convergence. Although the ABS has not been validated outside of this study, the effect sizes in the successful and improved groups were 0.9 and 0.7, representing a clinically meaningful change.

In 2012, the CITT group reported findings from a post-hoc analysis of this RCT related to the effect of CI treatment on specific types of symptoms attributable to CI. (12) The overall CISS scale was divided into two subscales: a performance-related subscale consisting of 6 symptoms related to visual efficiency when reading or performing near work, such as loss of place with reading, and the eye-related subscale consisting of 9 symptoms specific to visual function or asthenopic-type complaints, such as eye pain. Each subscale was reported as an average of the items in its category, with a range of values from 0-4. Subjects were grouped into those with or without a "treatment response", defined as an improvement of at least 8 points in their CISS scale. At baseline, scores on the overall CISS scale and the performance-related subscale were statistically significantly higher for children with parent-reported attention deficit hyperactivity disorder (ADHD) than for those without parent-reported ADHD (34.1 vs. 29.5 for the overall CISS scale; 2.8 vs. 2.2 for the performance related subscale). Those with a "treatment response" on the overall CISS score demonstrated improvements in both the performance-related subscale and the eye-related subscale of a mean 1.1 points. Further research is needed into whether the treatment-related improvement in performance-related symptoms seen with orthoptics training translates into improvements in reading performance and attention.

In 2009, investigators from the CITT group published a review of their 3 RCTs (including the 2008 trial described above) and resulting evidence-based guidelines for the treatment of children with symptomatic CI. (13) Discussed was a 2005 RCT with 72 children that compared base-in prism glasses or placebo reading glasses for all reading and near tasks. (14) Base-in prism glasses were found to be no more effective in alleviating symptoms, improving the NPC, or improving PFV at near than placebo reading glasses. Another RCT from the CITT group compared a 12-week program of home-based pencil push-ups with office-based vision therapy/orthoptics or office-based placebo therapy in 47 children. (15) Pencil push-ups, performed 15 minutes a day, 5 days a week, did not improve symptoms or signs associated with CI in this small study. Office-based vision therapy (sessions once a week for 12 weeks), supplemented by home exercises, was more effective than home-based pencil push-ups or office-based placebo therapy in reducing symptoms and improving signs of CI in children. The third trial (221 children, discussed above) also found a significant benefit of office-based vision therapy compared to pencil push-ups, home computer exercise, or office-based placebo therapy, although some benefit of pencil push-ups was observed. (8) The review concluded that use of base-in prism reading glasses is not supported by the results of the RCT, and although evidence does support office-based vision therapy as first-line treatment, home-based therapy has both greater availability and lower cost than office-based therapy. Therefore, these investigators recommended the use of home-based computer software plus pencil push-ups because this treatment approach was more effective than pencil push-ups alone in improving PFV, is more engaging for the child, and provides an automated, stepwise treatment approach. Monitoring of compliance was recommended.

Non-randomized, Comparative Studies. Shin et al. reported a non-randomized comparative study of office-based vision therapy in 2011. (16) Fifty-seven children with symptomatic CI, or combined CI and accommodative insufficiency, were divided into a treatment and untreated control group, matched by age and gender. Vision therapy was performed in the school clinic 2 times per week with instructions for home exercises to be performed for 15-25 minutes a day during the week. After 12 weeks of office-based vision therapy, the mean COVD-QOL [College of Optometrists in Vision Development – Quality of Life] symptom score decreased from 27.07 to 10.40 and the near point of convergence (NPC) improved from 8.67 to 3.20 in the children with CI. The mean positive fusional vergence (PFV) improved from 13.93 to 26.80. Sixty-seven percent of the children were considered to have been cured and 82% were improved. There were no significant changes between baseline and 12-week follow-up for the control group. Of the 20 children in the treatment group who completed a 1-year follow-up, 3 (15%) showed recurrence.

In 2011, Dusek et al. reported a non-randomized comparative study of 134 children with CI who had been referred to a tertiary care center in Austria for reading difficulties. (17) Thirty-two participants refused all treatment offered (control group), and the remaining children were given either base-in prism reading glasses (n=51) or computerized home vision therapy (n=51) based on preference. Parents were instructed to ensure that their child was carrying out the procedure correctly; compliance was verified on a weekly basis. All participants were examined for total reading time, reading error score, amplitude of accommodation, and binocular accommodative facility at baseline and after 4 weeks. Prismatic reading glasses were not worn during testing. Significant improvements were found in the prism glasses and computer exercise groups for total reading time, reading error score, amplitude of accommodation, binocular accommodative facility, and vergence facility. For example, reading speed improved by 21 seconds in the reading glasses group, 12 seconds in the computer exercise group, and 4 seconds in the control group. The mean amplitude of accommodation improved by 1.4 D in the reading glasses group, 1.0 D in the computer exercise group, and 0.3 D in the control group. The only significant improvement for the control group was vergence facility. Although this non-randomized study is limited by the potential for selection and performance bias, the results suggest that base-in prism reading glasses may be an effective treatment for CI and associated reading problems in children. Randomized placebo-controlled trials are needed to fully evaluate this treatment option.

In 2013, Borsting et al. published results from a single-arm, multicenter, study, the Convergence Insufficiency Treatment Trial–Reading Study. (18) Investigators evaluated parent-reported behavioral and emotional problems at baseline among 53 children with symptomatic convergence insufficiency and changes in parent-reported behavioral and emotional problems after 16 weeks of office-based vergence accommodative therapy. The intervention was consistent with that administered in the CITT trial. Parent-reported ADHD symptoms were assessed with the Connors 3 ADHD index and behavioral/emotional symptoms with the 120-item Child Behavior Checklist (divided into 3 competency-related subscales and 8 symptoms-related subscales). Of the 53 children enrolled, 48 consented to office-based therapy and 44 completed therapy and provided post-treatment data. After completion of therapy, the authors found a significant within-subject improvement in CISS scores and in scores on the Connors 3 ADHD index (effect size $d=0.58$, significantly different from zero). The subjects also demonstrated statistically significant improvements in the Child Behavior Checklist competency-related subscale related to school performance but not to social- or activities-related performance. On the symptom-related subscales, there were statistically significant improvements in the anxious/depressed, somatic complaints and internalizing problems scales. This study provides some evidence that ADHD-like and emotional/behavior problems may improve among children with symptomatic CI after office-based vision therapies. However, the study's small size and lack of a control group are substantial limitations that preclude making definitive conclusions about the efficacy of this treatment.

Learning Disabilities

Two studies were published in 2000 and 2001 that focused on the use of tinted lenses and eye patching as a technique to steady binocular vision as a therapy for dyslexia. Stein and colleagues reported results of a randomized trial in which 143 dyslexic children were instructed to wear yellow tinted glasses with or without the left lens occluded. (19) The children were instructed to wear the

glasses whenever they were reading or writing. Significantly more of the children who were given occluded glasses gained stable binocular vision in the first 3 months, (59%) compared with children given the unoccluded glasses (36%). Christenson and colleagues, however, found no difference in reading ability in children with dyslexia and abnormal binocular vision who were tested both with and without occluded, blue-tinted lenses. (20) A 2005 systematic review of the applicability and efficacy of eye exercises found that there was no clear scientific evidence to support the use of eye exercises for other disorders aside from CI, including learning disabilities and dyslexia. (6)

Several studies report that poor reading in children who do not have dyslexia or attention deficits may be related to impairments in accommodation or convergence, suggesting the need for an ophthalmologic and orthoptic evaluation. (21-23)

Ongoing Clinical Trials

A search of online site ClinicalTrials.gov on December 4, 2013 using the terms “orthoptic,” “orthoptics,” and “convergence insufficiency” returned a total of 18 ongoing trials, which were reviewed for trials related to orthoptic training for convergence insufficiency or learning disabilities. One of these is a randomized controlled trial, which is described further below.

- Convergence Insufficiency Treatment Study (full title: Effectiveness of Home-Based Therapy for Symptomatic Convergence Insufficiency) (NCT01446965). This is a randomized, controlled trial of patients aged 9-17 years with convergence insufficiency to compare the effectiveness of 12 weeks of active computer-based home therapies for convergence insufficiency to 12 weeks of near-target pencil push-ups to placebo computer-based home therapy. Estimated study enrollment is 600 subjects, and study completion date is listed as December 2015.

Clinical Input Received through Physician Specialty Societies and Academic Medical Centers

While the various physician specialty societies and academic medical centers may collaborate with and make recommendations during this process through the provision of appropriate reviewers, input received does not represent an endorsement or position statement by the physician specialty societies or academic medical centers, unless otherwise noted.

In response to requests, input was received from 4 physician specialty societies (5 reviewers) and 3 academic medical centers while this policy was under review in 2010-2011. Although input supported the use of office-based orthoptic training when home-based therapy had failed, some reviewers indicated that home-based therapy would typically include more exercises than pencil push-ups. Recommended were push-up exercises using an accommodative target; push-up exercises with additional baseout prisms; jump to near convergence exercises; stereogram convergence exercises; recession from a target; and maintaining convergence for 30-40 seconds.

Summary

A higher quality randomized controlled trial from 2008 indicates that office-based vision/orthoptic training improves symptoms of convergence insufficiency in a greater percentage of patients than a home-based vision exercise program consisting of pencil push-ups or home computer vision exercises. However, in this trial as in others, the home-based regimen may not have included the full range of home-based therapies, and therefore the evidence is insufficient to evaluate whether office-based vision/orthoptic training is more effective than the current standard of home-based therapy. Clinical input from academic medical centers and physician specialty societies supports the use of office-based orthoptic training when home-based therapy has failed. Therefore, orthoptic training may be considered medically necessary in patients with convergence insufficiency whose symptoms have failed to improve with a trial of at least 12 weeks of home-based treatment. Home-based therapy should include push-up exercises using an accommodative target; push-up exercises with additional base-out prisms; jump-to-near-convergence exercises, stereogram convergence exercises; recession from a target; and maintaining convergence for 30 to 40 seconds. Based on the available evidence, clinical input, and lack

of alternatives in patients who have failed home-based therapy, orthoptic training may be considered medically necessary for patients with symptomatic convergence insufficiency who have failed a course of home-based therapy.

For learning disabilities, no evidence has been identified in the past decade that would alter the conclusions reached in the 1996 TEC Assessment regarding the use of orthoptic training. In addition, there is consensus that visual therapies are not effective for reading/learning disorders such as dyslexia. (24-26) Therefore, orthoptic training for the treatment of learning disabilities is considered not medically necessary.

There is insufficient evidence to evaluate the effect of orthoptic training in children or adults who are slow readers without identified learning disabilities or symptoms of convergence insufficiency, or for the treatment of other visual disorders. Therefore, orthoptic training for all other conditions is investigational.

Practice Guidelines and Position Statements

In August 2009, the American Academy of Pediatrics, American Academy of Ophthalmology, American Association for Pediatric Ophthalmology and Strabismus, and the American Association of Certified Orthoptists issued a joint policy statement concerning pediatric learning disabilities, dyslexia, and vision. (25) For vision therapy, the policy concludes, "Currently, there is no adequate scientific evidence to support the view that subtle eye or visual problems cause learning disabilities. Furthermore, the evidence does not support the concept that vision therapy or tinted lenses or filters are effective, directly or indirectly, in the treatment of learning disabilities. Thus, the claim that vision therapy improves visual efficiency cannot be substantiated. Diagnostic and treatment approaches that lack scientific evidence of efficacy are not endorsed or recommended."

In 2011, the American Academy of Ophthalmology, American Association for Pediatric Ophthalmology and Strabismus, and the American Association of Certified Orthoptists published a joint technical report on learning disabilities, dyslexia, and vision. (26) The report states that reading disability, or dyslexia, is a language-based disorder, and treatment should be directed at this etiology. Although vision problems can interfere with the process of reading, children with dyslexia or related learning disabilities have the same visual function and ocular health as children without such conditions. The report concludes that there is inadequate scientific evidence to support the view that subtle eye or visual problems cause or increase the severity of learning disabilities and that scientific evidence does not support the claims that visual training, muscle exercises, ocular pursuit-and-tracking exercises, behavioral/perceptual vision therapy, "training" glasses, prisms, and colored lenses and filters are effective treatments for learning disabilities. In order to improve reading comfort, symptomatic convergence insufficiency in children can be treated with near-point exercises, prism convergence exercises, or computer-based convergence exercises. Near-point exercises generally consists of push-up exercises using an accommodative target of letters, numbers, or pictures; push-up exercises with additional base-out prisms; jump-to-near-convergence exercises, stereogram convergence exercises; recession from a target; and maintaining convergence for 30 to 40 seconds.

The following joint policy statement was formulated by the College of Optometrists in Vision Development, the American Optometric Association, and the American Academy of Optometry in 1997. (27) "People at risk for learning-related vision problems should receive a comprehensive optometric evaluation. This evaluation should be conducted as part of a multidisciplinary approach in which all appropriate areas of function are evaluated and managed. The role of the optometrist when evaluating people for learning-related vision problems (e.g., dyslexia) is to conduct a thorough assessment of eye health and visual functions and communicate the results and recommendations. The management plan may include treatment, guidance and appropriate referral. The expected outcome of optometric intervention is an improvement in visual function with the alleviation of associated signs and symptoms. Optometric intervention for people with learning-related vision problems consists of lenses, prisms, and Vision Therapy. Vision therapy does not directly treat learning disabilities or dyslexia. Vision therapy is

a treatment to improve visual efficiency and visual processing, thereby allowing the person to be more responsive to educational instruction. It does not preclude any other form of treatment and should be a part of a multidisciplinary approach to learning disabilities.”

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Billing Coding/Physician Documentation Information

92065 Orthoptic and/or pleoptic training, with continuing medical direction and evaluation

Additional Policy Key Words

N/A

Policy Implementation/Update Information

12/1/11 New policy; may be considered medically necessary.

3/1/12 No policy statement changes.

3/1/13 No policy statement changes.

3/1/14 No policy statement changes.

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