The MTI Photo Eye Screening camera uses a special type of Polaroid instant film and the Medical Technology, Inc., patented technology to identify six childhood eye disorders which can lead to amblyopia, the #1 cause of monocular blindness in children. Once the picture of a child’s eyes has been taken, the resulting photo is sent to a qualified evaluator where it is analyzed. The evaluation results are then sent back to the Club. If the results show there are problems, the parents of the child are notified that they should take them to an eye doctor for testing. Parents are told during the screening that if they hear nothing back, they are to assume the results of their child’s eye screening showed there were no problems. The screening process cost the Club $4-$5 per child which includes the price of the film, equipment, photo evaluation, and handling/postage.
Your child could have a serious vision problem, and you might not even know it.
Ten to fourteen percent of children have eye problems that are undetected. And they can go on undetected for years. Some of these conditions can cause learning problems at school; some can even lead to permanent vision loss.

Early detection is the best prevention. An iScreen™ is the best detection.
Traditional eye charts are only 40 percent effective in detecting vision problems. But here, we offer iScreen — the most advanced, most accurate vision screening technology available today. It's over 90 percent accurate. With iScreen, we'll check the following:

• Nearsightedness and farsightedness
• Alignment problems
• Strabismus or a crossed, lazy or wandering eye
• Factors leading to amblyopia
• Anisometropia
• Anisocoria
• Ptosis
• Cataracts and opacity
• Astigmatism

An easy, one-minute exam for kids as young as nine months.
With iScreen, your child's eyes don't have to be dilated. They're in and out of the exam in seconds. And the results come quickly too — usually the same day. If there's a problem, we'll refer you to an ophthalmologist or optometrist for complete diagnosis and treatment.

Ensure the vision for your child's future. Ask for an iScreen today.
iScreen
Digital Vision Screening Technology

Developed by doctors and the U.S. Army Aviation and Missile Command.

iScreen uses the same image-enhancing technology that the U.S. Army Aviation and Missile Command employs to pinpoint missile targets. The result is a digital imaging device that takes detailed pictures of the eyes with more speed and accuracy than other available methods. The iScreen system was developed in collaboration with a U.S. Army Missile Command engineer, a pediatric ophthalmologist and authority on digital photo screening, a practicing pediatrician, and a teaching physician at the University of Tennessee.

You can’t always spot a child with serious eye problems just by looking.
iScreen

Digital Vision Screening Technology

Without annual vision screenings, a child's serious eye problems may go undetected.

Children usually don't know they have vision problems and most of the time neither do their parents. Left undetected, abnormalities can lead to serious and permanent vision impairment. But with early detection, they can be corrected.

That's why the American Academy of Pediatrics recommends that your child's eyes be screened annually for problems such as:

- Near-sightedness (myopia)
- Far-sightedness (hyperopia)
- Alignment problems (can lead to amblyopia*)
- Strabismus, or a crossed, lazy, or wandering eye (can lead to amblyopia*)
- Anisometropia, or a difference in vision between the eyes (can lead to amblyopia*)
- Cataracts
- Astigmatism

*Amblyopia is a condition in the brain in which one eye is favored over another, resulting in the deterioration of the optic nerve of one eye. This leads to diminished vision and sometimes blindness in that eye.

iScreen is the fastest, most advanced vision screening system available, and is over 90% accurate. Best of all, it requires a minimum of time and effort on the child's part.

Here's how the iScreen system works:

- Your child's eyes dilate naturally in a dark room in about one minute.
- Your child sits at the machine and is attracted to a light, then the camera flashes—all with a minimum of time and effort.
- Within 7 seconds, digital pictures of your child's eyes are available for viewing on a computer screen.
- Images are electronically transferred and analyzed by trained technicians using specialized computer technology.
- Results are returned to your doctor within 24 hours and indicate whether or not your child should visit an eye care specialist.

Ask your doctor about scheduling an iScreen vision testing session for your child.

iScreen testing is usually covered by insurance. Please check with your provider if you have questions.
Effectiveness of the Welch Allyn SureSight Autorefractor as a Screening Tool in a Sample of Children Aged 3-69 Months

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David E. Fitzgerald, O.D.
Ira Krumholz, O.D.

Abstract
This study compares the Welch Allyn SureSight Autorefractor readings with conventional refractive findings of 93 children, whose ages ranged from 3 to 69 months. The Autorefractor's findings and the associated reliability number were recorded. If the findings had a low reliability (≤5), another measurement was attempted. At the conclusion, a pass/fail decision for each child was independently made using age-dependent refractive criteria. The children who passed/failed the autorefractor screening were then compared to the children who passed/failed the refractive component of the optometric examination. The sample was divided into two subgroups: children aged 3 months to 36 months and children 37 to 69 months. The analytical measures for the younger group were sensitivity 62.5% and specificity of 83.3%. False positives were 28.6%, while false negatives were 23.0%. In the older subgroup, sensitivity was 87.5% and specificity was 65.3%. False positives were 44.7% while false negatives were 8.6%. The high sensitivity and low false negative analytical measure in our older age group indicate that using the SureSight Autorefractor as a screening tool for refractive conditions is more effective in the older age group. However, this is offset some by the lower specificity and high percentage of false positives found in the older group, which could result in excessive referrals. In the younger subgroup there was less evidence as to the effectiveness of the SureSight autorefractor as a viable refractive screening instrument when compared with a more standard visual evaluation.

Key Words
astigmatism, false positive, false negative, hyperopia, infant, myopia, preschool children, retinoscopy, screening tool, sensitivity, specificity. Welch Allyn SureSight Autorefractor

Introduction
The purpose of this study was to evaluate the effectiveness of the Welch Allyn SureSight Autorefractor (Autorefractor) as a refractive screening tool in an infant-toddler and preschool population samples. The Autorefractor is an objective hand-held autorefractor (Figures 1, 2 and 3). It is designed as a tool to detect myopia, hyperopia, astigmatism in 1/4 diopter increments (can be changed to 1/8 diopter), and axis. According to its manufacturer, the Autorefractor is an easy to use portable instrument that enables the examiner to test patients, including young children, in any environment. The automatic objective refraction is measured from a test distance of 14 inches (35 cm). The child views a test pattern of peripheral blinking green lights and a central red light, which is seen when the instrument is aligned. These lights are accompanied by high and low
pitched chirping sounds, which serve as an indicator to the examiner of an appropriate testing distance. In conjunction with the auditory signal, the examiner places a cross mire onto the subject’s pupil. The findings are automatically taken and read as sphere, cylinder and axis with an associated reliability number. The instrument has a child and an adult calibration setting. When used in the child mode, the instrument has a hyperopic accommodative lens compensation based on that of a three-year old. Thus, the child’s mode refractive results will be relatively more hyperopic. An option of activating a screening referral indicator is also available.

Subjects and methods

State University of New York, State College of Optometry staff doctors, residents, and externs performed examinations on 114 children at their daycare center. The subjects’ ages ranged from 3 to 69 months. The exam included: visual acuity (VA), distance and near cover test, extraocular motility, pupils, nearpoint of convergence, non-cycloplegic retinoscopy, color vision, stereopsis, and assessment of the anterior adenexia and posterior segment without dilation. Due to the age range and capabilities of our sample, some of the testing procedures were varied. Methods for assessing VA included Preferential Looking using Teller or Cardiff Cards, Lea Cards and Tumbling E. If the videotapes, which were used to control distant fixation, were not adequate during retinoscopy, the Mohindra method was employed. This procedure is conducted at 50 cm in a darkened room, while the child views the retinoscope. The above procedures were performed on all children unless age and/or cooperation became a limiting factor. Using age dependent visual acuity and refractive criteria, a pass/fail decision for each child was independently made at the end of the examination. See Table 1. We decided not to include children with strabismus, ocular pathology or color vision deficits.

Examiner MV used the Autorefractor to screen all subjects who met the above criteria. At approximately 35 cm, the SureSight was directed toward the child’s eye to be measured and a series of beeping tones allowed for fine adjustment of the test distance. The unit has flashing lights and sounds that assist in engaging the child throughout the procedure. A “ta-dah” sound indicates that the instrument has successfully taken a measurement. With each reading the SureSight calculated and displayed the sphere, cylinder, axis and reliability number. The reliability number indicates the number of good readings and their consistency on a scale from 1 to 9, with >6 being acceptable, 5 indicating a marginal reading, and ≤4 being poor. If the reliability value was less than 6, the measurement was repeated. Subjects were excluded from the analytical calculation, if on repeated measurement attempts the minimum reliability value of 6 was not obtained. At the conclusion, again a pass/fail decision was made using visual acuity and age dependent refractive criteria as applied for standard or Mohindra retinoscopy (Table 1).

Results

Initially there were 32 subjects in the 3-36 months group. Two of these children were not included because of strabismus. In the initial 82 subjects in the 37-69 months group, two subjects were not included because of strabismus and two were not included because of a color vision deficit. Further exclusions from the results are as follows: In the younger group, six subjects did not meet the validity criterion, and we could not obtain results on four others on the Autorefractor. In the older group, two did not meet the validity criterion and we could not obtain results on three others on the Autorefractor. Thus, the results of comparing the Autorefractor with conventional retinoscopy are for 20 children in the younger group and 73 in the older group.

A failure list was independently generated from the results of the conventional refraction and a separate failure list was generated from the results of the Autorefractor. Thirty-three (33) children failed the visual acuity and/or refractive aspect of the optometric evaluation (nine in the younger group and 24 in the older group). Forty-four (44) children failed the Autorefractor (six in the younger group and 38 in the older group). Twenty-six (26) children were common to both groups.

The analytical measures of sensitivity, specificity, false positives and false negatives were calculated (Table 2). Sensitivity is a measure of the probability that the screening test will be positive when an abnormality actually exists, i.e., test being positive and the patient requiring referral. This measure indicates how good a test is at identifying the children needing referral. Specificity is the probability that the screening test will be negative when an abnormality actually is not present, i.e., test is negative and the patient does not need a referral. This measure indicates how good a test is at identifying the children who do not need to be referred. A false positive is when the test is positive but the patient does not need a referral and false negative is when the test is negative but the patient does need a referral. The best diagnostic tests are those with few false positives and false negatives.

Discussion

A valid and efficient vision-screening tool should be quick and easy to administer. The instrument and method used should be able to identify the most prevalent and sight threatening visual disorders, which can be remedied or treated. In the present study, the Autorefractor was used to evaluate the refractive status in children who were divided into two subgroups: in-

<table>
<thead>
<tr>
<th>Table 1. Failure Refractive Criteria</th>
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<tr>
<td><strong>Age</strong></td>
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<td>---------</td>
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<tr>
<td>0 to 24 months</td>
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<td>25 to 69 months</td>
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<th>Table 2. Analytic Results</th>
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<tr>
<td><strong>Analytic Measure</strong></td>
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<tr>
<td>-------------------------</td>
</tr>
<tr>
<td>Sensitivity</td>
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<tr>
<td>Specificity</td>
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<tr>
<td>False Positives</td>
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<td>False Negatives</td>
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We acknowledge that there are limitations to our data, including using non-cycloplegic retinoscopy and a different doctors or interns performing retinoscopy on subsequent screening days. Further, while permission for the exam was obtained from the parent/legal guardian by written consent, most children were examined in the absence of their parents with little to no history being available. Additionally, two methods of retinoscopy, the standard static and the Mehindra method were used. Finally, in determining pass or fail, a clinical judgment was made in that we considered both visual acuity and refractive status in the visual examination data.

Conclusion

The Welch Allyn Suresight Autorefractor is designed as a tool to detect myopia, hyperopia, astigmatism in ¼ diopter increments and axis. However, the instrument does not test for strabismus, pathology, or more subtle ocular problems hence, does not replace the need for a comprehensive eye examination. The low sensitivity and high false positives and negatives do not constitute analytical measures of a good screening instrument in the 3-36 month population. Additionally in this age group, there was a high percentage of low validity measurements (6 of 30 subjects) or instances where results were obtained (4 of 30 subjects). In situations where a comprehensive eye examination is not feasible, the unit has higher sensitivity for the older age group (37-69 months) but also has a high false positive which may result in a large number of children being overt/over-referred.

An earlier version of this research was presented as a poster at the 2002 annual meeting of the American Optometric Association in New Orleans, LA.

None of the authors has financial or other interest in the Welch Allyn Suresight Autorefractor.

References