

# Preschool Vision Screening Frequency After an Office-Based Training Session for Primary Care Staff

Robert W. Hered, MD\*, and Marjorie Rothstein, RN‡

**ABSTRACT.** *Objective.* Although vision screening for preschool children is recommended for detecting amblyopia, many pediatric and family medicine practices do not screen preschool-aged children. The aim of this study was to determine the effect of a training program for primary care clinical staff on vision screening behavior and attitudes.

*Methods.* All local pediatric and family medicine practices were mailed invitations for free training sessions in preliterate eye chart vision screening. The clinical support staff at each participating practice location received a single training session. The lead ancillary medical employee of each practice location was surveyed immediately before and after training, and again 4 to 6 months later, to determine the effect of a single training session on screening behavior and attitudes.

*Results.* Twenty-nine (26%) of 110 practice locations received training in vision screening. Four to 6 months after training, reported screening frequency of 3-year-olds increased, but not of other ages. The reported comfort level with screening 3-year-olds and 4-year-olds was improved 4 to 6 months after training. Most practices responded that the training was beneficial and worthwhile, but lasting impact on practice behavior for the cohort was modest.

*Conclusions.* Direct, practical training in preliterate eye chart vision screening may increase the number of 3-year-old children screened and improve clinical support staff comfort with screening preschool children. A single training session is not sufficient in itself, however, to achieve the goal of universal preschool vision screening in the primary care setting. *Pediatrics* 2003;112:e17–e21. URL: [http://www.pediatrics.org/cgi/content/full/112/1/e17;child,preschool,vision screening, physicians, family, pediatrics, physicians' offices](http://www.pediatrics.org/cgi/content/full/112/1/e17;child,preschool,vision%20screening,physicians,family,pediatrics,physicians%20offices).

Effective screening of preschool-aged children for vision abnormalities is recognized as a significant public health priority.<sup>1–6</sup> The most common cause of vision loss among young children is amblyopia, with prevalence estimated at 3% to 4% of preschool children.<sup>7,8</sup> Although treatable during childhood, amblyopia is the leading cause of monocular vision loss among adults.<sup>9</sup> Vision screening of 3- to 4-year-old children has been recommended for early detection of amblyopia.<sup>4,5,10</sup> Preschool vision

screening reduces permanent vision loss from amblyopia.<sup>11</sup> Eye chart vision screening also detects other causes of vision loss, including refractive errors and, less frequently, intraocular disease. Preschool vision screening is often performed at childcare centers and preschools, but mass screening alone may be insufficient for reaching the majority of children in this age group. Fewer than 25% of preschool children in the United States have undergone vision screening by government or private programs.<sup>1</sup> Therefore, vision screening is also advised as part of routine primary care medical examinations. An American Academy of Pediatrics policy statement promotes vision screening of young children for detection of amblyopia and lists specific recommendations.<sup>12</sup> Despite published recommendations, as many as 60% of primary care providers do not perform preschool vision screening, and others are inconsistent in screening attempts.<sup>13</sup> Inadequate screening is a factor in the late diagnosis of amblyopia.<sup>14</sup>

Factors associated with the current low rate of preschool vision screening in primary care practices may include inconsistent preschool screening recommendations and insufficient guidance on the selection and implementation of tests.<sup>10</sup> Promulgation of guidelines alone is likely to have insufficient impact on physician behavior.<sup>15</sup> Training in preschool vision screening is not a standard part of pediatrics and family medicine residency programs.<sup>16</sup> We suspected that frequent barriers to effective screening included lack of training in basic vision screening techniques and difficulty integrating screening into busy office practices. A primary care physician is unlikely to act on a recommendation for screening without a practical knowledge of preschool screening. Therefore, we chose to study the effect of practical, interactive training sessions within the primary care outpatient setting. We were particularly interested in whether a single training session could result in increased primary care vision screening.

## METHODS

Family and pediatric practices in Northeast Florida were offered free training in preliterate vision screening, which would be performed at their office locations. Physicians at all local practices were mailed invitations for free training sessions sponsored by a local vision screening charitable organization. Participating practices were queried before and after training regarding their screening attitudes, methods, and rates. Table 1 outlines the study design.

The primary target audience of the training session was office clinical support staff; physicians were also invited to attend. This target audience was perceived as the group that would perform the preschool vision screening test. The goal of the training ses-

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**TABLE 1.** Study Design

1. All local primary care practices are mailed an invitation to participate
2. Training sessions are scheduled for responding practice locations
3. Pretraining survey is administered
4. Training session is performed
5. Immediate post-training survey is administered
6. 4- to 6-month post-training survey is administered

sions was to present a practical strategy for successful preliterate eye chart screening, taking into consideration the physical layout and organization of each practice. The training session curriculum covered screening of 3-, 4-, and 5-year-old children.

The training involved specific instruction on performing vision screening with a preliterate eye chart. Each interactive training session covered the same material and included a demonstration of screening technique. The screening technique demonstrated during training sessions was similar to guidelines recommended by the Preschool Vision Screening Task Force of the Maternal and Children's Health Bureau and guidelines of the American Association of Pediatrics.<sup>12,17</sup> These guidelines include testing preschool children at 10 feet and using a linear display of optotypes. In this study, the recommended critical line for 3- and 4-year-olds was 20/40 and for 5-year-olds 20/30. To pass a screening examination, a child had to identify the majority of optotypes on the critical line with each eye. The preliterate eye chart demonstrated was the Lea Symbols chart (Precision Vision, La Salle, IL).

A pretraining questionnaire (Appendix A) was designed to obtain a baseline assessment of each practice location's screening method, target population, and comfort level with screening. Immediately after training, practices were asked to rate their perceived value of the training session. Practice locations agreed verbally to participate in the surveys. No attempt was made to obtain patient-related data, nor was there any attempt to determine the pass/fail rate of the screening tests performed by the practices. Four to 6 months after a practice location's training session, a questionnaire was used to determine the later effect of the training session. In each case, the surveys were directed toward the lead ancillary medical employee of the practice. All questionnaires were administered by the same author (M.R.).

The data were analyzed by nonparametric procedures using SPSS statistical software, version 11 (SPSS, Inc, Chicago, IL). The Wilcoxon signed ranks test was used to compare vision screening rates before and after training. The Kruskal-Wallis test was used to compare the reported impact of training on screening approach and screening success by age group.

## RESULTS

A total of 257 letters offering training sessions were sent to 110 locations in an attempt to reach all

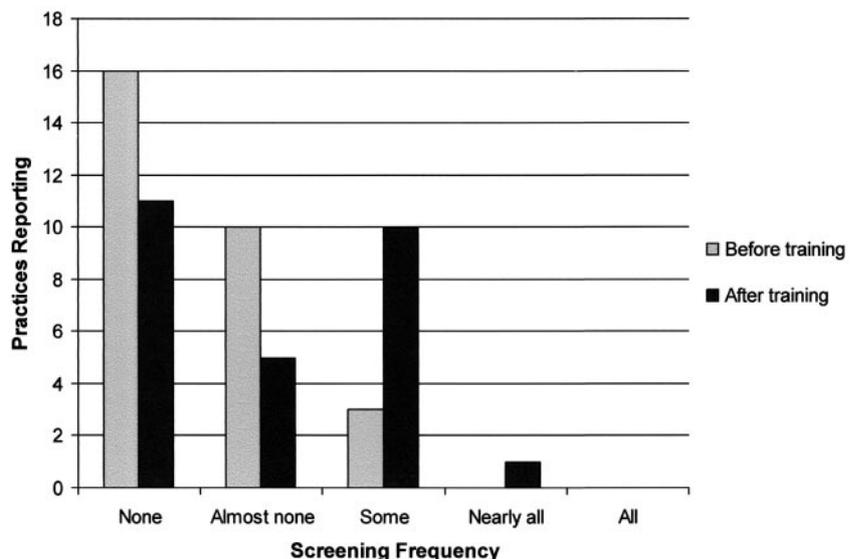
local family medicine and pediatric practices, including teaching programs. Letters were addressed to the pediatricians and family practitioners, and group practice locations received multiple letters. Over a 9-month period, 29 (26%) practice locations responded and received training. Five (17%) responding locations were family medicine practices, and 24 (83%) were pediatrics practices. The practice locations included solo and group private practices, hospital and university-affiliated practices, and public health clinics. One of the authors, a registered nurse with experience in pediatric care and preschool vision screening, performed all the training sessions (M.R.). The sessions were interactive and lasted 1 to 1.5 hours. At 6 (21%) locations, at least 1 physician attended the presentation.

Before screening, 26 (90%) of 29 practice locations reported screening none or almost none of their 3-year-old patients (Fig 1). The majority of practices reported screening at least some 4-year-olds (Fig 2) and nearly all 5-year-olds (Fig 3). The practices reported using a variety of screening tools (Table 2). The reported degree of comfort with screening examinations correlated with the age of the patient and was 2.2 for 3-year-olds, 3.0 for 4-year-olds, and 3.9 for 5-year-olds (scale of 1–5, 1 is least comfort; see Appendix A). All practice locations used 1 staff member to screen each child. All practices used medical assistants or nurses to screen children.

Immediately after screening, practice locations generally responded that the training session was helpful for all screening ages, with mean responses of 4.61 for 3-year-olds, 4.64 for 4-year-olds, and 4.63 for 5-year-olds (scale of 1–5, 1 is least helpful; see Appendix A).

Twenty-eight (97%) of 29 practice locations reported willingness to change screening techniques in their offices for 3- and 4-year-old children. Twenty-six (90%) of 29 were willing to change screening techniques for 5-year-old children. One (3%) of 29 practice locations responded that more training was needed.

Four to 6 months after training, 26 (90%) of 29



**Fig 1.** Three-year-old screening before and 4 to 6 months after training.

Fig 2. Four-year-old screening before and 4 to 6 months after training.

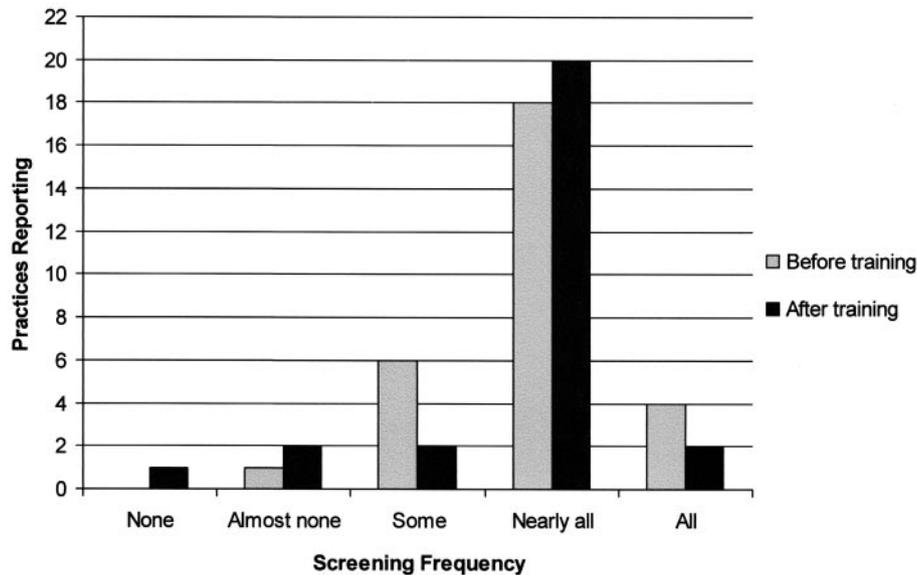
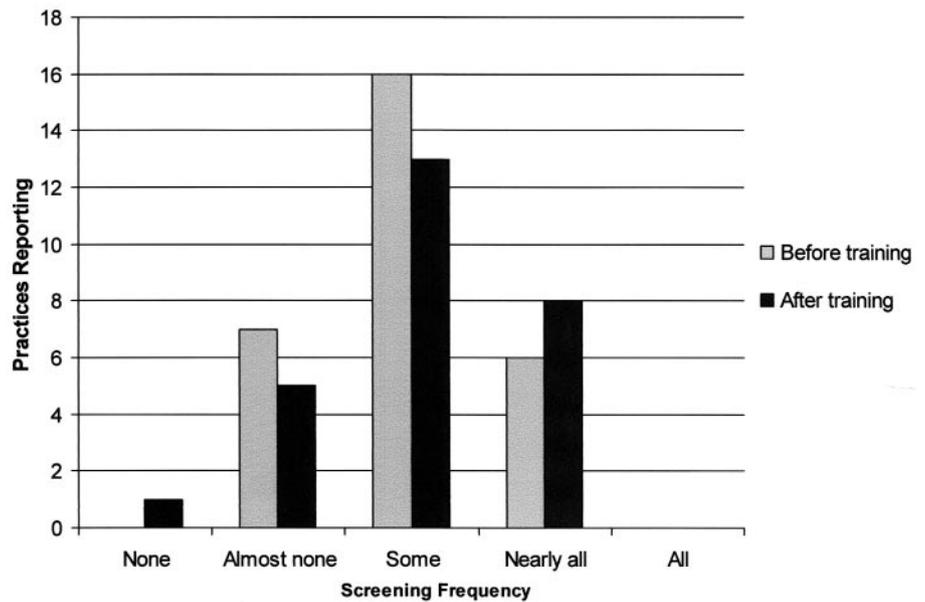


Fig 3. Five-year-old screening before and 4 to 6 months after training.

TABLE 2. Screening Tools Used Before and 4 to 6 Months After Training, by Child's Age\*

Age (y)	Lea Symbols		Other Picture Chart		Letters		Titmus Screener		Tumbling E Chart	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
3	2	8	2	9	0	3	0	0	0	1
4	4	9	15	14	5	12	2	3	1	2
5	4	9	9	9	19	16	4	6	2	3

\*Some practice locations used >1 technique.

practice locations reported that the training had been worthwhile. Four to 6 months after screening, reported comfort with screening of 3- and 4-year-old children was higher at 3.5 ( $P = .024$ ) and 3.8 ( $P = .001$ ). The mean response for 5-year-old children was unchanged at 3.9.

Four to 6 months after training, 22 (76%) of 29 practice locations reported that the training had an impact on their approach to preschool vision screening. The mean reported impact on screening ap-

proach was 2.79, and did not differ significantly for different child ages ( $P = .769$ ) (scale of 1–5, 1 is least impact; see Appendix A). The mean reported impact of screening on screening success was 3.02, with no significant difference reported for different ages ( $P = .821$ ).

Four to 6 months after training, 27 (93%) of 29 practice locations responded to questions regarding screening rates. The reported number of 3-year-old children screened in trained offices had increased

(Fig 1). Forty-one percent of practices reported screening at least some 3-year-olds, compared with 10% before training. A significant increase was found in the reported frequency of screening 3-year-old children ( $P = .029$ ). The number of practices screening all to nearly all 4-year-olds increased from 21% to 30% (Fig 2), but the overall change in screening 4-year-olds was not significant ( $P = .783$ ). The number of practices screening all to nearly all 5-year-olds increased from 76% to 81% (Fig 3), but the overall change in screening 5-year-olds did not achieve statistical significance ( $P = .234$ ). The presence of a physician at the training session did not correlate with higher screening rates.

Changes were reported in the types of screening tools used. More practices used Lea Symbols 4 to 6 months after training (Table 2). There was no change in the number of practices using other screening tools. Six months after the educational session, all practices continued to use 1 medical assistant or nurse to screen a child.

## DISCUSSION

The results of this study suggest that insufficient practical knowledge in preliterate vision screening techniques may be one barrier to preschool vision screening in the primary care office setting. Training in vision screening techniques was successful in increasing the number of screenings performed, but the increase was modest. Other barriers persist that are not eliminated by a single session of training.

Despite the offer of free training in vision screening, only 26% of practice locations participated in the program. One would anticipate participating practices to be open to making changes in their practices, and their willingness for improvement was indicated on survey responses. Initially, the practices' ratings of the training sessions were very high, and almost all practices stated that they did not need further training. Because the responses were by direct administration of a questionnaire and were not confidential, it is possible that some respondents did not wish to disappoint the questioner.

Four to 6 months after training, most practices (90%) reported that the training had been worthwhile, and most reported that there had been a positive impact on their approach to vision screening. Lasting changes in screening frequency, however, were less impressive. Although a significant increase in screening 3-year-old children was achieved, less than half of participating practices reported screening the majority of 3- and 4-year-olds 6 months after training. The impact on attitudes toward preschool vision screening, as demonstrated by the improved comfort level in screening 3- and 4-year-old children, appears to have been greater than the actual increase in screening frequency.

Phillips et al<sup>18</sup> defined a physician's recognition of a problem but failure to act as "clinical inertia." Clinical inertia is more likely to occur in the management or detection of asymptomatic conditions, particularly when there is a lack of education, training, and practice organization related to the condition.<sup>18</sup> This training program was directed toward office

staff, although physicians participated at some locations. Those practices with physician participation were not more likely to change behavior, however. Several participants expressed frustration with the inability to change attitudes and routines within the office practice. This concern is reinforced by the measured increase in comfort with the process of screening 3-year-old children, but the smaller increase in actual screenings performed 4 to 6 months later. Without an expressed commitment to screening by the physician leadership of a practice, it is unlikely that a consistent change in practice behavior will be effected. Education and practical training in preschool vision screening during pediatrics and family medicine residency training may be more effective than attempting to change the behavior of physicians already in practice.<sup>16,18</sup>

Changes unrelated but concurrent with the study occurred at several participating practices during this project, including staff turnover, rotation of physicians, and the splitting of one practice partnership. These events suggest that repeated training sessions may promote a more lasting impact on screening frequency. Videotaped or computer program training material may be beneficial for providing repeated training sessions in a clinical office.

Practical considerations of time and financial reimbursement may negatively impact screening rates in the primary care setting. Eye-chart screening remains time-consuming and challenging for primary care practices. The screening of 3- and 4-year-old children is more challenging than of older children and requires a greater time commitment.<sup>19</sup> An experienced, efficient vision screener may require 2 to 3 minutes to screen 1 preschool-aged child.<sup>19</sup> Newer, more rapid screening techniques may be required to significantly improve screening numbers, but, currently, techniques such as photoscreening are being evaluated with caution.<sup>10</sup> Until recently, primary care practices could not bill separately for eye-chart screening because it was bundled into the child's office visit charge. A new Current Procedural Terminology code (99173, Screening test of visual acuity, quantitative, bilateral) was recently added for use by primary care physicians, and reimbursement for this code may positively influence screening rates. Use of this code requires use of graduated visual stimuli for a quantitative estimate of visual acuity.

Finally, training in preschool vision screening requires financial support. This project was supported by a vision screening charitable organization, and similar support would be required to initiate training programs at other locations.

## APPENDIX

### Appendix Survey Questions

Before Training

1. How many children do you screen at each age?  
3 years: none almost none some nearly all all  
4 years: none almost none some nearly all all  
5 years: none almost none some nearly all all
2. What screening method(s) are you currently using for each age?

- 3 years:  
4 years:  
5 years:
- On a scale from 1 to 5 (1 is least comfortable and 5 is most comfortable), how comfortable are you with your current screening method for each age?  
3 years:  
4 years:  
5 years:
  - What level of personnel does the screening?
  - How many staff members do you use to screen a child?

#### Immediately After Training

- Are you willing to make a change in your screening method?  
Yes/No
- On a scale from 1 to 5 (1 is least helpful and 5 is most helpful), how helpful was the office training for each age?  
3 years:  
4 years:  
5 years:
- Do you feel you need more training?  
Yes/No

#### 4 to 6 Months After Training

- How many children do you screen at each age?  
3 years: none almost none some nearly all all  
4 years: none almost none some nearly all all  
5 years: none almost none some nearly all all
- Was the effort involved in scheduling and attending the training session worthwhile?  
Yes/No
- Did the training impact your approach to preschool vision screening in your practice?  
Yes/No
- On a scale of 1 to 5 (1 is least impact and 5 is greatest impact), to what extent did the training impact your approach to preschool vision screening for each age?  
3 years:  
4 years:  
5 years:
- On a scale of 1 to 5 (1 is least impact and 5 is greatest impact), to what extent did the training impact your success in screening preschoolers for each age?  
3 years:  
4 years:  
5 years:
- What screening method(s) are you currently using for each age?  
3 years:  
4 years:  
5 years:
- On a scale from 1 to 5 (1 is least comfortable and 5 is most comfortable), how comfortable are you with your current screening method for each age?  
3 years:

- 4 years:  
5 years:
- What level of personnel does the screening?
  - How many staff members do you use to screen a child?

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