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Prevalence of visual conditions in a clinical pediatric population

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Conclusion: The prevalence data from this study is important for the faculty and administrators at Pacific University College of Optometry, as well as for other clinicians. It adds to the data which supports the need for a strategic exam sequence which includes an assessment of both refractive status and binocular status.

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PREVALENCE OF VISUAL CONDITIONS

IN A CLINICAL PEDIATRIC POPULATION

By

CYNTHIA ANN SOLBERG

A thesis submitted to the faculty of the
College of Optometry
Pacific University
Forest Grove, Oregon
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Adviser:
Dr Suzanne D. Scott O.D.
Prevalence of Visual Conditions in a Clinical Pediatric Population

Signature of Author: Cynthia Ann Solberg

Signature of Adviser: Suzanne D. Scott O.D.
Author Biography: Cynthia Ann Solberg grew up in Incline Village, Nevada. She graduated from The University of Nevada, Reno in 1990 with a Bachelor of Arts degree in Psychology. After graduation she pursued a Masters degree in Social Work for a short period of time. Following this, she applied to and was accepted at Pacific University College of Optometry and began matriculation in the fall of 1995. She expects to graduate in 1999. She then plans to become an associate in a private practice in either Nevada, California, or Washington.
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Abstract

**Background:** The purpose of this retrospective study is to provide prevalence information about the visual conditions affecting the Pacific University Family Vision Centers’ pediatric population. It includes information about the common chief complaints that motivated parents to bring their children in for eye exams, and the clinician’s recommended treatments.

**Methods:** A retrospective review was performed of all records for pediatric patients seen in 1997 at Pacific University's Forest Grove and Portland clinics. There were 245 total patient encounters. 145 of these were new patients and 100 were established patients.

**Results:** The most common diagnosis in new patients was hyperopia (84.8%). Strabismus was diagnosed 15 times (10.3%). Fifty-nine patients presented with no chief complaint, and 18 presented with a parental concern of an eye turn.

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Introduction

Optometrists are highly trained professionals who diagnose and treat a wide variety of vision disorders. Optometrists are primary care practitioners who provide effective and economical health care. For many people eye care is their point of entry into the health care system, and eye care, by its very nature, allows for the assessment of a broad spectrum of systemic conditions.¹

The American Optometric Association has set forth clinical guidelines which describe the appropriate examination procedures for evaluating the eye health and vision status of infants and children. These guidelines are in place to help reduce the risk of vision loss in children and to assure normal visual development.¹ Unfortunately too few children receive comprehensive preventative eye care. Possibly parents are relying on vision screenings by general physicians or school screenings to detect visual problems in their children. However, these screenings rarely include evaluation of the child’s binocular or accommodative status.¹² These are just two areas of vision which if dysfunctional can have a detrimental impact on a child’s ability to perform successfully in school.

In order to offer effective and economical eye care optometrists need to know the prevalence of visual conditions. This prevalence information allows clinicians to more strategically plan their examination sequence. Knowing, for example, that an unusually large percentage of children presenting for an eye exam will have a binocular vision disorder such as strabismus, should suggest to clinicians that they test for this early in their examination sequence.
Prevalence information on visual conditions is also important when planning didactic courses at the optometric educational institutions. We often hear about the large percentage of the U.S. population which will reach the age of 50 over the next decade. This is a group which will certainly require optometricists' expertise in diagnosing and treating ocular disease and related systemic diseases. Yet there is also a large and growing population of children under 18 years of age, who will require optometrists who are skilled at the detection and assessment of refractive, binocular, and accommodative conditions. Pediatric prevalence information can help guide administrators and faculty in planning their course work.

Prevalence information will also be helpful for the development and planning of pediatric clinical curriculum at Pacific University's Family Vision Centers. These centers are staffed by doctors and students from the Pacific University College of Optometry, and as such are teaching facilities. Each patient who presents for a vision exam is examined by both a student clinician and a licensed Doctor of Optometry. One of Pacific University's vision clinics is located in Forest Grove which is a rural community, another is located in the city of Portland which is a metropolitan location. The Forest Grove clinic is located on the campus of Pacific University and offers pediatric services four times per week, each time for half of a day. The Portland clinic is located in downtown Portland and offers pediatric services one day per week for half of the day. It is therefore expected that there will be more pediatric patient encounters at the Forest Grove clinic.

The purpose of this retrospective study is to provide prevalence information about the visual conditions affecting the Pacific University Family Vision Centers' pediatric population. It includes information about the common chief complaints that motivated parents to bring their children in for eye exams, and the clinician's recommended treatments.

Methods

A retrospective study was performed of all the pediatric patients presenting for primary vision care to the Forest Grove and Portland clinics for a one year period of time (January 1, 1997 to December 31, 1997). Primary care includes complete vision exams (CVE), follow-up exams (FU), and vision screenings. Follow-up exams include such things as cycloplegic exams and Rx checks. The Forest Grove and Portland clinics generally schedule children age eight and under into the pediatric clinic. Using the clinics' scheduling records, all records for patients seen in 1997 were identified, these charts were examined, and specific data about each was collected. The following is a list of the data collected: patient's assigned account number, age, status (new vs. established patient), type of examination performed, clinic location, chief complaint, up to three diagnoses, and up to two treatment plans. Ages were grouped into the following ranges: 0 to 5 months, 30 days; 6 months to 11 months, 30 days; 1 year to 1 year, 11 months; 2 years to 2 years, 11 months; 3 years to 3 years, 11 months; 4 years to 4 years, 11 months; 5 years to 5 years, 11 months; 6 years and over. Diagnoses were determined from the
written assessment and plan for each patient, as well as the ICD-9 codes on the billing sheets. Treatments were determined from the written assessment and plan.

**Subjects**

Two hundred forty-five total patient encounters were recorded. Table 1 lists the number of visits for each age group.

**Table 1. Age Prevalence**

<table>
<thead>
<tr>
<th>Age</th>
<th>Forest Grove</th>
<th>Portland</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 6 months</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>6 months - 11 months, 30 days</td>
<td>7</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>1 year - 1 year, 11 months</td>
<td>11</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>2 years - 2 years, 11 months</td>
<td>10</td>
<td>7</td>
<td>17</td>
</tr>
<tr>
<td>3 years - 3 years 11, months</td>
<td>19</td>
<td>10</td>
<td>29</td>
</tr>
<tr>
<td>4 years - 4 years, 11 months</td>
<td>45</td>
<td>11</td>
<td>56</td>
</tr>
<tr>
<td>5 years - 5 years, 11 months</td>
<td>25</td>
<td>10</td>
<td>35</td>
</tr>
<tr>
<td>6 years and over</td>
<td>72</td>
<td>16</td>
<td>88</td>
</tr>
</tbody>
</table>

**Results**

**Patient Encounters**

There was a total of 245 primary care patient encounters at the two clinics; 190 (77.6%) at the Forest Grove clinic, and 55 (22.4%) at the Portland clinic. Table 2 shows a breakdown of the number of patient encounters and the type of exam performed.

**Table 2. Patient Encounters**

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Forest Grove # and % of patients</th>
<th>Portland # and % of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Patients</td>
<td>245</td>
<td>190 (77.6%)</td>
<td>55 (22.4%)</td>
</tr>
<tr>
<td>New patients</td>
<td>145</td>
<td>111 (76.6%)</td>
<td>34 (23.4%)</td>
</tr>
<tr>
<td>CVE</td>
<td>113</td>
<td>81 (71.7%)</td>
<td>32 (28.3%)</td>
</tr>
<tr>
<td>Screening</td>
<td>63</td>
<td>56 (88.9%)</td>
<td>7 (11.1%)</td>
</tr>
<tr>
<td>Follow-up</td>
<td>69</td>
<td>53 (76.8%)</td>
<td>16 (23.2%)</td>
</tr>
</tbody>
</table>

**Prevalence of Conditions**

There was a total of 145 new patients who presented to the clinics for either a full exam or a vision screening. Table 3 lists categories of conditions and their prevalence for this group of patients. The diagnoses of hyperopia, myopia, and astigmatism were based upon
the doctor’s written assessment. Any dioptric amount was considered significant, there was no minimum amount required to qualify for the diagnosis.

**Table 3. Prevalence of visual conditions in new patients**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Prevalence (# of patients)</th>
<th>Percentage of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hyperopia</td>
<td>123</td>
<td>84.8</td>
</tr>
<tr>
<td>Myopia</td>
<td>10</td>
<td>6.90</td>
</tr>
<tr>
<td>Astigmatism</td>
<td>63</td>
<td>43.4</td>
</tr>
<tr>
<td>Emmetropia</td>
<td>2</td>
<td>1.38</td>
</tr>
<tr>
<td>Esotropia</td>
<td>13</td>
<td>8.97</td>
</tr>
<tr>
<td>Exotropia</td>
<td>2</td>
<td>1.38</td>
</tr>
<tr>
<td>Hypertropia</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Convergence excess</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Convergence Insufficiency</td>
<td>2</td>
<td>1.38</td>
</tr>
<tr>
<td>Amblyopia</td>
<td>1</td>
<td>.689</td>
</tr>
<tr>
<td>Accommodative dysfunction</td>
<td>3</td>
<td>2.07</td>
</tr>
<tr>
<td>Oculomotor dysfunction</td>
<td>1</td>
<td>.689</td>
</tr>
<tr>
<td>Ocular Disease</td>
<td>2</td>
<td>1.38</td>
</tr>
</tbody>
</table>

**Presenting Concerns**

Of the 145 new patients who presented to the clinics 59 (40.7%) were categorized either as having no chief complaint or as presenting for a routine vision exam. Of these, 55 (93.2%) were diagnosed with hyperopia, 1 (1.69%) with myopia, and 23 (40.0%) with astigmatism. Twenty-three patients (15.9%) presented because they had failed a vision screening. Eighteen patients (12.4%) presented with a parental concern of an eye turn, 10 (55.6%) of these patients were actually diagnosed with an eye turn, 8 (80.0%) esotropes, and 2 (20.0%) exotropes. Nine patients (6.20%) had a chief complaint of school trouble, 8 (88.9%) of these patients were diagnosed with hyperopia, 1(11.1%) with myopia, 4 (44.4%) with astigmatism 0 with emmetropia and 0 with an eye turn.

**Treatments**

For the combined group (175 total) of new patients and follow-up patients receiving full exams, the following is a list of their prescribed treatments: single vision lenses 40 (22.9%), 25 for new patients and 15 for established patients receiving CVEs, bifocals 3 (1.71%), only established patients received bifocals, home vision therapy 18 (10.3%), vision therapy referral 11 (6.29%), and therapeutic pharmaceuticals 2 (1.14%).
Discussion

This was a small retrospective study of a clinical pediatric population. Since this was a clinical population we would expect a higher prevalence of vision disorders than for the general pediatric population. It is expected that most pediatric patients will be hyperopic, and indeed 84.8% of the patients in this study were diagnosed with some degree of hyperopia. Myopia of any amount before the age of 9 would be considered a vision disorder. Myopia in a pediatric population this young seldom progresses less than 2.00 diopters with a mean progression to 4.00 diopters.\(^4\) Six and nine-tenths percent of the children in this clinical population were diagnosed with myopia.

The established norms for strabismus in this age group are 3% to 5%, however this group had an incidence of 10.3%, with esotropia being most common.\(^3\) It was also found that parents who presented with a concern that their child had an eye turn were correct 55.6% of the time. Of the new patients who presented for exams 59 had no chief complaint. This represents 40.7% of the new patients. An assumption could be made that this represents patients who are seeking preventative primary care. The American Optometric Association recommends that all children under the age of two have an eye exam, and all children again receive an eye exam before entering school. However, studies show that only 14% of children under 6 have received an eye exam.\(^5\)

The two clinics reviewed for this study offer free comprehensive vision screenings. Unfortunately, only 63 children (25.7%) participated. This may be due to the public’s lack of awareness of the screening program, or of the importance of early vision screenings. Students from Pacific University also participate in a significant number of elementary school screenings. Yet, out of the combined clinic screenings and school screenings only 23 patients (9.39%) presented with the complaint that they had failed a screening. One might expect this number to be higher. Ocular disease is expected to be rare in a pediatric population. This study confirms that expectation. Only 2 children (.816%) required therapeutic pharmaceuticals. With such emphasis being placed on disease courses in school and on National Board exams, there is the risk of placing too little importance on binocular vision, ocular motility, and vision therapy. However, in order to effectively manage and treat the large and ever increasing pediatric population a strong knowledge base in these areas is necessary.

Many of the findings in this study confirm previous research and clinical expectations. There is a very high prevalence of hyperopia and astigmatism, and a low prevalence of myopia and ocular disease. This study does not support studies which indicate a high prevalence of accommodative anomalies.\(^2\) This study clearly supports that other than refractive anomalies, the most prevalent condition is a dysfunction of binocular vision.

The data from this study confirms the importance of a minimum data base when examining a pediatric population. Refractive status and binocular status must be included since they occur with the highest frequency. However, ocular disease must also be evaluated due to the serious consequences it can have. This study also indicates that too
few children are receiving vision exams. Better education of the public is needed concerning the importance of early comprehensive vision exams for children.
References


