Oregon Health & Science University
School of Medicine

Scholarly Projects Final Report

Title *(Must match poster title; include key words in the title to improve electronic search capabilities.)*

Attitudes Toward and Difficulties with Childhood Amblyopia Patching Treatment

Student Investigator's Name

Christa Prentiss

Date of Submission *(mm/dd/yyyy)*

04/05/2023

Graduation Year

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Project Course *(Indicate whether the project was conducted in the Scholarly Projects Curriculum; Physician Scientist Experience; Combined Degree Program [MD/MPH, MD/PhD]; or other course.)*

Scholarly Projects Curriculum, SCHI 703

Co-Investigators *(Names, departments; institution if not OHSU)*

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Concentration Lead's Name

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Project/Research Question

Among caregivers of pediatric patients with amblyopia treated at an OHSU clinic, what are attitudes toward and barriers to amblyopia treatments?

Type of Project *(Best description of your project; e.g., research study, quality improvement project, engineering project, etc.)*

Research study

Key words *(4-10 words describing key aspects of your project)*

amblyopia, ophthalmology, eye, survey, pediatric, child, parent, patch, treatment, compliance

Meeting Presentations

If your project was presented at a meeting besides the OHSU Capstone, please provide the meeting(s) name, location, date, and presentation format below (poster vs. podium presentation or other).

2022 ARVO Annual Meeting.
Hybrid in-person at Denver, Colorado, and virtual.
May 2022.
Poster.

Publications *(Abstract, article, other)*

If your project was published, please provide reference(s) below in JAMA style.

None.

Submission to Archive

Final reports will be archived in a central library to benefit other students and colleagues. Describe any restrictions below (e.g., hold until publication of article on a specific date).

None.

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Next Steps
What are possible next steps that would build upon the results of this project? Could any data or tools resulting from the project have the potential to be used to answer new research questions by future medical students?

The overall goal of this research is to identify behavioral support strategies for improving treatment compliance in amblyopia patients. The initial work in this project is to identify barriers to treatment compliance as well as which patients are impacted by barriers to treatment.

For future work utilizing our preliminary data, our team would like to explore the utilization of an interprofessional behavioral approach to addressing difficulties in using patching treatments. We would like to know: **"How do interprofessional (i.e. behavioral specialist) virtual check-ins affect the outcomes of pediatric patients who are using patching treatment for amblyopia?"**

Here are a few other presentations by team members relating to this project:

- Kim, E, Reznick, LG, Bellsmith, KN, Zaback, T, Lucero, A, Prentiss, CJ; Hribar, MR. Decrease in Returning Pediatric Amblyopia Patients and Potential Impact on Visual Outcomes. 2022 ARVO Annual Meeting, May 2022.
- Bradee, AR, Lemhouse, J, Prentiss, CJ, Reznick, LG, Hribar, MR, Bellsmith, KN. Parental experience in amblyopia treatment and its correlation with visual acuity outcomes: A pilot study. 48th AAPOS Annual Meeting, March-April 2023.

Please follow the link below and complete the archival process for your Project in addition to submitting your final report.

https://ohsu.ca1.qualtrics.com/jfe/form/SV_3ls2z8V0goKiHZP

Student's Signature/Date *(Electronic signatures on this form are acceptable.)*
This report describes work that I conducted in the Scholarly Projects Curriculum or alternative academic program at the OHSU School of Medicine. By typing my signature below, I attest to its authenticity and originality and agree to submit it to the Archive.

Christa Jillian Prentiss, 03/15/2023

Mentor's Approval *(Signature/date)*

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Report*: Information in the report should be consistent with the poster, but could include additional material. Insert text in the following sections targeting 1500-3000 words overall; include key figures and tables. Use Calibri 11-point font, single spaced and 1-inch margin; follow JAMA style conventions as detailed in the full instructions.*

Introduction *(≥250 words)*

Amblyopia is an impairment in visual acuity in one or both eyes that cannot be explained by an overt problem with the eye.[1] This loss of function is due to developmental dysfunction in the central nervous system and results in poor image processing by the cerebral cortex.[2] It is the leading cause of visual loss in children and young adults, affecting up to 5% of people of all ages.[3] Patching and atropine eyedrops successfully treat this condition. Patching therapy involves occluding the good eye so that the impaired eye is forced to work harder.[4] Patching therapy duration per day can vary from two hours to all day, and the treatment timeframe is usually is longer than six months.[4] Throughout this process, it is important to monitor the child's vision and follow-up with the eye care provider regularly to ensure efficacious treatment and avoid occlusion amblyopia in the good eye.[4]

Adherence to amblyopia treatment is often poor.[3,5,6] One aspect of patching that is often problematic for patients is treatment schedule adherence. Children may be resistant to wearing patches. Young children may throw temper-tantrums particularly with the initiation of new patching treatment[1] and may try to adjust the patch so that they can "peek," which makes the treatment ineffective.[4] Additionally, wearing a patch can be socially stigmatizing for children.[1] It is important for authority figures in the child's life to encourage patching and promote inclusivity.[1] Nonadherence can lead to slower vision improvement, a longer duration of treatment, and poorer outcomes.[4] Current literature has identified factors impacting compliance, but less is known about successful interventions to improve adherence.[7] This study's purpose is to identify parent attitudes towards amblyopia treatment and barriers to treatment compliance in order to inform future provider and multidisciplinary approaches to improve adherence.

Methods *(≥250 words)*

A survey instrument created was based on the Pediatric Eye Disease Investigator Group's (PEDIG) Amblyopia Treatment Index Patching and/or Atropine Questionnaires.[8] The survey assessed attitudes toward and difficulties with amblyopia treatments (specific questions detailed further in "Results" below), specifically patching and atropine. We later narrowed our results analysis to patching treatment alone, as atropine treatment responses were minimal and therefore less generalizable. A variety of response options were utilized by the survey tool, including multiple choice responses and write-in responses. Questions involving a treatment timeframe specified a 3-month timeframe. The survey tool was assessed for readability and literacy before implementation. As this research involved human subjects, IRB approval was obtained. This survey was anonymous and included no personal health information outside the date of the clinic appointment (and hence the survey administration), which was accessible only to certified members of the research team.

Parents and guardians of amblyopic patients ages 0 - 9 years old were recruited from a pediatric ophthalmology clinic at the Oregon Health & Science University Casey Eye Institute's Elks Children's Eye Clinic from May - December 2021. A digital information and consent sheet was provided at the start of the survey. The goal number of participants was at least 20 and up to 200. Participants were given surveys to complete in the waiting room before their child's clinic visit. The survey was administered using provided iPads and implemented in REDCap.

The survey responses were analyzed for the most frequently identified barriers to patching. Free text responses were analyzed for suggested improvements for support for patching. Data analysis was performed in Excel.

Results *(≥500 words)*

A total of 37 participants completed the survey; 34 of these were parents/caregivers of patients currently undergoing patching treatment for amblyopia. Boys accounted for 18 (53%) of children and the average child's age was 5 years old (range 1 - 8). Subjective patching ease and compliance were assessed (Tables 1 and 2). Twenty-four (71%) said that their child had difficulty with how the patch feels. Twenty-six (76%) indicated that their child easily wears the patch. Nineteen (56%) reported that their experience had gotten easier over time.

Write-in responses were collected. The most commonly reported (n = 32) hardest parts of patching were keeping the patch on (9; 28%) and remembering the treatment (7; 22%). Parents (n = 34) indicated that they thought better patch designs and quality (9; 26%) and rewards (6; 18%) could help. Respondents (n = 34) used rewards (21; 62%) and flexibility with patching time (15; 44%) to help encourage their child to wear the patch.

Detailed response breakdown and tables below.

Patching ease (past 3 months)						
	Always easy	Mostly easy	Sometimes easy	Sometimes difficult	Often difficult	Always difficult
Experience with patching	2 (6%)*	13 (38%)	6 (18%)	4 (12%)	5 (15%)	4 (12%)

Table 1: Patching ease (past 3 months). The majority of amblyopic patients' caregivers (62%) found patching to be sometimes to always easy.
* All percentages rounded.

Patching compliance (past 3 months)				
	Always	Mostly	Sometimes	Rarely
Daily patching was attempted	11 (32%)*	17 (50%)	4 (12%)	2 (6%)
Child was able to patch the full time prescribed	16 (47%)	12 (35%)	5 (15%)	1 (3%)
Parent remembered to	11 (32%)	19 (56%)	2 (6%)	2 (6%)

patch child every day				

Table 2: Patching compliance (past 3 months). Daily patching was attempted most to all of the time by the majority of participants (82%). Most amblyopic patients were able to wear the patch for the majority of the time prescribed (82%), with almost half always wearing the patch the full time prescribed. Participants typically remembered to patch their child (88%).
*** All percentages rounded.**

Multiple choice prompts

- **Over the past 3 months (single answer option) [also see Tables 1 and 2]**
  - **Patching has been sometimes – always easy (62%)**
    - **scale: Always easy, Mostly easy, Sometimes easy, Sometimes difficult, Often difficult, Always difficult**
  - **I have attempted to patch most – every day(s) (82%)**
    - **scale: Every day, Most days, Some days, Rarely**
  - **When patching, my child has been able to wear patch most – all time prescribed (82%)**
    - **scale: The full time prescribed, Most of the time prescribed, Some of the time prescribed, Little of the time prescribed**
  - **Remembered to patch most – every day(s) (88%)**
    - **scale: Every day, Most days, Some days, A few days**
- **When wearing patch, child has difficulty with… (multiple choice) [in descending order]**
  - **The way it feels (71%)**
  - **Skin rash or redness (15%)**
  - **Reading or doing schoolwork (15%)**
  - **Their appearance and the way others view them (12%)**
  - **Playing sports or being active (9%)**
  - **Drawing, writing, or coloring (3%)**
  - **Playing with toys (3%)**
  - **Other (write-in response prompted) (15%)**
- **When it is time to patch, my child complains but easily wears patch – happily complies (76%)**
  - **scale: Happily wears patch, Complains but easily wears patch, Cries or fights patch, Refuses to wear patch**
- **If child was in treatment over 3 months, experience has gotten a little easier – gotten much easier (56%)**
  - **scale: Gotten much easier, Gotten a little easier, Has not changed, Gotten a little harder, Gotten much harder, Not applicable**
  - **NOTE: "Not applicable" 9%**

Write-in responses - for participants who found any difficulties with patching

- **Hardest part of patching? [Top 3 responses]**
  - **Keeping patch on (28%)**
  - **Remembering to patch or remove patch (22%)**
  - **Child's discomfort (13%)**
- **What could help? [Top 3 responses]**
  - **Fun patch designs (18%)**
  - **Rewards (15%)**
  - **Better access to and lower cost of patches (12%)**
- **What have you done already to help? [Top 3 responses]**

- **Rewards (62%)**
- **Flexible treatment time (skip days, gradually increasing treatment time) (44%)**
- **Distraction and/or screen time (18%)**

Discussion *(≥500 words)*

This study suggests that while most parents at our clinic found patching sometimes-to-usually manageable by various metrics, many (12% - 38%, with variation depending on the metric) had significant difficulties implementing treatment for various reasons including their child's discomfort with treatment and remembering to apply treatment, which is consistent with the literature.[1] Additionally, almost half of our respondents found that treatment was either the same if not more difficult over the past three months. Suggestions for improvement included improved comfort in patch design, positive reinforcement, and better access to patching supplies.

There are some limitations with this study. Despite our attempts to ensure that survey responses were anonymous, participant bias could still occur in that participants were individually recruited at an office appointment versus being offered a survey electronically in a less personal setting (for example, as a mass email to a home computer). Another limitation of our study is that sampling bias may have occurred; parents who were compliant with follow-up visits constituted the population pool from whom we requested participants, and therefore may have had more success with treatments than the general population who may have missed follow-up appointments. A third limitation was that our survey was only provided in English, so this meant that persons who were not proficient in reading and comprehending English would not have been able to participate.

This data has already been used to inform further reach with our group. Using this data to guide inquiry, we next sought to capture a larger population size over multiple time points. We therefore adjusted the study protocol to include a restrospective chart review of 150 current amblyopia patients being treated with glasses, patching, or atropine eyedrops at OHSU to discover patterns of treatment and follow-up noncompliance. Groups who were treated with either glasses or patching were divided by how many visits they had had for their amblyopia diagnosis. Atropine-treated children constituted a separate group. Understandably, less compliance data was found for the 1-visit group. Of the 2-5+ visit (glasses and/or patching) and atropine groups, 89% - 100% and 82% of the these children had compliance information, respectively. Most compliance information described quantity and quality (93.1%) of compliance, whereas only 50% of these charts included reasons for why a child was noncompliant. Common reasons for noncompliance included broken glasses, lost glasses, sensory issues, and difficulties with fit or materials.

Additionally, data reported in this report has been used to create a survey that assesses anticipated difficulties with amblyopia treatment for parents/guardians of newly diagnosed children with amblyopia. This survey is being administered optionally after a newly diagnosed child's amblyopia diagnosis visit. The goal of obtaining this data is to inform improvements in initial education and explore early interventions with the goals of decreasing proportion of patients lost to follow-up early in treatment course.

Our group would also like to explore how difficulties with amblyopia treatment correlates with the amount of time undergoing treatment, and has made IRB adjustments to be able to adjust the survey detailed in this current project to include minimal pertinent personal health information of amblyopic patients so that chart reviews can be done on patients actively receiving treatment who present for clinic

visits and opt-in via the modified survey tool. Patient name, date of birth, and visit date will be used look up how many visits the patient has had for their amblyopia.

Our group hopes to translate both the modified attitudes toward and difficulties with amblyopia treatment and the initial diagnosis surveys into Spanish, and has gotten IRB approval for this in addition to reaching out to OHSU's translation services team to get a translation cost estimate.

Ultimately, we hope to use results of these surveys to inform patient and parent/guardian education, provide resources suggested by parents/guardians in surveys, assess usefulness of interventions, and incorporate multidisciplinary psychosocial support to amblyopic patients and their parents/guardians.

Conclusions *(2-3 summary sentences)*

This study suggests that while most parents at our clinic found patching manageable, many had significant difficulties such as logistical issues and discomfort, which is consistent with the literature.[1] Suggestions for improvement included improved comfort in patch design and positive reinforcement. Goals for further study include linking difficulties with treatment and its duration, evaluating parent suggestions, and determining whether adjustments based on survey data improve adherence.

References *(JAMA style format)*

1. American Association for Pediatric Ophthalmology & Strabismus. Amblyopia. 2019. Updated January 2021. Accessed February 7, 2023. https://aapos.org/glossary/amblyopia

2. Wallace, DK, Repka, MX, Lee, KA, et al. Amblyopia Preferred Practice Pattern. *AAO Journal.* 2017;125(1):P105-P142.

3. Vagge A, Nelson LB. Compliance with the prescribed occlusion treatment for amblyopia. *Curr Opin Ophthalmol.* 2017;28(5):454-459.

4. Coats, DK, Paysse, EA. Amblyopia in children: Management and outcome. UpToDate. 2019. Updated January 12, 2023. Accessed February 8, 2023 from https://www.uptodate.com/contents/amblyopia-in-children-management-and-outcome

5. Wallace MP, Stewart CE, Moseley MJ, et al. Compliance with occlusion therapy for childhood amblyopia. *Invest Ophthalmol Vis Sci.* 2013;54(9):6158-6166.

6. Stewart CE, Moseley MJ, Stephens DA, Fielder AR. Treatment dose-response in amblyopia therapy: the Monitored Occlusion Treatment of Amblyopia Study (MOTAS). *Invest Ophthalmol Vis Sci.* 2004;45(9):3048-3054.

7. Dean, SE, Povey, RC, Reeves, J. Assessing interventions to increase compliance to patching treatment in children with amblyopia: a systematic review and meta-analysis. *Br J Ophthalmol.* 2016;100(2):159-165.

8. Cole, SR, et. al. The Amblyopia Treatment Index. *J AAPOS.* 2001;5:250-254.