

## I. Title

Envision 20/20 by 2020: The identification, prevention and treatment of pediatric eye impairment in rural India.

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## II. Introduction

The World Health Organization (WHO) estimates that approximately 314 million people are visually impaired worldwide with 90% of this impairment originating in low income countries. Moreover, the WHO estimated that 49% of this impairment is the result of uncorrected refractive errors such as myopia, hyperopia, and/or astigmatism [1]. In up to 85% of these cases, early detection and cost effective interventions could have restored vision [1]. As children do not complain of visual difficulties, screening becomes especially important to avoid lifelong permanent visual impairment, social development, and loss of productivity. The US Preventative Services Task Force, the American Academy of Pediatrics, the Association of Pediatric Ophthalmology and Strabismus, the American Academy of Ophthalmology, the Maternal and Child Health Bureau, and the National Eye Institute all recommend screening to detect amblyopia, strabismus, and defects in visual acuity in children younger than age 5 years [2, 4-5]. Visual impairment in children is most effectively addressed through early interventions and has been shown to lead to better outcomes. It is for this reason that increasing preschool vision screening has been identified as one of the 10 objectives in Healthy People 2010.

## [Soft Break] III. Goals and Objectives

- a) Increase awareness of the causes of avoidable blindness and the resources available to eliminate them
- b) Screen 3000 underserved children including those with special needs
- c) Provide effective and cost effective treatments including:
  - correction of refractive error
  - treatment of allergies, inflammations, infections
  - referral to surgical centers if necessary
- d) Coordinate appropriate follow up through training of local personnel
- e) Continue monitoring the vision of the children screened over the course of the next 5 years through the utilization of local partnerships
  - Lions Club International
  - Dr. Mahesh Agrawal
  - Dr. Sangeeta Mewara
  - Dr. Rajendra Malviya
  - Dr. Rahul Mewara

**IV. Project design** [Soft Break][Soft Break] Approximately 3000 children between the ages of 36 months and 59 months residing in rural Madhya Pradesh, India will be screened for visual impairment including refractive error, amblyopia, strabismus, and astigmatism, which affect 5-10% of preschool aged children in the US. Eye evaluation [3-5] will include:

1. Ocular history
2. Vision assessment
3. External inspection of the eyes and lids via photoscreening
4. Ocular motility testing
5. Pupil examination
6. Red reflex examination
7. Ophthalmoscope examination
8. Visual acuity measurement using LEA symbols (Figure 1)
  1. Test distance 10 ft
  2. Pretest:
    1. Binocularly where the child will identify the symbols at a suprathreshold line such as 20/100
    2. The child must successfully identify 3 of 4 optotypes to demonstrate an understanding
  3. Test procedure:
    1. Monocular testing
    2. To proceed, 3 out of 4 optotypes on the previous line will have to be identified (critical lines 20/40 at 36-48 months, 20/30 at 48-59 months)
    3. If refractive error suspected, retinoscopy will be utilized for refraction.
9. Stereopsis screening with random dot stereogram (binocularly done with polarized glasses)
  1. Test distance: 40cm (630 arc sec)
  2. Pretest:
    1. identify the location of the 3D E on 4 of 5 trials
  3. Test procedure:
    1. Test the child's ability to identify the location of the stereo E.
    2. Tester should use 5 presentations, varying location in a nonsystematic manner.
10. Intraocular pressure measurement attempted

## V. Budget

1. Requested:
  1. Welch Allyn 3.5v Ophthalmic Set with Autostep Coaxial Ophthalmoscope, Spot retinoscope- Amazon.com \$801
  2. Welch Allyn PanOptic Ophthalmoscope with Cobalt Blue Filter and Corneal Viewing lens- Amazon.com \$560
  3. Glasses - \$1000 (\$2/pair, 500 pairs)
  4. Eye charts (LEA)- \$300
  5. Misc (Flashlights, Tape/eye patches, paper cups, pencil, paper, tape measures, global electronic converters) - \$400
  6. TOTAL: \$3061

2. Donations:
  1. Lens rods and free lenses for retinoscope - UPMC Eye and Ear Infirmary
  2. Tonopen- Northeastern Ohio Universities College of Medicine and Pharmacy Ophthalmology Interest Group
  3. Eye medications - Alcon, Allergan, AMO, B&L
  4. Pediatric LEA charts with light box (5)- Prevent Blindness Ohio
  5. Stereopsis screening with random dot stereogram (5)- Prevent Blindness Ohio

## VI. Measurable outcomes

1. Provide objective data on the effectiveness school based vision screenings in Khalgat and Bardwani, India
  1. Number of children screened
  2. Ability to screen children based on age and testing method
  3. Number of children identified with visual impairment
  4. Number of children effectively treated
  5. Long term outcomes followed annually for 5 years
    1. Rate of follow up
    2. Cost and benefit analysis of screening program
    3. The functional impact of visual impairment

## VII. References

- [1]. World Health Organization. (2009). Blindness and Visual Impairment: Global facts. Retrieved Oct 4, 2010, from [www.vision2020.org](http://www.vision2020.org)
- [2]. U.S. Preventive Services Task Force (2004). Screening for Visual Impairment in Children Younger than Age 5 Years. *Ann Fam Med.* 2:263-266.
- [3]. EE Hartmann, GE Bradford, PK Nottingham Chaplin, T Johnson, AR Kemper, S Kim, and W Marsh-Toole (2006). Project Universal Preschool Vision Screening: A Demonstration Project. *Pediatrics.* 117(2): 226-237.
- [4]. American Academy of Pediatrics, American Association of Certified Orthoptists, American Association for Pediatric Ophthalmology and Strabismus, and American Academy of Ophthalmology Joint Policy Statement (2003). Eye Examination in Infants, Children, and Young Adults by Pediatricians. *Pediatrics.* 111(4): 902-907.
- [5]. EE Hartmann, V Dobson, L Hainline, W Marsh-Toole, GE Quinn, MS Ruttum, PP Schmidt, and K Simons on behalf on the Maternal and Child Health Bureau and National Eye Institute Task Force on Vision Screening in the Preschool Child (2000). Preschool Vision Screening: Summary of a Task Force Report. *Pediatrics.* 106: 1105-1116.

## VIII. Tables and Figures

[Figure 1.] LEA symbols