

Diagnostic Accuracy of the Spot Vision Screener in a Pediatric Ophthalmology Clinic in Nepal



Gopal Bhandari 1 , Manisha Shrestha 1,Julis Oatts 2,Sadhan Bhandari1, Jeremy Keenan2,Puspa Giri1

Bharatpur Eye Hospital, Bharatpur, Nepal

Department of Ophthalmology, University of California San Francisco; San Francisco, CA



Introduction

- Worldwide, more than 500,000 children become blind each year, and 75% of blind children live in low- and middle-income countries (LMICs),where screening for preventable cause of vision loss is often limited or non existent.
- Conditions like strabismus and amblyopia, major causes of childhood blindness, are preventable through early detection and timely treatment. Screening interventions can significantly reduce the risk of vision loss in children.
- The Spot vision screener (Welch Allyn) is a portable, handheld device that has shown promising results in detecting refractive errors and eye misalignment, with reasonable sensitivity and specificity in various settings.
- This study aims to assess its accuracy in Nepal's clinic-based environment.

Methods

- This was a prospective study conducted at Bharatpur Eye Hospital, involving children aged 3-8 years seeking routine care, Participants were randomized, with 50% of eligible children enrolled in the study.
- A trained ophthalmic assistant performed photoscreening using the Spot vision screener device, followed by a comprehensive eye examination by a masked pediatric ophthalmologist.
- The device provided results indicating either “Complete Eye Exam Recommended” or “All Measurements in Range,” based on predefined screening thresholds from AAPOS guidelines.
- The ophthalmologist assessed for amblyopia, strabismus, and other vision-threatening conditions, with all procedures adhering to ethical standards and obtaining informed consent.

Results

- Total eligible children 190 and 95 patients were randomized for enrollment in the final study. The mean age was 6.4±1.4 years and 63.2% male.
- 24.2% had amblyopia and 8.4% had strabismus at near. 4.2% had non-amblyopia, non- strabismus referral-warranted disease.
- The referral rate from spot was 40.4%. Of the referred children , 52.6% had amblyopia and 15.8% had strabismus.
- AUC was highest for amblyopia (0.81) and least for the referral warranted diseases(0.42).
- The spot under-estimated spherical power and over-estimated cylindrical power.

Table-1 Diagnostic accuracy of spot

Condition	Sensitivity(95%CI)	Specificity(95%CI)
Any eye disease	81.5% (61.9-93.7%)	76.5% (64.6-85.9%)
Amblyopia	87.0% (66.4-97.2%)	75.0% (63.4-84.5%)
Strabismus	75.0% (34.9-96.8%)	63.2% (52.2-73.3%)
Referral-warranted disease	25.0% (0.60-80.6%)	59.3% (48.5-69.5%)

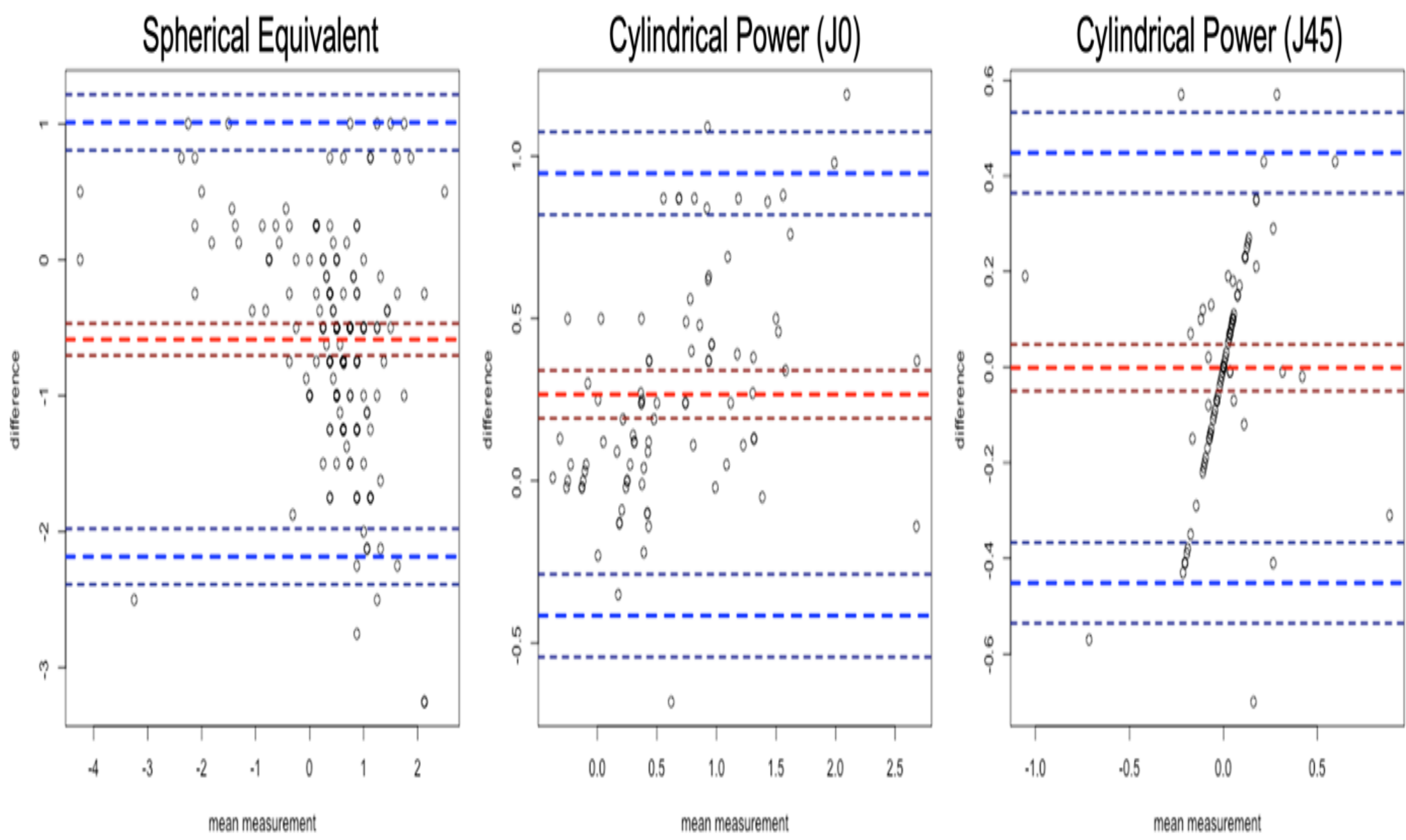


Fig1-Diverging dot plot demonstrating difference between retinoscopy and spot findings

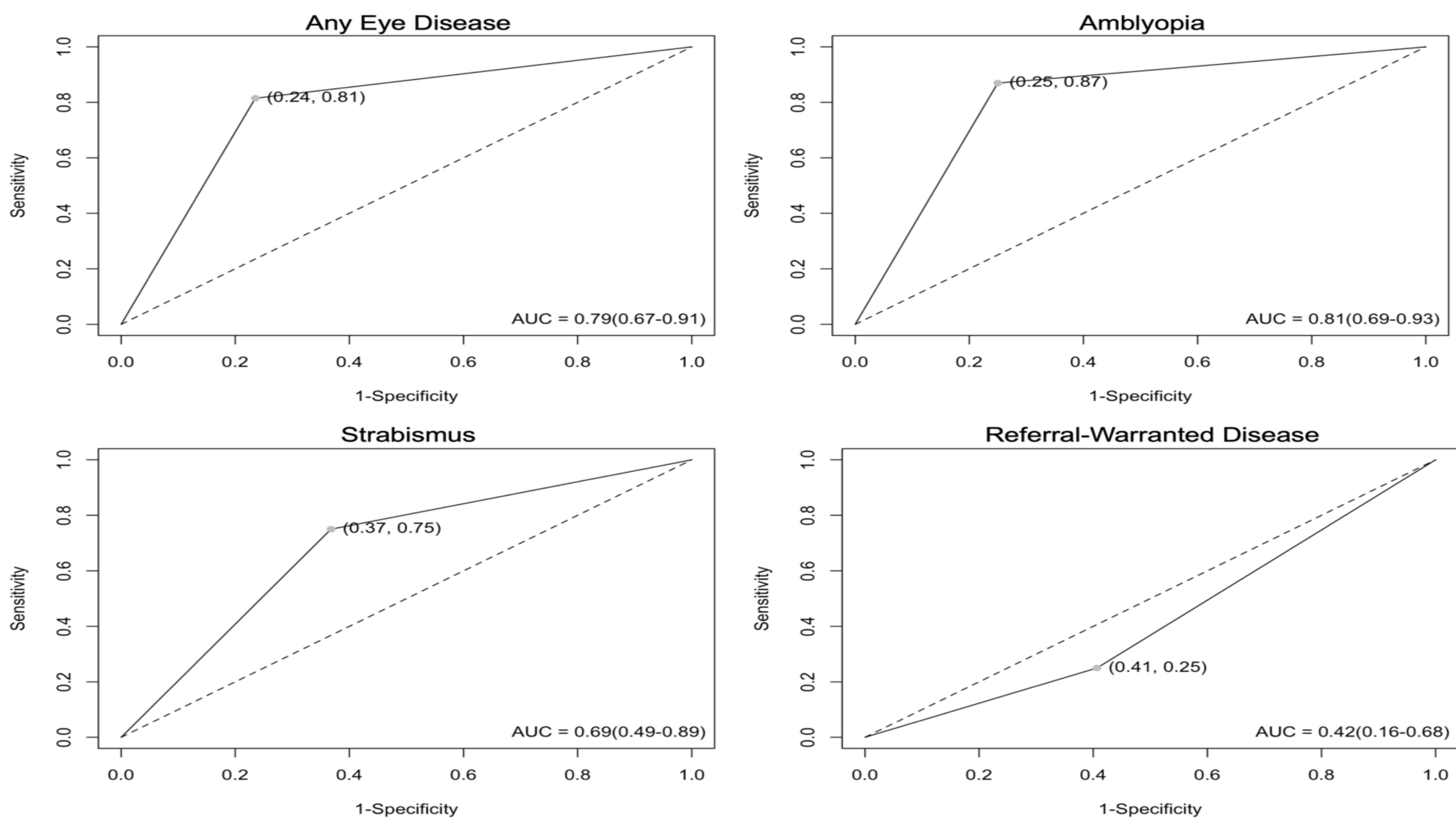


Fig2-Area under the Receivers Operating Characteristic curve

- The device performed poorly for non-strabismus, non-amblyopia referral-warranted disease and also under-estimated spherical power and over-estimated cylindrical power.
- Future studies or program using this screening device in low resource settings should consider these limitations in diagnostic accuracy and over-referral

Conclusion

- In our study, the Spot vision screener performed better in the detection of amblyopia (sensitivity 87.0%, specificity 75.0%) than strabismus (sensitivity 75.0%, specificity 63.2%).

Challenges

- Identifying potential research topics
- Inadequate knowledge in different study designs and sampling
 - Data analysis
 - Implication of research finding in real situation
 - Resource and time management