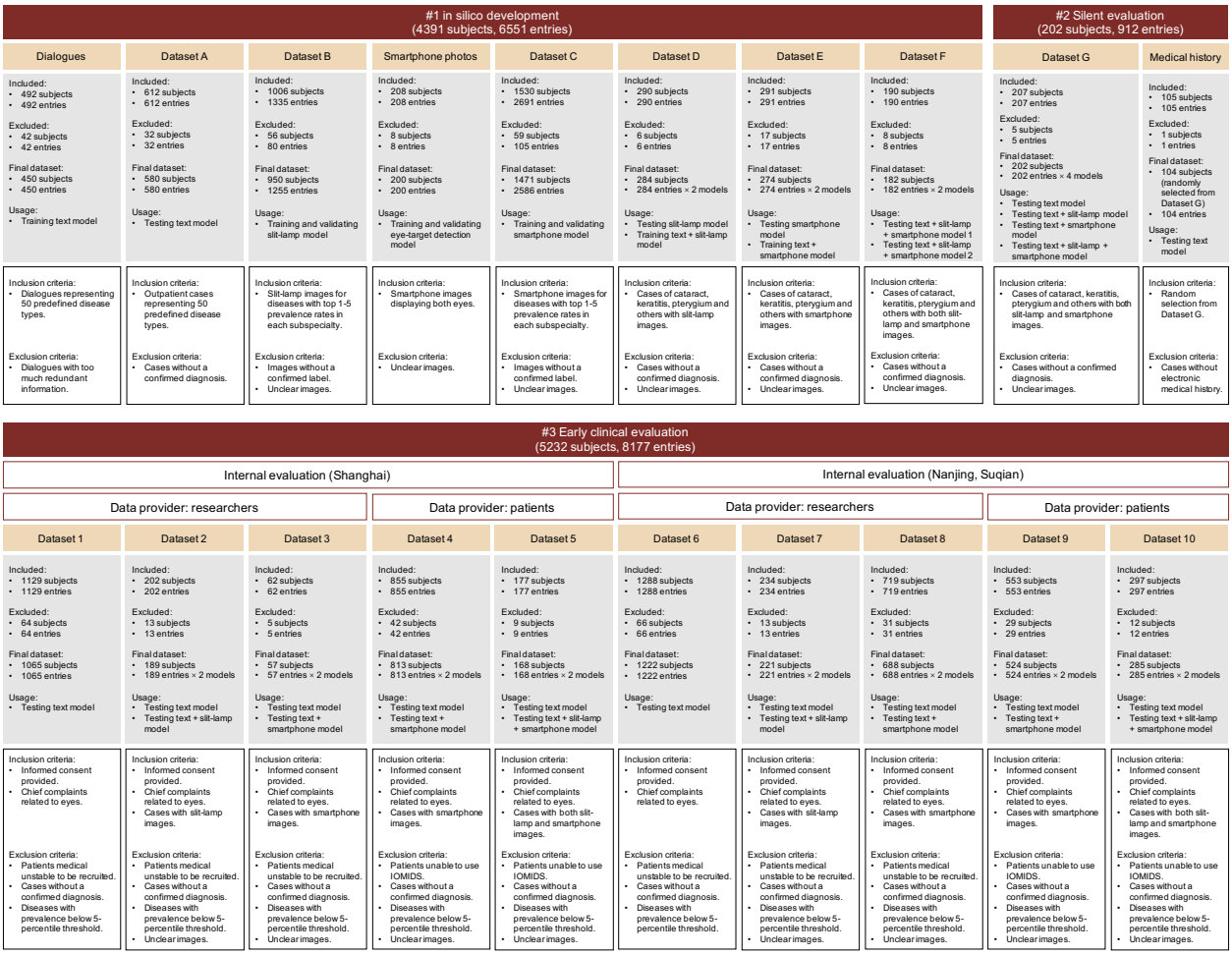
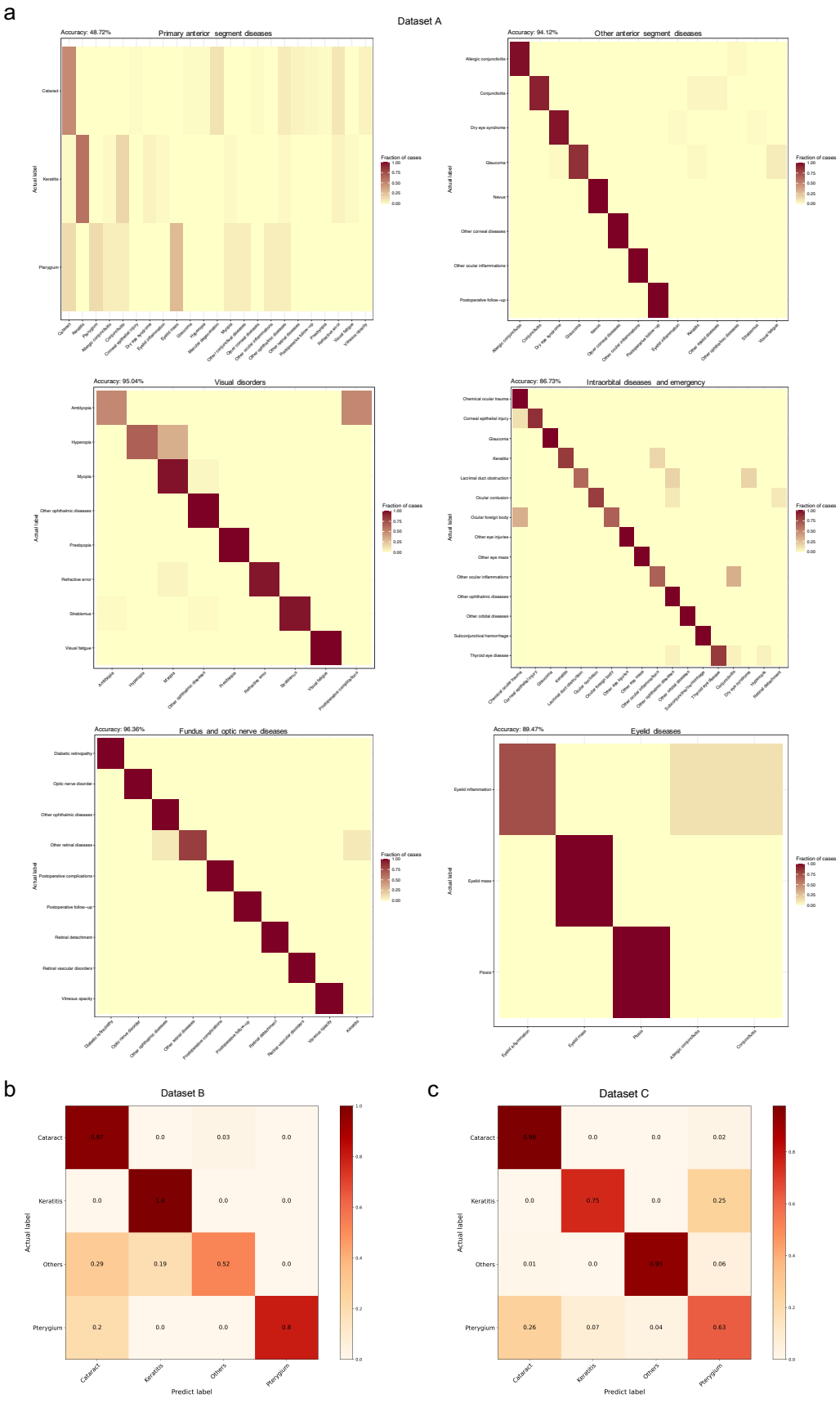
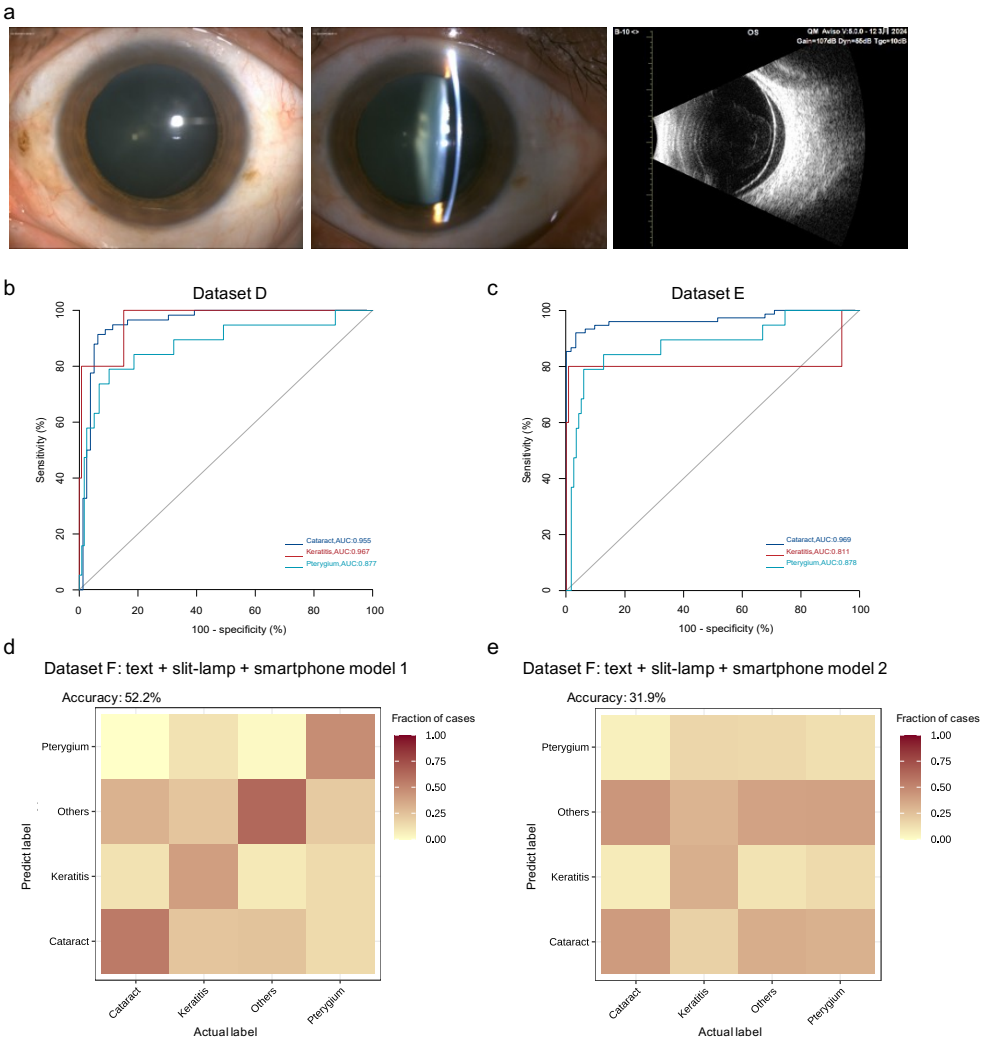


Supplementary Figure 1 Flowchart of model development and clinical evaluation. Our study consists of a development stage and two evaluation stages of cross-sectional study. During the in silico development stage, we developed a multimodal AI system using ChatGPT and anterior segment images captured by slit-lamp and/or smartphone to facilitate the diagnosis and triage of ophthalmic diseases. During the first evaluation stage (silent evaluation), we aim to evaluate the AI system's performance based on medical histories obtained through observation without patient interaction alongside slit-lamp and/or smartphone images. During the second evaluation stage (early clinical evaluation), we aim to evaluate the AI system's performance in outpatient clinics based on medical histories obtained through patient interview or self-reported information, combined with slit-lamp and/or smartphone-captured anterior segment images.

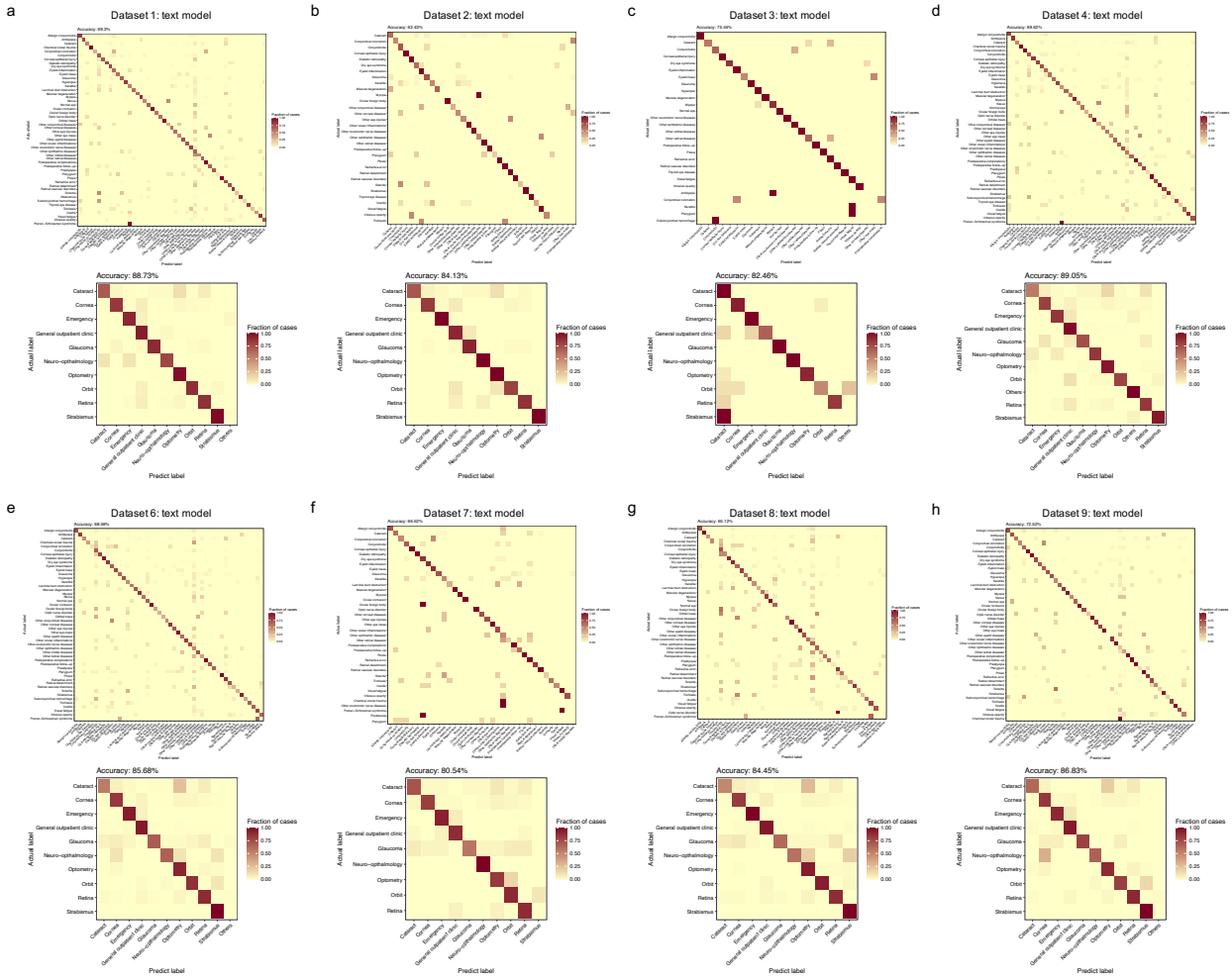

a
Dataset A
Accuracy: 48.72%
Primary anterior segment diseases
Accuracy: 94.12%
Other anterior segment diseases
Accuracy: 95.04%
Visual disorders
Accuracy: 86.73%
Intraorbital diseases and emergency
Accuracy: 96.36%
Fundus and optic nerve diseases
Accuracy: 89.47%
Eyelid diseases
Actual label
Fraction of cases
b
Dataset B
Cataract
Keratitis
Others
Pterygium
0.97
0.0
0.03
0.0
0.0
1.0
0.0
0.0
0.29
0.19
0.52
0.0
0.2
0.0
0.0
0.8
Predict label
c
Dataset C
0.98
0.0
0.0
0.02
0.0
0.75
0.0
0.25
0.01
0.0
0.93
0.06
0.26
0.07
0.04
0.63

Supplementary Figure 2 Confusion matrix obtained during the development stage. a, Confusion matrix illustrating diagnostic performance of the text model across six major classifications after in silico evaluation (Dataset A). **b,** Confusion matrix illustrating diagnostic performance of the slit-lamp model in the validation set (Dataset B). **c,** Confusion matrix illustrating diagnostic performance of the smartphone model in the validation set (Dataset C).

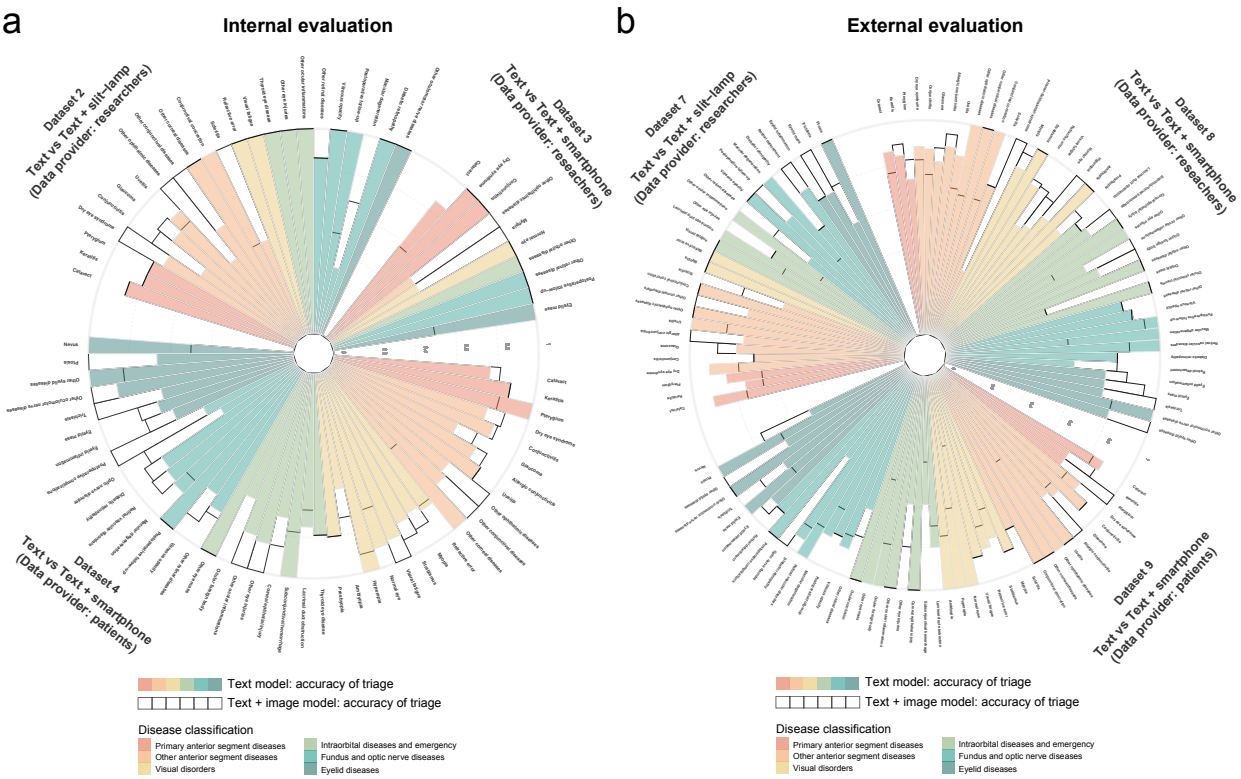


Supplementary Figure 3 Clinical rationale behind the threshold method for image model. a, The slit-lamp images (left and center) show a 52-year-old male with a right eye cataract. However, considering his medical history of sudden visual obstruction for three days and the B-scan ultrasound (right), the primary diagnosis is right eye retinal detachment, with a secondary diagnosis of right eye cataract. This indicates that image information may not necessarily represent the primary diagnosis but can suggest possible diagnoses and help rule out unlikely

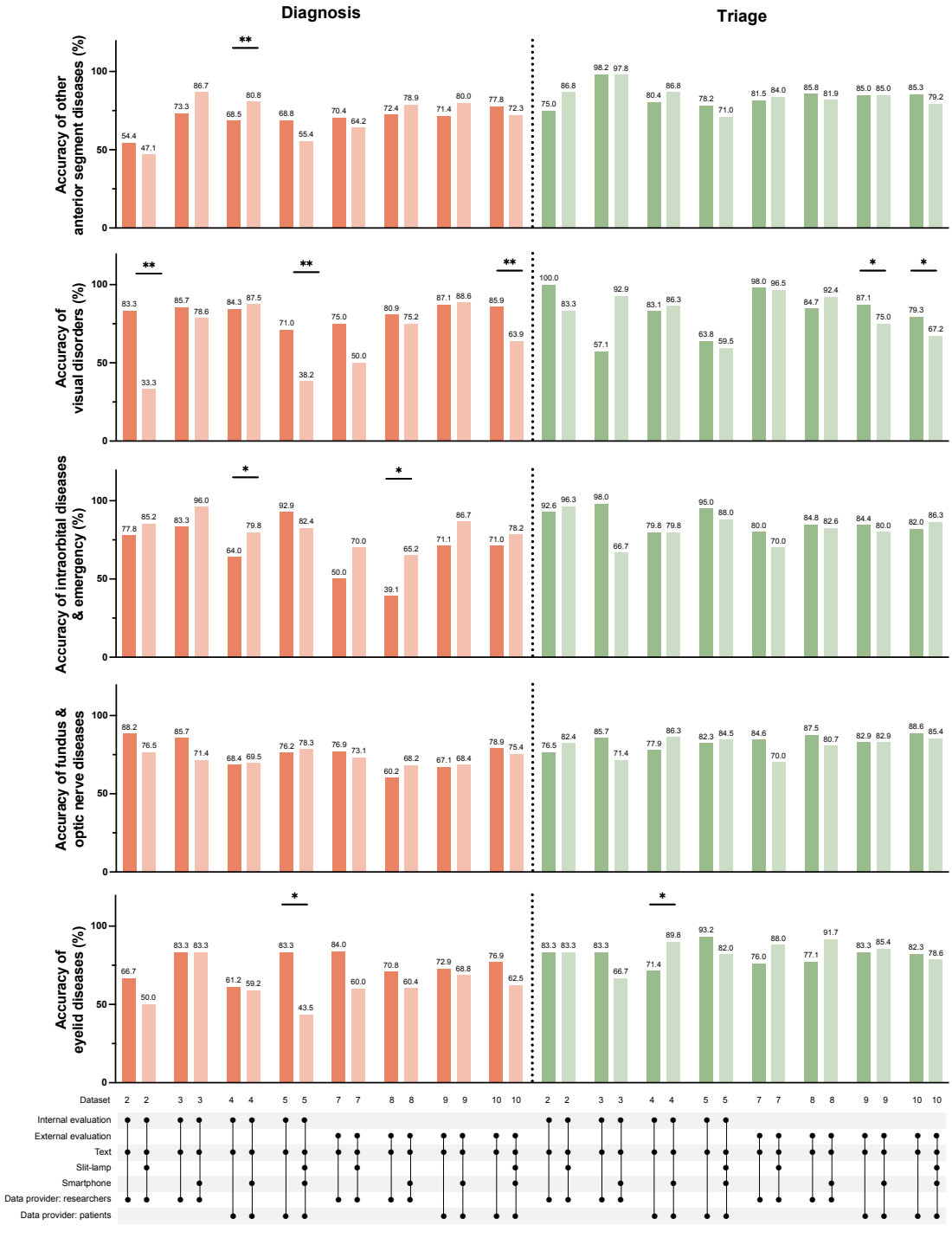
ones in clinical evaluation. **b-c,** Receiver operating characteristic (ROC) curves and corresponding AUCs for cataract, keratitis, and pterygium in Dataset D (b) and Dataset E (c). The curves are used to determine the thresholds for achieving high specificity in all three diseases. **d-e,** Confusion matrix illustrating diagnostic performance of the text + slit-lamp + smartphone model 1 (d) and the text + slit-lamp + smartphone model 2 (e) in the testing datasets. AUC = area under the curve.



Supplementary Figure 4 Confusion matrix obtained during the early clinical evaluation stage. Confusion matrix illustrating the diagnosis (upper) and triage (lower) performance of the text model during internal evaluations in Dataset 1 (a), Dataset 2 (b), Dataset 3 (c), and Dataset 4 (d), as well as external evaluations in Dataset 6 (e), Dataset 7 (f), Dataset 8 (g), and Dataset 9 (h). Overall accuracy for each dataset is noted in the top-left corner.

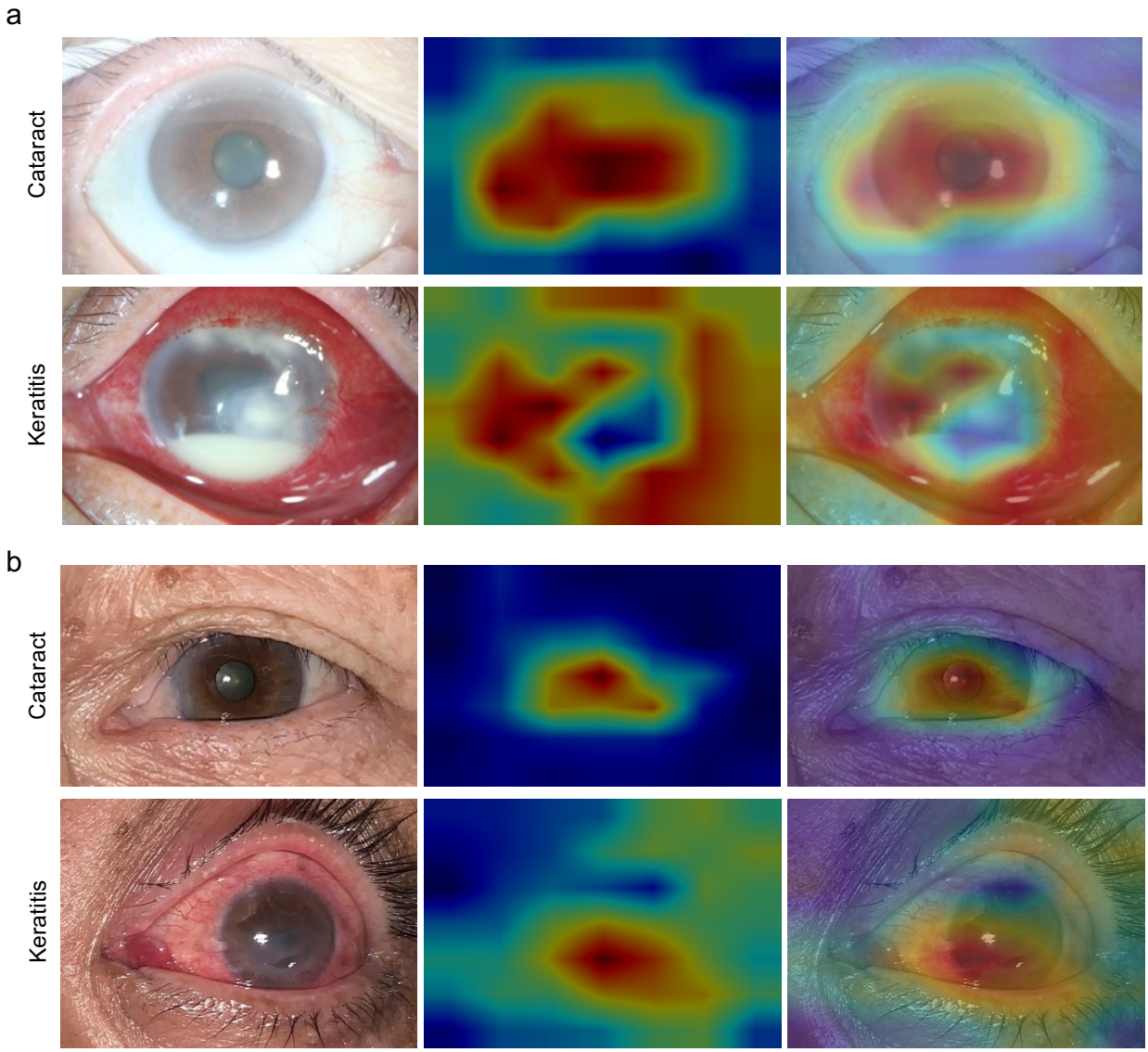


Supplementary Figure 5 Internal and external evaluation of IOMIDS performance on triage. Circular stacked bar charts of disease-specific triage accuracy across different models from internal (a, Dataset 2-4) and external (b, Dataset 7-9) evaluations. Solid bars represent the text model, while hollow bars represent multimodal models. No asterisk is provided because there are no significant differences in triage accuracy between the two models according to Fisher's exact test.

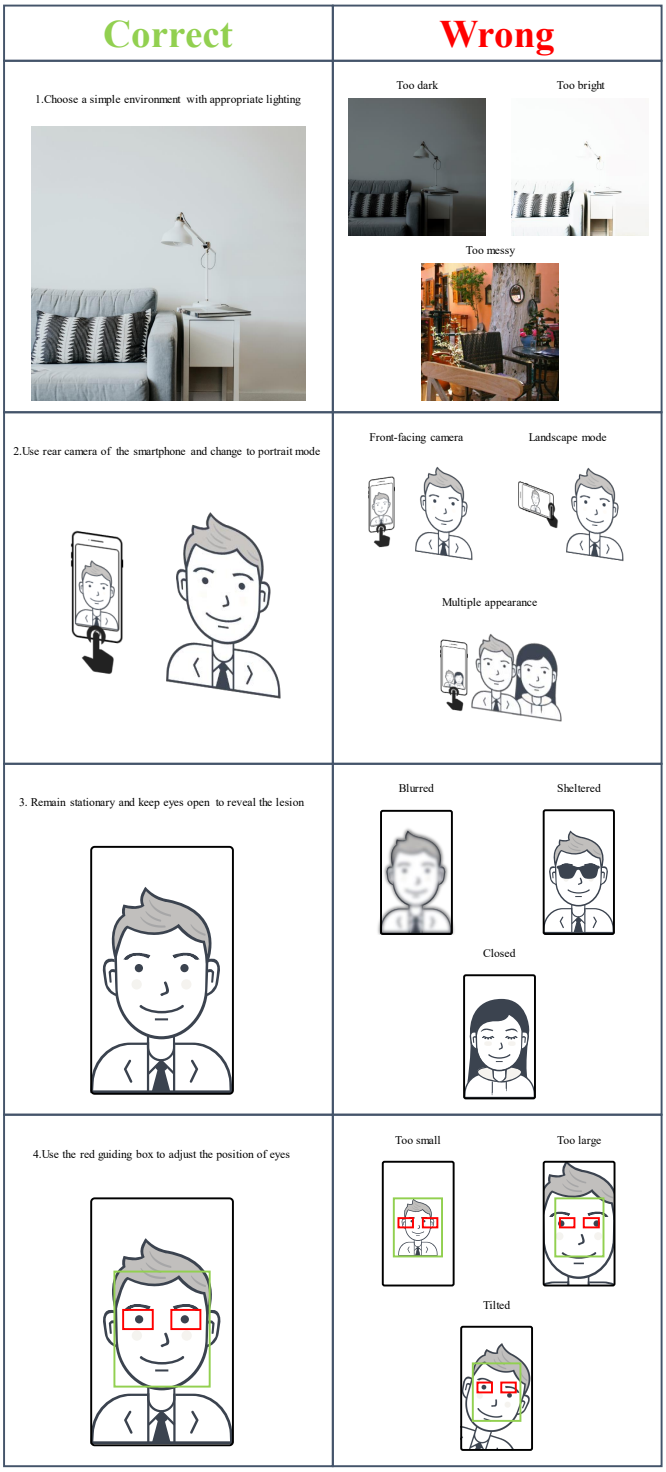


Supplementary Figure 6 Clinical evaluation of IOMIDS performance on diagnosis and triage across disease classifications. Bar charts depict diagnosis (red) and triage (green) performance for different models in Dataset 2-5 and Dataset 7-10. The y-axis title specifies the disease classification shown in each bar chart. The line graphs below indicate study centers

(internal, external), models (text, text + slit-lamp, text + smartphone), and data providers (researchers, patients). * P<0.05, ** P<0.01.



Supplementary Figure 7 Class activation maps of multimodal models. Typical slit-lamp captured images (a) and smartphone-captured images (b) for cataract and keratitis cases, along with their corresponding class activation maps (middle and right) generated from respective multimodal models.



Supplementary Figure 8 Detailed instructions for obtaining high-quality smartphone-captured eye photos. Before entering the photographing process, the system guides patients to use the rear-facing camera. During the photographing process, the system requires the patient's eye and facial position to be within the corresponding red and green boxes.

Supplementary Table 1 Summary of the clinical datasets based on study center

Center	Shanghai (n=2292)	Nanjing (n=1748)	Suqian (n=1192)	*P* value
Subspecialty, n(%)				**<0.0001**[a]
Outpatient clinic	574 (25.0%)	309 (17.7%)	231 (19.4%)	
Cornea	479 (20.9%)	362 (20.7%)	234 (19.6%)	
Cataract	308 (13.4%)	231 (13.2%)	98 (8.2%)	
Optometry	224 (9.8%)	305 (17.4%)	193 (16.2%)	
Glaucoma	202 (8.8%)	120 (6.9%)	71 (6.0%)	
Retina	188 (8.2%)	171 (9.8%)	115 (9.6%)	
Orbit	160 (7.0%)	123 (7.0%)	117 (9.8%)	
Strabismus	49 (2.1%)	62 (3.5%)	71 (6.0%)	
Emergency	82 (3.6%)	44 (2.5%)	50 (4.2%)	
Neuro−ophthalmology	26 (1.1%)	21 (1.2%)	12 (1.0%)	
Disease classification, n (%)				**<0.0001** [a]
Primary anterior segment diseases (cataract, keratitis, pterygium) [c]	372 (16.2%)	328 (18.8%)	163 (13.7%)	
Other anterior segment diseases	655 (28.6%)	544 (31.1%)	353 (29.6%)	
Vision disorders	617 (26.9%)	335 (19.2%)	354 (29.7%)	
Intraorbital diseases and emergency	257 (11.2%)	149 (8.5%)	87 (7.3%)	
Fundus and optic nerve disorders	261 (11.4%)	231 (13.2%)	164 (13.8%)	
Eyelid diseases	130 (5.7%)	161 (9.2%)	71 (6.0%)	
Sex, n (%)				**<0.0001** [a]
Male	1101 (48.0%)	794 (45.4%)	635 (53.3%)	
Female	1191 (52.0%)	954 (54.6%)	557 (46.7%)	
Age (mean ± SD)	39.2 ± 24.6	45.5 ± 22.8	36.1 ± 23.9	**0.005** [b]

Laterality, n (%)				**0.0138** [a]
Unilateral	936 (40.8%)	652 (37.3%)	435 (36.5%)	
Bilateral	1356 (59.2%)	1096 (62.7%)	757 (63.5%)	
Visit type, n (%)				0.6120 [a]
First visit	1849 (80.7%)	1402 (80.2%)	974 (81.7%)	
Follow-up	443 (19.3%)	346 (19.8%)	218 (18.3%)	

[a] *P* values were calculated using two-sided Fisher's exact test. Bold indicates statistical significance.
[b] *P* value was calculated using two-sided t-test. Bold indicates statistical significance.
[c] Due to the critical role of cataract, keratitis, and pterygium in image model development, they are classified and analyzed separately.

Supplementary Table 2 Examples of prompts used for prompt engineering during development of text model.

Theme [a]	Chief complaint	Physician's questions	Patient's answers	Physician's medical advice
Dry eye	My eyes feel extremely dry. I can hardly open my eyes in the afternoon and evening. I need to blink all the time. I usually wear contact lenses.	1. Do your eyes itch? 2. Do you sneeze frequently?	1. They do itch. 2. A little frequently.	Based on the information you provided, your diagnosis may be dry eye syndrome or allergic conjunctivitis. It is recommended to see a corneal specialist and use anti-inflammatory and dry eye drops. Hormone drugs should not be used for more than 2 weeks. Wear contact lenses less often. Reduce eye use and rest enough. Don't stay up late.
Itchy eye	I've always had a rhinitis which would lead to conjunctivitis when getting serious. I came to see a doctor in March and was prescribed cyclosporine.	1. Are your eyes feeling itchy now? Do you have a lot of eye secretion?	1. My eyes are not as itchy as before. Every morning when I wake up, my eyes are dry. There are some dry secretion instead of brushed secretion in the past.	Based on the information you provided, your diagnosis may be allergic conjunctivitis. It is recommended that you see a corneal specialist. Continue to use eye drops.
Eye swelling	My intraocular pressure has always been very high at about 30. I have a swelling and sore sensation with my eyes.	1. Have you checked the corneal endothelium? 2. Has your intraocular pressure been high before?	1. I did, and they said that the cornea is a little thick. 2. Yes, it has been high since I was a child.	According to the information you provided, your diagnosis may be glaucoma. It is recommended to see a glaucoma specialist. According to your description, it is necessary to complete the glaucoma examination, but other causes cannot be ruled out.
Eye pain	My left eye is swollen and painful. It was a little painful the day before yesterday and got swollen yesterday.	1. Does it hurt when you press it? 2. Did you stay up late recently? 3. Are there any other symptoms?	1. Yes, it does. 2. A lot. 3. There are no other problems.	Based on the information you provided, your diagnosis may be blepharitis. It is recommended to see a corneal specialist. You need to use antibiotic eye drops for treatment, eat a light diet, and drink less tea or coffee. Apply hot compresses to your eyes before going to bed at night. Don't stay up late.
Eye discharge	My child began to have a lot of eye discharge since	1. Which eye? 2. Is he allergic to anything?	1. Both eyes. 2. He is allergic to some food.	Based on the information you provided, your diagnosis may be conjunctivitis. It is recommended that you see a corneal

	yesterday. His eyes are sticky and red.			specialist. You need to use eye drops for treatment and pay attention to eye hygiene. If there is no improvement in a week, you need to go to the ophthalmology clinic for a follow-up examination in time.
Eye masses	I have a small fleshy growth on my eye.	1. When did it grow? Has it grown bigger?	1. It grew when my eye was itchy before. It has been there ever since, and has not grown bigger.	Based on the information you provided, your diagnosis may be a conjunctival tumor. It is recommended that you see a specialist of orbital and ocular tumors.
Blurry vision	I can't see.	1. How long have you been unable to see? Can't you see anything? 2. Do you have a high blood pressure or diabetes? Do you have any other health problems?	1. It started in the second half of last year. I can't see clearly. 2. I have a high blood pressure, but no other problems.	Based on the information you provided, your diagnosis may be age-related cataracts. It is recommended that you see a cataract specialist. However, other eye diseases, such as retinopathy, need to be ruled out.
Eye injuries or foreign bodies	I hit my eye while playing basketball, and now I occasionally feel a black object floating in my eye.	1. When did you hurt your eye? 2. Do you feel a foreign body sensation?	1. One month ago. 2. There is no foreign body sensation. But I feel like hair or blood floating in my eye.	Based on the information you provided, your diagnosis may be vitreous opacity. It is recommended that you see a retinal specialist. It may be secondary to eye trauma. It is recommended to take a B-ultrasound and intraocular pressure test to rule out retinal lesions. If there are no special problems found, you can ignore the vitreous opacity and it will get better in the future.
Proptosis	I felt a little dizzy and tearful a while ago, so I went for a checkup. A cavernous hemangioma was found in my left orbit last week. I feel that my left eye is bulging.	1. How long have you been feeling bulging with your eye? 2. Do you have any other problems in your body, such as high blood pressure, diabetes, hyperthyroidism, etc.? 3. Do you see one thing as two? 4. Do you feel that your eyes change a lot when you lower your head?	1. One month. 2. No. 3. No. 4. I don't feel an obvious change.	Based on the information you provided, your diagnosis may be orbital cavernous hemangioma. It is recommended to see a specialist in orbital diseases and eye tumors. A CT scan is needed. The tumor is not growing fast. You can consider observation or surgical treatment. Surgery carries the risk of blindness.

[a] The themes are categorized based on chief complaints.

Supplementary Table 3 Univariate logistic regression for diagnostic and triage accuracy

	Diagnosis		Triage	
Subgroup	OR (95% CI)	*P* value	OR (95% CI)	*P* value
Center (reference: Shanghai)				
Nanjing	0.95 (0.85 - 1.06)	0.367	0.97 (0.84 - 1.11)	0.652
Suqian	1.02 (0.89 - 1.17)	0.724	1.28 (1.07 - 1.52)	0.007
Model (reference: text model)				
Text + slit-lamp	0.94 (0.76 - 1.17)	0.600	0.89 (0.68 - 1.16)	0.390
Text + smartphone	1.71 (1.51 - 1.93)	**<0.0001**	0.94 (0.82 - 1.09)	0.423
Text + slit-lamp + smartphone	0.82 (0.53 - 1.25)	0.738	0.92 (0.73 - 1.16)	0.485
Data provider (reference: researchers)				
Patients	1.37 (1.23 - 1.53)	**<0.0001**	0.84 (0.74 - 0.96)	0.008
Gender (reference: male)				
Female	0.97 (0.87 - 1.07)	0.508	0.97 (0.85 - 1.10)	0.617
Age (reference: ≤45)				
>45	0.53 (0.48 - 0.59)	**<0.0001**	0.90 (0.79 - 1.02)	0.100
Laterality (reference: unilateral)				
Bilateral	1.49 (1.34 - 1.65)	**<0.0001**	0.92 (0.81 - 1.05)	0.223
Visit type (reference: first visit)				
Follow-up	1.42 (1.24 - 1.63)	**<0.0001**	0.90 (0.77 - 1.06)	0.209
Disease classification (reference: primary anterior segment diseases)				
Other anterior segment diseases	1.66 (1.43 - 1.92)	**<0.0001**	1.09 (0.90 - 1.32)	0.380
Visual disorders	3.26 (2.75 - 3.87)	**<0.0001**	1.14 (0.93 - 1.39)	0.213
Intraorbital diseases and emergency	1.34 (1.10 - 1.63)	0.003	1.01 (0.78 - 1.30)	0.958
Fundus and optic nerve diseases	1.39 (1.16 - 1.66)	**<0.0001**	1.00 (0.79 - 1.26)	0.990
Eyelid diseases	1.35 (1.09 - 1.68)	0.006	0.95 (0.72 - 1.25)	0.715
Words input by subjects (reference: ≤50 Chinese characters)				
>50 Chinese characters	1.37 (1.08 - 1.74)	**0.009**	1.28 (0.97 - 1.70)	0.080
AI diagnosis (reference: false)				
True	NA	NA	0.95 (0.82 - 1.09)	0.446

Bold indicates statistical significance. CI = confidence interval, NA = not applicable, OR = odds ratio