

ORIGINAL ARTICLE

Assessing General Doctors' Ophthalmic Competency and the Impact of Continuing Professional Development

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Received: 29 October 2025

Revised: 10 December 2025

Accepted: 26 December 2025

Abstract

Background: Eye conditions are commonly encountered in primary care, requiring general doctors to possess adequate ophthalmic knowledge and skills. However, many general doctors report limited confidence in diagnosing and initiating treatment for eye conditions. With ongoing advances in medical knowledge, continuing professional development (CPD) is crucial for maintaining and enhancing clinical competence. This study aimed to assess the current ophthalmic competence of general doctors and to explore how CPD can improve their ability to diagnose and manage common eye conditions.

Methods: A cross-sectional survey was conducted among general doctors who had graduated within the past five years. Data were collected via an online questionnaire comprising demographics, confidence in diagnosing and managing eye diseases, multiple-choice knowledge questions, and perceptions of ophthalmology education and CPD. Descriptive and inferential analyses were performed.

Results: Sixty general doctors completed the survey. The mean age was 26.2 years (SD 1.93), median time since graduation was 18 months (IQR 6-29), and median overall GPA was 3.50 (IQR 3.30-3.70). The mean ophthalmology knowledge score was 81.7% (SD 13.9). Confidence was highest for common eye diseases such as pterygium, hordeolum, and conjunctivitis, and lowest for emergency conditions such as central retinal artery occlusion (CRAO) and acute angle-closure glaucoma. GPA correlated positively with knowledge scores ($r = 0.467$, $p < 0.001$), and ophthalmology course grade significantly predicted performance (Spearman's $\rho = 0.42$, $p = 0.004$). Most respondents preferred CPD activities every 6–12 months.

Conclusion: Although general doctors demonstrated satisfactory knowledge of common eye conditions, their confidence in managing ophthalmic emergencies remained limited. Academic performance during medical school was a strong predictor of retained

knowledge, underscoring the need for enhanced ophthalmology teaching and regular, case-based CPD to strengthen practical skills after graduation.

Keywords: ophthalmology education; general doctors; CPD; medical education; diagnostic confidence

Introduction

Eye conditions are common presentations in primary care but remain under-represented in many medical curricula.^{1,2} General doctors frequently serve as the first point of contact for patients with ocular complaints; however, many report having limited ophthalmic knowledge and clinical confidence, particularly regarding acute eye conditions.³⁻⁵ The global decline and disparities in the duration and quality of undergraduate ophthalmology education have been recognized internationally and may lead to misdiagnosis, delayed referrals, or inappropriate management.¹

Studies have consistently shown persistent knowledge and confidence gaps among primary care doctors and residents, particularly in ophthalmology. For example, reports from the United States and research on medical students' retention of screening eye examination skills highlight insufficient ophthalmic knowledge and diagnostic confidence among early-career practitioners.⁶⁻⁹ Consequently, continuing professional development (CPD) programs are widely proposed as a mechanism to strengthen ophthalmic competency. However, to design effective CPD curricula that address specific practice gaps, a clear understanding of the current knowledge baseline and learning preferences of general doctors is essential.

The International Council of Ophthalmology (ICO) has established global guidelines for undergraduate ophthalmic education, em-

phasizing that all medical graduates should achieve core competencies to recognize, diagnose, and manage common eye conditions and emergencies.¹⁰ However, a systematic review by Krungkraipetch et al. revealed significant global disparities in ophthalmology curricula relative to ICO recommendations.¹¹ Despite these guidelines, ophthalmology rotations in Thailand are typically brief, and there is limited evidence regarding knowledge retention and confidence among recent graduates in clinical practice.

Therefore, this study aimed to (1) evaluate the ophthalmic knowledge and self-reported confidence of Thai general doctors within five years of graduation, (2) assess their perceptions of ophthalmology education, and (3) identify preferred CPD formats to enhance diagnostic and management skills, providing an evidence base for developing targeted educational interventions.

Methods

Study Design

This study was a cross-sectional, online survey administered via Google Forms. The questionnaire link was distributed through the LINE application in collaboration with regional medical education centers across Thailand.

Participants and Sampling

The study population consisted of general doctors who had graduated with a Doctor of Medicine degree within the past five years and were working in primary care settings. Participants were recruited using a pragmatic sampling approach to capture a broad cross-section of the target population.

Sample size and response rate

This study was designed as an exploratory survey, and no a priori sample size calculation was performed. The survey link was distributed via professional online channels and regional medical education networks without a defined sampling frame; therefore, the total number of physicians who received the survey could not be reliably determined, and a response rate could not be calculated. A total of 60 eligible respondents completed the questionnaire and were included in the analysis. However, this sample size provides sufficient statistical power for the analyses performed, ensuring the reliability of our results.

Research Instrument

The online questionnaire comprised four sections:

1. **Demographics:** age, gender, duration of ophthalmology training, time since graduation, overall GPA, ophthalmology course grade, and current workplace.

2. **Confidence in Diagnosing and Managing Common Eye Diseases:** rated on a 4-point Likert scale (1 = not confident at all; 4 = very confident).

3. **Knowledge Assessment:** a 10-item multiple-choice questionnaire (MCQ) assessing diagnosis and initial management of common ophthalmic conditions.

4. **Perceptions of Ophthalmology Education:** closed and open-ended questions exploring views on undergraduate ophthalmology training and preferences for CPD.

Data Collection Procedure

The questionnaire was distributed via Google Forms and disseminated through the LINE application in collaboration with regional medical education centers across Thailand. Participants completed the survey anonymously on personal devices.

Data Analysis

Demographic and confidence data were analyzed using descriptive statistics (mean, SD, median (IQR), frequency, and percentage). MCQ scores were summarized using descriptive statistics. Associations between demographic/academic variables and knowledge scores were examined using Pearson correlation and Spearman rank correlation, as appropriate. Comparisons between subgroups were performed using independent samples t-tests. A p -value of < 0.05

was considered statistically significant.

Ethical Considerations

Participation was voluntary, and electronic informed consent was obtained.

The study was approved by the Human Research Ethics Committee of Khon Kaen Hospital, Thailand (Approval No. KEXP 67076).

Results

Participant Characteristics

Sixty general doctors completed the survey, working across different regions of

Thailand: Central (24, 40.0%), Northeastern (19, 31.7%), Northern (8, 13.3%), Southern (5, 8.3%), and Eastern (4, 6.7%). The mean age was 26.2 years (SD 1.93), and the median time since graduation was 18 months (IQR 6-29). The median overall GPA was 3.50 (IQR 3.30-3.70). Twenty-two participants (36.7%) earned an A in ophthalmology, 14 (23.3%) received a B+, and 14 (23.3%) earned a B. Most participants worked in general or regional hospitals (53.3%), followed by community hospitals (30.0%) and university-affiliated hospitals (15.0%) (Table 1)

Table 1 Characteristics of Participants

Variable n(%)	(n=60)
Age (years), Mean $\pm$ SD	26.2 $\pm$ 1.9
Duration of ophthalmology training (weeks), Mean $\pm$ SD	3.0 $\pm$ 1.2
Months since graduation (months), Median (IQR)	18 (6-29)
Overall GPA, Median (IQR)	3.50 (3.30-3.70)
Ophthalmology grade n (%)	
- A	22 (36.7 %)
- B+	14 (23.3 %)
- B	14 (23.3 %)
- Lower than B	10 (16.7 %)
Current workplace n (%)	
- General/regional hospital	32 (53.3 %)
- Community hospital	18 (30.0 %)
- University-affiliated hospital	9 (15.0 %)
- Private clinic	1 (1.7 %)

Note: Values are presented as mean $\pm$ standard deviation (SD) for normally distributed continuous variables, median (interquartile range [IQR]) for non-normally distributed continuous variables, and number (percentage) for categorical variables.

Knowledge Assessment

The mean ophthalmology knowledge score was 81.7% (SD 13.9).

Confidence in Diagnosis and Management

As illustrated in Figure 1, participants demonstrated the highest confidence in managing common, non-urgent eye conditions such as pterygium (Diagnosis M = 3.77; Treatment M = 3.28), hordeolum (Diagnosis M = 3.58; Treatment M = 3.38), and various forms of conjunctivitis (M > 3.0). In contrast, confidence was considerably lower for ophthalmic emergencies and less frequently encountered diseases, including central

retinal artery occlusion (Diagnosis M = 1.86; Treatment M = 1.92), papilloedema (Diagnosis M = 2.10; Treatment M = 2.02), and acute angle closure glaucoma (Diagnosis M = 2.58; Treatment M = 2.33). Further analysis revealed no statistically significant association between the workplace setting (Community Hospital, General or Regional Hospital, University-affiliated hospital, or Private clinic) and confidence levels (data not shown). These findings suggest that general doctors felt more capable when managing routine anterior segment disorders but less confident when facing acute or vision-threatening conditions.

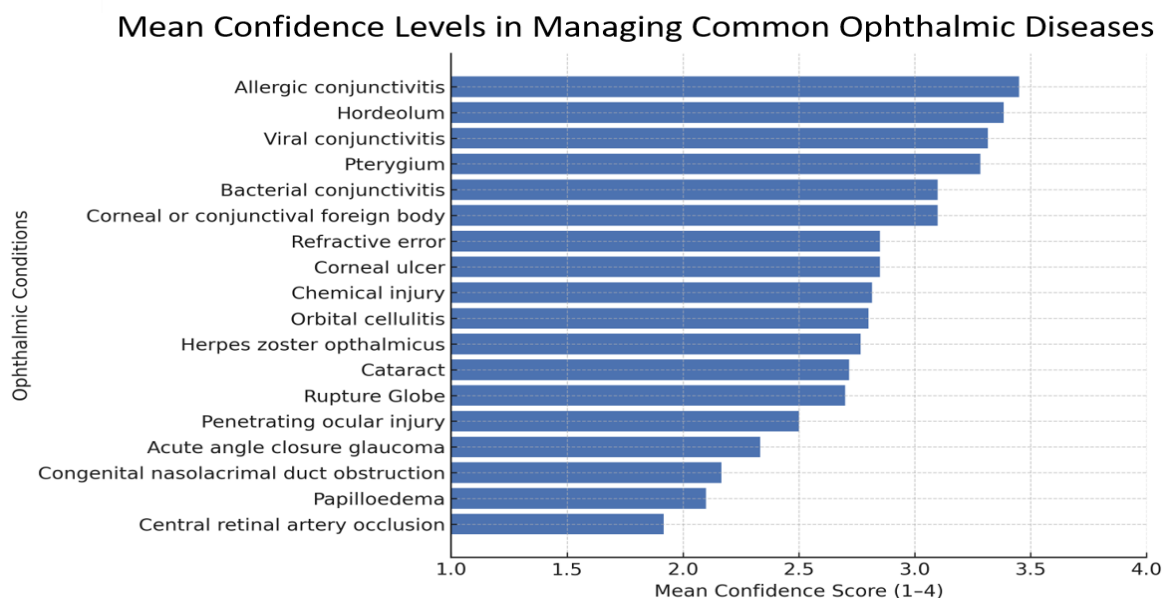


Figure 1 Mean confidence levels in managing common ophthalmic diseases among general practitioners (n = 60). Confidence was rated on a 4-point Likert scale (1 = not confident at all, 4 = very confident). Respondents showed the highest confidence in managing common external eye conditions such as allergic conjunctivitis, hordeolum, and pterygium, whereas lower confidence was reported for emergency or complex cases including CRAO, papilloedema, acute angle closure glaucoma and ocular trauma.

Confidence in Ocular Examination Skills

Respondents reported the highest confidence in extraocular movement examination ($M = 3.50$), pupillary light reflex ($M = 3.30$), and visual acuity testing ($M = 3.20$), and the lowest confidence in anterior chamber depth estimation ($M = 2.38$), tonometry ($M = 2.33$), and direct ophthalmoscopy ($M = 2.26$).

Perceptions of Undergraduate Ophthalmology Education

Participants identified observation of real cases, video on-demand lessons, and traditional lectures as the most effective learning methods. More than half (56.7%) believed that writing case reports improved long-term retention. Most respondents (76.7%) felt moderately to very well prepared by their ophthalmology curriculum, and 58.3% expressed interest in ophthalmology residency training. The preferred clinical rotation duration was 4.5 weeks (range 2–12 weeks).

Preferred CPD Approaches

Respondents recommended short workshops, online materials, and observational rotations as preferred CPD formats. The largest proportion (38.3%) preferred participation every 6–12 months.

Correlation Analyses

A significant positive correlation was found between overall GPA and ophthalmology knowledge scores ($r = 0.467$, $p < 0.001$), indicating that participants with stronger overall academic performance tended to achieve higher scores on the knowledge assessment (Figure 2A). Similarly, a moderate positive correlation was observed between ophthalmology course grades and MCQ scores (Spearman's $\rho = 0.42$, $p = 0.004$), suggesting that higher ophthalmology grades were associated with better knowledge retention after graduation (Figure 2B). In contrast, no significant association was detected between months since graduation and knowledge scores (Spearman's $\rho = 0.036$, $p = 0.784$). To further investigate this, a comparison between recent graduates (≤ 2 years) and experienced physicians (> 2 years) was performed, which also revealed no significant difference in mean competence scores (8.46 vs. 8.29; $p = 0.60$). These findings indicate that elapsed time since graduation was not a key determinant of ophthalmic knowledge among recent graduates (Table 2)

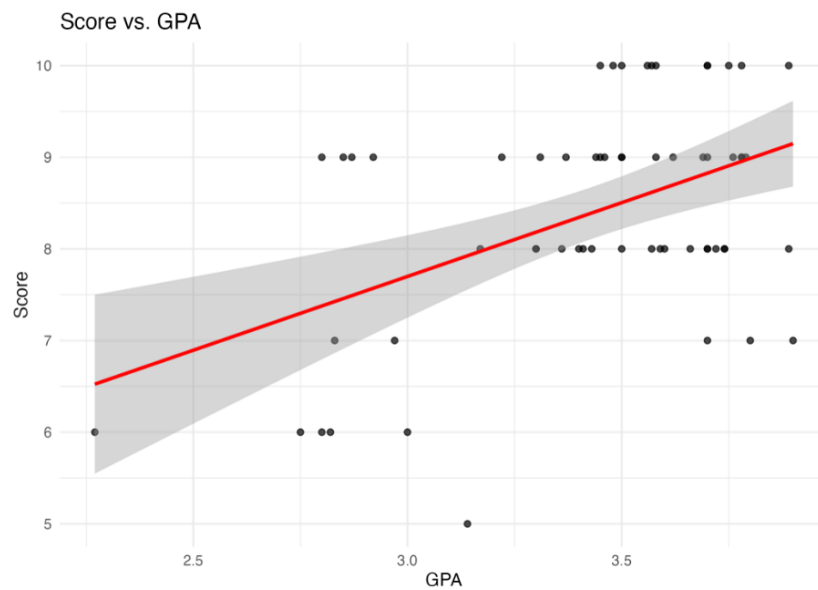


Figure 2A Each dot represents an individual participant ($n = 60$). The x-axis indicates the overall GPA (range 2.0–4.0), while the y-axis represents the corresponding ophthalmology MCQ knowledge score (0–10 scale). The red line illustrates the fitted linear regression model, and the gray band indicates the 95% confidence limits.

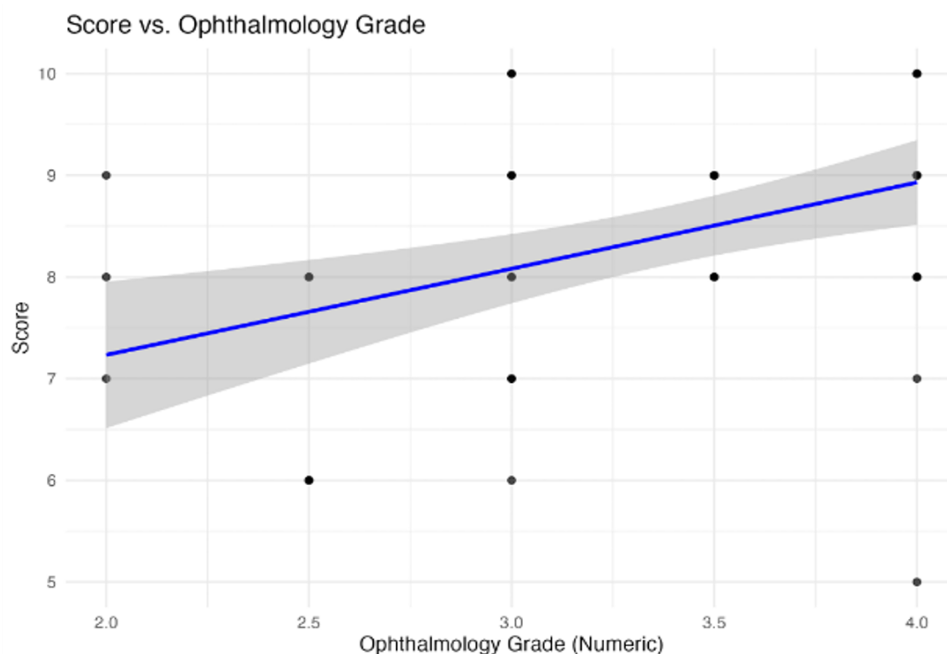


Figure 2B Each point represents an individual participant ($n = 60$). The x-axis shows ophthalmology course grade (converted to numerical scale: A = 4.0, B+ = 3.5, B = 3.0, etc.), and the y-axis represents the corresponding MCQ knowledge score (0–10). The blue line indicates the linear regression fit with 95% confidence limits (gray band).

Table 2 Correlation Analysis Between Academic and Demographic Variables and Ophthalmology Knowledge Scores (MCQ)

Variable	Statistical Test and Coefficient	<i>p</i> -value	Interpretation
Overall GPA vs MCQ score	Pearson's $r = 0.467$	$< 0.001^*$	Significant positive correlation
Ophthalmology grade vs MCQ score	Spearman's $\rho = 0.42$	0.005^*	Significant difference among grade groups (higher grade $\rightarrow$ higher knowledge score)
Months since graduation vs MCQ score	Spearman's $\rho = 0.036$	0.784	No significant correlation

Note: 1. $*p < 0.05$ was considered statistically significant. Both Pearson and Spearman correlations were used to validate linear and non-parametric associations between continuous variables.

2. ($n = 60$)

Discussion

While Thai general doctors demonstrated satisfactory overall ophthalmic knowledge, their confidence in managing ophthalmic emergencies remained limited. This finding aligns with international studies showing that primary care physicians often exhibit substantial deficiencies in ophthalmic diagnostic skills and clinical confidence, particularly for acute or vision-threatening conditions.² Prior evidence indicates that non-ophthalmologist clinicians frequently misdiagnose serious eye diseases, have inadequate retention of essential examination skills, and may delay appropriate referral, thereby increasing the risk of adverse outcomes.³⁻⁵ The positive relationships between overall GPA, ophthalmology course

grades, and knowledge scores emphasize the influence of academic performance on retained competence. This suggests that students who perform strongly during their undergraduate medical training are more likely to preserve and apply ophthalmic knowledge after graduation. Academic achievement may reflect better foundational understanding, effective learning strategies, or greater engagement during clinical rotations, all of which facilitate long-term knowledge retention. These findings highlight the importance of strengthening undergraduate ophthalmology education and ensuring sufficient depth of training for medical students, as early academic performance appears to play an important role in shaping future clinical competence. The lack of association between

time since graduation and knowledge performance in our study suggests that knowledge decay is driven less by chronological time than by limited clinical exposure. Although Haycocks et al. (2024) reported significant variations in long-term factual knowledge retention, our subgroup analysis found no significant difference in competence scores between recent graduates (≤ 2 years) and experienced practitioners (> 2 years).¹² This suggests that basic ophthalmic knowledge may remain relatively stable in the short term, or that the "silo effect" described by Mottow-Lippa et al. where unused skills fade after rotation— occurs rapidly after medical school and plateaus, regardless of subsequent years in practice.¹³ Furthermore, Albert et al. emphasize that active "rehearsals" rather than years of practice are the primary determinant of retention.¹⁴ Therefore, incorporating "regular refresher training" into CPD is essential to prevent this decline.

Participants' preferences for case-based, hands-on learning are consistent with adult learning principles stressing active participation.¹⁵ Flexible formats—such as video-on demand resources, peer learning, and short practical workshops—align with contemporary blended CPD models that enhance clinical applicability and accessibility

Limitations

The author acknowledges several limitations

in this study. Due to the distribution of the survey via online professional channels, the total number of recipients was unknown, precluding the calculation of a response rate. Given the modest sample size of 60 participants, and the absence of an a priori sample size calculation, the statistical results should be interpreted as exploratory rather than confirmatory. Additionally, the use of self-reported confidence levels and a brief 10-item knowledge test may not fully capture the full range of clinical proficiency. Future studies incorporating larger sample sizes and practical skill assessments are recommended to extend these findings.

Implications

Curriculum developers should consider extending the duration of ophthalmology rotations and incorporating more case-based learning to reinforce diagnostic reasoning and clinical application. CPD organizers should adopt blended learning models combining online and hands-on formats, emphasizing real patient cases and simulated ophthalmic emergencies at regular 6–12 months intervals.

Conclusion

Thai general doctors demonstrated an adequate foundation in ophthalmology; however, notable gaps remained in confidence and the ability to manage complex

or emergency eye conditions. Academic performance during medical school was a stronger predictor of retained knowledge than time since graduation. Regular, case-based, and interactive CPD initiatives are essential to address these competency gaps and strengthen the quality of ophthalmic care in primary care settings.

Funding

No external funding was received for the research, authorship, or publication of this article.

Declaration of Conflicting Interests

The author declares no conflicts of interest related to the research, authorship, or publication of this article.

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