

Appraisal of Eye-Care Professionals' Knowledge, Practices, and Barriers Regarding Progressive Addition Lenses: A Cross-Sectional Survey



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ABSTRACT

Purpose: To determine how eye-care professionals (ECPs) view, prescribe, and handle progressive addition lenses (PALs), paying special attention to their clinical confidence, knowledge, practical difficulties, and need for ongoing education.

Study Design: Cross-sectional survey.

Place and Duration of Study: Department of Optometry, College of Applied Medical Sciences, Qassim University, Buraydah, Saudi Arabia; data were collected nationwide across Saudi Arabia from January 2025 to July 2025.

Methods: There were 212 registered ophthalmologists and optometrists who participated in the survey. While responses were summarized using descriptive analyses, relationships between knowledge, prescribing behavior, confidence, and training engagement were investigated using chi-square (χ^2) testing, ordinal logistic regression, and k-means cluster analysis.

Results: Only 52.8% of respondents consistently measured all necessary biometric parameters during dispensing, even though 75% of respondents rated their knowledge of PALs as good or excellent. Longer clinical experience (≥ 15 years), increased participation in continuing education (≥ 10 hours annually), and access to digital centration technologies were all independently linked to higher prescribing confidence (52.8%). The most often mentioned barriers to PAL use were patient adaptation issues (86.8%) and lens cost (72.6%). Three different practitioner profiles were identified by cluster analysis: Occasional Prescribers (27.4%), Practical Generalists (43.4%), and Progressive Advocates (29.2%).

Conclusion: Although attitudes toward PALs are generally positive, there are still significant gaps between routine clinical implementation and perceived knowledge, especially when it comes to personalized fitting and biometric assessment. Increased access to digital dispensing tools and targeted continuing education could help convert current knowledge into more reliable prescribing procedures and better patient outcomes.

Keywords: Presbyopia, Lenses, Eyeglasses, Health Knowledge, Attitudes, Practice, Patient Satisfaction.

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INTRODUCTION

An estimated 1.8 billion people worldwide suffer from presbyopia.¹ Presbyopia affects about half of Saudi Arabian adults over 35, but 76% of them are unaware of it. According to reports, 48% of people have uncorrected presbyopia, but 82% of those who are affected view glasses as a suitable remedy.² In

suitable candidates, progressive addition lenses (PALs) have proven to be superior to single-vision and bifocal lenses due to their capacity to offer smooth vision correction over a varying distances.³ With an estimated adoption rate of about 21%, the clinical penetration of PALs in Saudi Arabia is still relatively low.⁴ Single-vision corrections are still accepted by nearly 46% of presbyopic patients.² According to market analyses, premium PALs are the Gulf region's fastest-growing segment due to rising digital device usage and aging populations.⁵

Successful adaptation to PALs is closely linked to accurate fitting, individualized dispensing, and effective practitioner–patient communication.⁶ Patient satisfaction is highly dependent on the accuracy of biometric measurements and quality of counseling during lens selection and adaptation. Despite the growing emphasis on advanced PAL technologies, significant gaps still exist between theory and application. Patient-focused studies have identified barriers such as cost concerns and apprehension regarding adaptation,^{4,6,7} yet limited data are available from the perspective of eye-care professionals (ECPs). There may be some problems regarding how the provider communicates with a patient, about the recommended PALs to utilize, along with how the patient may use the selected PALs most comfortably (the ergonomics).^{8,9} While there is generally a positive attitude towards PALs, some providers have stated that they feel reluctant regarding the complicated fit of PALs, and the ways to manage the patient while providing for the PALs.^{7,10,11} The difficulties related to this area are compounded by the fact that there are limited opportunities for formal education and the technology of PAL design is evolving rapidly.

Successful adaptation to PALs is primarily influenced by three factors: precise lens alignment during dispensing, appropriate pre-dispensing expectation management, and effective patient education on the adaptation process. In addition, binocular vision status plays a critical role, as vergence function and phoria responses directly affect an individual's tolerance and ease of adaptation to PAL use.¹² Studies have reported patient satisfaction rates with PAL ranging from 50% to 78%.^{4,12,13} Despite this, nearly half of new PAL users experienced initial discomfort in primary care settings. Key contributing factors included insufficient assessment of binocular vision, suboptimal lens design selection, and lack of task-specific visual triage during prescribing and dispensing.

The objectives of this study were to systematically examine the level of knowledge, prescribing patterns, attitudes and perceived barriers of ECPs regarding PALs in Presbyopia. This research will assist in providing specific recommendations for training and supporting optimal presbyopic care throughout the Kingdom.

METHODS

A cross-sectional study was conducted to assess ECP' knowledge, views, prescribing habits, perceived difficulties and training requirements regarding the use of PALs. The research followed the Declaration of Helsinki's and ethical approval was obtained from the Health Research Ethics Committee of Qassim University's Deanship of Scientific Research (**Reference number: 21/02/11**). ECPs enrolled in the study were registered with the Ministry of Health and were practicing across diverse clinical settings, including hospitals, private clinics, academic institutions, and optical retail outlets. Only those with current clinical experience in managing presbyopic patients were included to ensure the relevance and applicability of the findings. To enhance regional representation, participants were recruited from multiple regions across Saudi Arabia.

A structured questionnaire was developed based on a review of relevant literature and expert input from optometry and statistical professionals. Internal consistency analysis demonstrated a Cronbach's alpha of 0.74. Minor revisions were made following expert panel feedback prior to distribution. The final instrument included sections on demographic characteristics, knowledge of PAL design, attitudes toward prescription, current clinical practices, perceived barriers, and continuing education needs. A combination of multiple-choice items, Likert scales, and open-ended questions enabled the collection of both quantitative and qualitative data.

A stratified random sampling approach was employed to ensure proportional geographic representation from all regions of the Kingdom. Sample size was calculated using standard prevalence survey formulas, assuming a population proportion of 0.5 to account for maximum variability, with a 95% confidence level ($Z = 1.96$) and a margin of error of 6.7%.¹⁴ Accordingly, the minimum required sample size to achieve adequate statistical power under feasible study conditions was determined to be 212 participants.

The data were gathered using a Google Form (from January to July 2025). Individuals voluntarily consented to participate by electronic consent were included. No personal information was requested, and confidentiality was ensured. Descriptive statistics were used to assess demographics, knowledge, prescribing behavior, attitudes, perceived barriers, and training preferences. Categorical variables were compared using the χ^2 test, while logistic and ordinal logistic regression identified predictors of prescribing confidence and frequency, with model performance evaluated by classification accuracy. Prescribing patterns were further analyzed using k-means cluster analysis based on prescribing frequency, confidence, and continuing education engagement. Qualitative responses highlighted training needs, perceived barriers, and suggested improvements. Statistical significance was set at $p < 0.05$.

RESULTS

A total of 212 ECPs completed the survey, yielding a 90% response rate. Most participants were male (78%), with a mean age of 38.1 years and an average of 12.6 ± 10.3 years of clinical experience. The majority were optometrists (90%), while 10% were ophthalmologists. Respondents included professionals from Saudi Arabia as well as Sudan, Nigeria, Jordan, and Yemen practicing within the Kingdom. They represented diverse practice settings, including retail optical stores (35.8%), hospitals or clinics (31.1%), private practice (27.4%), and academia (5.7%), with broad geographic distribution across Saudi Arabia.

Most respondents reported a moderate to strong understanding of PAL technologies. Familiarity was highest for conventional and free-form designs, while awareness was lower for occupational, short-corridor, specialty, and personalized PAL designs, suggesting limited exposure to emerging lens technologies (Figure 1).

Optometrists demonstrated significantly higher perceived knowledge compared with ophthalmologists ($\chi^2 = 9.666, p = 0.002$), likely reflecting their greater

involvement in spectacle dispensing. However, no significant association was found between PAL knowledge and participation in continuing education ($\chi^2 = 9.774, p = 0.369$).

Practitioners with more than 30 years of experience were more likely to rate their knowledge as “excellent” compared to those with less than 5 years of experience. Gender differences were also observed, with a higher proportion of males rating their knowledge as “good,” while more females reported a “moderate” level of knowledge.

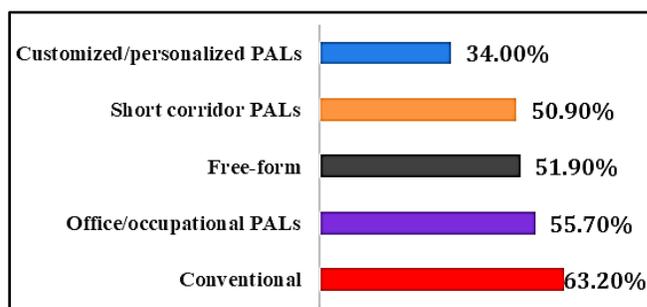


Figure 1: Familiarity with different PAL types.

Over 77% of respondents reported being confident or very confident in prescribing PALs. Prescribing confidence was strongly associated with perceived knowledge ($\chi^2 = 52.163, p < 0.001$) and prescribing frequency ($\chi^2 = 39.908, p < 0.001$), but not with years of clinical experience ($\chi^2 = 83.637, p = 0.667$), indicating that targeted education—beyond experience alone—may enhance confidence.

Most participants expressed positive attitudes toward contemporary PAL technologies, with 75.5% agreeing that digital innovations improve patient satisfaction and adaptation. Additionally, 78.3% emphasized verification and on-eye assessment as essential patient-centered quality measures. Recommendations for PALs were primarily driven by patient lifestyle needs and motivation, while practice-related incentives played a lesser role.

Table 1: Prescribing and dispensing practices.

Variable	Always	Frequently	Occasionally	Rarely	Never	p-value
Prescribing Frequency	18.9%	50.9%	26.4%	3.8%	0%	< 0.001
Refraction Verification	64.2%	20.8%	6.6%	8.5%	0%	< 0.001
Assessment of Parameters	52.8%	26.4%	8.5%	6.6%	5.7%	< 0.001
Participation in Design Selection	37.7%	28.3%	23.6%	5.7%	4.7%	< 0.001

Prescribing and dispensing practices varied significantly across respondents (χ^2 range = 45.8–140.3, $df = 4$; $p < 0.001$), reflecting notable differences in clinical approaches (Table 1). While 77.3% of eye care professionals reported occasionally prescribing progressive addition lenses (PALs), only 18.9% indicated they always prescribed them when appropriate. Patient selection of PALs for presbyopia most ranged between 25% and 50% of cases, followed by 51% to 75%, suggesting moderate uptake in routine clinical practice.

Practitioners used the following factors to assist in making clinical decisions regarding patients using lenses: the visual requirements of the patient; the occupational requirements of the patient; previous lens experiences the patient may have had; the suitability of the lens frame being used by the patient. Although many practitioners assess their clients using subjective refraction verification and basic fitting parameters (such as monocular pupillary distance and fitting height), the evaluation of intermediate and advanced fitting parameters (such as frame wrap angle and pupil size) by practitioners was not consistently performed as often.

The degree to which practitioners incorporate quality control measures into everyday practice varied significantly. For example, on average, practitioners verified subjective refraction in approximately 64.2% of their patients and assessed basic fitting parameters in about 52.8% of their patients (Table 1).

As illustrated in Figure 2, there were several barriers to prescribing PALs, which were primarily related to the difficulties patients had in adapting to the new lenses, the peripheral distortion or 'swim' effects created by the lenses, and the costs of PALs. Practitioners had also been found to be less likely to prescribe PALs to patients who were new to wearing lenses, patients who had significant financial

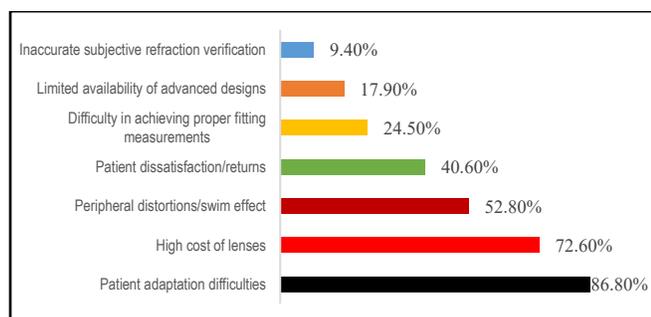


Figure 2: Reported challenges in PAL prescribing.

constraints, patients with either cognitive or physical disabilities, and patients who had significant myopia.

The preferred brands of PALs were Essilor (Varilux) and Zeiss, with 70.8% and 63.2% of respondents choosing each brand. Factors influencing the choice of brand included the design and performance of lenses (33.0%) and the cost of lenses (33.0%).

Nearly half of respondents (48.1%) completed continuing education and training (CET) during the year, with 21.7% attending quarterly and 14.2% biannually; 16% reported no CET requirement. Despite high confidence and self-reported knowledge in prescribing PALs, participants identified ongoing training needs. The most requested topic was advanced PAL designs and technology (74%). Other topics are shown in Table 2.

Table 2: Preferred Workshop Topics.

Workshop Topic	% Interested
Advanced PAL designs and technology	74.5%
Accurate fitting and measurement techniques	61.3%
Patient adaptation strategies & troubleshooting	56.6%
Matching different PAL brands and their performance	54.7%
Verification of subjective refraction for PALs	37.7%
Managing patient expectations and enhancing satisfaction	37.7%

The preferred formats of continuing education are shown in Table 3.

Table 3: Preferred Training Formats.

Training Format	% Preference
Training and hands-on workshop sessions	70.8%
Webinars or online courses	65.1%
Clinical study cases and research innovations	53.8%
Manufacturer-led training sessions	48.1%
Mentorship programs and peer discussions	36.8%

Cluster analysis found three types of practitioners: Progressive Sponsors (29.2%), who prescribe often, were confident, and pursued continuing education; Practical Generalists (43.4%), who had low to moderate prescribing, confidence, and learning; and Occasional Prescribers (27.4%), whose prescribing, confidence, and learning are in a low range. The key finding of the open-ended questions on workshops was that nearly 50% of participants expressed an interest in workshops on advanced PAL designs (49.1%) and exact fitting techniques (48.1%).

Using logistic regression analysis, the study predicted practitioner confidence at 47.2% and prescribing frequency at 51.9% based on age, clinical experience, and practice setting. These factors account for a limited amount of the variance in prescribing behavior among practitioners. The ordinal logistic regression performed also found a significant relationship between practitioner's self-reporting of PAL knowledge and their confidence in prescribing PALs (likelihood-ratio $\chi^2 = 9.40$; $df = 3$; $p = 0.024$) but there were some restrictions on model fit due to low counts in some of the categories.

DISCUSSION

This multicenter survey indicates that perceived knowledge of progressive addition lens (PAL) design among eye care practitioners in Saudi Arabia is a key determinant of their prescribing confidence and clinical practice patterns. The length of time in practice as a professional remains only partially explanatory. ECPs had positive attitudes toward PALs, but there was an enormous range in the amount that they prescribed, and this was restricted to a variety of practical, economic, and patient-related factors.

The outcomes of regression and cluster analyses illustrated that demographic and practice characteristics accounted for only a small portion of the prescribing behavior of ECPs and identified the need for enhanced education and improved access to appropriate clinical information resources targeted towards ECPs.

Most of the participants who answered the survey about PALs were young to middle-aged (38.1 years old on average), who have had moderate clinical experience with the lens type. Optometrists comprised most responders, the primary practitioners who prescribe glasses and manage presbyopia for patients within this geographical area. The participants in this study worked in a variety of practice settings, such as retail optical shops, hospitals, clinics, and private practices; this wide variety of practice environments likely contributed to the differences seen between practitioners in terms of prescribing patterns, the integration of PALs into their workflow, and practitioner level of autonomy. As a result, this variety may impact how often PALs are recommended and accurately dispensed to patients.

Optimal visual outcomes may only be achieved when utilizing appropriate knowledge of PAL design

concepts and individualized fit parameters. Optimizing visual outcome by modifying various components of the PAL: corridor length, inset position, and working distance, has been proven to promote wearer satisfaction and decrease optical aberrations for easier adaptation.^{7,12} Although many of the respondents felt comfortable prescribing conventional PALs, they were much less familiar with the newer designs (free-form, personalized, and task specific), particularly those utilizing short-corridor and gaze-tracking technologies. The rapid technological changes in PAL design and production have resulted in newer PALs being used by only a limited number of ECPs. There is also lack of knowledge amongst practitioners regarding customized surfacing options and design capabilities for PALs. BCLA CLEAR Presbyopia Consensus for health care in 2025 places emphasis on structured training and decision support tools to improve consistency of application of advanced PAL technologies.¹⁵ Our findings in this study demonstrate that clinicians who have a greater level of clinical experience have a higher level of self-reported knowledge regarding PALs. Thus, experiential learning also plays a role in this regard, which is further supported by research in similar health-care system settings.¹⁶

Optometrists reported knowing far more about PAL technology than the ophthalmologists, likely due to their frequent involvement in dispensing and following up on spectacles. The smaller differences between male and female practitioners may be a result of unequal opportunities to participate in continuing professional development and/or clinical exposure to the technologies, but further research will be necessary to determine what may have influenced these differences.

Confidence in prescribing PAL is primarily dependent on his/her alignment with the competencies required and ongoing exposure to lens technologies and is not dependent upon their years of service. Respondents had positive perceptions of current PAL technologies being available and indicated that they value the process of verification and the need for a patient to have a "try on" before recommending the use of PALs. This belief is aligned with a patient-centered approach to providing quality care. Decisions regarding the prescription of PALs were guided by careful consideration of the patient's lifestyle demands and desired visual comfort, reflecting an ethical, patient-centered, and individualized approach to

clinical practice.

Although respondents indicated the need for routine use of PALs, less than one in five practitioners indicated they were using PALs on a regular basis. A significant influence on prescribing practices was identified as practice settings, patients' demographics, and workflow limitations; therefore, it is reasonable to assume that decisions to prescribe PALs are impacted largely by systemic factors.

Participants identified adaptation difficulty, financial barriers, and a lack of experience with advanced design characteristics as their most common reasons for not prescribing PALs. These results are supported by other studies that adaptation difficulty and cost continue to be barriers to PAL adoption.^{9,17}

PAL Intolerance has been correlated with the discrepancy in the accuracy and/or verification of the prescription. Hence, it is essential to have an accurate refraction and a correct fitting for PALs.¹⁸ The present study showed that hospitals and clinics received a greater rate of refraction re-verifications than retail locations, possibly reflecting procedural differences between the two environments and differences in time allowed for the refraction process. The heightened sensitivity of PALs to small errors in prescriptions makes enhanced verification methods a necessity.¹⁹ Automated refraction technology will help mitigate some of the workflow limitations found in retail environments and will also provide a level of accuracy.²⁰

Over 50% of survey participants assessed important fitting characteristics, but only partly complied with established guidelines; this indicates that there is a continuing trend toward under-measuring advanced fitting characteristics. The findings are consistent with previous studies that have identified clinically meaningful discrepancies in both fitting height and frame measurement, which are known to contribute to non-adaptation.⁷

Less than 40% of participants reported taking part in individualized selections of PAL designs; this reflects a problem with patients' ability to pay for PALs, as well as the fact that there is not enough information available in the public or trained practitioners about how to choose the correct PAL for a patient. In addition, nearly 70% of those who participated in this survey were counselling their patients on PAL adaptation, which illustrates the importance of education in reducing patient

intolerance rates to PALs. Digital PALs were also emphasized heavily by practitioners in this study; there appears to be an increasing interest in digital technologies, such as freeform PAL lenses, and how they affect visual comfort and satisfaction with prescribed PALs. This emphasis on digital PALs is likely to receive growing attention and stronger reinforcement in contemporary optical dispensing literature.^{21,22} The brand preferences identified in this study reflect current global trends within the optical industry; typically, the brand that is most commonly prescribed by practitioners worldwide is Essilor (partly due to their aggressive advertising). In this survey, optical performance and cost were reported to be the most important factors influencing brand selection. Manufacturer incentives had an insignificant overall impact on brand selection, indicating that clinical factors were more important than commercial factors when prescribing PALs.

Although most respondents reported confidence in their prescribing abilities, the need for structured training remains substantial. Only a small proportion participate in continuing education (CE) activities annually, and the majority are not bound by mandatory CE requirements. The highest demand for further training centered on advanced PAL design, fitting precision, and troubleshooting of adaptation challenges, reinforcing the view that PALs require ongoing skill development. Additionally, previous international polling corroborates that PAL education is a major priority for continuing professional development.¹³ Accordingly, stakeholders should align their CE offerings with core PAL competencies by developing evidence-based curricula and micro-credentialled "PAL bootcamps," while also evaluating the impact of PAL-focused CE on real-world clinical outcomes.²³

The ideal learning formats for educational programs were both hands-on workshops but also online learning. Cluster analysis revealed another subgroup of highly active prescribers who utilized PAL but still expressed substantial training needs. Regression analysis showed that some demographic and practice characteristics account for limited variation in prescribing confidence and frequency, and that training, technology and institutional support have larger effects than demographic characteristics or practice characteristics.

The results indicate that many professionals are open to using PAL technology to enhance their

patients' quality of life. However, due to inconsistency in applying acquired knowledge and workflow problems, it is difficult for many professionals to feel confident when recommending PALs to their patients. The results showed that perceived knowledge is the key factor driving confidence and the decision to prescribe a lens. Thus, the profession will need to provide structured competency-based education regarding advanced optical design principles, proper fitting techniques, and the management of non-adaptation problems.²⁴

The limitations of this study include using self-reported data and a cross-sectional design resulting in recall bias or social desirability bias. Secondly, lack of objective clinical audits limits the generalizability of the study. The results should be taken as a current indication of practitioners' perceptions rather than as firm conclusions regarding the practitioner's clinical practice. Future studies that include objective data related to the refraction process or the 'real-world' experience of lens wearers will provide additional understanding of the practitioners and their patients.

CONCLUSION

Barriers identified in this research to the uptake of PALs among practitioners are limited exposure to PAL designs, lack of standardization of the methods used for verifying and fitting PALs, high cost of PAL products and concerns about patient adaptation. In total, only 18.9% of practitioners routinely provided prescriptions for PALs while approximately one third assisted patients throughout the selection process for lenses. Although practitioners possess sufficient theoretical knowledge and provide adequate patient counselling, there was inconsistency in biometric measurement and binocular vision assessment in the routine practice of practitioners. The results of this study demonstrate that there exists a disconnect between practitioner knowledge and implementation of knowledge related to PAL use, highlighting a need for focused training with outcome objectives based on competency, and better access to digital centralizing tools to help standardize PALs prescription and presbyopic care.

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Conflict of Interest: Authors declared no conflict of interest.

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Author's Designation and Contribution

Abdelaziz M. El-Madina; Associate Professor: *Concepts, Design, Literature search, Data acquisition, Data analysis, Statistical analysis, Manuscript preparation, Manuscript editing, Manuscript review.*

