



## ORIGINAL ARTICLE

# Competencies and training needs of the Portuguese optometrists - a national inquiry

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### KEYWORDS

Competency-based education;  
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Optometry practice;  
Primary eye care;  
Primary healthcare

### Abstract

**Purpose:** The World Health Organization places the Optometrist as the primary eye care provider, clearly defining its competencies and scope of practice. In Portugal, there are no studies about Optometrists professional competencies and the profession remains unregulated. The aim of this study was to describe the Portuguese optometrists' professional competencies model and to identify possible training needs felt.

**Methods:** A questionnaire survey was carried out, with the Portuguese optometric population as target group, ascertaining the level of academic qualifications, the clinical procedures most frequently performed, the training needs felt and the confidence levels in the performance of certain procedures.

**Results:** The 444 validated surveys represent 28.41% of the study population, making it a representative sample. The validated sample had 78.8% of Graduates, 20.5% of Masters and 0.7% of PhDs in Optometry.

**Conclusions:** The results of this study allowed us to conclude that the competences most frequently performed by Portuguese optometrists are a very reductive view of the internationally stipulated, based on Refraction, Basic Ocular Health Assessment, Contactology and Paediatric Optometry in School Age (>6 years old). The most important training needs occur at the level of Applied Ocular Pharmacology, Prismatic Prescription, Optometry in Special Needs Populations, Contactology in Special Cases, Low Vision and Clinical/Hospital Internship. Professional experience of 10 years or more and Master's/PhD qualifications give rise to more skills, higher levels of confidence and lower training needs. Higher frequency of execution of certain procedures translates into high levels of confidence and less training needs in the area.

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**PALABRAS CLAVE**

Educación basada en la competencia;  
Planificación de la plantilla;  
Optometría;  
Práctica optométrica;  
Cuidados oculares primarios;  
Atención sanitaria primaria

**Competencias y necesidades de formación de los Optometristas portugueses: encuesta a nivel nacional****Resumen**

**Objetivo:** La Organización Mundial de la Salud considera al Optometrista como el profesional primario de la salud ocular, definiendo con claridad sus competencias y ámbito de práctica. En Portugal, no existen estudios sobre las competencias profesionales de los Optometristas, por lo que la profesión no está regulada. El objetivo de este estudio fue describir el modelo de competencias profesionales de los optometristas portugueses, y identificar las posibles necesidades de formación constatadas.

**Métodos:** Se llevó a cabo una encuesta mediante empleo de cuestionario, cuyo objetivo fue la población optométrica portuguesa, verificando el nivel de titulaciones académicas, los procedimientos clínicos más frecuentemente utilizados, las necesidades de formación constatadas, y los niveles de confianza en la realización de ciertos procedimientos.

**Resultados:** Las 444 encuestas validadas representan el 28,41% de la población de estudio, lo cual supone una muestra representativa. La muestra validada incluyó un 78.8% de Graduados, un 20.5% de Titulados de Máster y un 0.7% de Doctores en Optometría.

**Conclusiones:** Los resultados de este estudio nos permitieron concluir que las competencias más frecuentemente realizadas por los optometristas portugueses constituyen una visión muy reductiva de las internacionalmente estipuladas, basándose en refracción, valoración básica de la salud ocular, contactología y optometría pediátrica en la edad escolar (>6 años). Las necesidades más importantes en cuanto a formación se producen a nivel de Farmacología Ocular Aplicada, Prescripción Prismática, Optometría en poblaciones con necesidades especiales, Contactología en casos especiales, baja visión y Prácticas Clínicas/Hospitalarias. La experiencia profesional superior a 10 años, y la titulación de doctorado, redundan en una mayor competencia, niveles superiores de confianza, y menores necesidades de formación. Cuanto más elevada es la ejecución de ciertos procedimientos, mayores son los niveles de confianza, y menores las necesidades de formación en este área.

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**Introduction**

The Alma-Ata Declaration, elaborated in Kazakhstan on September 12, 1978 and adopted by the World Health Organization (WHO) defines the concept of Primary Health Care as the first contact level of the individual and the community with the health system.<sup>1</sup> The concepts of health and disease require a reformulation of thinking and the verification of epidemiological transition leads to a change in the models for preventive action and health promotion.<sup>2</sup> The approach to the primary level of health care was based on the need to create prevention and rehabilitation services that would maximize the health and the well-being of the individual, accompanying globally and longitudinally all his health/disease process and not just the disease episodes.<sup>3</sup> Adequate primary care provision now presupposes a cross-sectoral (among different health sectors) and multidisciplinary (among different health professional groups) approach, as well as a greater diversity of care provision.<sup>4</sup>

The approach to primary eyecare involves a complementarity between the health sector *per se* and the community, that is, between clinical practice and the component of eyecare protection and promotion. Approach epidemiologically the ocular conditions according to their prevalence,

incidence, socioeconomic implication in human life, costs of prevention vs treatment and availability of intervention allows the creation of more efficient action and prioritization plans.<sup>5</sup> Primary eyecare, as directed by WHO, should be sufficiently comprehensive to solve immediately primary attention conditions and act in the prevention of others.

In the year 2015, it was estimated among the world population, that 36 million people were blind (0.51% of world's population) and the number of individuals with moderate or severe visual impairment was 216, 6 million (3.09% of world population). Among the main causes (gross prevalence) are uncompensated refractive error, cataract, glaucoma, macular degeneration, corneal opacity, trachoma and diabetic retinopathy. World population growth, as well as the inversion of population pyramids in developed countries predict an increase in the number of individuals affected by the most common causes of visual impairment or blindness. Alarming predictions for 2020 point to an action at the level of primary care, and in a large-scale, as the solution to deal with demographic changes and consequent increase in the number of cases, preventing avoidable visual impairment and blindness.<sup>6</sup>

Following the WHO directives, Portugal created the National Program for Vision Health implemented by the Directorate-General of Health. Primary or secondary eye-

care in Portugal are responsibility of ophthalmologists, who are duly assisted by support staff, namely orthoptists and nurses. Although Ophthalmology is a medical-surgical specialty, based on therapeutic and surgical intervention at the secondary care level, in Portugal these professionals perform primary eyecare of refraction and visual rehabilitation.<sup>7</sup> At National Health Service (NHS) level, eyecare is fully integrated on hospital or secondary care, with primary eye care in Portugal being maintained in a practice at different levels, in an unorganized way, varying in the quality of care provided and accessibility for the user, remaining to be developed as a structured discipline in the NHS.<sup>8</sup> The patient's entry into the NHS is through the general practitioner who refers to the hospital specialty of ophthalmology without any prior eye evaluation, based solely on the express will or symptomatology of the patient.<sup>7</sup> Optometry remains an unregulated and not recognized as a health profession.

The WHO is clear in the placement of the Optometrist as the primary eye care provider and defining its competences.<sup>9</sup> In Portugal, the academic training in Optometry dates to 1988 in Minho's and Beira Interior Universities, with duly approved study plans and training objectives, from 1988 to 2006/2007 Beira Interior University and 2009/2010 in Minho's University the graduate study plans were 4 and a half years, after that date it became of 3 years, by which time most students finish and begin clinical activity.<sup>10,11</sup> There are also 2-year Master's<sup>12,13</sup> and 3-year Doctoral study plan.<sup>14,15</sup> In the inexistence of legislation or regulatory body, all postgraduate and continuous education is performed voluntarily by the Portuguese Optometrists.<sup>15</sup> Other eye care professions that work alongside Optometrists are Orthoptists and Ophthalmologists. Orthoptists have their profession recognized and regulated by the Ministry of Health, having a 4-year degree with syllabus in the field of optometry, health sciences, exact sciences and hospital internship. Ophthalmologists are graduated in Medicine for 6 years with a specialization in Ophthalmology of 4 years, the profession is regulated by their own body, the Medical Order, recognized and career regulated by the Ministry of Health. The competencies of Orthoptists and Ophthalmologists are defined by law corresponding in a very similar way to the competencies of the Ophthalmologist and Orthoptist in the United Kingdom (UK) respectively. The profession of Optician, which does not require any training in Portugal, and Optometrist are not regulated by law, but their competencies are also similar to those performed by Dispensing Opticians and Optometrists in the UK. The inexistence of legislation prevents Optometrists from resorting to the use of therapeutic or diagnostic drugs in their clinical practice.

The optometric scope of practice should be divided into two distinct areas. In a more general approach, the transversal competences of all health professionals, which include communication, argumentation and interpretation skills and standards of good practices in health. In a more specific approach are the competences of the field of optometric practice that are divided into five generic units that refer to the responsibilities and obligations of the optometrist to the patient, communication, diagnostic and treatment, clinical information management; and six detailed units that address clinical guidelines in the areas of: methods of ocular examination, prescription of optical aids, adaptation and

monitoring of contact lenses, identification, referral and follow-up of ocular pathologies, visual function evaluation and treatment and oculomotor and binocular vision anomalies evaluation and treatment.<sup>16,17</sup>

The aim of this study was to describe the Portuguese optometrist's professional competency model according to the procedures performed, levels of confidence and training needs.

## Material and methods

The survey target group were the Portuguese optometrists, whose population estimated at 2017 was 1563 individuals according to data from Portuguese universities and the International Agency for the Prevention of Blindness.<sup>18</sup> For a 95% confidence interval, and setting the margin of error at 5%, the required sample should have a minimum of 309 individuals.<sup>19</sup> The inclusion criteria were the frequency of higher education Optometry study plan acquired in Portuguese territory, as well as current practice of the profession.

The selected data collection instrument was the questionnaire survey with closed response options and completed in a single moment. The survey was anonymous and individual, requesting personal information only on gender, age, educational background, area of activity and years of professional practice. It was formulated using digital tools and its distribution was made through online platforms, being available for filling for 21 days. It was conceived in three sections, for easier filling, where the first examined the professional competencies of optometrists in the context of their current practice, the second focused on the training needs and the third analysed the confidence level in the performance of certain competencies.

520 responses were recorded with 76 eliminations according to the criteria. The number of validated responses was 444, a sample that was included in the subsequent statistical analysis, made using the IBM SPSS Statistics software, version 25.0.

In a first phase of statistical analysis it was used descriptive statistics, through counts and frequency analysis in order to summarize the data. The central location measure used was the median (*me*) and the dispersion measure was the interquartile distance (*iqr*), according to the ordinal or scalar nature of the data. In the tests of hypothesis and correlations it was used non-parametric statistics, namely the Mann-Whitney U-Test, the Kruskal-Wallis Test and the Spearman Non-Parametric Correlation Coefficient. The use of this type of tests refers to the characteristics of the construct under analysis. Thus, the analysis is not sensitive to distribution asymmetries, nor to the presence of outliers, not obliging assumptions of distribution normality or homogeneity of the variance.

## Results

### Sample characterization

The mean age of the sample (mean  $\pm$  standard deviation) was  $33,0 \pm 7,7$  years (range from 21 to 59 years), and the age distribution shows a higher proportion of individuals

**Table 1** Sample division in intervals of professional practice years.

Intervals of professional practice years	n = 444
Up to 4 years	118
5–9 years	127
10–13 years	95
14 or more years	104

between 27 and 37 years old. This fact can be justified by the recent nature of the higher education in Optometry, which began in national territory in 1988. The sample was divided in 68,7% (305) females and 31,3% (139) males.

According to academic qualifications, the institution where the Graduate's degree was obtained and professional practice area, it was observed that 78.8% of the respondents have a Graduate's degree, 20.5% a Master's degree and 0.7% a PhD; 71.6% received the Graduate's degree from Minho's University, 28.2% from Beira Interior University and only 0.2% from the Institute of Education and Science. 96.2% of respondents work in Optical Office. The exercise in National or Private Health Service, Research or Industry represents, in its entirety, only 3.8% of the sample. However, it is noticed that the Private Health Service is already the second largest area of professional practice, representing 2.9% of the sample. For the purposes of comparison with specific variables, the academic qualifications were encompassed in only two areas: Graduate and Master/PhD, given the residual number of doctorates in the sample (0.7%).

The distribution of professional practice years in the sample indicates a higher proportion of individuals with an experience of less than 11 years, strongly related to the age distribution in the sample and justified by the recent character of the Optometry training. The mean number of professional experience years is  $9.4 \pm 6.2$ . It was analysed whether the individuals with more years of experience were also those who had more academic qualifications (Masters/PhD), not having been verified differences between the groups. The mean years of professional practice for the Graduate's group is  $9.3 \pm 6.0$  and for the Masters/PhD group  $9.8 \pm 6.8$ . To compare the specific variables with the professional practice years, the sample was divided into intervals as shown in Table 1.

### Competencies based on the performed procedures

The frequency of optometric procedures execution was analysed by defining the most frequently performed procedures ( $4 < me < 5$ ), the procedures performed sometimes ( $me = 3$ ) and procedures rarely or never performed ( $1 < me < 2$ ) as presented in Table 2.

Analysing the frequency of the procedures performed, according to the years of professional practice, there are statistically significant differences when comparing the interval up to 4 years with the interval of 14 or more years of professional practice in the frequency of Retinoscopy ( $\rho = 0.012$ ) and Autorefractometry ( $\rho = 0.044$ ); and also in the comparison between the interval 5–9 years with the interval of 14 or more years of professional practice in the frequency of Retinoscopy ( $\rho = 0.005$ ) and Autorefractometry ( $\rho = 0.007$ ).

These results indicate that the frequency of the Retinoscopy procedure is higher in the 14 or more years of professional practice interval than in the lower ones. In the case of the Autorefractometry the process is the reverse, individuals with 14 or more years of practice tend to perform this procedure less often than individuals with lower experience.

Statistically significant differences were observed for all Binocular Vision procedures and between all levels of experience, however, when compared the frequency of these procedures between the interval of up to 4 years and the interval of 14 years or more, statistically significant differences in the order of  $\rho < 0.001$  were observed for each of the procedures, which indicates that individuals with more years of professional practice perform Basic Binocular Vision procedures more frequently than individuals with less years of experience (up to 4 years). There is also a gradual increase in the frequency of the Phoria Measure and Stereopsis procedures with the increase of the number of experience years.

There were also statistically significant differences in the frequency of Tonometry between the interval of up to 4 years and the interval of 10–13 years of practice ( $\rho = 0.009$ ) and between the interval up to 4 years and the interval of 14 or more years of professional practice ( $\rho = 0.001$ ), which indicates that individuals with 10 or more years of professional practice perform the procedure more often than individuals with professional experience of less than 4 years.

It was observed that there are statistically significant differences in the frequency of execution of all Contactology procedures with values in the order of  $\rho < 0.001$  when comparing the intervals of up to 4 years with 14 or more years of professional practice, indicating that individuals with more years of professional experience more often perform Contactology procedures than individuals with less years of professional practice, with a gradual increase in the frequency of execution with the increase of the number of experience years.

There were also statistically significant differences in the Prismatic Prescription between all the defined intervals ( $\rho < 0.001$ ). It should be noted that there were statistically significant differences in the frequency of execution of all Advanced Binocular Vision procedures ( $\rho < 0.001$ ) between the intervals of up to 4 years and 14 or more years of practice, allowing to observe that individuals with more professional experience, specifically in the 14 or more years of practice interval, perform more often these procedures.

Statistically significant differences were also observed between the interval of up to 4 years and the interval of 14 or more years of professional practice in the frequency of execution of Ocular Pathology Management ( $\rho = 0.006$ ) and Pre and Post-Operative Evaluation ( $\rho = 0.001$ ), indicating that individuals with more years of professional practice (14 years or more) more frequently perform these Advanced Eye Health procedures than individuals with less years of professional experience.

It was observed that there are statistically significant differences for the execution of all procedures of Diagnostic and Therapeutic Exams between the interval up to 4 years and the interval of 14 or more years of practice (Retinography:  $\rho = 0.002$ ; Topography and Perimetry:  $\rho < 0.001$ ; Aberrometry:  $\rho = 0.007$  and Biometry:  $\rho = 0.028$ ). These results indicate that optometrists rarely perform these procedures, but when they do, Retinography and Topography

**Table 2** Frequency of optometric procedures ( $m_e$ : median;  $iqr$ : interquartile range).

Frequency	Procedure	$m_e$	$iqr$	
Most frequently performed	Refraction	Retinoscopy	4	2
		Subjective examination	5	0
	Basic ocular health assessment	Autorefractometry	5	1
		Slit-lamp examination	4	1
		Ophthalmoscopy	4	1
		Tonometry	4	1
		Tear evaluation	4	3
	Contactology	Keratometry	4	3
	Paediatric optometry	School Age (>6 years)	4	2
		Phoria measure	3	1
Performed sometimes	Procedure basic binocular vision assessment	Reserves measure	3	1
		Accommodative amplitude	3	1
	Basic binocular vision assessment	Accommodative flexibility	3	1
		Stereopsis	3	1
	Contactology	Dynamic retinoscopy	2	2
		Adaptation in keratoconus	1	2
		Orthokeratology	1	0
	Advanced binocular vision assessment	Adaptation of special CL	1	1
		Visual therapy	1	1
		Prismatic prescription	1	1
Visual training of athletes		1	0	
Advanced ocular health assessment	Ocular pathology management	2	3	
	Low vision	1	1	
	Pre and postoperative evaluation	1	1	
Rarely or never performed	Diagnostic and therapeutic exams	Retinography	1	2
		Topography	1	1
	Paediatric optometry	Aberrometry	1	0
		Tomography	1	0
		Perimetry	1	0
	Optometry in special needs populations	Biometry	1	0
		Pre-verbal age (0–2 years)	1	0
		Pre-school age (3–6 years)	2	3
		Cognitive, behavioural or social disorders	2	3
		Psychic or mental disability	2	3
Physical, sensory or audio communication disability	2	3		

are the most performed. Individuals with 14 or more years of professional practice perform more procedures of Diagnostic and Therapeutic Exams, namely Retinography and Topography, and more often than individuals with less years of professional experience.

In the frequency of execution of all Paediatric Optometry procedures according to the professional practice intervals, statistically significant differences were observed between the intervals of up to 4 years and 14 or more years of experience ( $p < 0.001$ ), indicating that individuals with 14 or more years of professional practice more often perform these procedures. It was also noted that the frequency of this type of procedure gradually increases with the increasing of professional experience.

Finally, the professional practice intervals were compared to each other for the procedure Evaluation of Patients with Special Needs with Physical, Sensory or Audio Communication Disability, with statistically significant differences observed between the intervals of up to 4 years and 14 years or more ( $p = 0.016$ ) and between the intervals of up to 4 years

and 5–9 years of professional practice ( $p = 0.004$ ), indicating that professionals with less than 4 years of practice perform less frequently these procedures than professionals with 5–9 and 14 years or more of professional experience.

Analysing the frequency of execution of the different procedures according to the academic qualifications, previously obtained and grouped into two categories, Graduate and Master/PhD, statistically significant differences were observed for the frequency of the procedures: Dynamic Retinoscopy ( $p = 0.0026$ ), Biomicroscopy ( $p = 0.004$ ), Keratometry ( $p = 0.033$ ), Adaptation in Keratoconus ( $p = 0.003$ ), Visual Therapy ( $p = 0.046$ ), Prismatic Prescription ( $p = 0.006$ ), Ocular Pathology Management ( $p = 0.006$ ), Pre and Post-Operative Evaluation ( $p = 0.007$ ), Retinography ( $p = 0.003$ ), Topography ( $p = 0.015$ ), Aberrometry ( $p = 0.021$ ), Pre-Verbal Paediatric Patient Assessment (0–2 y/o) ( $p = 0.028$ ) and Assessment Patient with Cognitive, Behavioural and Social Disorders ( $p = 0.045$ ). These results indicate that individuals with higher qualifications, that is, academic degree of Mas-

ters/PhD, more frequently perform the referred procedures, than individuals with only a Graduate's degree.

## Training needs

Table 3 presents the training needs indicated by the respondents, defining total training requirement ( $4 < me < 5$ ), partial training requirement ( $me = 3$ ) and no training requirement ( $1 < me < 2$ ), this last condition was not verified for any of the units included in the questionnaire.

Analysing the training needs referred according to the four intervals of professional practice years previously defined, it was observed that there are statistically significant differences in the Prismatic Prescription training needs between the interval of up to 4 years and the interval of 14 or more years of practice ( $p = 0.001$ ) indicating that there is a greater training need on the part of less experienced professionals. In the case of Low Vision, there are statistically significant differences between the intervals of 5–9 years and 10–13 years of experience, the latter of which report higher training needs at Low Vision level.

Comparing the training needs according to academic qualifications, there are statistically significant differences in the areas of Ocular Pathology ( $p = 0.020$ ), Ocular Manifestation of Systemic Diseases or Therapeutics ( $p = 0.010$ ), Prismatic Prescription ( $p = 0.014$ ), Paediatric Optometry ( $p = 0.010$ ), Contactology in Special Cases ( $p < 0.001$ ), Diagnostic and Therapeutic Exams Execution ( $p = 0.001$ ) and Diagnostic and Therapeutic Exams Interpretation ( $p = 0.002$ ), Low Vision ( $p < 0.001$ ), Public Health: Epidemiological Studies in Health Vision ( $p < 0.001$ ) and Clinical/hospital Internship ( $p = 0.016$ ). In all these areas, there is a greater training need assumed by the Graduates in relation to Masters/PhDs.

## Confidence levels of procedures performed

For the confidence levels in the execution of the procedures analysis it was defined the maximum confidence levels ( $4 < me < 5$ ), the intermediate confidence levels ( $me = 3$ ) and the minimum or non-existent confidence levels ( $1 < me < 2$ ) as presented on Table 4.

Comparing the confidence levels between the four intervals of professional practice years, there were statistically significant differences for the procedures of Binocular Vision ( $p < 0.001$ ), Contactology in Special Cases ( $p < 0.001$ ), Visual Therapy ( $p = 0.006$ ), Prismatic Prescription ( $p < 0.001$ ), Ocular Pathology Assessment ( $p = 0.020$ ), Pre and Post-Operative Evaluation ( $p = 0.011$ ), Paediatric Optometry: Pre-Verbal Age ( $p = 0.016$ ) and Pre-School age ( $p < 0.001$ ), between the interval up to 4 years and the interval of 14 or more years of practice, indicating a higher level of confidence by the more experienced professionals. There is also a gradual increase in confidence levels in the execution of the above procedures with professional experience, presenting lower values in the first interval (up to 4 years) and higher confidence values in the last interval (14 years or more).

Analysing the confidence levels referred according to academic qualifications, statistically significant differences were observed for the procedures of Binocular Vision ( $p = 0.007$ ), Contactology in Special Cases ( $p < 0.001$ ), Visual Therapy ( $p < 0.001$ ), Prismatic Prescription ( $p = 0.002$ ), Diag-

nostic and Therapeutic Exams ( $p < 0.001$ ), Ocular Pathology Assessment ( $p = 0.001$ ), Low Vision ( $p = 0.013$ ), Pre and Post-Operative Evaluation ( $p < 0.001$ ), Procedures in Operating Room ( $p = 0.022$ ), Paediatric Optometry: Pre-Verbal Age ( $p = 0.002$ ) and Pre-School Age ( $p = 0.028$ ). Individuals with Master/PhD qualifications reported higher confidence levels in the performance of these procedures compared to individuals with a Graduate's degree.

## Discussion

Contrary to what is beginning to be seen in some developed and underdeveloped countries,<sup>20–22</sup> in Portugal the model of Optometrists practice is reduced, being that the majority of the individuals of the sample, 96.2%, is exclusively practicing in optics office. The results indicate that the most frequently performed procedures by Portuguese Optometrists are very reductive view of the Optometrist scope of practice<sup>21</sup> defined by the competent authorities, based on Refraction, Basic Ocular Health, Basic Contactology and School Age Paediatric Patient Assessment (>6 years).<sup>16,23</sup> The scope of practice observed in countries such as the United Kingdom, Australia, or the United States of prescription of therapeutic and diagnostic drugs or managing pathologies<sup>21,24</sup> is not a reality in Portugal, although Optometry study plans have significant similarities between these countries. The first option of the survey "I do not perform" certain procedure was divided into two sub-options: "I do not have patients or equipment to do so" or "I do not perform by choice". More than 50% of optometrists do not perform the procedures because they have no patients or equipment to do so. Only in Retinoscopy, Subjective, Forias and Reserve Measurement and Accommodative Status Assessment (Dynamic Retinoscopy, Accommodative Amplitude and Flexibility) procedures the justification for non-execution is mainly due to the professional's choice. The rarely or never performed procedures, such as Basic and Advanced Binocular Vision Assessment, Advanced Contactology, Advanced Ocular Health Assessment, Diagnostic and Therapeutic Exams, Paediatric Patient Assessment in Pre-Verbal (0–2 years) and Preschool Ages (3–6 years) and Optometry in Special Needs Populations, are in fact fundamental competences of the Optometrist according to the World Council of Optometry and consequently the World Health Organization and that only through its execution can be provide extensive visual and eye care, which includes refraction and prescription, detection/diagnosis and management/treatment of eye diseases and the rehabilitation/treatment of conditions of the visual system.<sup>16,23</sup> The procedures for which are referred the highest confidence levels are Refraction, Basic Binocular Vision Assessment, Basic Ocular Health Assessment, Basic Contactology, and Paediatric Patient Assessment in School Age (>6 years). The procedures for which individuals report low confidence levels are Prismatic Prescription, Low Vision, Pre-and Post-Operative Evaluation, Procedures in Operating Room, Aberrometry, Tomography, Perimetry, Biometrics and Paediatric Patient Assessment in Pre-Verbal Age (0–2 years). A professional expertise in Optometry study<sup>25</sup> noted that the learning experience contributes to the professional development, as we state in this work more years

**Table 3** Training needs ( $m_e$ : median;  $iqr$ : interquartile range).

Training needs	Training area	$m_e$	$iqr$
Total training requirement	Applied ocular pharmacology	4	1
	Prismatic prescription	4	1
	Optometry in special needs populations	4	1
	Contactology in special cases	4	1
	Low vision	4	1
	Clinical/hospital internship	4	2
	Binocular vision	3	1
	Ocular pathology	3	1
Partial training requirement	Ocular manifestation of systemic diseases or therapeutics	3	1
	Referral for other professionals	3	1
	Paediatric optometry	3	1
	Diagnostic and therapeutic exams execution	3	1
	Diagnostic and therapeutic exams interpretation	3	1
	Public health: epidemiological studies in vision health	3	1

**Table 4** Confidence levels in the execution of procedures ( $m_e$ : median;  $iqr$ : interquartile range).

Confidence Level	Procedure	$m_e$	$iqr$	
Maximum confidence levels	Refraction	5	0	
	Basic binocular vision assessment	4	1	
	Basic ocular health assessment	4	0	
	Contactology	Basic contactology	4	1
	Paediatric optometry	School age >6 years	4	2
	Contactology	Contactology in special cases	3	2
	Advanced binocular vision assessment	Visual therapy	3	1
	Ocular Pathology Management		3	1
Intermediate Confidence Levels	Diagnostic and therapeutic exams	Retinography	3	2
	Paediatric optometry	Topography	3	2
	Optometry in special needs populations	Pre-school age (3–6 years)	3	2
	Advanced binocular vision assessment	Cognitive, behavioural or social disorders	3	2
		Psychic or mental disability	3	1
		Physical, sensory or audio communication disability	3	2
		Prismatic prescription	2	1
Minimum or non-existent confidence levels	Advanced ocular health assessment	Low vision	2	1
		Pre and postoperative evaluation	2	1
		Procedures in operating room	1	1
		Aberrometry	2	2
	Diagnostic and therapeutic exams	Tomography	2	2
		Perimetry	2	1
	Paediatric optometry	Biometry	2	2
	Pre-verbal age (0–2 years)	2	2	

of professional practice is reflected in a higher frequency of procedures performance of procedures and also into higher confidence levels. The most experienced training needs are also those that represent lower execution frequency and lower confidence levels. No statistically significant differences were found between the training needs felt and the institution where the Graduate's degree was obtained. This can be explained by the nature and restructurings of study plans<sup>15</sup> which may give recent graduates (up to 4 years' experience) less competence and confidence to perform certain procedures or by the natural evolution of professional practice. Professionals with more than 10 years of experience tend to perform more procedures, more often,

more safely, performing more thorough evaluations. Individuals with qualifications at Master's/PhD level frequently perform more optometric procedures, have lower training needs and have higher confidence levels in the execution of procedures.

## Conclusions

The competencies most frequently performed by the Portuguese optometrists constitute a very reductive view of the optometric competences stipulated internationally and are based on Refraction (Retinoscopy, Subjective

and Self-refraction), Basic Ocular Health (Biomicroscopy, Ophthalmoscopy and Tonometry), Contactology (Lacrimal Evaluation and Keratometry) and School Age Paediatric Optometry (>6 years). These competencies tend to be broadened and more frequently performed after 10 years of professional practice and/or with the acquisition of Masters/PhD qualifications. The most felt training needs occur in the less frequently performed procedures with lower levels of confidence, namely Applied Ocular Pharmacology, Prismatic Prescription, Optometry in Special Needs Populations, Contactology in Special Cases, Low Vision and Clinical/hospital internship. Qualifications at Master's/PhD level translate into more competencies, higher levels of confidence in the execution of procedures and lower training needs felt by professionals. Optometrists with more years of practice (more than 10) have more skills, higher confidence levels in the execution of procedures and smaller training needs referred. Higher frequencies of execution of certain procedures translate into high confidence levels and lower training needs in the area. Optometrists who perform certain procedures more often tend to also perform supplementary procedures frequently, making optometric assessments more complete. Professionals with high confidence levels in performing certain procedures are also individuals with high confidence levels to perform supplementary procedures.

## Recommendations

Despite the need for further study of the subject, this work provides insight into some future research lines and comprehensive eye care intervention plans. The reevaluation of academic training in number of years and content and the creation of a competency framework within the scope of national optometric practice, with possible expansion paths based on academic and professional training, are fundamental to advocate the regulation of the profession in Portugal.

## Conflicts of interest

The authors have no conflicts of interest to declare.

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## References

- World Health Organization. *Declaração de alma-ata*; 1978.
- Saltman RB, Rico A, Boerma W. Primary care in the driver's seat? In: *Organizational Reform in European Primary Care*. 1st ed. Maidenhead: Open University Press; 2006.
- Biscaia AR, Heleno LC. Primary health care reform in Portugal: Portuguese, modern and innovative. *Cien Saude Colet*. 2017;22:701–712, <http://dx.doi.org/10.1590/1413-81232017223.33152016>.
- Smith J. *Primary Care: Balancing Health Needs, Services and Technology*. 1. Utrecht, The Netherlands: Igitur, Utrecht Publishing & Archiving Services; 2001. Revised Ed.
- Konyama K. Essential components of primary eye care. *Community Eye Heal J*. 1998;11:19–21.
- Flaxman SR, Bourne RRA, Resnikoff S, et al. Global causes of blindness and distance vision impairment 1990–2020: A systematic review and meta-analysis. *Lancet Glob Heal*. 2017;5:e1221–1234.
- Murta JN, Reis FF, Lopes H, et al. Rede Nacional de Especialidade e de referênciação em Oftalmologia. *Serviço Nac Saúde*. 2016.
- Directorate-General of Health. *National Program for Vision Health - Review and Extension 2020*. Lisbon; 2016 <https://www.dgs.pt/documentos-e-publicacoes/programa-nacional-para-a-saude-da-visao-pdf.aspx>.
- World Health Organization. *WHO | Universal Eye Health: A Global Action Plan 2014–2019*. World Health Organization; 2014.
- Universidade da Beira Interior. *Licenciatura em Optometria e Ciências Da Visão*; 2018 <https://www.ubi.pt/curso/2>.
- Universidade do Minho. *Licenciatura em Optometria e Ciências Da Visão*; 2018 [https://www.uminho.pt/PT/ensino/oferta-educativa/\\_layouts/15/UMinho.PortalUM.UI/Pages/CatalogoCursoDetail.aspx?itemId=3040&catId=9](https://www.uminho.pt/PT/ensino/oferta-educativa/_layouts/15/UMinho.PortalUM.UI/Pages/CatalogoCursoDetail.aspx?itemId=3040&catId=9).
- Universidade da Beira Interior. *Mestrado em Optometria e Ciências Da Visão*; 2018 <https://www.ubi.pt/curso/868>.
- Universidade do Minho. *Mestrado em optometria avançada*; 2018 [https://www.uminho.pt/PT/ensino/oferta-educativa/\\_layouts/15/UMinho.PortalUM.UI/Pages/CatalogoCursoDetail.aspx?itemId=3056&catId=9](https://www.uminho.pt/PT/ensino/oferta-educativa/_layouts/15/UMinho.PortalUM.UI/Pages/CatalogoCursoDetail.aspx?itemId=3056&catId=9).
- Universidade do Minho. *Programa Doutoral em Optometria e Ciências Da Visão*; 2018 [https://www.uminho.pt/pt/ensino/oferta-educativa/\\_layouts/15/uminho.portalum.ui/pages/catalogocursodetail.aspx?itemid=2094&catId=7](https://www.uminho.pt/pt/ensino/oferta-educativa/_layouts/15/uminho.portalum.ui/pages/catalogocursodetail.aspx?itemid=2094&catId=7).
- Ferreira MIC, Franco S. *Os 25 Anos Da Optometria e Das Ciências Da Visão Na universidade do minho: A construção de um paradigma*. 1st ed. Braga, Portugal: Author Edition; 2016. Accessed July 13, 2018 <http://hdl.handle.net/1822/49270>.
- Kiely PM, Chappell R. *A Global Competency-Based Model of Scope of Practice in Optometry - World Council of Optometry*; 2015.
- Kiely PM. Optometrists association australia universal (entry-level) and therapeutic competency standards for optometry. *Clin Exp Optom*. 2008;2009(92):362–386.
- International Agency for the Prevention of Blindness. *Global Action Plan Indicators - The Data in Full • IAPB Vision Atlas*; 2017 <http://atlas.iapb.org/global-action-plan/gap-indicators/>.
- Vaz Freixo MJ. *Scientific Methodology: Fundamentals, Methods and Techniques*. 1st ed. Lisbon, Portugal: Instituto Piaget; 2009.
- Thite N, Jaggernath J, Chinanayi F, Bharadwaj S, Kunjeer G. Pattern of optometry practice and range of services in India. *Optom Vis Sci*. 2015;92:615–622.
- Kiely PM, Cappuccio S, McIntyre E. Optometry Australia scope of practice survey 2015. *Clin Exp Optom*. 2017;100(3):260–269.
- Shah K, Naidoo K, Chagunda M, Loughman J. Evaluations of refraction competencies of ophthalmic technicians in Mozambique. *J Optom*. 2016;9(3):148–157.
- Lewis TL. Defining the scope of practice of optometry. *Optom Vis Sci*. 1994;71:76–79.
- Council GO. *Competencies Criteria Optometry*; 2016.
- Faucher C. Development of professional expertise in optometry. *Optometry*. 2011;82(4):218–223.