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FROM THE EXAMINATIONS DEPARTMENT



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Final Report November 2010 Refraction Certificate Examination

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Introduction

The third Refraction Certificate examination in the restructured format was held in Birmingham on 29 and 30 November 2010. 53 candidates presented themselves for the examination. The examination consisted of an eight station OSCE covering a range of skills required to assess visual acuity, refractive error and the prescription of spectacles.

Examination blueprint

The Refraction Certificate (RCert) is designed to assess the following learning outcomes from the Royal College of Ophthalmologists curriculum for ophthalmic specialist training (OST):

CA2	Vision
CA7	Motility
PM1	Management plan
PM14	Spectacles
PS2	Refraction
PS21	Hand hygiene
C1	Rapport
C2	Communication
C12	Records
BCS6	Optics
BCS14	Instrument technology
AER16	Time management

Examination Structure

Eight OSCE stations are selected from a possible 16. Four stations are compulsory (they will appear in every examination). Four stations are selected from the remaining twelve.

Compulsory stations: (15 marks available for each OSCE)

1. Cycloplegic Retinoscopy
2. Non Cycloplegic Retinoscopy
3. Subjective Refraction Sphere
4. Subjective Refraction Cylinder

Remaining stations

5. Binocular Balance (15 marks)
6. A second Cycloplegic Retinoscopy (15 marks)
7. Focimetry (10 marks)
8. Lens Neutralisation (10 marks)
9. Muscle Balance with Maddox Rod (15 marks)
10. Muscle Balance with Prism Cover Test (15 marks)
11. Near Addition (10 marks)
12. A second non Cycloplegic Retinoscopy (15 marks)
13. Refraction of a Model Eye (15 marks)
14. Trial Frame Fitting and Interpupillary Distance (IPD) Measurement (5 marks)
15. Visual Acuity and Refraction Estimation (5 marks)
16. Visual Acuity Testing of a Child (5 marks)

The stations used in the November examination were:

1. **Cycloplegic retinoscopy**
2. Non-cycloplegic retinoscopy (2)
3. **Non-cycloplegic retinoscopy**
4. Near addition
5. **Subjective refraction: modification of cylinder**
6. Visual acuity and estimation of spectacle correction
7. **Subjective refraction: modification of sphere**
8. Focimetry

Standard setting

Candidates must be able to accurately assess visual acuity, measure refractive error and recommend an appropriate spectacle correction to pass the RCert. The pass mark was identified using two different methods:

Borderline candidate method (BCM)

Examiners marked the station they were supervising according to the marking guidance provided. In addition they were asked to rate the candidates overall performance as a pass, a fail or borderline. The median mark allocated to the borderline candidates then becomes the pass mark for that station. The sum of the borderline marks for each station is the examination pass mark.

Hofstee method

In advance of the examination, members of the College's Examinations Committee were asked to nominate the values for the following:

1. The maximum credible pass mark for the examination (80%)
2. The maximum credible pass rate for the examination (75%)
3. The minimum credible pass mark for the examination (50%)
4. The minimum credible pass rate for the examination (10%)

The cumulative fail rate as a function of the pass mark and the co-ordinates derived from the four values above were plotted on a graph. The point where a line joining the two co-ordinates intersects the cumulative function curve is used to identify the pass mark.

The pass mark for the examination is the sum of the BCM pas mark and one standard error of measurement (SEM), which is calculated after the examination results are known.

Results (Table 1)

Maximum possible mark	100
Mean candidate mark	71
Median candidate mark	70
Standard deviation	11.81
Highest candidate mark	91
Lowest candidate mark	33
Range of marks	58
Reliability	0.6
Standard error of measurement (SEM)	7
BCM pass mark	67
Hofstee pass mark	71
Pass mark used (BCM + 1 SEM)	74
Pass rate	22/53 (42%)

Distribution of marks (Table 2)

<46	//	2
46-50		0
51-55	////	4
56-60	///	3
61-65	//// /	6
66-70	//// ////	10
71-75	//// ///	8
76-80	//// ///	9
81-85	//// //	7
86-90	///	3
>90	/	1
		53

Statistics for each station (Table 3)

	Station							
	1	2	3	4	5	6	7	8
	Cyclo ret 1	Non cyclo ret 2	Non cyclo ret 1	Near add	Subj cyl	VA	Subj sph	focim
Max mark	15	15	15	10	15	5	15	10
Mean	10	11	9	7	10	5	12	7
Mean%	66	70	61	73	69	100	78	71
Median	10	11	9	8	12	5	12	8
Med%	67	73	60	80	80	91	80	80
SD	3.29	3.47	3.34	1.68	3.87	0.72	2.99	2.73
Max	15	15	15	10	15	5	15	10
Min	3	3	2	3	1	3	3	1
Range	12	12	13	7	14	2	12	9

Global judgments for each station (Table 4)

	Station (number of candidates)							
	1	2	3	4	5	6	7	8
	Cyclo ret 1	Non cyclo ret	Non cyclo ret	Near add	Subj cyl	VA	Subj sph	focim
Pass	10	23	15	29	32	47	37	30
Borderline	17	17	19	22	12	5	11	14
Fail	16	13	19	2	9	1	5	9
% Pass	19	43	28	55	60	89	70	57

Correlation between stations (Table 5)

		2	3	4	5	6	7	8
		Non cyclo ret 2	Non cyclo ret 1	Near add	Subj cyl	VA	Subj sph	focim
1	Cyclo ret 1	0.313	-0.003	0.199	0.203	0.236	0.080	0.015
2	Non cyclo ret 2		0.507	0.208	0.175	0.366	0.165	0.173
3	Non cyclo ret 1			0.003	0.231	0.162	0.461	0.051
4	Near add				0.149	0.149	-0.014	0.076
5	Subj cyl					0.224	0.295	-0.101
6	VA						0.220	0.211
7	Subj sph							0.000

Item discrimination and facility

33% item discrimination has a value between -1.00 and +1.00. If the candidates who score well in the examination overall score well in the station, the item discrimination index will be close to +1.00. If the candidates who score poorly in the examination overall score well in the station, the item discrimination index will be close to -1.00. Ideally the station item discrimination value should be greater than 0.400.

The facility of a station measures how easy it was.

Utility of each question (Table 6)

	Station	33% item discrimination	Item facility
1.	Cycloplegic retinoscopy 1	0.444	0.491
2.	Non-cycloplegic retinoscopy 2	0.722	0.642
3.	Non-cycloplegic retinoscopy 1	0.611	0.472
4.	Near addition	0.278	0.830
5.	Subjective refraction: modification of cylinder	0.444	0.679
6.	Visual acuity and estimation of spectacle correction	0	1.0
7.	Subjective refraction: modification of sphere	0.389	0.830
8.	Focimetry	0.222	0.755

Breakdown of results by training (Table 7)

	Failed	Passed	Total
In OST	20	16	36
Not in OST	11	6	17
Total	31	22	53

These differences are not statistically significant (p=0.57)

Breakdown of results by deanery (Table 8)

Deanery	Failed	Passed	Total
East Midlands	2	0	2
East of England	0	2	2
East Scotland	0	1	1
London	1	4	5
Mersey	1	1	1
North West	4	0	5
Northern	1	2	3
SE Scotland	1	1	2
South Yorks NH	1	1	2
SW Peninsula	2	1	3
West Midlands	2	0	2
West Scotland	1	0	1
Wales	0	2	2
Wessex	1	0	1
Yorkshire	3	1	4
Total	20	16	36

Breakdown of results by stage of training (Table 9)

Stage (includes FTSTA)	Failed	Passed	Total
ST1	3	0	3
ST2	3	3	6
ST3	11	10	21
ST4	1	0	1
Unknown	2	3	5
Total	30	16	36

Breakdown of results by gender (Table 10)

	Failed	Passed	Total
Female	13	10	23
Male	18	12	30
Total	31	22	53

These differences are not statistically significant (p=1.0)

Breakdown of results by country of qualification (Table 11)

	Failed	Passed	Total
UK	14	14	28
Outside UK	17	8	25
Total	31	22	53

These differences are not statistically significant (p=0.26)

Breakdown of results by stated ethnicity (Table 12)

	Failed	Passed	Total
Asian	15	8	23
Black African	1	0	1
Chinese	3	3	6
Mixed	2	1	3
Arabic	3	1	4
White British	6	8	14
Unknown	1	1	2
Total	31	22	53

Breakdown of results by number of previous attempts (Table 13)

Attempts	Failed	Passed	Total
1 (First)	18	12	30
2	8	7	15
3	4	1	5
4	1	1	2
5	0	0	0
6	0	1	1
Any resit	13	10	23
Total	31	22	53

Comparison to previous examinations (Table 14)

	March 2010	July 2010	Nov 2011
Candidates	43	47	53
Pass mark	69	75	74
Pass rate	47%	53%	42%
Reliability	0.58	0.6	0.6
SEM	9	8	7
% Candidates in OST	67%	70%	68%

Feedback: Candidate feedback

Positive comments:

Quite fair
Good
Booklet - map all detailed (for getting to exam)
Nice set up - relaxing
Everyone so friendly
Focimeter very calm
Whole exam much calmer
Examiners fantastic
Patient selection good - good ret reflexes
Clear and enough time in between stations
Exactly what was expecting

Candidate Suggestion/Comments

Time is an issue - this is by far the commonest problem, in particular Retinoscopy and Cyl
Mounting the lenses before time
Cross cyl - struggling to see axis markers
Mark cylinders with marker pen?
Trial frame lop sided (as fitted by examiner)
Trial frame not mounted
Reading chart not present and available - have equipment ready
One patient - had to repeat the question numerous times
Not happy about late start
More time for orientation -timetable could be more slack
Not the order on the door
Didn't like the boxes on the mark sheet
Difficulty finding Os in the Snellen (fixation device)
Could have been shown how to control the fixation device
Worry about finding the centre of lens in focimetry
Difficulty about fogging - most optoms use occlusion
Room too hot
Too much noise outside the room (during intervals)

Examiner feedback

Suggest using LogMAR for poorly sighted patients
Candidates could move patient if vision poor
Change technique marking to include specific items
Change examiners box in Question 1 in retinoscopy on Mark sheet
Why ask for examiner working distance?
Need a box for VA in the subjective questions
Terminology on Mark Sheets
 e.g. Prescription at start (instead of Information given)
 Correct prescription (instead of Correct answer)

Marking instructions need to be clearer on retinoscopy
One examiner not Familiar with Retinoscopy
Trial Frame – mounted –found it difficult

On the day
Need to emphasis Fixation device – in particular o s for cylinder
Room Lighting

Summary

The Refraction Certificate comprehensively assesses a candidate's competence with all components of the measurement of visual acuity and spectacle correction. The pass rate is disappointingly low, especially in trainees in ST2 and ST3 (50%). Candidates in ST3 will, however, have another opportunity to pass the examination (April 2011) before the next ARCP. Feedback from candidates and examiners is generally positive. Several useful comments have been made to help the running of each station. Time still appears to be a problem in some stations.

The examination has a reliability of 0.6, which is too low for a high stakes examination. This value has remained remarkably stable, in spite modifications to the marking scheme made by the Senior Examiner.

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January 2011