

The Royal College of Ophthalmologists

17 Cornwall Terrace, London. NW1 4QW.

Telephone: 020-7935 0702, Extension 210

Facsimile: 020-7487 4674

Email: Emily.Beet@rcophth.ac.uk

Website: WWW.RCOPHTH.AC.UK

FROM THE EXAMINATIONS DEPARTMENT



PATRON HRH THE DUKE OF YORK, KCVO, ADC

Final Report July 2011 Refraction Certificate Examination

Contents:

1.	Introduction, Blueprint and Structure	2
2.	Standard Setting	3
3.	Results and Analysis	4
4.	Breakdown of Results	7
5.	Candidate and Examiner evaluation	9
6.	Summary and recommendations	10
7.	Appendix 4 (Hofstee pass mark calculation)	11

Introduction

The fifth Refraction Certificate examination in the format was held in Glasgow on 19 and 20 July 2011. 41 candidates presented themselves for the examination. The examination consisted of an 8 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:

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

Remaining stations

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

The stations used in the July 2011 examination were:

1. Cycloplegic retinoscopy
2. Non-cycloplegic retinoscopy 2
3. Non-cycloplegic retinoscopy 1
4. Near addition
5. Subjective refraction-cylinder
6. Lens neutralisation
7. Subjective refraction-sphere
8. Trial frame and IPD measurement

Standard setting

Candidates must be able to accurately assess visual acuity, measure refractive error and recommend an appropriate spectacle correction to pass the Refraction Certificate. The pass mark is identified using the borderline candidate method. In addition the pass mark using the Hofstee method is calculated as a comparison, but not used to decide identify the successful candidates.

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 (see appendix 3 for details)

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
2. The maximum credible pass rate for the examination
3. The minimum credible pass mark for the examination
4. The minimum credible pass rate for the examination

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 Hofstee pass mark used to compare the difficulty of successive examinations)

Results (Table 1)

Maximum possible mark	100
Mean candidate mark	69.7
Median candidate mark	72
Standard deviation	11.2
Highest candidate mark	89
Lowest candidate mark	35
Range of marks	64
Reliability	0.43
Standard error of measurement (SEM)	6
BCM pass mark	61
Hofstee pass mark	71
Pass mark used (BCM + 1 SEM)	67
Pass rate	27/41 (66%)

Distribution of marks (Table 2)

<46	/	1
46-50	/	1
51-55		0
56-60	////	9
61-65	///	3
66-70	///	3
71-75	////	12
76-80	////	5
81-85	////	5
86-90	//	2
Total		41

The distribution of the candidate marks is strongly bimodal. (/ candidate passed, / candidate failed)

Statistics for each station (Table 3)

	Station							
	1	2	3	4	5	6	7	8
	cyclo ret	non cyclo ret 2	non cyclo ret 1	near add	subj cyl	neutral	subj sph	cyclo ret
Max mark	15	15	15	10	15	10	15	5
Mean	13	10	10	7	10	5	12	4
Mean%	84	66	65	71	65	46	78	87
Median	15	9	9	7	11	5	13	5
Med%	100	60	60	70	73	50	87	100
SD	3.79	3.05	3.67	2.19	3.95	2.66	3.6	0.85
Max	15	15	15	10	15	10	15	5
Min	3	3	2	1	2	0	1	2
Range	12	12	13	9	13	10	14	3

Global judgments for each station (table 4)

	Station (number of candidates)							
	1	2	3	4	5	6	7	8
	cyclo ret	non cyclo ret 2	non cyclo ret 1	near add	subj cyl	neutral	subj sph	cyclo ret
Pass	28	20	17	20	28	11	28	29
Borderline	10	19	22	16	5	13	10	10
Fail	3	2	2	5	8	17	5	2
% Pass	67	48	40	48	67	26	67	69

Correlation between stations (Table 5)

		1	2	3	4	5	6	7
		cyclo ret	non cyclo ret 2	non cyclo ret 1	near add	subj cyl	neutral	subj sph
2	non cyclo ret	0.36						
3	non cyclo ret	-0.03	0.01					
4	near add	0.28	-0.02	0.32				
5	subj cyl	0.09	0.08	0.42	0.18			
6	neutral	0.13	-0.12	0.22	0.07	0.32		
7	subj sph	0.29	0.34	-0.17	-0.12	-0.26	-0.29	
8	frame IPD	-0.02	0.09	0.11	0.00	-0.08	0.06	0.10

Comment

It is striking that there is such a poor correlation between the 2 non-cycloplegic retinoscopy stations, which test the same skill. This suggests that the patients used for the 2 stations were different.

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 each station estimates how easy the candidates found the task to complete.

Utility of each question (Table 6)

Pass or fail on marks for each station

	Station	33% item discrimination	Item facility
1.	Cycloplegic retinoscopy	0.250	0.46
2.	Non-cycloplegic retinoscopy 2	0.214	0.44
3.	Non-cycloplegic retinoscopy 1	0.250	0.46
4.	Near add	0.107	0.51
5.	Subjective refraction; cylinder	0.214	0.54
6.	Lens neutralisation	0	0.29
7.	Subjective refraction; sphere	0.143	0.54
8.	Trial frame and IPD	0.107	0.61

Pass or fail on global judgments for each station

	Station	33% item discrimination	Item facility
1.	Cycloplegic retinoscopy	0.250	0.46
2.	Non-cycloplegic retinoscopy 2	0.214	0.29
3.	Non-cycloplegic retinoscopy 1	0.107	0.32
4.	Near add	0.250	0.41
5.	Subjective refraction; cylinder	0.179	0.46
6.	Lens neutralisation	-0.036	0.17
7.	Subjective refraction; sphere	0.143	0.44
8.	Trial frame and IPD	0.179	0.51

Breakdown of results by training (Table 7)

	Failed	Passed	Total
In OST	8	21	29
Not in OST	6	6	12
Total	14	27	41

These differences are not statistically significant ($p = 0.31$)

Breakdown of results by deanery (Table 8)

Deanery	Failed	Passed	Total
East Midlands	0	2	2
East of England	1	1	2
East of Scotland	0	1	1
London	3	4	7
Mersey	0	1	1
North West	1	2	3
Northern	0	1	1
Northern Ireland	0	1	1
Peninsula	0	1	1
SE Scotland	0	1	1
Wessex	1	0	1
West Midlands	1	2	3
Yorkshire	1	4	5
Total	8	21	29

Breakdown of results by stage of training (Table 9)

Stage (includes FTSTA)	Failed	Passed	Total
ST1	2	2	4
ST2	4	11	15
ST3	2	8	10
Total	8	21	29

Breakdown of results by gender (Table 10)

	Failed	Passed	Total
Female	4	11	15
Male	10	16	26
Total	14	27	41

These differences are not statistically significant ($p = 0.55$)

Breakdown of results by country of qualification (Table 11)

	Failed	Passed	Total
UK	6	15	21
Outside UK	8	12	20
Total	14	27	41

These differences are not statistically significant ($p = 0.65$)

Breakdown of results by stated ethnicity (Table 12)

	Failed	Passed	Total
Asian	8	10	18
Chinese	1	4	5
Other	2	2	4
White British/Irish	1	6	7
White other	2	4	6
Unknown	0	1	1
Total	14	27	41

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

Attempts	Failed	Passed	Total
1 (First)	9	9	18
2	3	11	14
3	1	3	4
4	0	4	4
5	1	0	1
Any resit	5	18	23

Comparison to previous examinations (Table 14)

	March 2010	July 2010	Nov 2011	April 2011	July 2011
Candidates	43	47	53	57	41
Pass mark	69	75	74	71	67
Pass rate	47%	53%	42%	35%	66%
Pass rate in OST	58%	60%	44%	47%	72%
% Candidates in OST	67%	70%	68%	63%	71%
Reliability	0.58	0.6	0.6	0.6	0.42
SEM	9	8	7	6	6
Hofstee pass mark	68	72	71	67	71

Evaluation

Candidate evaluation (see appendix 1 for detailed feedback)

Summary of evaluation

- Candidates were very happy with the conduct of the examiners in each team
- Patients used in team 1 were considered to be appropriate. There were a small number of concerns (2 candidates) with patients in team 2.
- Opinions of the OSCE organization were mixed. There were a few comments about timekeeping, but the majority of candidates were happy (one enjoyed it)
- Instructions to candidates were clear for 95% of candidates.
- A substantial minority of candidates had concerns about the fairness of the OSCE as an assessment of their knowledge. The stress of performing under pressure was the only common theme.
- 56% of candidates claimed to be self-taught. It is not possible to calculate the pass rate for these candidates as the feedback is collected anonymously. The median number of refractions performed in preparation for the examination was 50 (range 15 to 200)
- General comments about the examination were varied (positive and negative) and sometimes contradictory (amazing facilities vs. venue too small)

Summary

The Refraction Certificate examination is now well established and has been accepted by the majority of candidates and examiners. Concerns that the OSCE does not represent a realistic assessment of a full refraction remain. However candidates acknowledge that preparation for the examination requires significant practice in complete refractions. They are also required to prepare for important components of an assessment of a patients refractive error that were not previously assessed.

The distribution of the results is clearer bimodal with modal marks of 56-60 and 71-75 respectively. This suggests that many candidates are not prepared for the examination in spite of the detailed advice given to them. A beneficial effect of the bimodal distribution is that very few candidates have marks that cluster around the pass mark.

The cycloplegic retinoscopy, modification of the sphere and IPD/trial frame stations are the easiest for the candidates. The non-cycloplegic retinoscopy, and lens neutralisation stations were most difficult.

The retinoscopy and modification of the cylinder are the most discriminatory stations. The lens neutralisation station is not discriminatory. This is explained by the difficulty of the station.

The pass rate increases with stage of training and experience with the examination (50% ST1, 73% ST2, 80% ST3).

The pass rate has risen to 72% in OST (66% overall).

The reliability remains unacceptably low and had deteriorated.

Michael Nelson BSc (Hons) FRCOphth MAEd

Education Adviser

August 2011

Candidate General Feedback

Were you treated in a courteous manner by the examiners in this station?

Team 1			Team 2			Overall		
Yes	No	DNA	Yes	No	DNA	Yes	No	DNA
100%	0	0	100%	0	0	100%	0	0

Team 1 comments:

- All examiners very polite
- Very helpful
- Helpful examiners
- All examiners very helpful, kind
- Put candidates at ease
- Very friendly examiners
- Examiners are very kind
- Excellent examiners
- Very pleasant
- Apart from the fact that the time keeping wasn't good.

Team 2 comments:

- Every one were kind and courteous
- Better than last exam. More relaxing environment and helpful but maybe that's me!
- Very well mannered
- One examiner would not let me prepare the trial frame in the preliminary minute (this was the near add station)
- Excellent
- Very friendly and made attempts to put us at ease. Thank you!

Were the patients you were asked to examine appropriate for the station?

Team 1			Team 2			Overall		
Yes	No	DNA	Yes	No	DNA	Yes	No	DNA
100%	0	0	94%	6%	0	98%	2%	0

Team 1 comments:

- Clear reflexes, well dilated, very co-operative
- Excellent choice of patients

Team 2 comments:

- One patient could not keep his eye open in the non cyclo ret and there was no room to examine his left eye without getting in the way of the spot
- The patients seemed to be very appropriate candidates
- Had problems with spherical corrections patient as she could not reproduce the same results when offered the same lenses at different times

OSCE Overall Feedback

Was the OSCE well organised?

Team 1			Team 2			Overall		
Yes	No	DNA	Yes	No	DNA	Yes	No	DNA
92%	0	6%	100%	0	0	95%	0	5%

Team 1 comments:

- Too small rooms
- Ran to time. Familiar layout
- Enjoyed it
- Fairly well organised
- Timekeeping poorly organised. Start/end times often not clear, leading to delays and confusion and need to rush station. Equipment failures with retinocope/fixation chart needing extra time added to station
- Problems with timing first station
- Excellent setting. Top facilities. Excellent rooms.
- Time Keeping

Team 2 comments:

- The electronic chart in the room for sphere correction (Nikon) was an unusual one. Difficult to operate and readings in American system. There was also a potential error. I was writing on another candidates answer sheet and I only realised it at the end. It was changed but am worried for the other stations where I did not check
- No problems
- Mine was the first round and I think there was a fair bit of confusion. The reading chart I was given was one that is usually not used. It took time to replace it, I was however given extra time
- The height of one vision chart projector was a little low, my head was blocking the way
- I would give 7/10. There should be a start bell and a finish bell, as in some of the stations some started a bit late
- Ran impressively smoothly

Were you given clear instructions about the OSCE?

Team 1			Team 2			Overall		
Yes	No	DNA	Yes	No	DNA	Yes	No	DNA
96%	4%	0	94%	6%	0	95%	5%	0

Team 1 comments:

- First station subjective cyl refining. Me and examiner didn't know about when to start by the time I was told I had only 2 minutes and no extra time was given
- Very clear

Team 2 comments:

- RCOphth information pack says that no Fresnel prisms are given for manual lens neutralisation
- American system of vision used which is not frequently practised in the UK

Did you feel that the OSCE was a fair assessment of your knowledge?

Team 1			Team 2			Overall		
Yes	No	DNA	Yes	No	DNA	Yes	No	DNA
75%	21%	4%	71%	18%	11%	73%	20%	7%

Team 1 comments:

- Very artificial situation which does not completely reflect reality (ie. multiple methods of doing the same thing are inferior here to the exam “model answer”)
- One cannot judge a candidate under time pressure. We always have time in the clinics to reach a good refraction. Even experienced opticians take time. It is not just to judge a decision based on the 40 minute assessment
- I believe the current format of the refraction exam is not an ideal way to test as it is unnatural to break the process into individual steps. Even optometry students have 1 student to refract completely
- Lens neutralisation – more appropriate for one lens instead of two. Time factor, resulted in being rushed
- Only +0.25/-0.25xcyl available. Not appropriate for patient
- I do not however think using electronic European Snellens chart in the cyl station was fair. It is not commonly used in our practice and totally threw me
- Realistically you have more than 5 minutes to carry out the tasks in clinical practice. 5 minutes is not enough for a fair assessment. Not a true reflection of ability
- Yes very good choice of patients very relaxing ambience
- The time keeping

Team 2 comments:

- Difficult to comment! 5 minutes is a short period! VA charts could be standardised for the ease of the candidates!
- Long case would be better
- It never is
- Not sure
- A bit stressful but I suppose that’s the way it is
- Feels more pressurised
- Although confusing lens box with black positive cyls caught me out
- Other than the initial confusion caused by alternating between red and black plus and negative lenses and the disaster this caused for my first station , perhaps standardisation

Exam Preparation Feedback

Who helped you to develop competence in refraction?

Team 1		Team 2		Overall	
Optometrist	20	Optometrist	11	Optometrist	31
Consult' Ophth'	6	Consult' Ophth'	4	Consult' Ophth'	10
Fellow Trainee	12	Fellow Trainee	7	Fellow Trainee	19
Self-taught	13	Self-taught	10	Self-taught	23

Other:

- Difficulty getting anyone to help until ST3. Perhaps a formal College course or rota refraction sessions could help
- Refraction course
- Refraction course
- Online course e-LH website
- Orthoptists
- Course 'Dundee Refraction Course' – Very much recommended
- Course
- Mock exam
- Watch video (AAD series)
- Online module (RCOphth)
- We do not have any training resources in our deanery (East Midlands – South) – It was very stressful to learn as consultant did not have time to teach in DGH, no optoms observed my study sessions to learn to refract pretty much myself which was really stressful. Addressed the issue to TPD; no luck
- 1 day course
- Refraction course on RCOphth website

Approximately how many complete refractions (retinoscopy + subjective modification) did you carry out in your preparation for the examination?

Team 1 comments:

- 15
- 20
- 20
- 20
- +20
- 25
- 30 – 40
- 40
- 40 – 50
- Around 50
- 50
- 50
- 50
- 60
- 75
- 85
- 90
- 50 – 100
- 100
- >100
- 150
- 200

Team 2 comments:

- Approx 20 (+0) 30
- Less than 10
- 15
- 35
- 40
- 40
- 50
- 50
- 60 but had no one to give back feedback
- Retinoscopy >70, Subjective about 20
- In this sitting about 70. I have given the exam before
- 50 – 60
- 50 – 70
- 50 – 60 children 2 years ago about 50 adults prior to exam
- 80
- 100 – 120

Any other advice that you would like to share with future candidates.

Team 1 comments:

- Practice, practice, practice. Remember 5 minutes feels like 3 minutes during the exam
- Practice complete refractions but also practice “OSCE” stations. Start early as there’s not a lot of time in clinic to refract. Practice everything that can appear on the exam
- If you can ret children, you can ret anyone! Practice. The exams “non-refraction” elements are just as important and is the difference between pass and fail
- Do not deviate from information provided
- Be clear about instructions, be polite and be confident
- Instructions can be contradictory
- Too short a time and more stations – lot of time pressure. Prefer old style time frame. I feel old system of 1 – 2 long station better
- Mind the time. Develop a system
- Practice, practice, practice!
- Practice like the OSCE, get a method and stick to it
- Very well organised
- Time is very short for the lens neutralisation station – work quickly!
- Practice made perfect
- Practice all stations on patients
- Practice, practice, practice
- More refractions
- Not enough time

Team 2 comments:

- Practice, practice, practice beware of the first station
- Attend various courses – Eastbourne, Dundee.... Please advertise these courses on the Royal College website
- Pay attention to time constraints
- Try to organise a mock exam and expect not to pass 1st time
- Candidates need to have a very clear mental preparation on each OSCE station because in my panic I have forgotten basic steps
- Practice a lot. Time yourself with an optom/consultant observing
- A minimum of 50 complete refractions are essential
- If I pass, then will know that my technique worked
- Practice, practice, practice. e-LFH resource great. College pre exam instructions vital
- Practice, practice! Ask questions when unsure but keep to one technique to save confusion
- Focus on retinoscopy and be quick!
- Time is the main factor
- Beware of colouring on lens boxes

Any other comments you have about the Refraction Certificate Exam.

Team 1 comments:

- I was extremely cross that the provided 0.50 JCC in 1335 session 19/7/11 red circuit did not have clear signs!!! I noticed the other candidates bought their own, but this should not disadvantage others
- Good examination. Combine sphere and cyl subjective refraction into one station

- Was there a reason I was asked to give “transposition” of answers although it gave “no extra points”?
- Difficult to fix 3 lenses in a trial frame during near addition exam, keep dropping
- The Glasgow Caledonian facilities are amazing. Excellent choice of examination centre and excellent organisation!!!
- The fixation target should be an axis with the patient. It was slightly higher. Where you need to place answers in the answer sheet there should be a clear box with question and where answer should go to save time and confusion
- Please improve the time keeping

Team 2 comments:

- In the instructions for candidates it says that we won't be given Fresnel prisms in glasses / we were given glasses Fresnel. For non cyclo refraction lenses were very finger printed. I had to clean each lens before using
- The old style of examination with a single patient was better as you could potentially correct errors along the way
- I would prefer the old style with a whole refraction. There also seemed to be subjectivity of marking in the past exam
- Please ensure that the charts given are appropriate. It does not take much to throw a candidate into panic!
- There should be 'options' training for us to do retinoscopy especially if consultants and other fellow trainee have no time to train you. I don't know how/where to address this issue. Also, should we ophthalmologists be examined for refraction techniques this strict unless they are trained to become paediatric ophthalmologists. Well the whole point is there should be a dedicated trainee in departments to teach refraction!!!
- Stressful and quick but I prefer that to being lengthy. Might be more fair in comparing separate skills but best practice in the exam doesn't always reflect actual practice by experienced ophthalmologists. The biggest issue is that candidate might not be familiar with the equipment (red – black lenses) which will affect the result under the stress of time
- Needs to be organised at a bigger venue to give more space. American system of vision used for VA but not widely practised in the UK
- Very tight for space here. Examiners didn't pre fit trial frames