

Examination Report

April 2015 Refraction Certificate Examination



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1 Introduction

The fifteenth Refraction Certificate examination in the format was held on 13th April 2015. Fifty-seven candidates presented themselves for the examination. The examination consisted of a 12 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

The examination consists of 12 OSCE stations. Each station contributes a possible 15 marks to the overall total. The stations used for the examination were:

1. Cycloplegic Retinoscopy (CR1)
2. Cycloplegic Retinoscopy (CR2)
3. Subjective Refraction Cylinder (SRC)
4. Cycloplegic Retinoscopy (CR3)
5. Cycloplegic Retinoscopy (CR4)
6. Lens Neutralisation (LN)
7. Non Cycloplegic Retinoscopy (NCR1)
8. Non Cycloplegic Retinoscopy (NCR2)
9. Visual acuity and IPD measurement (VA)
10. Subjective Refraction Sphere (SRS)
11. Binocular balance (BB)
12. Near Addition (NA)

2 Summary

This is the 8th sitting of the refraction certificate with 12 OSCE stations. The reliability of the examination remains variable and has fallen since the last sitting (Cronbach alpha 0.4) and does not meet the expectations of the GMC.

The Hofstee method of standard setting was used to identify the pass mark for this examination, which was 77%, which was highest pass mark to date. Previous Hofstee calculations have always been based upon a 'standard' set of parameters. Now that this method of standard setting has been approved by the GMC, the examiners provide an updated set of parameters based upon the difficulty of the examination in April.

The pass rate remains at around 65% with a higher pass rate in OST at 73%.

There were no significant differences in performance based upon OST, gender, ethnicity, first language or country of qualification.

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Education Adviser

3 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 is identified using the Hofstee method:

Hofstee method (see appendix 1 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 80%
2. The maximum credible pass rate for the examination 75% (minimum fail rate 25%)
3. The minimum credible pass mark for the examination 65%
4. The minimum credible pass rate for the examination 30% (maximum fail rate 70%)

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.

4. Results (table 1)

Number of candidates	57	
Maximum possible mark	180	
Mean candidate mark	143.7	80%
Median candidate mark	144	80%
Standard deviation	14.3	7.9%
Highest candidate mark	169	94%
Lowest candidate mark	106	59%
Reliability	0.4	
Standard error of measurement (SEM)	10.8	
Hofstee pass mark	138	77%
Pass rate	37/57	65%
Pass rate in OST	27/37	73%

Distribution of marks (table 2)

Score	Distribution	Total
91-95		0
96-100		0
101-105		0
106-110	//	2
111-115		0
116-120		0
121-125	///	3
126-130	///	3
131-135	//// //	11
136-140	//// /	5
141-145	//// /	6
146-150	////	5
151-155	//// //	10
156-160	///	4
161-165	////	5
166-170	///	3
Total		57

/ Candidate failed / candidate passed

Statistics for each station (table 3)

		Mean	Median	Standard deviation	Minimum	Maximum
1	CR1	13.6	14	2.3	4	15
2	CR2	13.0	15	3.4	0	15
3	SRC	9.8	12	5.3	0	15
4	CR3	12.8	14	2.9	2	15
5	CR4	13.0	14	2.3	6	15
6	LN	12.1	12	2.8	5	15
7	NCR1	10.8	12	3.7	1	15
8	NCR2	10.8	11	3.4	3	15
9	VA	11.9	12	2.3	6	15
10	SRS	12.6	14	3.1	1	15

11	BB	11.5	13	3.5	3	15
12	NA	11.8	12	3.0	5	15

The relative weights for each skill in refraction (based upon the number of stations is:

Clinical skill	Number of stations	Contribution to total marks	Median mark
Retinoscopy	6	50%	14
Subjective	3	25%	13
Other	3	25%	12

Correlation between stations (table 4)

	CR1	CR2	SRC	CR3	CR4	LN	NCR1	NCR2	VA	SRS	BB
CR1											
CR2	0.37										
SRC	0.15	0.24									
CR3	0.36	0.18	-0.16								
CR4	-0.08	-0.11	-0.26	0.16							
LN	-0.18	-0.33	-0.10	-0.04	0.11						
NCR1	-0.02	0.03	-0.03	-0.08	0.04	0.01					
NCR2	0.08	0.01	-0.07	0.24	0.07	0.01	0.59				
VA	-0.22	0.08	0.44	-0.19	-0.15	-0.12	0.16	0.05			
SRS	-0.01	-0.11	-0.04	0.03	0.10	0.04	-0.03	0.21	0.02		
BB	0.07	-0.13	0.12	0.17	0.06	-0.02	-0.13	0.13	0.07	0.71	
NA	0.05	0.08	-0.01	0.06	0.03	0.03	-0.10	0.19	0.19	0.35	0.45

Median correlation between the cycloplegic refraction stations = 0.05

- There was good correlation between CR1 and CR2, and CR3 and CR1.
- There was moderate correlation between CR3 and CR2
- **There was poor correlation between CR4 and the three other CR stations**

Correlation between non-cycloplegic refraction stations = 0.59

Best correlation between Binocular balance and subjective refraction of the sphere

Poorest correlation between lens neutralisation and CR2

Correlation between each station and the total score (table 5)

CR1	CR2	SRC	CR3	CR4	LN	NCR1	NCR2	VA	SRS	BB	NA
0.33	0.33	0.42	0.33	0.13	0.05	0.35	0.53	0.34	0.50	0.57	0.46

5. Breakdown of results

Breakdown of results by training (table 8)

	Failed	Passed	Total
In OST	10	27	37
Not in OST	10	10	20
Total	20	37	57

These differences are not statistically significant (0.14 Fishers exact)

Breakdown of results by deanery (table 9)

Deanery	Failed	Passed	Total
East Midlands	0	0	0
East of England	1	0	1
East of Scotland	0	1	1
KSS	0	0	0
London	2	6	8
Mersey	0	0	0
North Scotland	0	1	1
North West	0	5	5
Northern	0	0	0
Northern Ireland	0	0	0
Oxford	0	1	1
Peninsula	1	1	2
Severn	0	1	1
South East Scotland	0	2	2
Wales	3	1	4
Wessex	0	1	1
West Midlands	2	3	5
West Scotland	0	1	1
Yorkshire	1	3	4
Total	10	27	37

Breakdown of results by stage of training (table 10)

Stage (includes FTSTA)	Failed	Passed	Total
ST1	8	20	28
ST2	0	3	3
ST3	1	1	2
ST4	0	0	0
Total*	9	24	33

*Level at examination unknown for 4 candidates

Breakdown of results by gender (table 11)

	Failed	Passed	Total
Female	10	11	21
Male	10	26	36
Total	20	37	57

These differences are not statistically significant ($p = 0.16$ Fishers exact)

Breakdown of results by country of qualification (table 12)

	Failed	Passed	Total
UK	7	22	29
Outside UK	13	15	28
Total	20	37	57

These differences are not statistically significant ($p = 0.10$ Fishers exact)

Breakdown of results by first language (table 13)

	Failed	Passed	Total
English	6	19	25
Not English	6	8	14
Total*	12	27	

*Unknown for 18 candidates

These differences are not statistically significant ($p = 0.29$)

Breakdown of results by stated ethnicity (table 14)

	Failed	Passed	Total
Non-white	11	21	32
White	5	13	18
Total*	16	34	50

*Unknown for 7 candidates

These differences are not statistically significant ($p = 0.76$ Fishers exact)

Breakdown of results by number of previous attempts (table 15)

Attempts	Failed	Passed	Total
1 (First)	14	28	42
2	4	8	12
3	1	1	2
4	1	0	1
Any resit	6	9	15
Total	20	37	57

6 Comparison to previous examinations (table 16)

Date	Candidates	Pass mark	Pass rate	Pass rate in OST	% Candidates in OST	Reliability	SEM	Hofstee pass mark
Mar 10	43	69%	47%	58%	67%	0.6	9 (9%)	68%
July 10	47	75%	53%	60%	70%	0.6	8 (8%)	72%
Nov 10	53	74%	42%	44%	68%	0.6	7 (7%)	71%
Apr 11	57	71%	35%	47%	63%	0.6	6 (6%)	67%
July 11	41	67%	66%	72%	71%	0.4	6 (6%)	71%
Nov 11	69	65%	71%	75%	70%	0.6	8 (8%)	68%
Mar 12	54	73%	54%	66%	57%	0.6	8 (8%)	72%
July 12	44	71%	59%	67%	64%	0.5	9 (9%)	71%
Dec 12*	71	69%	75%	77%	55%	0.6	11(6%)	72%
Apr 13	64	74%	61%	64%	64%	0.8	11(6%)	74%
July 13	42	72%	74%	90%	48%	0.7	10(6%)	74%

Dec 13	75	72%	67%	76%	65%	0.7	10(6%)	71%
Apr 14	56	73%	84%	89%	66%	0.6	9.5(5%)	75%
July 14	34	74%	62%	55%	65%	0.4	11 (6%)	74%
Dec 14*	63	71%	68%	77%	68%	0.6	12 (7%)	71%
Apr 15*	57	77%	65%	73%	65%	0.4	11 (7%)	77%

* Hofstee pass mark used for these examinations

Performance of candidate by deanery for all examinations to date, where deanery is known (table 17)

Deanery	Total passes	Total candidates	Pass rate %
KSS	9	10	90
East of Scotland	8	9	89
Oxford	7	8	88
North Scotland	6	7	86
South East Scotland	13	16	81
Mersey	22	28	79
North West	23	31	74
London	92	126	73
Northern	13	18	72
Yorkshire	32	46	70
Wessex	13	19	68
East Midlands	18	27	67
East of England	22	33	67
Northern Ireland	8	12	67
West Midlands	33	49	67
West Scotland	14	22	64
Severn	12	19	63
Wales	15	27	56
Peninsula	9	27	33
Total	369	534	69

Appendix 1 Hofstee method for standard setting

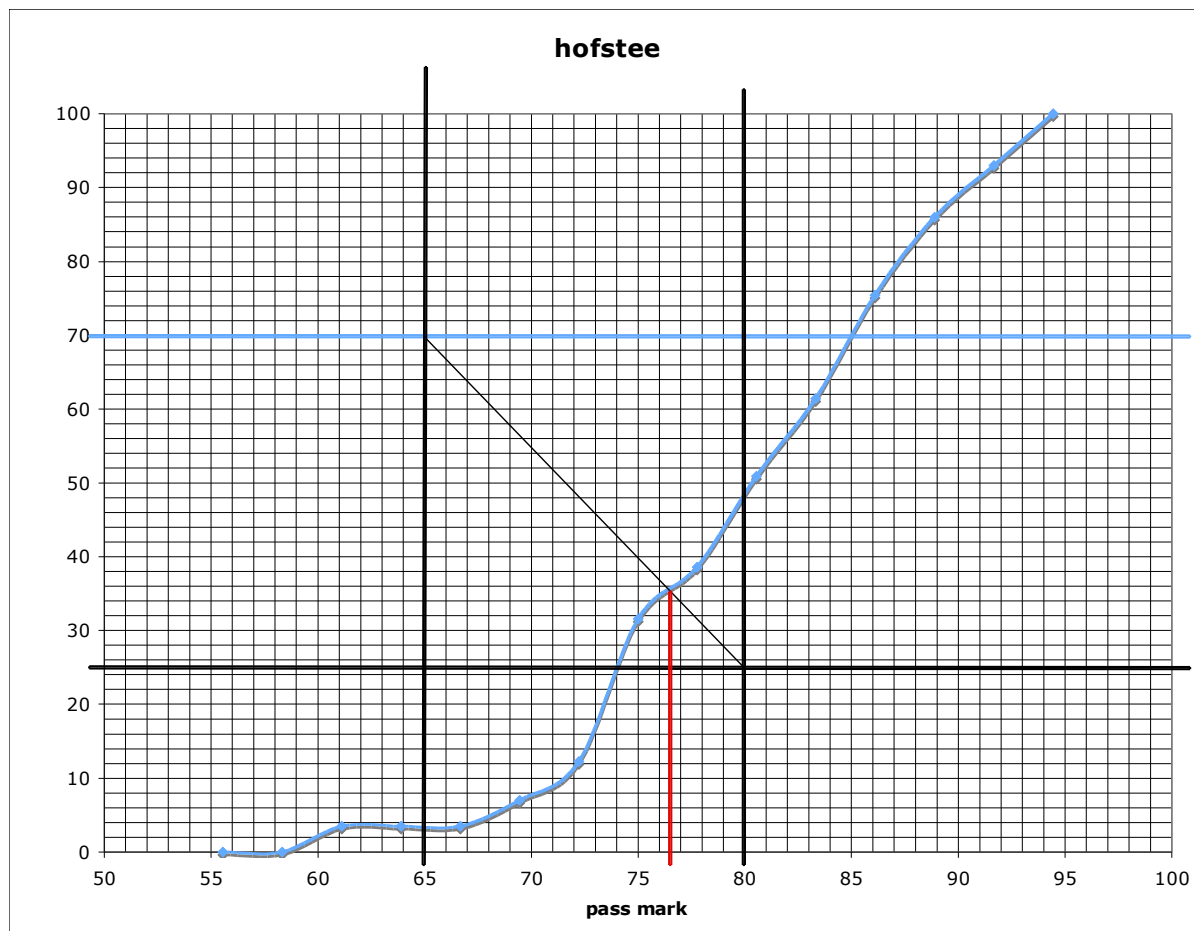
Hofstee method

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 135/180 (80%)
2. The maximum credible pass rate for the examination (75%)
3. The minimum credible pass mark for the examination 117/180 (65%)
4. The minimum credible pass rate for the examination (30%)

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 for this examination was 138/180 (77%).



Appendix 2: Candidate feedback

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

Yes 22/22

No 0/22

1 did not answer

Comments

- All the examiners were helpful and understanding to time constraints
- Examiners friendly and approachable.
- Organisational staff excellent
- All were friendly
- Very helpful examiners
- Very friendly examiners and understanding, especially in a station where there was a mistake in the given information.
- They were all very helpful and friendly
- All examiners were very courteous and friendly

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

Yes 18/22

No 4/22

Comments

- One of the patients had a small palpebral fissure and was getting her head back during retinoscopy and her examination was a bit difficult.
- The patients were appropriate overall. One patient repeatedly did not read what I asked her to when checking VA and therefore made it more difficult during a timed OSCE scenario when trying to perform effectively.
- I'm not sure that the 'near add' lady was familiar with the concept. I know I was the first candidate of the first day and possibly was having a bit of stress. I can tell that she wanted to help us but not sure she was the best candidate. For future reference I would recommend to educate fully your actors/patients
- The patients were very cooperative and intelligent
- My last station was near addition and the last station of the day. The patient did not seem to be able to have a consistent level of reading on the chart and as a result this made things confusing and time ran out prematurely. This was noticed by the examiner who actually asked the patient at the end of the exam what she could read as it seemed to vary without any lens changes.
- I felt that some of the answers given by two of the patients (subjective refraction: cylinder and subjective refraction sphere) were misleading and as result valuable time was lost.

The OSCE overall

Was the OSCE well organized?

Yes 19/22

No 3/22

Comments

- The OSCE was well organized. Some equipment was old and broken – one pair of trial frames had worn out axis markings and broken lens cells which caused a distraction and time delay in one particular station.
- All was very good except that the young lady acting as timer was not accurate. She was walking around telling each station to start and at one point had forgotten to tell my station to start. This is unfair and a loud bell/alarm should have been used instead.
- There was no formal bell ring to signify start of time of the various stations. There was a person who came in to tell the start and stop of time and unfortunately she missed coming in to my first station which cost me at least 3 minutes of my examination time.
- Good instructions on how to reach the center. Everything was running smoothly. On time. The only thing I would change is that the stations had no doors so the rooms were not soundproof. However there was an incident I highlighted immediately after my exam. The information given for the 'near add' station weren't correct. The age of the patient was different to the one given (9 years of difference) which as you can imagine gives big difference in the given prescription. I had to give Rx according to what the Pt told me she is, not according to what was written on the paper
- The timing was good and the guiding was great. She was very friendly
- The 12 stations cover the basic steps of the refraction technique that one needs to be familiar with.
- Apart from the poor quality trial lenses and poor retinoscopes, well organized. Patients were generally good and well responsive.

Were you given clear instructions about the OSCE?

Yes 19/22

No 3/22

Comments

- In a station where using a trial frame was optional, the examiner asked me "do I really need to use it" when I started using the trial frame. That threw me off guard since if the use of the trial frame is optional, there should be no say on the matter

really. I stopped using the trial frame based on his suggestion which made it a bit unfair and I don't think he should have mentioned that. I received the same comment with several other candidates who had that exam as well

- Straight forward introduction on the day to support information previously sent in post by the College.
- The usher was also the timer. These roles should have been separate. At one point I was waiting for almost 2 minutes to find out where my next station would be – that was time I should have spent reading the brief outside
- Very clear instructions and enough time to go through them
- I didn't understand the pronunciation of many words during the initial instructions before the exams, and I didn't understand that we get a one minute warning before 10 minutes not before every 5 minutes, again for the accent, it should have been more clearly pronounced.
- Was unsure in my first station what the one minute mark meant i.e. whether it was after five minutes or after ten minutes. All other instructions however were clear.

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

Yes 14/22

No 7/22

1 did not answer

Comments

- The technical tasks were a fair assessment of knowledge. However, the time constraints are unrepresentative of real-life scenarios. Most candidates have to resit, not due to a problem with their technique, or in fact due to their inability to refract, but due to the unrealistic 5 minute restraint on the 3 stations – for Cylinder refinement and Sphere refinement, Binocular Balance. 5 minutes to undergo cycloplegic or non-cycloplegic refraction per eye is adequate and a realistic representation of the clinical setting.
- This does not test knowledge. The retinoscopy stations are fine but the 5 minute stations are asking too much and is unrealistic. To consult on near add and do focimetry in 5 minutes is far too tight. Testing speed precludes testing skill – as people run out of time they lose marks they can get otherwise. If you take many experienced doctors/optometrists how many would conduct in good time? Will the patient have felt like they were thorough? People have commented on this over the years but I'd like to know if there are any plans to change this?
- In refining cylinder station I was not provided with prescription in both plus and minus cylinder (I thought this would be the case as per information pack); this was not a major problem but transcribing and changing the lenses affected the overall time that I had available in the station
- I refract a lot of patients per week (adults and kids) and I didn't manage to show my experience in this very limited time. Also, most of the patients were very straight forward. The absence of a complicated case doesn't help to differentiate the good candidates, in my opinion.

- I still need to see the results to answer that , I lost the second station due to misunderstanding , but the rest I did my best and I don't know if I was doing the right thing or not
- This exam does not test how well we can perform the art of refraction but rather how good we are in meeting targets that seem to be highly variable from examiner to examiner and thus by no means objective. This applies especially to the ret stations, which should have a pre-defined within-target percentage that need to be achieved to gain a certain respective mark score. For instance, I received highly differing marks for the same percentage out of target at ret with different patients. Why is that? Another question is how the "true" retinoscopy refraction of a patient is actually found? Is it just the result of one examiner's ret, which, given the large known inter-observer variation in retinoscopy, seems to be inadequate. I would expect at least 3 measurements by different observers and if those were too much apart from each other (say by more than 1D) I would deem this patient inappropriate for such an exam.
- The time allotted for the near add station was not enough
- I am very pleased with the structure of the OSCE and no difficulties were encountered in the vast majority of the stations. However I felt that I didn't perform well in the subjective refraction stations where all my further actions were based on patients' answers which were not always clear. In any case I followed all the steps as instructed even if some of the final results were wrong.
- Some stations were time pressured e.g near add history and binocular balance - others were not. Maybe this was just my personal experience.
- Not knowledge but it assesses the speed of refraction

Exam Preparation

Who helped you to develop competence in refraction? (Please tick the answer as appropriate)

Optometrist 18/22

Consultant ophthalmologist 7/22

Fellow trainee 7/22

Self-taught 10/22

Other (please list) Refraction Certificate Course (WOPEC)

Question 2

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

- 50
- 65
- Approximately 100 exam specific refractions in addition to 18 months of paediatric clinics performing adapted retinoscopy.
- 70
- Approximately 100 – 150
- 50

- 25
- 70 – 80
- 80
- 80
- At least 150 over the last year (vast majority in children. In adults around 30 – 40)
- 200
- 200
- 70 patients
- 70
- 100
- 200+
- 30
- 50
- 35-40
- none

Question 3

Please provide any other advice that you would like to share with future candidates.

- The technical aspect of the exam is not particularly challenging. What you will find difficulty in, is completing the 'non-refraction' stations within the 5 minute time slot. I suggest you learn how to refract (cyclo/non-cyclo), ensure your confidence is optimal, then focus the remainder of your time in becoming efficient at completing the other stations, where you will struggle to finish within the 5-minute slot.
- Practice
- Practice and read the masterpass book. Don't go to too many different opticians – they all do different things and this can put you off. Use your own system.
- Take a mock test; that's a huge help
- Practice timed examination stations
- Bring own retinoscope and trial frame
- Read college online learning module on EyeSite- useful information and videos
- Ask your local optoms to assist you and remember that is a straight forward examination, keep it simple and work very fast. Specially in the subjective station you cannot afford to lose time so be prepared for that
- Practice with an eye on timing, try to finish in less than 3 minutes including recording.
- Be prepared to fail this exam no matter how hard and long you prepare for it. See it as a golden opportunity to advance in the art of refraction. It seems to be a lottery if you will pass or not.
- I would recommend to candidates to take with them a lens case to the exam that they have been using to refract patients as it was a great help to me.
- Be aware of what is expected in each station
- The handout of the Royal College of Ophthalmologists is very helpful and highlights all the key points that one should focus on while preparing for the Refraction Certificate Exam

- Most patients are excellent for the OSCE understanding the instructions clearly which makes the examination assess competence rather than communication skills – the latter is assessed robustly in other ways through WpBA and other examinations.
- More practice is essential for this exam
- This is an exam which tests the ability to do a refraction in a limited short period of time. So need more and more practice to finish it within 4 minutes. Make sure you write in the correct answer sheet and not to mess up the answer sheets. Very narrow margin of error.

Please write any other comments you have about the Refraction Certificate Exam below.

- Overall, I was happy with how the exam was organized and the examiners' attitude. In my second station however, the examiner was talking to the time keeper lady during the test and I felt distracted. Also, I wish the examiner had given me a written starting refraction rather than telling me verbally which lenses to put in the trial frame. This caused me making mistake in documenting my final refraction after the sphere correction.
- As stated before, I lost time in my first station as my examiner didn't know it had started though I even pointed it to him. The patient also pointed it out a few times after which he checked. He did say he will give me 10 minutes but it seemed I finished with everyone else and had a 1 minute changeover time before the focimeter station. I hope you can look into this for future candidates and I hope this station hasn't cost me the exam!
- The computerized charts used in the Birmingham centre stopping working during one of the stations which caused loss of time. They are also much more complex to use compared to the conventional charts or the projectors.
- I would suggest that you provide earlier results for candidates pending to get interviews/training posts
- Please consider that candidates from other countries have been through many stresses including the visa process the very expensive travel costs the new country and the new language to use daily, it was my first time out of my country, I was so stressed and the instructions were not clearly pronounced at all. The staff were friendly and the examiners eased me and made their English more cleared for me and I'm very grateful for everyone.
- A suggestion to both make this exam a little closer to reality and also a bit fairer:
 - I sat this exam twice and struggled both times with the cyl refinement station although I practised it more than 100 times on patients. It is a highly artificial situation to be presented with just a wrong cyl (power and/or axis) and the right sphere and being asked not to change the sphere (other than sphere compensation that is). Can we assume that the circle of least confusion really is on the retina, as it is supposed to be in this artificial setting at the start of this station? As time is so tight there is no chance to check this with an introductory duochrome test. With my patient, for instance, the VA with the starting refraction was < 6/60 Snellen, which is why I started refining the axis with the +1JCC as is common practice. However, this led to nowhere with inconsistent answers to bracketing the axis and in the end (with time running out) I had to skip steps and jumping in with a lower powered JCC.
 - I suggest the following change: There should be one station with 3 assessments on the same patient being 1) non-cyclo ret 2) based on this ret

result: sphere refinement 3) based on 1) and 2): cyl refinement. This is how we practice refractions in preparing for the exam on a daily basis with optometrists and this also offers a direct evaluation of our ret and sphere refinement skills. Obviously, it is very important to have an appropriate patient with consistent answers for such a joint station. This should be checked by at least 3 different observers' refractions, which should not show more variation than 0.5D.

- Generally well organized but one patient as written above spoiled what was a good effort on organization and impartiality.
- As doctors we should have more experience in the refraction since we are not much exposed in this area. This exam is absolutely essential since it gives an insight into refraction and we could gain more experience as part of ophthalmology training.
- Trial lenses given were not in good quality. Retinoscopes given are not in good quality for an exam. The retinoscope I got for CPR, the rotating wheel is very tight