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Observations on the relationship between the dietetic Objective Structured Clinical Exam and placement outcome.

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1 **Observations on the relationship between the Dietetic Objective Structured**

2 **Clinical Exam and placement outcome.**

3 **Abstract**

4 **Aims**

5 Objective Structured Clinical Examinations (OSCEs) are used extensively in medical

6 education to prepare students for the clinical setting. Use in dietetic education is still

7 relatively new and relationships to placement outcomes are unknown. The aim of this

8 review was to explore eleven years of OSCE and placement data to answer: Does the

9 OSCE predict dietetic placement outcome? and What are the student perceptions of the

10 benefits of OSCE in preparation for practice?

11 **Methods**

12 Data collected retrospectively from 328 students between 2006-2017 who had

13 completed their final year OSCE and placement. Aggregate OSCE mark and mean

14 marks obtained in active and passive OSCE stations, were compared to placement

15 outcome. Evaluation questionnaires completed by students at the end of the OSCE were

16 collated.

17 **Results**

18 Aggregate marks achieved in OSCE stations were significantly different in students

19 who passed (mean 63.24, SD7.94), struggled (mean = 58.25, SD8.82) or failed (mean =

20 57.31, SD8.28) placement, $p < 0.001$. Majority of students perceived the OSCE as a

21 meaningful and fair assessment (92%) that helped to prepare them for practice (82%).

22 **Conclusions**

23 The OSCE provides a meaningful assessment of dietetic student skills in preparation for
24 practice. Aggregate OSCE marks provide a consistent indicator of students who are
25 likely to struggle in practice.

26 **Key words:** Assessment, competence, dietetics, education, evaluation, OSCE

27 **Introduction**

28 Medical education has utilised **Objective Structured Clinical Exams (OSCEs)** for
29 many years to develop communication and clinical skills ¹ in preparation for the clinical
30 setting.²⁻³ **OSCEs** are reported to stimulate learning and greater achievement of specific
31 clinical competence.⁴ It is well documented that the OSCE is labour intensive, time
32 consuming and therefore an expensive examination to run ⁵ however, the ability to
33 prepare students for the practice setting has been identified as a key strength of this
34 examination ² as well as its flexibility in design and structure.⁶

35 There is a wealth of data supporting the use of the OSCE to prepare medical students
36 for practice,⁷ in contrast, OSCE assessments in dietetics is relatively new.⁸
37 Consequently, there is little reported data on whether the OSCE has the same benefits in
38 preparing dietetic students for placement.⁸ In addition, the range of skills assessed in a
39 dietetic OSCE may differ from those assessed in medical, nursing and other
40 professional **OSCEs**.^{4, 7-8} Although communication skills **are** core to all professional
41 assessments, remaining skills tested will vary due to the nature of the work undertaken
42 by the different professions. For example: dietetic students may be assessed on

43 anthropometric assessments, but hands on examination, use of equipment or clinical
44 procedures as seen in nursing, medical **OSCEs** is not required.

45 The design of the dietetic OSCE involves mapping of specific skills against the
46 examination format as described by others.⁹⁻¹¹ The OSCE was originally set up as six
47 discrete 10- minute stations, consisting of two active and four passive stations¹⁰ using a
48 multi- station design¹² to test specific clinical skills. Active stations focus on
49 communication skills, knowledge and application whilst passive stations explore
50 practical skills around knowledge application, understanding and dietary
51 manipulation.¹¹

52 Actors using standardised scripts play the part of patients in the active OSCE stations¹³.
53 Experienced academic or clinical examiners assess active stations using a standardised
54 scoring sheet, which assesses the knowledge and communication skills utilised by
55 students. Actors and examiners meet prior to the examination to run through the scripts,
56 discuss standard answers and clarify scoring to ensure consistency during the
57 examination. In addition, moderation occurs at the active stations to ensure consistency
58 with actor's delivery throughout the examination and marking process.

59 The passive stations assess clinical skills such as assessment, implementation and
60 intervention. For example, a clinical scenario and data for planning a dietetic
61 intervention, such as biochemistry, growth charts and food diaries maybe provided.
62 Allowing assessment of student's ability to interpret provided data; identify areas in the
63 diet requiring manipulation, addressing issues raised, as well as indicating appropriate
64 alternative food choices. Skills required to carry out these tasks are developed and

65 practiced in class helping to prepare students for both the OSCE examination and the
66 final practice.¹⁴

67 Students move from station to station, a system of bells and buzzers indicates when the
68 student should move to the next station. Incorporation of feedback from examiners,
69 students and actors¹⁰ over the years has resulted in a number of changes. Key skills
70 tested from the initial OSCE design of six 10- minute stations were amalgamated into
71 four 15- minute stations, which included two passive and two active stations.

72 Integration of skills into longer OSCE stations more accurately reflect a real life
73 scenario.¹⁴ For example, having more time in the active station with the actors allows
74 students time to move through the Model and Process for Nutrition and Dietetic Practice
75 (**MPNDP**),¹⁵ as they would in a real clinical situation, rather than focusing on one
76 discrete aspect of the consultation. In addition, integration of skills better reflects the
77 growing competency and skill development of a final year student¹⁶ and allows better
78 assessment of communication and clinical reasoning skills.¹⁷⁻¹⁸ Examiners test clinical
79 reasoning skills further at the end of the active station by asking a standard question.

80 Placement assessment requires students to demonstrate competencies in the following
81 areas: the **MPNDP**,¹⁵ communication, reflection, professionalism and time
82 management. The OSCE examination therefore specifically tests skills related to the
83 **MPNDP**,¹⁵ communication, professionalism and time management in preparation for
84 placement.

85 The use of the OSCE with Australian and UK dietetic students prior to their first
86 practice experience has indicated a potential for the OSCE to predict those students who
87 may have difficulties on their initial placement.⁸ However, first placements or early

88 placements are likely to be the most challenging for students as experiences in these
89 settings will all be new, including opportunities for students to start working with
90 patients and applying theory into practice. Student performance on final year placement
91 and final year OSCE however may differ considerably, as students will have a greater
92 knowledge base, prior placement experience and opportunities to practice and develop
93 skills further.

94 This paper reports on data collected over the last 11 years and will review final year
95 OSCE marks and the relationship to dietetic students' progress on final year placements.
96 It includes an exploration of the relationship between active and passive station marks,
97 student outcome on the final placement and student's perception of this examination.

98 **Methods**

99 **Ethical approval was provided by the Faculty Research Ethics and Integrity**
100 **Committee.** Data was collected retrospectively on students from 2006 to 2017, who had
101 completed both the final year OSCE and undertaken the final placement. OSCE marks
102 and placement outcome were collated. Student feedback following the OSCE was
103 collated onto an excel spreadsheet. Feedback from students following OSCE is a
104 standard process; with anonymous feedback from student's actors and examiners, being
105 used annually to modify OSCE design and delivery. Feedback is collated at the end of
106 the OSCE; it includes questions that explore perception of the OSCE. Questionnaire
107 responses range from strongly agree, agree, neither disagree nor agree, disagree,
108 strongly disagree. Percentage responses were collated for agreement and disagreement,
109 responses coded as; neither agree nor disagree, where coded as disagreement.
110 Achievement on placement was split into three categories:

- 111 1. Pass, achieved all placement learning outcomes.
- 112 2. Struggled, required additional support from placement team before passing
- 113 placement.
- 114 Data on students requiring extra time and/or support from placement team is
- 115 routinely recorded at the time of placement and was used to code students in this
- 116 category.
- 117 3. Failed, did not achieve placement learning outcomes despite additional support
- 118 from placement team.

119 **Active stations link into placement competencies around communication, and**

120 **application of the MPNDP¹⁵ and professionalism. Students may receive a food**

121 **record and GP letter to review before starting the consultation. Information**

122 **gathered during the consultation guides assessment, diagnosis and appropriate**

123 **provision of information to the actor in a professional and competent manner.**

124 **Passive stations link into placement competencies relating to the MPNDP¹⁵ and**

125 **involve discriminatory skills, interpretation of data and practical application of**

126 **food knowledge skills. Active and passive stations are both time limited linking into**

127 **the placement competency around time management.**

128 In 2010 following programme redesign, the timing of the OSCE changed from a post to

129 a pre-placement assessment, and the number of OSCE stations were reduced to four 15-

130 minute stations (two active and two passive). Data from 2006/7 to 2009/10 relates to the

131 OSCE being undertaken after placement and data from 2010/11 to 2016/17 relates to the

132 OSCE being undertaken prior to clinical placement.

133 OSCE station marks are reported as percentages. Descriptive statistics are provided for
134 the aggregate OSCE mark, and the mean active and mean passive station marks from
135 2006-2017. Student feedback was explored using percentage response to evaluations.
136 Inferential statistics were carried out using SPSS, version 21 (SPSS Inc, Chicago, IL,
137 USA). Data were tested for normality using the Shapiro-Wilk's test.

138 Differences in OSCE active and passive station marks and placement outcome were
139 explored using one way ANOVA and independent t-test. The level of significance was
140 set at $p < 0.05$.

141 **Results**

142 A total of 328 students undertook the OSCE from 2006-2017. The aggregate score
143 achieved for the OSCE was 62.42 % (SD 8.29).

144 One way ANOVA indicates significant differences in the aggregate OSCE mark for
145 students who passed, struggled or failed placement $F = (2, 325) = 9.842, p < 0.001$ (see
146 Table 1).

147 **INSERT TABLE 1 HERE**

148 **Table 1: Aggregate marks achieved in OSCE and placement outcome**

149

150 The difference in aggregate OSCE mark for students who struggled and students who
151 failed placement was not significant. Of those students identified as requiring additional
152 support from the placement team ($n = 22+26$), nearly half 46% (22/48) went on to
153 achieve the final placement.

154 Data was reviewed to explore timing of the OSCE (pre-placement and post-placement),
155 and impact on relationship between aggregate OSCE mark and placement outcome.
156 Regardless of OSCE timing, aggregate OSCE mark for students who passed placement
157 and those who failed placement remains significantly different (Table 2).

158 **INSERT TABLE 2 HERE**

159 **Table 2: Aggregate OSCE mark for Post-Placement and Pre -placement compared
160 to placement outcome**

161 Data for active station OSCE marks and placement outcome were explored for pre and
162 post-placement timings. There were 2 years when the post-placement OSCE ran with
163 only 1 active station, 2008/9 and 2009/10. Data for these two years was removed to
164 allow comparison of mean active station marks and placement outcome, see Table 3.

165 **INSERT TABLE 3 HERE**

166 **Table 3: Mean active station marks and placement outcome**

167 Regardless of post and pre-placement OSCE timing, mean active station mark for
168 students who passed placement and those who failed placement remains significantly
169 different.

170 *How many students failing active stations go onto fail placement?* Regardless of post
171 and pre-placement OSCE timing the percentage of student's failing one active station is
172 consistent, post-placement was 9% (6/65) and pre-placement was 10% (19/190). Of
173 those students failing one active station, 64% (16/25) went on to pass the placement.

174 Data for passive station OSCE marks and placement outcome were explored for pre and
175 post-placement timings. Pre-placement OSCE; there was no significant difference in

176 passive station marks achieved by students who, passed, struggled or failed placement,
177 see Table 4.

178 **INSERT TABLE 4 HERE**

179 **Table 4: Mean passive station marks and placement outcome**

180

181 A total of 312 students completed the evaluation questionnaires equating to a 95%
182 (312/328) response rate. The data were separated into two categories, students
183 completing the OSCE after placement and students completing OSCE before placement,
184 see Table 5.

185 **INSERT TABLE 5 HERE**

186 **Table 5: Student evaluation of the OSCE examination**

187

188

189 Undertaking the OSCE pre-placement as compared to post- placement resulted in higher
190 agreement with all questions. Students perceived the OSCE to be stressful regardless of
191 timing however, the last three years indicates a downward trend in students perceived
192 level of stress with responses of 97%, 83% and 70% being recorded.

193 **Discussion**

194 This retrospective review of final year OSCE and placement data has identified a
195 significant difference in the aggregate OSCE mark and placement outcome. The mean
196 active station mark was significantly different in students who passed, and students who
197 failed placement however, the passive station marks lost significance with placement
198 outcome when the OSCE moved to a pre-placement assessment. Student evaluation
199 supported the view that the OSCE is a meaningful and fair assessment of skills, which

200 prepare students for practice. The data presented here is unique in that it provides a
201 longitudinal perspective that illustrates a consistent relationship between dietetic
202 students' performance in the OSCE and dietetic placement outcome. This data supports
203 and builds on findings from other studies. Highlighting the potential of the dietetic
204 OSCE to identify dietetic students who may require additional support on placement.⁹
205 In addition, findings indicate that the OSCE not only has a place in identifying first year
206 dietetic students who may struggle on placement⁹ but also final year dietetic students
207 completing the final placement.

208

209 Although the timing of the OSCE has changed, from post to pre-placement, relationship
210 between OSCE performance and placement outcome remains significant. The OSCE
211 comprises of active and passive stations, the mean active station marks were a
212 significant indicator of students' achievement on placement and provides further
213 evidence to support this type of examination to test the application of knowledge and
214 communication skills prior to placement. A small number of dietetic students (10%)
215 regularly fail one of the active stations, failing one active station is not indicative of
216 failing placement. Obtaining a lower mean mark in the active stations is however,
217 linked to placement failure, suggesting a more generalised problem with applying
218 communication skills and knowledge to support clinical reasoning skills.

219

220 Performance at active stations was variable with large deviations in the marks achieved.
221 Knowledge and confidence¹⁹ may inhibit performance resulting in poor demonstration
222 of communication skills. When knowledge and confidence are high, better
223 communication skills maybe demonstrated, communication skills and knowledge are

224 closely linked²⁰ resulting in case based variability of students' ability to communicate
225 to actors in **OSCEs**.²¹ This may account for the variability seen in active station marks
226 in the dietetic OSCE.

227

228 In addition, medical **OSCEs** that assess whole tasks, where students examine patients
229 on a diagnosed complaint rather than discrete skills, increased students' use of
230 diagnostic reasoning skills.¹⁷ This may also be the case for the dietetic active OSCE
231 stations, with the move from discrete skill testing, to longer consultations that reflect
232 real life scenarios.²² On placement, students need to demonstrate their ability to apply
233 clinical reasoning skills, to work through the MPNDP¹⁵ with a variety of patients. Lack
234 of ability to transfer these skills from one patient to another, to demonstrate safe clinical
235 reasoning will result in placement failure. Lower mean marks achieved in the active
236 stations are therefore indicative of poor clinical reasoning skills.

237

238 Passive stations test skills against paper exercises, actors are not involved. Passive
239 station marks lost significance with placement outcome when the OSCE moved to a
240 pre-placement assessment. Completing the OSCE post-placement allows students time
241 to practice and consolidate skills on placement. The significant association between
242 placement outcome and passive station marks post-placement may therefore reflect poor
243 consolidation of these skills on placement. Alternatively, anxiety of undertaking the
244 practical exam following a failed placement may result in poor performance at passive
245 stations. When passive stations occur prior to placement, attainment of skills are more
246 likely to reflect students learning and acquisition of skills in University. This may
247 account for the lack of significance between placement outcome and passive station

248 marks when the OSCE moved from post to pre-placement assessment. In addition, the
249 resulting lack of significance between placement outcome and passive station marks
250 suggests that skills examined are different from those in active stations. Passive stations
251 test a discrete range of skills, patients are not involved, this may contribute to the lack
252 of association between pre-placement passive station marks and placement outcome, as
253 complex clinical reasoning skills are not specifically tested.¹⁷

254

255 Moving the OSCE to pre-placement has altered students' perception of the relevance of
256 this examination, with the majority of students reporting the OSCE to be a more
257 meaningful and fair assessment of skills. Students increasingly see this examination as
258 a way to help them manage stressful events. Similar to findings in dental students,²³ the
259 majority of dietetic students indicated that they found the OSCE stressful.

260 Interestingly, perceived stress in dental students did not affect student performance.²³

261 Hong²⁴ however has suggested that student's anxiety about **OSCEs** may influence
262 their ability to perform during the OSCE. Examination stress may affect their
263 individual working memory "*the ability to hold in information and manipulate it*"²⁵
264 (^{p93}) the combined effect of this could result in a poor demonstration of skills within the
265 active OSCE stations. In nursing students, anxiety has been reduced by providing video
266 exemplars prior to the OSCE, however this did not impact on students overall
267 performance.²⁶ Suggesting that anxiety is not the only factor impacting student
268 performance in the OSCE.

269

270 Poor time management and anxiety are commonly cited reasons for students struggling
271 on placement and requiring additional time.²² Dietetic students use timed sessions to

272 develop confidence in information retrieval, attainment and performance ability prior to
273 sitting the OSCE.²⁷ This may help to improve students' perception of control and in
274 combination with techniques to reduce student anxiety, may help to improve
275 performance long term.²⁸ In addition, OSCE briefings allow students to become familiar
276 with the process. These measures may have contributed to the downward trend in
277 students reported stress levels with the dietetic OSCE examination over the last three
278 years.

279

280 Providing feedback after an OSCE affects the affective domain of learning and
281 improves students' ability to relate OSCE activities to clinical practice.² Video/audio
282 recording also provides a valuable method to further support students in reflecting on
283 skill use in preparation for the OSCE and future placement.²⁹ Currently we offer dietetic
284 students audio/video recording as an optional method of support when developing skill
285 use, with audio- recording routinely used for some skill development sessions. Routine
286 use of simulation strengthens links between theory and practice, as well as developing
287 confidence³⁰ and self-efficacy³¹ in use of communication skills. Practical sessions also
288 help support knowledge acquisition,³² in preparation for the OSCE, setting theory exam
289 close to the OSCE helps strengthen this area further.

290

291 A retrospective review of data does carry some limitations as it is unable to relate
292 individual feedback to student performance or explore variations in placement
293 performance and skills utilised with student perceptions. However, despite these
294 drawbacks and the minor changes that have occurred to the OSCE over the last eleven
295 years a consistent pattern has emerged. The data presented indicates that the OSCE

296 provides a successful assessment of dietetic students' practical skills required for
297 placement. The OSCE has a valid role in preparing dietetic students for placement and
298 identifying students likely to struggle and therefore require additional support.

299

300 In summary, this retrospective review highlights an association between the aggregate
301 OSCE mark, in particular mean active station marks and dietetic students who are likely
302 to fail placement. The OSCE provides a meaningful assessment of practical clinical
303 skills, and is a useful indicator of dietetic students' performance in practice, indicating
304 students who are likely to require additional support on placement.

305

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Table 4: Aggregate marks achieved in OSCE and placement outcome

N=328	Passed Placement n= 280	Struggled on placement n=22	Failed placement n=26
Mean OSCE mark (SD)	63.24 (7.94)	58.25 (8.82) *	57.19 (8.28)**

* Independent t-test indicates significant difference between students who passed placement and those who struggled on placement, $p = 0.005$

** independent t-test indicates significant difference between students who passed placement and those who failed placement, $p <0.001$

Table 5: Aggregate OSCE mark for Post-Placement and Pre -placement compared to placement outcome

N=328	Passed placement	Struggled on placement	Failed placement	P value
Post-placement OSCE mean (SD)	62.71(7.80)	54.82 (5.51) *	55.07 (5.84) **	0.001
n=138	n= 116	n=10	n=12	
Pre-placement OSCE mean (SD)	63.61(8.12)	61.10 (10.21)	59.00 (9.77) **	0.101
n=190	n= 164	n=12	n=14	

*Independent t-test indicates significant difference between students who passed placement and students who struggled $p = 0.002$ ** Independent t-test indicates significant difference between students who passed placement and those who failed placement; post-placement $p = 0.001$, pre-placement $p = 0.047$

Table 6: Mean active station marks and placement outcome

Mean Active station marks	Passed placement	Struggled on placement	Failed placement	P value
Overall mean active stations (SD)	66.72 (10.04)	61.50 (13.49)	56.00 (11.74)**	0.001
N=255	n = 220	n = 16	n = 19	
Post-placement OSCE Active stations (SD)	67.14 (9.13)	54.38 (7.47)*	52.90 (8.39)**	0.001
n= 65	n = 56	n= 4	n = 5	
Pre-Placement OSCE Active stations (SD)	66.58 (10.36)	63.88 (14.43)	57.11 (12.82)**	0.007
n= 190	n =164	n= 12	n=14	

*Independent t-test indicates significant difference in active station marks achieved in students who passed placement and students who struggled, $p = 0.008$. ** Independent t-test indicates significant difference in active station marks between students who passed placement and those who failed; overall $p = <0.001$, post- placement $p = 0.001$ pre-placement $p = 0.002$

Table 4: Mean passive station marks and placement outcome

Mean Passive Station marks	Passed placement	Struggled on placement	Failed placement	P value
Overall passive station mean (SD)	61.30 (9.26)	59.18(9.26)	*57.41(9.31)	.050
N =325	n=280	n=22	n=26	
Post-placement OSCE Passive stations (SD)	62.56(8.39)	57.60(9.41)	**54.69 (6.89)	.003
n = 65	n=116	n=10	n=12	
Pre-Placement OSCE Passive stations (SD)	60.41(9.76)	58.50 (9.71)	59.75(10.67)	.795
n= 190	n=164	n=12	n=14	

* Independent t-test indicates significant difference in overall passive station marks between students who passed placement and those who failed, $p = 0.042$ **Independent t-test indicates significant difference in post- placement passive station marks between students who passed placement and students who failed placement, $p= 0.003$

Table 5: Student evaluation of the OSCE examination

N=312	Percentage of students who agree that the OSCE				
	Is a meaningful assessment of skills	Is a fair assessment of skills	Helps to prepare students for practice	Is perceived to be stressful	Will help students manage stressful events
OSCE Post-placement 2006/7 to 2009//10 (n=140)	63% (93/140)	73% (104/140)	35% (54/140)	83% (116/140)	40% (56/140)
OSCE Pre-placement 2010/11 to 2016/17 (n=172)	92% (160/172)	92% (158/172)	82% (141/172)	89% (155/172)	81% (140/172)