Original Article

Determinants of Outcome of Final Undergraduate Surgery Examinations in a Nigerian University

O Onwuasoigwe, EE Onyia[1], M Mesi[1]

Department of Surgery, Orthopedic Surgery Unit, University of Nigeria Teaching Hospital, [1]Department of Surgery, Neurosurgery Unit, University of Nigeria Teaching Hospital, Enugu, Nigeria

Abstract

Background: Medical students' assessment is an important aspect of medical undergraduate training that requires periodic review to achieve objectivity and improve training. We reviewed the outcome and factors that influenced outcome of undergraduate students' final surgery examination. **Materials and Methods:** Final examination records of undergraduate medical students in surgery from a single institution for 5 years (2013–2017) were retrospectively reviewed. Scores of the students in continuous assessments (CA), multiple-choice questions (MCQs), essays, long case, short cases, orals, and objective structured clinical examinations (OSCE) were extracted as appropriate. The data were analyzed using SPSS® for Windows version 21. **Results:** A total of 960 candidates' results were analyzed over 5 successive years, 722 candidates (75.2%) were males, and 238 (24.8%) were females. The overall pass rate was 62.6%. Success rate in the clinical examinations was higher in females (84.5%) compared to males (72.7%). $\chi^2 = 13.381$, $P < 0.001$. MCQs section of the examinations had the highest failure rate (49.5%). Female gender ($P < 0.001$), passing CA ($P < 0.001$), and shorter duration-<9 years in medical school ($P < 0.001$) were strongly associated with passing the final surgery examination. Pass rate was 73.1% for females and 56.2% for males during the OSCE period. **Conclusion:** CA is the single most important determinant of success in final surgery examination, while MCQs constitutes the most difficult aspect of the examinations. Irrespective of method of assessment, females seem to do better than males.

Keywords: *Final examinations, outcome, undergraduate surgery*

Date of Acceptance:
02-May-2018

Introduction

In every generation, medical doctors are not only expected to render selfless service for the well-being of humanity but also shoulder a solemn responsibility to pass on knowledge to produce the next generation of doctors. In crossing, these professional "Rubicon" medical students are periodically examined to determine their eligibility and competence. Competence in medicine has been defined as the use of communication, knowledge, technical skills, clinical reasoning, emotions, values, and reflection in daily practice for the benefit of the individuals and communities being served.[1] Flexner's report was published in 1910 and is even today widely celebrated as a seminal document which has raised the standard of medical education.[2,3]

Access this article online

Quick Response Code:

Website: www.njcponline.com

DOI: 10.4103/njcp.njcp_12_18

PMID: *******

The evolution of learning has also been shaped by the Bloom's taxonomy whose basic tenet was that learning at the higher levels is dependent on having attained prerequisite knowledge and skills at the lower levels.[4] This search for the ideal training method led to the development of current concepts of Problem Base Learning and Competence-based training in medicine.[5,6]

In educational practice, assessment methods can generally be classified as either formative, i.e., enhanced learning or summative, i.e., for grades.[7] Exit (final)

Address for correspondence: Dr. EE Onyia, Department of Surgery, Neurosurgery Unit, University of Nigeria Teaching Hospital, Enugu, Nigeria.
E-mail: ephraim.onyia@unn.edu.ng

How to cite this article: Onwuasoigwe O, Onyia EE, Mesi M. Determinants of outcome of final undergraduate surgery examinations in a Nigerian University. Niger J Clin Pract 2018;XX:XX-XX.

undergraduate medical examinations are usually summative. Before 1950s, assessment of medical knowledge and clinical skills of doctors were often done using written and oral examinations but since then, the use of a variety of assessment methods has characterized medical education, credentialing, and licensure.[8] The assessment methods commonly used in both undergraduate and postgraduate medical education are multiple choice questions (MCQs), extended matching questions, essay questions, objective structured clinical examinations (OSCE), and oral assessment.[9] In an aspect of the clinical examination called the long case, students' interview and examine a real patient and then present their findings to the examiners who in turn question the students by an unstructured oral examination on the patient problems and other relevant topics. In the mid-seventies, Harden *et al.* introduced the OSCE popularly referred to as OSCE, to curtail the disadvantages of the traditional clinical examinations.[10] Since then, OSCE is shown to have advantages, especially in terms of objectivity, uniformity, and versatility of clinical scenarios that can be assessed, and superiority over traditional clinical assessment.[11] Despite the widely felt need for valid and reliable instruments for the measurement of patient-centered communication, most of the instruments currently available have not been thoroughly investigated.[12]

It is therefore compelling that performance of clinical medical students in examinations be evaluated in view of the changing trends particularly in developing countries such as Nigeria. This study aims to identify the determinants of outcome with the hope that such evaluation will help in developing training programs that enhance anticipated competencies among medical students.

Materials and Methods

A review of final examination records of undergraduate medical students in surgery from 2013 to 2017 was retrospectively carried out. Data on the performance of students in continuous assessment (CA), One-correct-option MCQs, Essays, Long case, Short cases, Orals, and OSCE were extracted as appropriate. The examination scores of end-of-posting tests of the students, after each of the four mandatory surgery rotations (codenamed S1, S2, S3, and S4) together with the scores from Mock Final Examination were summed up to constitute the CA. The CA, MCQs, Essays, and Orals were considered the written part whereas the long case, short cases, and OSCE aspects constitute the clinical part of the final examination.

Only medical students who made it to the final year and qualified for the final MBBS examinations in surgery were included in the study. Those who were disqualified from sitting for the final surgery examinations, based on <75% training attendance, were excluded. The retrieved data were analyzed using SPSS for Windows version 21 (SPSS, Inc.,Chicago, Illinois, USA). $P < 0.05$ was considered statistically significant.

Results

A total of 960 candidates' results were analyzed over 5 successive years [Figure 1]. Out of them, 722 were males and 238 were females, giving M:F ratio of 3:1. The duration spent by students in medical school varied between 5 and 17 years. Mean duration was 7.7 ± 1.9 years.

The overall pass rate among candidates was 62.6% [Table 1]. However, the rate varied from 57.1% to 74.6% [Figure 2].

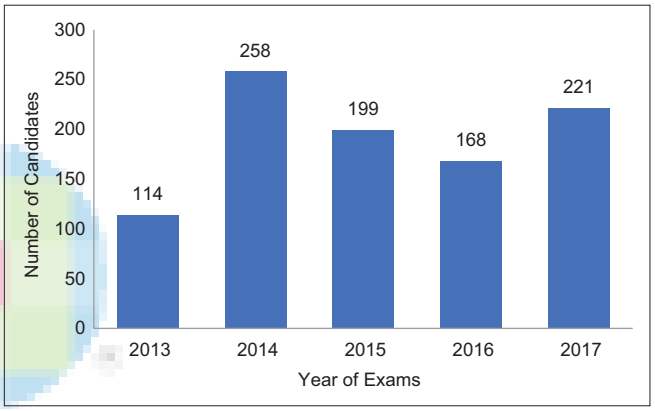

Figure 1: Distribution of number of candidates per year

Table 1: Overall outcome of examinations

Valid	Frequency (%)	Valid percentage	Cumulative percentage
Pass	601 (62.6)	62.6	62.6
Fail	359 (37.4)	37.4	100.0
Total	960 (100.0)	100.0	

Table 2: Failure rate versus outcome of different aspects of examination

Valid	*n*=960, *n* (%)	Failed final exams	Percentage failed final exams (*n*=359)
Failed clinicals	234 (24.4)	234	65.2
Failed CA	459 (47.8)	294	81.9
Failed essay examinations	336 (35.0)	192	53.5
Failed multiple choice	475 (49.5)	266	74.1
Failed written (total)	449 (46.8)	293	81.6
Incomplete results*	20 (2.1)	20	5.6

CA=Continuous assessment

Table 3: Multivariate analysis of determinants of outcome in final MBBS surgery examinations

	Passed (%)	Failed (%)	Total (%)	Significance
Sex				
Male	425 (58.9)	297 (41.1)	722 (100.0)	χ^2=17.399, *P*=0.000
Female	176 (73.9)	62 (26.1)	238 (100.0)	
Total	601 (62.6)	359 (37.4)	960 (100.0)	
Continuous assessment				
Passed	436 (87.0)	65 (13.0)	501 (100.0)	χ^2=266.947, *P*=0.000
Failed	165 (35.9)	294 (64.1)	459 (100.0)	
Total	601 (62.6)	359 (37.4)	960 (100.0)	
Duration in school (years)				
5-8	485 (69.7)	211 (30.3)	696 (100.0)	χ^2=54.186, *P*=0.000
≥9	116 (43.9)	148 (56.1)	264 (100.0)	
Total	601 (63.7)	359 (36.3)	960 (100.0)	

Table 4: Outcome for objective structured clinical examinations versus nonobjective structured clinical examinations methods of examination

	Examinations result		Total (%)
	Pass (%)	Fail (%)	
OSCE	353 (60.0)	235 (40.0)	588 (100.0)
Non-OSCE	248 (66.7)	124 (33.3)	372 (100.0)
Total	601 (62.6)	359 (37.4)	960 (100.0)

χ^2=4.2815, *P*=0.03853 at 0.05. OSCE=Objective structured clinical examinations

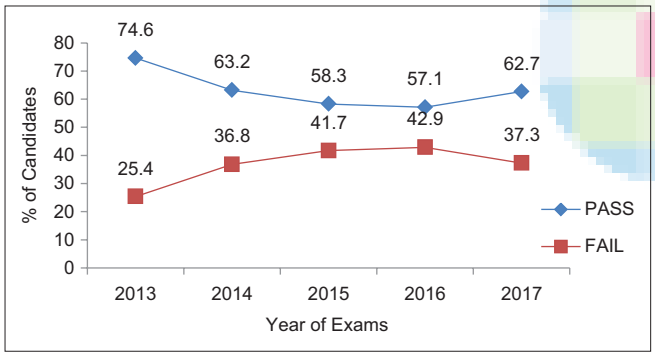

Figure 2: Outcome by year of examinations

MCQs and the CA were the most common examination failures in 49.5% and 47.8%, respectively. Of those who failed the final examination, 81.9% failed CA [Table 2]

Pass rate was 73.1% for females and 56.2% for males during OSCE period, and 75.0% and 63.4% for females and males respectively during the Non-OSCE Period.

Female sex, passing CA, and shorter duration <9 years in medical school is strongly associated with passing the final MBBS surgery examinations [Table 3]. Success rate in clinical examinations was higher in females (84.5%) compared to male candidates (72.7%).

χ^2 = 13.381, $P < 0.001$

Discussion

In our Institution, surgery is a major component of the final MBBS examination and must be passed by the student to qualify for award of the degree. From this study, two-thirds of candidates on the average pass the final MBBS Surgery examinations when the instruments under review were applied in its conduct. Although this pass rate compared with the mean pass rate of 60% for PLAB over a 5-year period (2012–2016), according to the General Medical Council of the United Kingdom,[13] there is still great need for improvement. We noticed a dip in the pass rates between 2015 and 2016, lower than the usual averages [Figure 2]. Interestingly, this coincided with the period when the traditional pattern of clinical examination was replaced with OSCE. We infer that the introduction of a new method of assessment could negatively affect students' performance See [Table 4]. This underscores the need for adequate student reorientation before implementation of any new examination method. Besides, the recoil of students' pass rate in the 2016 and 2017 OSCE reinforces the stated reliability of OSCE as a standard method.[7] In a review of pediatric literature relevant to OSCE, Carraccio and Englander concluded that the combination of OSCE, standardized board examinations and direct observation in the clinical setting has the potential of becoming the "gold standard" for measuring physician competence.[14]

The MCQs turned out to be the examination that the candidates failed most. MCQs seem to assess the knowledge base of students, and if well-constructed, they can test the application of knowledge and problem-solving skills. The thought process involved is also more complex with candidates weighing different units of information against one another when making a decision.[15] Thus, the high failure rate could be a reflection of lack of broad knowledge base among students. We also noted that among students who failed

their final surgery examinations, 81.9% failed their CA. Further assessment showed that 64.1% of those who failed their CA eventually failed their final compared to 13% failure rate among those who had passed their CA. Failing CA influences final outcome in a significant and negative way. To improve pass rate of the final surgery therefore, students should be made to realize the summative nature of the various assessments early in the course of their training. It has also been shown that both learning outcome and perceived course quality were enhanced by the increased frequency of examinations, possibly by promoting consistent student study habits.[16] Therefore, medical educators need to be aware of the paramount role of summative assessments in promoting student learning.[17]

This study shows a gender gap in terms of undergraduate medical student enrollees in our setting. A male:Female ratio of 3:1 ultimately translates into thrice as many male doctors as their female counterparts. This statistics for our setting stresses the need for proactive measures to support the girl-child in career pursuit.

Among other factors, female gender has been shown to confer lower risk of having difficulty during clinical training.[18] Our findings concurred with this report. We observed a significant pass rate difference of 73.9% among females compared to 58.9% among males ($P < 0.001$). This gender-based difference was maintained before the introduction of OSCE and thereafter. In our setting, females are more likely to attend all academic activities and have less distracting extra-curricular activities than their male counterparts.

Furthermore, the students who have stayed longer than expected (9 years and above) in the undergraduate training were more likely to fail the final surgery examinations when compared with those who spent less time in medical school ($P < 0.001$). Candidates stayed longer than expected due to failure to pass examination at first attempt. Another common reason in our environment is incessant industrial actions that disrupt academic activities. These industrial actions result from labor disputes between the government and various labor unions in the universities or the teaching hospitals leading to shut down of academic activities. After such disruption, students might have to repeat disrupted clinical postings. This explains the 9-year average duration spent in the medical school by students. Studies have shown that being in medical school is associated with higher level of stress.[19] It is therefore understandable that students who could not exit the program as at when due may have higher psychological issues which might affect their outcomes. This needs to be further evaluated.

Conclusion

In our Institution, success in the final surgery examination is a prerequisite for the award of MBBS degree. From this study, although MCQs is the most difficult aspect of the surgery examination, passing the CA, female sex and shorter stay in the medical school are factors favorable for a better outcome. In addition, improvement of programs that widen students' knowledge base as well as adequate students' reorientation to new evaluation processes may further raise the average pass rates.

Acknowledgment

Trainers and all academic staff of Surgery Department of our institution who generated the student scores culled for this work.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Epstein RM. Assessment in medical education. N Engl J Med 2007;356:387-96.
2. Flexner A. Medical Education in the United States and Canada. New York: A report to the Carnegie Foundation for the advancement of Teaching, New York: Carnegie Foundation for Advancement of Teaching, 1910.
3. Stahnisch FW, Verhoef M. The Flexner Report of 1910 and Its Impact on Complementary and Alternative Medicine and Psychiatry in North America in the 20th Century. Evidence-Based Complement Altern; 2012.
4. Cullinane A. Bloom's taxonomy and its use in classroom assessment. Resour Res Guid 2009;1:1-4.
5. Frank JR, Snell LS, Cate OT, Holmboe ES, Carraccio C, Swing SR, *et al*. Competency-based medical education: Theory to practice. Med Teach 2010;32:638-45.
6. Gewurtz R, Coman L, Dhillon S, Jung B, Solomon P. Problem-based learning and theories of teaching and learning in health professional education health professional education. J Perspect Appl Acad Pract 2016;4:59-70.
7. Ferris H, Flynn DO. Assessment in medical education ; what are we trying to achieve ? Int J High Educ 2015;4:139-44.
8. Norcini JJ, Mckinley DW. Assessment methods in medical education. Teach Teach Educ 2007;23:239-50.
9. O'Shaughnessy SM, Joyce P. Summative and formative assessment in medicine: The experience of an anaesthesia trainee. Int J High Educ 2015;4:198-206.
10. Harden RM, Stevenson M, Downie WW, Wilson GM. Assessment of clinical competence using objective structured examination. Br Med J 1975;1:447-51.
11. Zayyan M. Objective structured clinical examination: The assessment of choice. Oman Med J 2011;26:219-22.
12. Brouwers M, Rasenberg E, van Weel C, Laan R, van Weel-Baumgarten E. Assessing patient-centred communication in teaching: A systematic review of instruments. Med Educ 2017;51:1103-17.
13. PLAB Pass Rates. General Medical Council; 2017. Available from: https://www.gmc-uk.org/doctors/plab/23456.asp. [Last

accessed on 2017 Nov 10].
14. Carraccio C, Englander R. The objective structured clinical examination: A step in the direction of competency-based evaluation. Arch Pediatr Adolesc Med 2000;154:736-41.
15. Al-Wardy NM. Assessment methods in undergraduate medical education. Sultan Qaboos Univ Med J 2010;10:203-9.
16. Saint DA, Horton D, Yool A, Elliott A. A progressive assessment strategy improves student learning and perceived course quality in undergraduate physiology. Adv Physiol Educ 2015;39:218-22.
17. Raupach T, Brown J, Anders S, Hasenfuss G, Harendza S. Summative assessments are more powerful drivers of student learning than resource intensive teaching formats. BMC Med 2013;11:61.
18. Jardine DL, McKenzie JM, Wilkinson TJ. Predicting medical students who will have difficulty during their clinical training. BMC Med Educ 2017;17:43.
19. Abdulghani HM, AlKanhal AA, Mahmoud ES, Ponnamperuma GG, Alfaris EA. Stress and its effects on medical students: A cross-sectional study at a college of medicine in Saudi Arabia. J Health Popul Nutr 2011;29:516-22.