

Adequacy of Orthopaedic Surgery Educational Teaching Methods amongst Medical Students in Enugu State

Abstract

Introduction: Orthopaedic surgery educational teaching methods for medical students vary across different tertiary institutions in Nigeria. **Aim(s):** To determine the perception of medical students on the adequacy of orthopaedic surgery teaching methods in Enugu state, Nigeria. **Materials and Methods:** A cross-sectional online survey conducted using a well-structured questionnaire with the Google forms software and distributed to final year medical students at the two tertiary universities in Enugu state via online forums. SPSS was used for analysis. Significance set at $P < 0.05$. **Results:** 106 final year medical students filled the form. Response rate was 65.1%. 85.8% of the respondents reported that every student gets posted for orthopaedic surgery while 53% agreed that graphical illustrations were used. 50% reported that the learning environment were serene whereas 94.3% reported that their lecturers are well-trained. However, 55.6% reported that they do not have surgery simulations. Furthermore, 15.09% reported that they are aware of pitfalls in the teaching methods where only 27.36% alluded to using the library. There was no statistically significant association between gender and perception on quality of trainers/teaching methods of orthopaedic surgery in Enugu state (P value < 0.112). **Conclusion/Recommendation:** The orthopaedic surgery teaching methods currently being used are not adequate. Efforts should be made to increase the quality of exposure of medical students to orthopaedic surgery and increase the use of graphical illustrations/simulations.

Keywords: Teaching, medical students, simulations, educational, orthopaedic surgery

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Introduction

Orthopaedic surgery is a specialty of surgery dedicated to the prevention, diagnosis and treatment of diseases and injuries of the musculoskeletal system in all age groups.^[1] Orthopaedic surgery teaching methods in Nigeria involve teaching in small groups and large groups. Small group teaching may be bedside, or in a seminar room or tutorials, all of which simulate deep learning, and develop the students' higher intellectual skills, such as reasoning and problem-solving.^[2] Asani *et al.* defined bedside teaching as any kind of training in the presence of a patient, regardless of the environment in which the training is conducted. This is also applied to orthopaedic surgery.^[3]

Bedside teaching in orthopaedic surgery includes presentation of new cases clerked by students, demonstration of physical signs, providing feedback to students, showing humane ways of sharing bad

news, physicians' personal interaction with patients. The benefits of bedside teaching include professional thinking, observation of communication skills and teamwork and integration of communication skills, clinical skills and ethical issues in the process of patient care.^[3] In Nigeria, this bedside teaching takes place during clinical postings in orthopaedic surgery rotation for medical students.

In southern Nigeria, students are exposed to orthopaedic surgeries, clinics and ward rounds where they have contact with the patients and are allowed to manage patients under the supervision of their consultants. The average duration of orthopaedic clinical is three weeks. Another small group teaching method is tutorial classes. Tutorial sessions involve a class or short series of classes in which one or more instructors provide intensive instruction on a subject to a small group of medical students. During tutorials, medical students are trained to develop and assess their ideas, clarify

Received: 20-Oct-2022
Accepted: 11-Apr-2023
Published: 27-Jun-2023

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Access this article online

Website:

www.jwacs-jcoac.com

DOI: 10.4103/jwas.jwas_246_22

Quick Response Code:



How to cite this article: Imediegwu KU, Ugwu OM, Onyekaoonwu SC, Ikeaba CS, Dimson CJ, Okogu SI, *et al.* Adequacy of orthopaedic surgery educational teaching methods amongst medical students in Enugu state. *J West Afr Coll Surg* 2023;13:10-5.

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concepts taught in lectures, define new problems, seek solutions, cultivate problem-solving skills, and indulge in self-learning.^[4] Seminar is a lecture or presentation delivered to an audience or in groups on a particular topic or set of topics that are particularly educational. It is also a small group method of teaching.^[5] Again, orthopaedic surgery simulations which attempts to present education and evaluation problems authentically is one of the small group methods used where the student or trainee is required to respond to the problems as he or she would under natural circumstances.^[6] This allows interactive, and at times immersive, activity by recreating all or part of the clinical experience without exposing patients to the associated risks.^[7] Large group teaching includes formal classroom lectures. The theoretical aspects of orthopaedic surgery are taught, and this takes place in a physical class or more recently due to the Corona virus pandemic in an online class. Lecture materials are usually projected and contain pictures and pictorial representations of the surgery topic being taught. Other learning methods which help in students' exposure to orthopaedic surgery are journal clubs, library and online resources. Adequate teaching methods in orthopaedic surgery seems to be lacking in south-eastern Nigeria and this will become a problem in the future as fewer medical graduates will be interested in the specialty. There is also a paucity of studies on the adequacy of orthopaedic surgery teaching methods in Nigeria. This study intends to find out the pitfalls and possible remedies to improve learning and teaching methods in this surgical field.

The aim of this study was to assess the perspectives of medical students in Nigeria on the current state of orthopaedic surgery teaching in Nigeria and determine the adequacy of these teaching methods.

Materials and Methods

The study was conducted among clinical medical students in two universities in Enugu state, which is a state in the south-eastern part of Nigeria in West Africa. These universities are the University of Nigeria, Nsukka (UNN), Enugu state and the University of Science and Technology (ESUT), Parklane, Enugu state, Nigeria.

This was an online cross-sectional study conducted among undergraduate clinical students in South-eastern Nigeria to determine their perception on the adequacy of orthopaedic surgery teaching and ways to improve and promote orthopaedic surgery learning among undergraduate medical students. Ethical approval was obtained from the Health, Research and Ethical committee of the University of Enugu Teaching Hospital, Enugu with the REFERENCE NO: UNTH/HREC/06/465.

This study included undergraduate clinical students in various universities in Enugu state, Nigeria who consented to the study. Convenience sampling method was adopted; the individual clinical medical students who

were willing to participate were selected. To address the research questions, a survey instrument was designed by the principal investigator. Content accuracy and internal validity of the questionnaire were finalised with input from consultants who are experts in medical education. The data collected included Social Demographics and Assessment of the adequacy of orthopaedic teaching methods, factors affecting the teaching methods and ways of improving orthopaedic teaching methods. A modified Likert scale was utilised to elicit students' response to the perceived adequacy of orthopaedic surgery teaching methods. The questionnaire was sent to students through the help of key lead representatives of both university student's associations and a brief informed consent was stated in the opening of the electronic questionnaire. The study was conducted over three (3) months period. Data was entered and descriptive and inferential analysis done using the Statistical Package for the Social Sciences (SPSS, IBM Version 25). The study was conducted at 95% confidence interval and significance was set at $P < 0.05$.

Results

Social demographics

A total of 106 respondents were gotten from the online Google form questionnaire out of 163 final year medical students that links was sent to. This gives a response rate of 65.1%. Of the 106 respondents, 67.9% were from the University of Nigeria Nsukka (UNN), 32.1% were from the Enugu State University (ESUT). Christianity is practised by 98.1% of the respondents while 1.99% was other religions. 74% were of the Igbo ethnic group, 6.7% were Bini tribe whereas the remaining were other tribes. Figures 1-3 shows

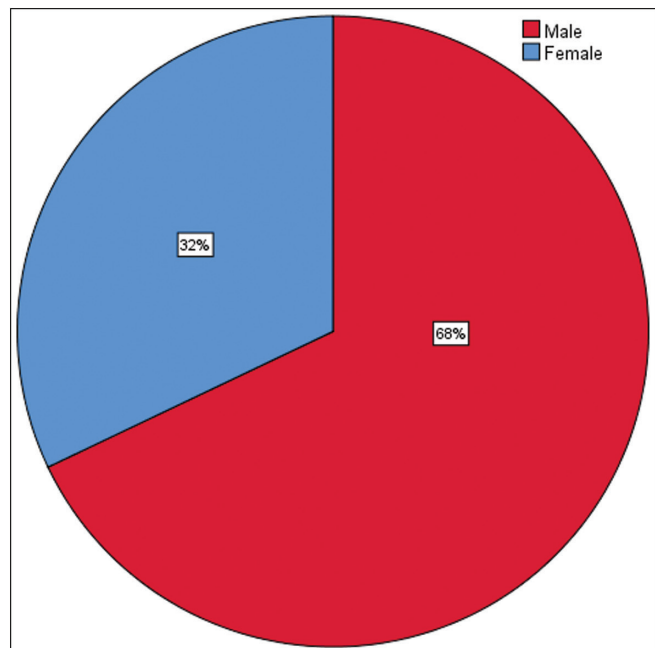


Figure 1: Sex distribution of respondents

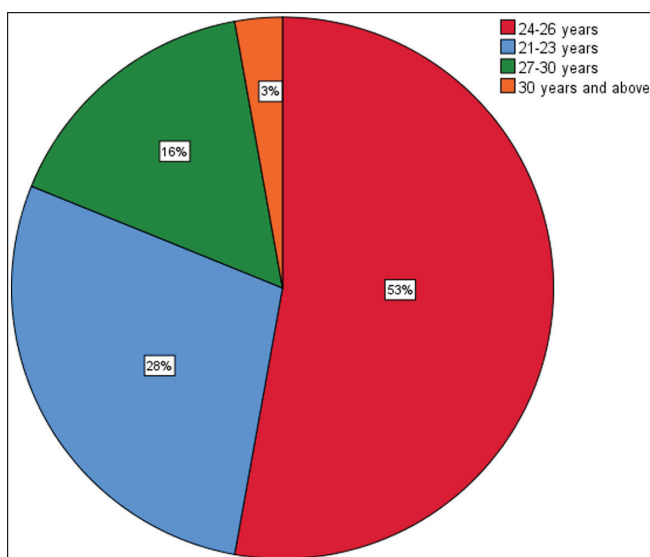


Figure 2: Age distribution of respondents

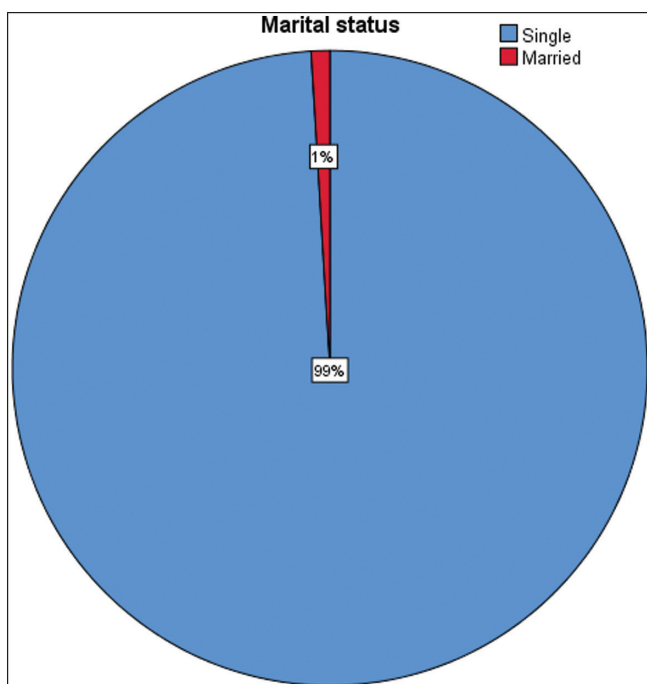


Figure 3: Marital status of respondents

the sex, age distribution and marital status respectively amongst the respondents.

Assessment of the Adequacy of Orthopaedic Surgery University Teaching Methods for Surgery Students in a Developing Country

Discussion

To access the adequacy of teaching methods used in orthopaedics, a series of questions were posed to the students as shown in Table 1. A standardised teaching method in

orthopaedic surgery comparable to global standards needs to be incorporated into the Nigerian university system. As revealed by a study by Bartlett *et al.*,^[4] students need simulations especially in sub-specialties like arthroscopy, in order to have a better imaginary understanding of the procedures. In our study, the figures were not encouraging as 55.66% alluded to unavailability of simulations in their orthopaedic surgery education. Also, units like arthroplasty would need graphical illustrations for students and residents to grasp the basics of joints replacement. This can be inferred from a study by Hooper *et al.*^[8] which revealed that virtual reality assisted arthroplasty training helped in improving technical skills. In addition, journal clubs and easy access to the internet should be functional as this would logically enable the medical students read up on latest orthopaedic specialties which classroom lectures might not sufficiently cover like foot, ankle surgery, Ilizarov and other common reconstructive orthopaedics procedures. A basic firm understanding of these principles would be nice if mastered before they eventually become doctors. There are different informative resources available online for graphical illustrations in orthopaedic surgery for medical students that could increase interest and solidify what they are taught in lectures. A good example is the nailed it team, by Adriano *et al.*^[9] which revealed options for orthopaedic surgery students. However, in our study, when asked about satisfaction towards graph illustrations, just half (50%) of the respondents were satisfied as shown in Table 2.

As shown in Table 1, about 55.66% of the respondents answered yes when asked if they have surgery simulations. A study done by Bartlett *et al.*^[4] showed that students' interest in orthopaedics and surgery was found to increase after simulator use. This further adds weight to the need for simulations to stimulate interest in students towards orthopaedic surgery.

This study demonstrated that more than half of the population were satisfied with the teaching methods of orthopaedic surgery in their various universities. This can be seen from the modified Likert scale in Table 2. It also showed that 91 out of 106 respondents agreed that every student get to be posted for posting in orthopaedic surgery while only 15 (14.15%) answered no to this question in Table 1. When asked if their lecturers are well-trained, 94.34% answered yes whereas only 5.66% answered no [Table 1].

Outside of traditional textbooks, websites represent an additional valuable resource to medical students at all training levels. This view was supported by a study by Wadhwa *et al.*^[10] on the musculoskeletal educational resources for future aspiring orthopaedic surgeons. However, from our study, about 29 respondents said they had a club journal in their school, out of which only 17.65% are members. Less than half of the respondents (41.51%) have access to website links for more information [Table 1].

Table 1: Assessment of teaching method in orthopaedics (percentages in bracket)

	Yes	No	Maybe
Do you do clinical rotations in orthopaedic surgery?	98 (92.45%)	8 (7.55%)	0
Does every student get posted to orthopaedic surgery?	91 (85.85%)	15 (14.15%)	0
Are the classrooms crowded with students?	55 (51.89%)	51 (48.11%)	0
Are your lecturers well trained?	100 (94.34%)	6 (5.66%)	0
Do you have surgery simulations?	47 (44.34%)	59 (55.66%)	0
Do you have extra tutorial sessions?	35 (33.02%)	71 (66.98%)	0
Are you aware of any specific pitfalls in the teaching methods already in use in orthopaedics surgery?	16 (15.09%)	90 (84.91%)	0
Do you make use of the library?	29 (27.36%)	77 (72.64%)	0
Is there a club journal in your school?	34 (32.08%)	72 (67.92%)	0
Are you a member of any club journal? (n = 34)	6 (17.65%)	28 (82.35%)	0
Do you have access to website links for more information?	62 (58.49%)	44 (41.51%)	0
Are graphical illustrations used by your lecturers in teaching?	53 (50%)	39 (36.79%)	14 (13.21%)
Is your library equipped with resource materials in orthopaedics?	25 (23.58%)	17 (16.04%)	64 (60.38%)
Do you have adequate number of orthopaedic lecturers?	65 (61.32%)	25 (23.58%)	16 (15.09%)

Table 2: Modified Likert scale on satisfaction on teaching methods in orthopaedic surgery (percentage in bracket)

	Satisfactory	Dissatisfactory	Neutral	Strongly satisfactory	Strongly dissatisfactory
How do you rate the explanations of the graphical illustrations? (n = 106)	53 (50.00%)	11 (10.38%)	35 (33.01%)	7 (6.60%)	0 (0.0%)
How satisfactory is the general average performance of students in orthopaedic surgery (n = 106)	43 (40.57%)	8 (7.55%)	52 (49.06%)	1 (0.94%)	2 (1.89%)

About 16 respondents out of 106 alluded to specific pitfalls in teaching methods already used in orthopaedics but 90 respondents remained unaware. Some of the factors highlighted to be the pitfall of the orthopaedic surgery teaching methods include lack of qualified orthopaedic lecturers, lack of serene environment, overcrowding in classes, lack of surgery simulation and underwhelming graphical illustrations, and short exposure to clinical postings.

With these results, more emphasis should be placed on making the learning environment conducive. This can be further buttressed by the data in Table 3 where 45.28% of students described their learning condition as poor. This goes to show that the learning environment and condition of the students that participated in this study is less than ideal. The orthopaedic surgery curriculum is quite broad and can be intensive. Hence, having a conducive environment would help facilitate improved learning.

Furthermore, exposing students to a longer duration of posting in orthopaedics might improve the average general performance of the students. Table 4 shows that most students spend about 3–4 weeks in orthopaedics posting. A study by Ali and Bulstrode^[11] in the UK showed that most surgeons agreed that at least 8 weeks is required to master the basics of orthopaedic surgery. The study also showed that in Canada and the UK, medical schools devote 2.26% and 2%, respectively, of their curricula to musculoskeletal education. Simulation of orthopaedic

Table 3: Condition of learning for Orthopaedic Surgery

	Frequency	Percentage
Poor	48	45.28
Serene	53	50.00
Very poor	5	4.72

Table 4: Duration of clinical rotations in orthopaedics

	Frequency (n = 98)	Percentage
2 weeks	31	31.62
3–4 weeks	65	66.33
5–6 weeks	2	2.04

surgeries has been found lacking in the medical schools of the studied population. This is evident by the data represented in Table 1 where only 44.34% agreed to have surgery simulations. Whereas students may not be able to participate in every surgery due to different degrees of priority, simulations can be structured to adapt the students to practical operative situations.

Today’s medical students have access to and are adept in the use of technology for learning. Educators can make use of this technological ability as they attempt to impart knowledge and technical skills to the student.^[12] This differs from findings in our study which revealed that only half of the respondents are taught with sufficient graphical illustrations and 41.51% alluded to having no access to website links for more information [Table 1].

Table 5: Number of students in a classroom

	Frequency	Percentage
<50	4	3.77
50–100	26	24.53
101–150	15	14.15
>150	61	57.55

Table 6: Correlative analysis between gender and various factors affecting adequacy of orthopaedic surgery education in the universities

Factors	Gender		Chi-square	P value
	Female	Male		
Are the students crowded in the classrooms?				
No	14 41.2%	37 51.4%	0.965	0.326
Yes	20 58.8%	35 48.6%		
Do you have adequate number of orthopaedic lecturers?				
No	10 29.4%	15 20.8%	1.510	0.470
Yes	18 52.9%	47 65.3%		
I don't know	6 17.6%	10 13.9%		
Are your lecturers well trained				
No	0 0.0%	2 2.8%	4.380	0.112
Yes	31 91.2%	69 95.8%		
Maybe	3 8.8%	1 1.4%		

The focus of medical education is now shifting towards continuous learning with students being encouraged to take more responsibility for their training by making use of online resources available at their disposal to improve their knowledge of orthopaedics.^[12] Currently, this is not being done as only about 34 respondents alluded to the provision of a club journal in their school and only 17.65% of them are members. Moreover, only 27.36% of students make use of the school library. This is quite a small number since the library is known to house so much knowledge that can be useful to students. However, this might be attributed to the fact that the library is not well equipped as suggested by 23.58% of students [Table 1]. Thus, it becomes essential to utilise an approach to teaching and learning that best meets the specific needs of the students.^[13]

Overcrowding is a deterrent to quality learning as about 57.55% of students complained to be more than 150 in a class [Table 5]. Furthermore, a little over half of the respondents (51.89%) agreed that students are being crowded in classrooms while 48.11% answered no to the same question. This can diminish the learning experience for students especially those who are unfortunate to sit far away from the lecturer. As shown in Table 6 inferential analysis, there was no significant relationship between

Table 7: Which recommendations can help improve the results?

	Frequency	Percentage
Improve the learning environment	46	43.40
Improve the teaching methods	26	24.53
Increase the frequency of teaching	11	10.38
Provision of basic amenities for Students	20	18.87
Employ more lecturers	3	2.83

gender with perspectives on crowding in the classrooms, number of lecturers and the level of training of the lecturers with p values of 0.326, 0.4770 and 0.112. However, a study by Nsubuga *et al.*^[14] published by BMC Medical Education recommended that the number of students enrolled in orthopaedic surgery needs to be appropriate for the student-supervisor ratio to improve practise-based learning.

Conclusion/Recommendations

The orthopaedic teaching methods currently used in teaching clinical medical students in Enugu state are not adequate.

In accordance with the findings from our study, as shown in Table 7, improving the learning environment was the top recommendation (43.4% of students) given by respondents and this would provide students with enough motivation and equipment to gain more knowledge and skills. Also, the lecturers are encouraged to regularly engage in updated courses to improve their teaching skills and should routinely incorporate graphical illustrations to help students get more engaged and further deepen their understanding of orthopaedic surgery during lectures. In addition, methods which have been proven to be more effective, especially small group teachings, should take the forefront and the students should be encouraged to be more participatory by asking questions and clerking and presenting as many cases as possible during their orthopaedic surgery clinical postings. Active mentorship platforms should be established with avenues for regular feedback interactions between the students and the teachers. Furthermore, the universities libraries should be equipped with more resource materials to interest students and make them use the facility. Club journals should be established as these have been found lacking in the schools and students should be encouraged to participate actively. Finally, there is a need to improve on the provision of more standard basic amenities, as this would help improve their attentiveness to academic studies and orthopaedic surgery learning.

Limitation(s) of the study

- This was an online study and this could have limited the number of possible respondents. Future multicentre studies would be advised to get a broader national view.
- It would be difficult to neglect the other surgical specialties effect on the factors affecting orthopaedic

surgery education as teachings simultaneously occur in the universities under similar conditions.

Acknowledgements

None.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

Ethical approval

Ethical approval was obtained from the Health, Research and ethical committee of the University of Enugu Teaching Hospital, Enugu, Nigeria with REF NO- UNTH/HREC/2022/06/465.

Availability of data and material

Additional data from the research project could be made available by the author on request.

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