Pre-internship Nigerian medical graduates lack basic musculoskeletal competency

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Abstract

Purpose Our aim was to assess the basic musculoskeletal competency of pre-internship graduates from Nigerian medical schools.

Methods We administered the Freedman and Bernstein basic musculoskeletal competency examination to 113 pre-internship graduates from seven Nigerian medical schools over a three year period from 2008 to 2010 at the University of Uyo Teaching Hospital. Five specialist residents took the examination to test criteria relevance.

Results All graduates failed this test, obtaining scores ranging from 7% to 67%. The duration of the orthopaedic posting, and observation of operative fracture fixation, were not significant determinants of the score. The two final-year specialist residents each had a marginal pass in the examination.

Conclusion Basic musculoskeletal competency among pre-internship Nigerian medical-school graduates is inadequate.

Introduction

The National Ambulatory Medical Care Survey (2005) summary in the USA revealed that the two highest symptom-based reasons in 2007 for patient visits to a physician were musculoskeletal and respiratory (9.9%) [1]. The same study revealed that the largest number of patient visits were to general-practice physicians. Most cases of musculoskeletal disease will be seen by physicians in general practice, and medical-school foundation in orthopaedics is crucial to the quality of health care delivery for these complaints [2]. The Nigerian medical system does not require that medical doctors undergo postgraduate training before they can independently practice medicine. Consequently, the need for adequacy in undergraduate musculoskeletal education may be higher in this environment than in the developed world, where some form of post-graduate certification is necessary.

Methods

Over a three year period, from 2008 to 2010, a validated panel of questions assessing basic musculoskeletal competency [3] was administered to 113 pre-internship medical doctors from three of the six geopolitical zones of Nigeria as part of the qualifying interview into the one year internship programme at the University of Uyo Teaching Hospital. In order to reduce the possibility of coaching by senior doctors, the examination was not administered to every batch of these recent graduates.

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None of the candidates had prior exposure to the panel of questions. Three respondents had attended college outside Nigeria, and one did not specify the medical school. These four were excluded from the results. There was no time limit for this part of the exam, and the results were scored anonymously by the corresponding author. The information required included the medical school in which the respondent was trained, the duration of the orthopaedic posting and whether or not the respondent had witnessed open reduction and internal fixation (ORIF) of fractures.

Criterion relevance

The same panel of questions was administered to five senior registrars in the orthopaedic residency programmes from two training centres and at different specialty years of training, as a measure of criteria relevance. They were administered to these residents with the permission of their trainers, without any prior notice to the residents but with their individual consent.

Statistical analysis

We conducted basic analysis of the results using STATA 10, STATA Corp, TX, USA. The Shapiro–Wilk test was used to test for data normality. The mean or median scores were compared between groupings of various characteristics using the two-sample Wilcoxon rank sum test (Mann–Whitney *U* test) for non-normative data.

Results

Exam scores

The range of scores was from 7% to 67%, with a mean of 28.9 ± 10.6 and a median of 29 [interquartile range (IQR) 20–35]. The range of mean scores for each question was from 1.8% (question 11) to 89.9% (question 10) (Table 1).

Duration of orthopaedic posting

Mean scores of respondents for the different durations of orthopaedic posting are shown in Table 2. The duration of the posting was not a significant determinant of examination score ($p=0.14$).

Observation of ORIF

Table 3 shows the frequency of respondents against the criterion “watched ORIF”. Observing ORIF was not significantly related to the examination score ($p=0.88$).

Exam scores of senior registrars

Scores of the five senior registrars ranged from 49% to 75% (Table 4). Two participants in this group were in the final year of specialist training (specialist year 3) and scored 73% and 75%.

Discussion

An OVID MEDLINE search suggests this study is the first attempt to assess the adequacy of basic musculoskeletal knowledge and skills in West African medical schools. The quality of musculoskeletal knowledge of medical doctors is crucial for the care of the large number of trauma patients in this environment. Labinjo et al. noted an overall Nigerian road traffic injury rate of 41 per 1,000 population and a mortality rate 1.6 per 1,000 population [4]. Studies from the developed world show that the highest symptom-based presentation is from the musculoskeletal system [1]. Forty percent of respondents, in a study by Reznick et al., felt unprepared to handle fractures [5]. The Nigerian medical system does not require that medical doctors undergo postgraduate training before they can independently practice medicine. Consequently, the need for adequate undergraduate musculoskeletal education may be said to be higher in this area than in the developed world.

Table 1 Mean scores for each question

Questions and mean scores													
Question no.	1	2	3	4	5	6	7	8	9	10	11	12	
Mean score (%)	11.9	22	50.5	48.6	9.6	22.9	56	6.4	43.1	90	1.8	10.1	
Question	13	14	15	16	17	18	19	20	21	22	23	24	25
Mean score (%)	13.8	29.7	62.4	17.4	78	6.4	27.5	2.8	23.9	27.5	8.3	19.3	35.8

Mean score for trauma questions (2, 4, 5, 7, 8, 9, 13, 15 and 22): 32.15%

Mean score for applied anatomy questions (4, 10, 12, 15, 20, 24 and 25): 38.41%

Table 2 Duration of the orthopaedic posting against examination score and descriptive statistics^a

	Number of respondents	Mean score	Standard deviation
>2 <4 weeks	29	25.1724	8.1199
2 weeks or less	41	31.9024	12.1692
>4 to 6 weeks	16	30.1250	12.0879
> 6 weeks	11	27.9091	8.2517
No answer	12	26.9167	7.8908

^a Kruskal – Wallis test

Despite the need for adequate musculoskeletal care in this area, recent graduates in this study all failed this test of basic competency in musculoskeletal knowledge according the passing score of 73.1% in the Freedman and Bernstein examination [3]. This international examination is devoid of questions requiring knowledge of or about high-tech equipment and should give a fair assessment of musculoskeletal competency in resource-constrained settings such as Nigeria. The uniform failure in these scores indicates inadequate teaching of musculoskeletal medicine. The absence of a significant relationship between the examination score and duration of the orthopaedic posting suggests the training programmes lack structure and thus do not provide standard learning to the students. This was further buttressed by the poor mean trauma-specific score (32.15%) despite the high proportion (72%) of respondents who had observed ORIF.

The mean score for the definition of compartment syndrome (22%) and its treatment (56%) are cause for concern because of the harm that results from poor management of a limb-compartment syndrome, which is a common consequence of treatment by traditional bonesetters [6]. The mean score for applied anatomy questions was 38.41%. Applied anatomy with clinical correlates may be a marker of the ability of a curriculum to explain basic content, especially as the introduction during anatomy courses and its application/reinforcement in the clinical years should render the item easier to remember. Menon noted an average score of 57.2% in the anatomy section and a 30% reduction in the time allotted to education in anatomy [7]. His respondents and those in this study had their highest score in question 10

Table 3 Frequency of medical graduate respondents against the criterion “watched open reduction and internal fixation (ORIF)”

Watched ORIF (2008–2010)	Number	Percent
No	31	28.4
No answer	6	5.5
Yes	72	66.1
Total	109	100.0

Table 4 Scores of senior registrars by specialist year

Specialist year	Score (%)
1	49
1	53
1	54
3	73
3	75

(carpal tunnel syndrome): 95% and 89.9%, respectively. Failure in the anatomy section suggests defective clinical application during the teaching of anatomy in Nigerian medical schools. The knowledge of anatomy is considered the most relevant of the basic medical sciences to daily clinical practice [8] and particularly relevant to understanding musculoskeletal medicine [9].

In this study, In order to maintain validity, scores were not awarded for answers to questions that would have been correct in this environment because it was not in the marking scheme. For example, Question 14: A patient presents with new-onset low back pain. Under what conditions are plain radiographs indicated? Please name 5 (example: history of trauma). Correct answers include: (1) spine deformity or tenderness, for Pott’s disease or spinal typhoid [10]; (2) background of sickle cell disease. However, these questions give an allowance for cases like this by asking for five answers but scoring on any correct four.

Numerous studies reveal inadequate competency in musculoskeletal medicine within a regular medical school curriculum [3, 7, 11–16]. However, taking electives in orthopaedic surgery [11] and making it the top residency choice are associated with obtaining good scores on the basic competency examination [16]. These studies express concerns about the adequacy of the musculoskeletal curriculum in the respective medical schools and suggest an increase in mandatory musculoskeletal education and its scheduled time [11], taking electives in orthopaedics [13] and using a special advanced programme [17].

The two final-year specialist residents had marginal passes in the examination. Though the number is small, it suggests the questions have inadequate criteria relevance for this environment. For example, there were no questions pertaining to Pott’s disease, orthopaedic aspects of sickle cell disease, polytraumatised patients, adult fractures, treatment of patients following management of complications from traditional bonesetters care (nonunion, chronic osteomyelitis, traditional bonesetters gangrene) [18]. A similar exam with questions that emphasise community needs of this environment will be a more appropriate measure of basic orthopaedic training in Nigerian medical schools. Menon, in India, also noted the absence of questions relevant to local context [7]. Pinney and Regan showed that community needs are not reflected in the musculoskeletal

curricula of Canadian medical schools [2], which were found to devote a mean of 2.26% of curriculum time to musculoskeletal medicine, which, as noted in the study by Pinney and Regan to be in sharp contrast with the 13.7 to 27.8% prevalence of musculoskeletal complaints presenting to the typical primary care physician [2]. The curriculum time devoted to musculoskeletal medicine at 21 medical schools in the UK was 2% [19]. In order to improve the standard of musculoskeletal education in Nigeria, the Medical and Dental Council of Nigeria, vested with the authority to accredit medical schools, can review the content and modality of the musculoskeletal curriculum in our medical schools. Such action made an impact in the USA [20]. Bilderback noted a 77.8% pass rate after six weeks of a special system-based programme in orthopaedics [21]; 31.3% of Canadian medical schools have a mandatory clinical exposure to musculoskeletal education [2], unlike the Nigerian situation in which it is mandatory in all schools in our study. The corresponding authors' medical school has a ten day slot for orthopaedic education.

There are some limitations to this study: Respondents had finished medical school in some cases for up to one year. This somewhat accounts for the inadequate overall performance and explains the necessity to couple the competency examination with a competitive interview to ensure some modicum of nonspecific revision. The original study by Freedman and Bernstein was on postgraduate students and may not translate equitably to recent but untrained graduates, as in this study. The question on duration of the orthopaedic posting was not accurately defined to distinguish between a "pure" orthopaedic posting and orthopaedics as part of the surgery posting (more common in Nigerian medical schools). However, the information given reflects the individuals' concept of the time spent in musculoskeletal learning, and its content should have a bearing on the examination result.

A quote from the paper by Pinney and Regan [2] is apt: "Educating medical students about musculoskeletal medicine requires an organised program, conscientious teachers, and adequate curriculum time."

Conclusion

This study reveals inadequate musculoskeletal competency of the pre-internship Nigerian medical-school graduate, according the Freedman and Bernstein test for musculoskeletal competency. The duration of the orthopaedic posting and observation of operative fracture fixation were not significant determinants of the score, suggesting the curriculum is not structured.

Conflict of interest The authors declare they have no conflict of interest

References

1. Cherry DK, Woodwell DA, Rechtsteiner EA (2007) National ambulatory medical care survey: 2005 summary. *Adv Data* 29 (387):1–39
2. Pinney SJ, Regan WD (2001) Educating medical students about musculoskeletal problems. are community needs reflected in the curricula of canadian medical schools? *J Bone Jt Surg Am* 83-A (9):1317–1320
3. Freedman KB, Bernstein J (1998) The adequacy of medical school education in musculoskeletal medicine. *J Bone Jt Surg Am* 80 (10):1421–1427
4. Labinjo M, Juillard C, Kobusingye OC, Hyder AA (2009) The burden of road traffic injuries in nigeria: Results of a population-based survey. *Inj Prev* 15(3):157–162
5. Reznick RK, Brewer ML, Wesley RM, Stauffer ES (1987) Orthopaedic teaching: The practicing family doctor's perspective. *Orthop Rev* 16(8):529–535
6. Omololu B, Ogunlade SO, Alonge TO (2002) The complications seen from the treatment by traditional bonesetters. *West Afr J Med* 21(4):335–337
7. Menon J, Patro DK (2009) Undergraduate orthopedic education: Is it adequate? *Indian J Orthop* 43(1):82–86
8. Arraez-Aybar LA, Sanchez-Montesinos I, Mirapeix RM, Mompeo-Corredera B, Sanudo-Tejero JR (2010) Relevance of human anatomy in daily clinical practice. *Ann Anat* 20;192(6):341–348
9. Day CS, Ahn CS (2010) Commentary: The importance of musculoskeletal medicine and anatomy in medical education. *Acad Med* 85(3):401–402
10. Alonge TO, Ogunlade SO, Omololu AB, Obajimi M (2003) Infective lumbar discitis in a sickler—an occult 'typhoid' spine? *West Afr J. Med* 22(3):267–268
11. Day CS, Yeh AC, Franko O, Ramirez M, Krupat E (2007) Musculoskeletal medicine: An assessment of the attitudes and knowledge of medical students at harvard medical school. *Acad Med* 82(5):452–457
12. Jones JK (2001) An evaluation of medical school education in musculoskeletal medicine at the university of the west indies, barbados. *West Indian Med J* 50(1):66–68
13. Matzkin E, Smith EL, Freccero D, Richardson AB (2005) Adequacy of education in musculoskeletal medicine. *J Bone Jt Surg Am* 87(2):310–314
14. Mayer RS, Baima J, Bloch R, Braza D, Newcomer K, Sherman A et al (2009) Musculoskeletal education for medical students. *Am J Phys Med Rehabil* 88(10):791–797
15. Queally JM, Kiely PD, Shelly MJ, O'Daly BJ, O'Byrne JM, Masterson EL (2008) Deficiencies in the education of musculoskeletal medicine in ireland. *Ir J Med Sci* 177(2):99–105
16. Yeh AC, Franko O, Day CS (2008) Impact of clinical electives and residency interest on medical students' education in musculoskeletal medicine. *J Bone Jt Surg Am* 90(2):307–315
17. Queally JM, Cummins F, Brennan SA, Shelly MJ, O'Byrne JM (2011) Assessment of a new undergraduate module in musculoskeletal medicine. *J Bone Jt Surg Am* 93(3):e9.
18. Yinusa W, Ugboye ME (2003) Problems of amputation surgery in a developing country. *Int Orthop* 27(2):121–124
19. Williams JR (2000) The teaching of trauma and orthopaedic surgery to the undergraduate in the united kingdom. *J Bone Jt Surg Br* 82(5):627–628
20. Day CS, Yeh AC (2008) Evidence of educational inadequacies in region-specific musculoskeletal medicine. *Clin Orthop Relat Res* 466(10):2542–2547
21. Bilderback K, Eggerstedt J, Sadasivan KK, Seelig L, Wolf R, Barton S et al (2008) Design and implementation of a system-based course in musculoskeletal medicine for medical students. *J Bone Jt Surg Am* 90(10):2292–2300