

Assessing musculoskeletal training in South Africa

Dr R Dachs* MBChB(UCT), MMed(Orth)UCT, FCS(SA)Orth

Dr S Roche* MBChB(UCT), FCS(SA) Orth, LMCC(Canada), Consultant

Dr B Vrettos* MBChB(UCT), FCS(SA)Orth, FRCS(Eng), MMed(Orth)UCT, Consultant

Dr K MacIntyre, MBChB(Stel), MMed(Orth)Stel, FCS(SA)Orth, Arthroplasty Fellow, Groote Schuur and Life Orthopaedic Hospitals

Dr B Currin, MBChB(Wits), Intern, Groote Schuur Hospital 2010/2011

Dr N Kruger* MBChB(UCT), FCS(SA)Orth, FRCS(Ed), Consultant

Prof J Walters* MBChB(UCT), FCS(SA)Orth, Previous Head of Department

Prof R Dunn* MBChB(UCT), MMed(Orth)UCT, FCS(SA)Orth, Head of Department

*Department of Orthopaedic Surgery, University of Cape Town

Correspondence:

Dr Robert Dachs

H49 Old Main Building

Groote Schuur Hospital

Observatory

7925

Email: robdachs@gmail.com

Abstract

A familiarity with musculoskeletal disorders is vital for medical school graduates. The purpose of this study was to investigate perceived deficiencies in undergraduate education to provide motivation for a restructuring of the curriculum. A basic competency examination in musculoskeletal medicine was used.

Group 1 comprised 79 interns in their first postgraduate year. The recommended passing score for the examination was 73.1%. The score for the interns in Group 1 was 45.3%. Seventy-two (91%) of the 79 interns failed to demonstrate basic competency.

The examination was reapplied to 53 interns (Group 2), to establish whether a two-month orthopaedic rotation during internship improved performance. The score for the group was 56.8%. 85.7% (18/21) of those who had completed an orthopaedic rotation and 93.8% (30/32) of those who had not completed an orthopaedic rotation failed the assessment. The additional exposure to musculoskeletal medicine during internship did not show statistical benefit (95% CI 58.0–79.5).

In summary, 91% of medical-school graduates failed a basic competency examination, and no benefit was found from completing an internship rotation. We believe that undergraduate musculoskeletal education in South Africa is inadequate and that programmes throughout the country should be reassessed.

Key words: Musculoskeletal education, undergraduate curriculum, basic competency examination, orthopaedic.

Introduction

Musculoskeletal symptoms account for a quarter of primary care and accident and emergency attendances internationally, and approximately two-thirds of people on long-term sick leave in Europe claim a musculoskeletal problem as the reason.^{1,2} The economic burden of musculoskeletal illness accounts for 2.5–7.7% of the gross national product of many nations.³ An audit from Durban in South Africa found that 63% of orthopaedic operations performed in 2009 were as a direct result of assaults, gunshots or motor vehicle accidents (MVAs).⁴ In 2001, injuries killed 5.1 million people and accounted for 12% of disability-adjusted life years (DALYs) lost worldwide, which was more than that lost due to tuberculosis, diarrhoea and malaria combined.⁵ More

alarming is a Ugandan study which found that for each person who dies from trauma, three to eight more are permanently disabled.⁶ In South Africa, DALYs lost due to injury is ranked third behind HIV/AIDS and infectious/parasitic illnesses, and above cardiovascular disease, respiratory disease, malignancies and diabetes mellitus.⁷ In 2000, musculoskeletal diseases accounted for the loss of more than 45 000 DALYs in South Africa.⁸ Furthermore, the impact of musculoskeletal conditions is predicted to increase dramatically with the ageing of the population, lifestyle changes resulting in a lack of physical fitness and obesity, and the increase in MVAs with the urbanisation and motorisation of the developing world.

The provision of musculoskeletal care comes from a broad spectrum of practitioners, with only 6% of musculoskeletal care in the United States being provided by orthopaedic surgeons.⁹ In South Africa there are an estimated 1.5 orthopaedic surgeons per 100 000 of the population.¹⁰ Junior doctors in South Africa are exposed to one of the highest loads of musculoskeletal illness.¹¹ This is particularly relevant during the compulsory year of community service, often served in rural areas far from specialist support. Much of the death and disability from injury in developing countries has been attributed to inadequate care. Daar *et al.* estimated that 20% of deaths among young adults in developing countries could be prevented by simple surgical interventions.¹² Nunn *et al.* assessed factors associated with a delay to arthrotomy in paediatric septic arthritis of the hip.¹³ In their study from northern KwaZulu-Natal, they found that deprivation, consultation with a traditional healer, maternal education and distance to a health care facility were not associated with a delay to arthrotomy, but initial misdiagnosis by the doctor was. A good understanding of musculoskeletal medicine is therefore essential for the future good practice of most, if not all, medical school graduates. This knowledge base needs to be acquired in medical school and then refined during postgraduate training. However, throughout the world, undergraduate curricula are dedicating less and less time to the teaching of the musculoskeletal system. In the United Kingdom, only 2% of the available teaching time during the clinical years is devoted to trauma and orthopaedic surgery, with a decrease over the past decade from 6%.¹⁴

Many studies express concern that doctors lack the competency and skills to manage musculoskeletal disorders seen in daily practice. A survey of Ontario physicians found the unnecessary use of diagnostic tests, inappropriate prescriptions and lack of diagnostic suspicion of dangerous musculoskeletal conditions to be common problems.¹⁵ This inability to recognise common conditions, and a lack of understanding of the appropriate use of special investigations, results in ineffective usage of valuable resources. There are countless scenarios in orthopaedic surgery where inappropriate initial management can drastically increase the cost and complexity of definitive treatment. An Australian study found only 10% of medical inpatients undergo a musculoskeletal examination, despite 40% having musculoskeletal symptoms on admission.¹⁶ Jandial *et al.* from Newcastle University assessed confidence in paediatric musculoskeletal assessment.¹⁷ The majority of respondents had no confidence in the musculoskeletal assessment, while most respondents were very confident in the cardiovascular, respiratory and abdominal systems. Musculoskeletal assessment ranked lowest of all systems. In addition, only half of the respondents recalled any teaching of paediatric musculoskeletal medicine at undergraduate level. It would be considered negligent for a medical graduate to be incompetent at assessing the cardiovascular or respiratory system, yet it is common for students to leave medical school without being able to make an adequate assessment of the musculoskeletal system.

Many studies express concern that doctors lack the competency and skills to manage musculoskeletal disorders seen in daily practice

We wanted to quantify this problem in a South African context. A basic competency examination in musculoskeletal medicine was applied to a group of recently graduated doctors (*Figure 1*).¹⁸ The assessment was reapplied two years later to evaluate whether the recently instituted two-year internship, with its compulsory two-month Orthopaedic/Orthopaedic Trauma rotation, had any effect on competency in musculoskeletal medicine.

Methods

We enrolled interns in their first postgraduate year in 2010 at Groote Schuur and Tygerberg Hospitals (Group 1) and asked them to complete the Freedman and Bernstein Musculoskeletal examination (*Figure 1*). The test was administered on the first day of each hospital's intern orientation programme. All 79 interns agreed to participate. The cohort included graduates from all eight South African medical schools.

The examination was developed to test medical school graduates' understanding of basic musculoskeletal problems. It was validated by chairs of residency programmes in orthopaedic surgery and internal medicine. The pass mark was set at 73.1% by the 124 chairs of orthopaedic residency programmes, and 70% by the 240 chairs of internal medicine residency programmes. The examination consists of 25 short-answer questions. The questions were also weighted according to importance from 0 to 10 by the orthopaedic chairs. Topics included fractures and dislocations, back pain, arthritis, basic anatomical knowledge, and emergencies that require immediate referral to an orthopaedic surgeon. The examination was scored anonymously according to the validated answer key. In our study, the overall unweighted score was calculated as described in the original paper and the recommended pass mark set at 73.1%. As an additional test of validity, the examination was administered to all registrars in orthopaedic surgery at the University of Cape Town.

To ascertain whether a two-month orthopaedic rotation during internship significantly improved performance in the musculoskeletal assessment, the examination was applied to a second study group (Group 2) consisting of all first and second year interns at Groote Schuur Hospital during 2011. A list of 76 interns was obtained from the intern curator, and the examination was administered via e-mail. The examination was sent out at three-weekly intervals over a four-month period. A final response rate of 69.7% was achieved (53/76). Data was analysed using Stata 11 to estimate percentages and their binomial exact 95 per cent confidence intervals. (Stata 11 was published in 2009 by StataCorp LP.)

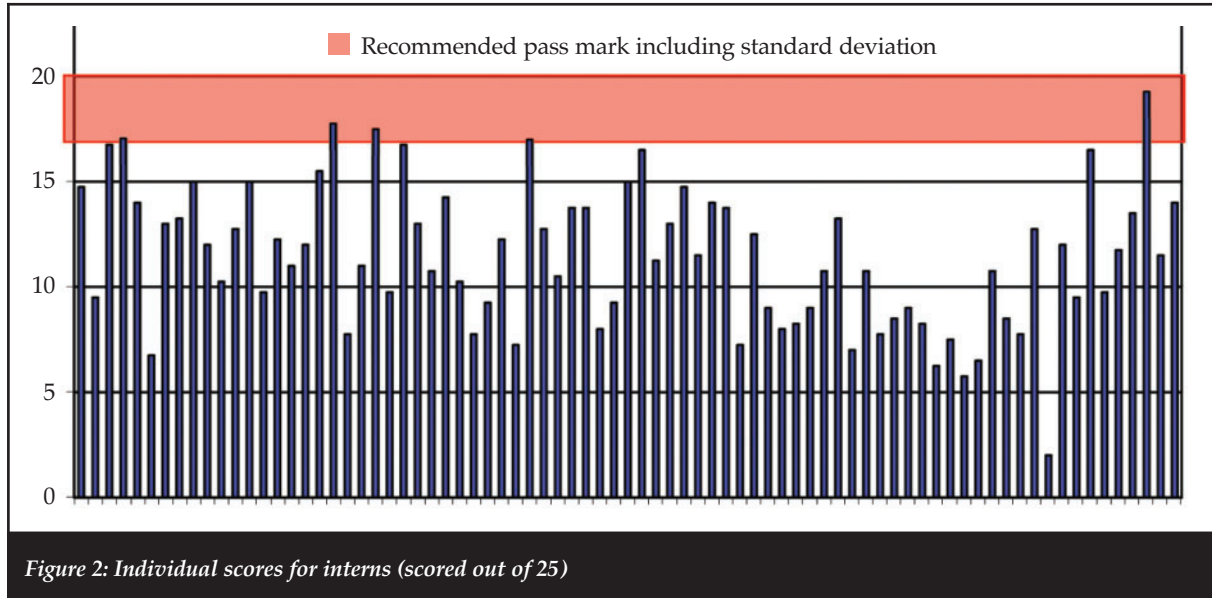
Results

Overall unweighted score

The mean score for the 17 orthopaedic registrars was 96.0%, and that for the 79 interns in their first postgraduate year was 45.3% (8.0–77.0%, 95% CI 42.3–48.4) (*Figure 2*). Only seven interns (9%) had a score of more than 73.1 ± 6.8% and thus demonstrated basic competency in the examination. The scores for the individual questions ranged from as high as 92.3% to as low as 9.0%.

Question	Answer	Intern (Group 1) score
1. What common problem must all newborns be examined for?	Congenital dislocation of the hip (CDH, dislocation, subluxation also accepted): 1 point	80.7%
2. What is a compartment syndrome?	Increased pressure in a closed fascial space: 1 point	71.8%
3. Acute septic arthritis of the knee may be differentiated from inflammatory arthritis by which laboratory test?	Any analysis of fluid from aspiration (cell count, Gram stain, culture): 1 point	21.8%
4. A patient dislocates his knee in a car accident. What structure(s) is/are at risk for injury and therefore must be evaluated?	Must mention popliteal artery: 1 point	51.3%
5. A patient punches his companion in the face and sustains a fracture of the 5th metacarpal and a 3 mm break in the skin over the fracture. What is the correct treatment, and why?	Irrigation and debridement; risk of infection: 1/2 point each	32.7%
6. A patient comes to the office complaining of low back pain that wakes him up from sleep. What two diagnoses are you concerned about?	Tumour and infection: 1/2 point each	28.2%
7. How is compartment syndrome treated?	Fasciotomy (surgery also accepted): 1 point	92.3%
8. A patient lands on his hand and is tender to palpation in the 'snuff box' (the space between the thumb extensor and abductor tendons). Initial radiographs do not show a fracture. What diagnosis must be considered?	Scaphoid fracture (carpal bone fracture also accepted): 1 point	50.0%
9. A 25-year-old man is involved in a motor vehicle accident. His left limb is in a position of flexion at the knee and the hip, with internal rotation and adduction of the hip. What is the most likely diagnosis?	Hip dislocation: 1 point	59.0%
10. What nerve is compressed in carpal tunnel syndrome?	Median nerve: 1 point	87.2%
11. A patient had a disc herniation pressing on the 5th lumbar nerve root. How is motor function of the 5th lumbar nerve root tested?	Dorsiflexion of the great toe (toe extensors also accepted): 1 point	9.0%
12. How is motor function of the median nerve tested in the hand?	Any median function (metacarpophalangeal finger flexion; thumb opposition, flexion, or abduction): 1 point	44.2%
13. A 12-year-old boy severely twists his ankle. Radiographs show only soft-tissue swelling. He is tender at the distal aspect of the fibula. What are two possible diagnoses?	Ligament sprain and Salter-Harris I fracture (sprain, fracture also accepted): 1/2 point each	41.7%
14. A patient presents with new-onset low back pain. Under what conditions are plain radiographs indicated? Please name five (example: history of trauma).	Age > 50 years; neurological deficit; bowel or bladder changes; history of cancer, pregnancy, drug use, or steroid use; systemic symptoms (night pain, fever); paediatric population: 1/4 point each, full credit for four correct responses	57.1%
15. A patient has a displaced fracture near the fibular neck. What structure is at risk for injury?	Common peroneal nerve (peroneal nerve also accepted): 1 point	35.9%
16. A 20-year-old injured his knee while playing football. You see him on the same day, and he has a knee effusion. An aspiration shows frank blood. What are the three most common diagnoses?	Ligament tear, fracture, peripheral meniscal tear (capsular tear, patellar dislocation also accepted): 1/2 point each, full credit for two correct responses	37.2%
17. What are the five most common sources of cancer metastases to bone?	Breast, prostate, lung, kidney, thyroid: 1/4 point each, full credit for four correct responses	63.3%
18. Name two differences between rheumatoid arthritis and osteoarthritis.	Any two correct statements (i.e. inflammatory vs degenerative, proximal interphalangeal joint vs distal interphalangeal joint, etc): 1/2 point each	46.8%
19. Which malignancy may be present in bone yet typically is not detected with a bone scan?	Myeloma (full credit for haematological malignancies – leukaemia, lymphoma): 1 point	38.5%
20. What is the function of the normal anterior cruciate ligament at the knee?	To prevent anterior displacement of the tibia on the femur: 1 point	24.4%
21. What is the difference between osteoporosis and osteomalacia?	Osteoporosis: decreased bone density; osteomalacia: decreased bone mineralisation (any true statement about epidemiology, pathophysiology, e.g. oestrogen vs vitamin D, also accepted): 1 point	27.8%
22. In elderly patients, displaced fractures of the femoral neck are typically treated with joint replacement, whereas fractures near the trochanter are treated with plates and screws. Why?	Blood supply to femoral head (avascular necrosis, non-union also accepted): 1 point	67.9%
23. What muscle(s) is/are involved in lateral epicondylitis (tennis elbow)?	Wrist extensors (full credit for any wrist extensor – extensor carpi radialis brevis, extensor carpi radialis longus, extensor digitorum communis): 1 point	17.9%
24. Rupture of the biceps at the elbow results in weakness of both elbow flexion and _____?	Supination: 1 point	28.2%
25. What muscle(s) control(s) external rotation of the humerus with the arm at the side?	Infraspinatus or teres minor accepted (full credit for rotator cuff): 1 point	14.1%

Figure 1. Freedman and Bernstein questionnaire



Weighted score

To examine the hypothesis that the interns may have scored well on the most important questions and poorly on the least important questions, a weighted score was calculated. The overall weighted score for all interns was 47.0% (95% CI 43.9–50.1). Seventy-one (90%) of the 79 interns failed the examination when the questions were weighted according to their attributed importance.

Individual component scores

Anatomy-based questions (Q8, 10, 11, 12, 15, 20, 22, 23, 24, 25) were answered poorly, with an average score of 37.9% (95% CI 33.6–42.3), compared to the overall average score of 45.3%. 'Red flag' questions dealing with orthopaedic emergencies (Q2, 4, 5, 6, 7) were better answered, with an average score of 55.3% (95% CI 50.7–59.8).

Cohen method

A pass mark was calculated using the Cohen method (70% of the 95th percentile).¹⁹ This was done to set a pass mark as a function of the performance of the top candidates so as to adjust for the difficulty of the examination. Fifty-six of the 79 interns (70.9%) failed the assessment according to the pass mark (53.9%) set by the Cohen method.

In the follow-up study (Group 2) a response rate of 69.7% was achieved (53/76). Unweighted scores were calculated. The mean score for the group was 56.8%. Those who had completed an orthopaedic rotation during their internship (21/53) achieved an average score of 62.4% (35–83%), compared to 54.1% (20–80%) among those who had not yet completed an orthopaedic rotation (32/53). 85.7% (18/21, 95% CI 62.6–96.2) of those who had completed an orthopaedic rotation and 93.8% (30/32, 95% CI 77.8–98.9) of those who had not completed an orthopaedic rotation failed the assessment. The additional exposure to musculoskeletal medicine during an internship rotation did not show statistical benefit (95% CI 58.0–79.5).

While our study population was too small to allow any statistically significant sub-analysis, we were able to demonstrate two trends, with the interns who scored higher in the assessment coming from programmes with more time allocated to orthopaedic training and from programmes that included on-call duties for the students.

There are several limitations to this study. Freedman and Bernstein's musculoskeletal examination is the only validated assessment tool available. We used the pass mark of $\geq 73.1\%$ established by 124 orthopaedic programme directors instead of that of $\geq 70\%$ established by 240 internal medicine programme directors. Selecting the lower pass mark may have changed some of our findings. While the pass mark was validated by 124 programme directors, it is open to criticism. However, using the Cohen method, which uses the top performing students as a point of reference to set a pass mark that reflects the difficulty of the assessment, more than 70% of the interns still failed. Our study may have been limited by sample bias, with participants coming exclusively from two large tertiary hospitals in Cape Town. Our intern group did, however, include graduates from all eight South African medical schools. In the follow-up study the 69.7% response rate may have introduced selection bias. Administering the questionnaire by e-mail introduced two possible limitations. To guarantee anonymity the participants were asked to place their answers in a box at the intern curator's office. However due to logistical factors, most chose to reply via e-mail, thus effectively compromising their anonymity. Participants were asked to answer without the use of textbooks or other resources, but this could not be guaranteed. The second-year interns who responded may have benefited from writing the same test two years earlier. However, on analysing the results, there was no significant difference in the results of this group (57.9%) compared to the overall group average of 56.8%.

The interns who scored higher in the assessment came from programmes with more time allocated to orthopaedic training and from programmes that included on-call duties for the students

Discussion

Our study shows that the majority of newly qualified South African doctors do not have a basic level of competence in musculoskeletal medicine. This is alarming, not only because of the high prevalence of musculoskeletal conditions, but also because a large number of interns, Community Service Officers and Medical Officers in South Africa work in areas without specialist support. It is a major challenge to identify and quantify the specific factors which contribute towards the poor performance of our medical graduates. Factors such as curricular content, time allocation, teaching methods and teacher skills are all likely to contribute.

The majority of South African medical schools have recently restructured their undergraduate programmes, which have been accredited by the Undergraduate Education and Training Committee of the Health Professions Council of South Africa. Our findings suggest that these programmes are not effective in providing adequate undergraduate musculoskeletal training, or are not being applied as intended. We corresponded with our fellow medical schools and collected data relating to the nature of their undergraduate orthopaedic programmes. The national average is between four and six weeks of time allocated to training, which amounts to a approximately 2% of the curriculum. The majority of medical schools combine this time with training in other specialties, effectively reducing the exposure to musculoskeletal medicine even further. Half of our medical schools also do not have on-call duties for their medical students. Orthopaedic Surgery is taught in year 5 of the MBChB programme at the University of Cape Town. It has a Higher Education Qualifications Framework (HEQF) credit value of 7 out of a total of 197 (3.6%) for year 5. This credit value is a useful surrogate marker of perceived importance and time dedicated to a particular discipline. In comparison to Orthopaedic Surgery, Anaesthesia has a HEQF credit value of 19, Public Health/Health Promotion a credit value of 34, and Psychiatry, taught in years 4 and 6, a credit value of 42. Another concerning finding was that most programmes had contact with students only in the final two years of training. This contradicts the concept of early clinical contact, a key strategy of the South African Council on Higher Education for student academic development.²⁰

Williams, from the University Hospitals of Leicester, showed a 6% improvement in performance by undergraduate students when the orthopaedic surgery component of their training was increased by just one week.²¹ Interestingly, they also showed the quality of education received in a given subspecialty may influence the choice of an undergraduate student's career.²² This association between increased time in a discipline and improved competency is apparent. However, given the vast and ever-expanding scope of modern medicine, and the curricular demands imposed by other disciplines/subspecialties on curriculum time, simply demanding an increased allotment of time is not a realistic solution to the problem. Alternative ways to increase total contact time must be explored. These include on-call duties shadowing an orthopaedic registrar, participation in primary-care outreach programmes and structured elective blocks, and more effective self-directed learning programmes.

Most orthopaedic departments have well-established primary-care outreach programmes. Including students in these programmes may be an effective method of exposing them to the common musculoskeletal conditions they will encounter after graduating. The Parallel Rural Clinical Curriculum (PRCC) at Flinders University School of Medicine in South Australia rotates medical students through rural hospitals for a year (their pre-final year).²³ The students reported numerous benefits, including exposure to a broad range of patient presentations, continuity of care, mentorship, increased responsibility in the care of patients, and better performance in the exit examination. More focused teaching of the basic sciences may also make time available for the teaching of the clinical skills so lacking in musculoskeletal medicine. Several studies have shown that undergraduate training is frequently not directly relevant to the skills required for management of musculoskeletal conditions in a general outpatient setting. Rural rotations, such as the PRCC at Flinders University, have been shown to address this bias toward tertiary medicine.

We found that among South African medical schools, approximately 60% of group teaching of musculoskeletal medicine consisted of large-group lectures. Costa from Warwick University compared the use of didactic lectures with that of interactive discussion sessions in undergraduate teaching of orthopaedics.²⁴ The students in the interactive discussion group rated the presentation of their teaching more highly and performed better on their end-of-placement written test. This is critical when it comes to teaching the musculoskeletal examination. Thompson found that large-group teaching of physical examination skills does not allow students to attempt the skills discussed or to receive feedback from the teachers.²⁵

Interestingly these findings are far from new. Abraham Flexner, regarded as the first medical educationalist, advised over a century ago that medical training should be 'marked by small classes, personal attention and hands-on teaching'. He believed lectures allowed medical schools to 'handle cheaply by wholesale a large body of students that would otherwise be unmanageable and thus give the lecturer time for research'.²⁶ Flexner's latter comment brings up another important point. Specialists working in the state have numerous commitments outside of their clinical work, including research, fellowship programmes, postgraduate education and private practice commitments. These trends may well mean registrars are becoming increasingly more responsible for undergraduate training. They in turn are often new to student supervision and lack the appropriate training. Archer from Stellenbosch University found a short course in undergraduate clinical supervision improved interaction with students and provided supervisors with previously unused teaching strategies.²⁷ The participants 'emphasised that the faculty has an obligation to provide opportunities for clinical supervisors to improve their skills to supervise students and to better understand adult learning'.

The Bone and Joint Decade Undergraduate Curriculum Development Group published recommendations for a musculoskeletal undergraduate curriculum in 2004.²⁸ The recommendations set global standards for the minimum level of competence in managing patients with musculoskeletal problems, regardless of further specialisation.

The focus of their recommendations was on the skills required to diagnose a person with a musculoskeletal problem. As it is a basic skill, they recommend that the musculoskeletal examination be taught early in the curriculum along with the other organ systems. Their second recommendation was the competency to assess urgent problems of the musculoskeletal system. Emergencies may not be common, but it is essential to recognise them and to manage them appropriately. In our study, while the 'red flag' group of questions was answered better than the average (average score of 55.3% compared to the overall average score of 45.3%) this was not reassuring, as only half the candidates knew to look for a vascular injury in a patient with a dislocated knee, and only 13% knew the basic management of an open fracture. In addition, only 6% of the study group considered both tumour and infection in someone with lower back pain that woke them from sleep (Figure 1).

Competency in musculoskeletal medicine must therefore be a requirement before graduating, regardless of further specialisation

Bilderback *et al.* from Louisiana State University designed a six-week course in musculoskeletal medicine and used Freedman and Bernstein's examination to assess its efficacy.²⁹ A look at the principles of their curriculum illustrates possible solutions to deficiencies in our musculoskeletal education. Most significantly they believed that medical education would be improved if clinical instruction began during the pre-clinical years. The main features of their course were the use of small groups of no more than five students to focus on the physical examination, and basic-science teaching which was directly related to clinical practice. Faculty from the departments of orthopaedic surgery, anatomy and rheumatology designed the course. The aim was to provide an adequate foundation of primary-care knowledge of the musculoskeletal system. The clinical lectures were directly preceded by relevant anatomy lectures and dissections to provide a context for the clinical information. Self-learning was facilitated by placing lecture material on a course website, which the students were encouraged to study before class. Attendance at lectures was not mandatory, but students who missed no more than two lectures were given a bonus in the final examination. The course directors identified the material that they judged essential and then recruited basic-science experts in those areas to teach it. This contrasts with the old style where the basic scientist decides the content of the pre-clinical curriculum. In a short period, they showed a 20% improvement in the Freedman and Bernstein examination.

At the University of Cape Town, the orthopaedics department has started using the methods described at Louisiana State University to restructure their undergraduate training programme. Orthopaedics is currently taught in fifth year over a four-week block which is shared with both Anaesthetics and Trauma. Teaching the entire curriculum within these time constraints is challenging, and to increase exposure to important musculoskeletal emergencies, students are now rostered into on-call duties and weekend rounds with the attending registrar.

They have also started rotating through the paediatric orthopaedic department to gain exposure to this important aspect of musculoskeletal medicine, and are required to complete a detailed logbook of cases and procedures which they have witnessed or performed to ensure they are gaining appropriate exposure. Students who are interested have also been integrated into research projects currently being run within the department. Because of the limited teaching time available, self-directed learning has been prioritised by upgrading online resources. A series of standardised examination technique videos have been created and are loaded, together with other core topics, onto tablets which the students keep for the duration of the block. Students also meet once a week to provide feedback to the Head of Department, and teachers are now more accountable, as all consultants and registrars are scored by the students at the end of each four-week block. The Department of Orthopaedics is working together with the Department of Anatomy to establish a programme where musculoskeletal anatomy is taught together with the examination of the musculoskeletal system so that a clinical context is provided for their dissection. This strategy will also serve the purpose of establishing earlier clinical contact so that the examination of the musculoskeletal system can be learnt early, revised, and consolidated over years rather than it being an afterthought, taught near the end of the clinical programme. It has been negotiated that from 2014, the allocated four-week block will be shared only with Trauma, and no longer Anaesthetics.

Conclusion

Undergraduate training in musculoskeletal medicine is inadequate in South Africa, and internship programmes do not compensate for this lack. The delivery of musculoskeletal care is not the exclusive domain of the orthopaedic surgeon and is provided largely by other practitioners. Competency in musculoskeletal medicine must therefore be a requirement before graduating, regardless of further specialisation. Ultimately we as the orthopaedic teaching community are responsible for ensuring that we train competent and skilled doctors who will go out into our community and practice good, safe medicine.

Acknowledgement

Statistical analysis by Mr H Carrara, Analytical Epidemiologist/Biostatistician, School of Public Health and Family Medicine, UCT.

No benefits of any form have been or are to be received from a commercial party related directly or indirectly to the subject of the article.

References

1. Kahl LE. Musculoskeletal problems in the family practice setting: guidelines for curriculum design. *Journal of Rheumatology* 1987;14:811-14.
2. National Board of Health and Welfare. Year Book of Health and Medical Care. 2001. Stockholm: Socialstyrelsen.
3. Reginster JY. 'The prevalence and burden of arthritis' in *Rheumatology (Oxford)* 2002;41:Suppl.1:3-6.

4. Govender S. Musculoskeletal trauma - are we winning? *South African Orthopaedic Journal*, 2011;3:8.
5. World Health Organization. World Health Report 2002: Statistical annex 3: Burden of disease in DALYs by cause, sex and mortality stratum in WHO regions, estimates for 2001.
6. Kobusingye O, Guwatudde D, Lett R. Injury patterns in rural and urban Uganda. *Inj Prev*. 2001;7:46-50.
7. Beveridge M, Howard A. The burden of orthopaedic disease in developing countries. *Journal of Bone and Joint Surgery* 2004;A6:1819-22.
8. SA MRC. Initial burden of disease estimates for South Africa, 2000.
9. Karpman RR. Musculoskeletal disease in the United States: who provides the care? *Clin Orthop Relat Res*. April 2001;385:52-56.
10. Health Professions Council of South Africa, <http://www.statssa.gov.za>.
11. Krug E. Injury: a leading cause of the global burden of disease. Geneva: World Health Organization. 1999. Document WHO/HSC/PVI/99.11.
12. Daar AS, Rizvi SA, Naqvi SA. Surgery with limited resources in Morris, P.J. & Wood, W.C. 2000. *Oxford textbook of surgery* (2nd ed.) New York: Oxford University Press, p. 3386.
13. Nunn TR, Cheung WY, Rollinson PD. A prospective study of pyogenic sepsis of the hip in childhood. *J Bone Joint Surg Br*. 2007;89-B(1):100-106.
14. Williams JR. The teaching of trauma and orthopaedic surgery to the undergraduate in the United Kingdom. *Journal of Bone and Joint Surgery [Br]* 2000;82:627-28.
15. Glazier RH, Dalby DM, Badley EM, Hawker GA, Bell MJ, Buchbinder R, et al. Management of common musculoskeletal problems: a survey of Ontario primary care physicians. *Canadian Medical Association Journal* 1998;158:1037-40.
16. Ahern MJ, Soden M, Schultz D, Clark M. The musculoskeletal examination: a neglected clinical skill. *Australian and New Zealand Journal of Medicine* 1991;21:303-306.
17. Jandial S, Rapley T, Foster H. Current teaching of paediatric musculoskeletal medicine within UK medical schools – a need for change. *Rheumatology* 2009;48:587-90.
18. Freedman KB, Bernstein J. The adequacy of medical school education in musculoskeletal medicine. *J Bone Joint Surg Am*. 1998;80:1421-27.
19. Cohen-Schotanus J. A standard setting method with the best performing students as point of reference: practical and affordable. *Med Teach* 2010;32(2):154-60.
20. Council on Higher Education. Improving Teaching and Learning Resources. Pretoria: Council on Higher Education, 2004.
21. Williams SC. A new musculoskeletal curriculum: Has it made a difference? *Journal of Bone and Joint Surgery [Br]* 2010;92-B:7-11.
22. Kolasinski SL, Bass AR, Kane-Wanger GF, et al. Subspecialty choice: Why did you become a rheumatologist? *Arthritis Rheum* 2007;57:1546-51.
23. Couper ID. Evaluation of the parallel rural community curriculum at Flinders University of South Australia, in the context of the GEMP Year 3. Johannesburg: University of the Witwatersrand, 2006.
24. Costa ML. Does teaching style matter? A randomised trial of group discussion versus lectures in orthopaedic undergraduate teaching. *Medical Education* 2007;41(2):214-17.
25. Thompson AE. Improving undergraduate musculoskeletal education: a continuing challenge. *J Rheumatol* 2008;35:2298-99.
26. Wear D. Iconoclast: Abraham Flexner and a Life in Learning' in *New England Journal of Medicine* 2002;347:2008-2009.
27. Archer E. Improving undergraduate clinical supervision in a South African context. *African Journal of Health Professions Education* December 2011;3(2).
28. Woolf AD, Walsh NE, Akesson K. Global core recommendations for a musculoskeletal undergraduate curriculum. *Ann Rheum Dis* 2004;63:517-24.
29. Bilderback K. Design and implementation of a system-based course in musculoskeletal medicine for medical students. *J Bone Joint Surg Am*. 2008;90:2292-2300.

This article is also available online on the SAOA website (www.saoa.org.za) and the SciELO website (www.scielo.org.za). Follow the directions on the Contents page of this journal to access it.