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Improved education in musculoskeletal conditions is necessary for all doctors

Kristina Åkesson,¹ Karsten E. Dreinhöfer,² & A.D. Woolf³

Abstract It is likely that everyone will, at some time, suffer from a problem related to the musculoskeletal system, ranging from a very common problem such as osteoarthritis or back pain to severely disabling limb trauma or rheumatoid arthritis. Many musculoskeletal problems are chronic conditions. The most common symptoms are pain and disability, with an impact not only on individuals' quality of life but also, importantly, on people's ability to earn a living and be independent. It has been estimated that one in four consultations in primary care is caused by problems of the musculoskeletal system and that these conditions may account for up to 60% of all disability pensions. In contrast, teaching at undergraduate and graduate levels — and the resulting competence and confidence of many doctors — do not reflect the impact of these conditions on individuals and society. Many medical students do not have any clinical training in assessing patients with bone and joint problems. Under the umbrella of the Bone and Joint Decade 2000–2010, experts from all parts of the world with an interest in teaching have developed recommendations for an undergraduate curriculum to improve the teaching of musculoskeletal conditions in medical schools. The goal for each medical school should be a course in musculoskeletal medicine concentrating on clinical assessment, common outpatient musculoskeletal problems and recognition of emergencies. Improving competency in the management of musculoskeletal problems within primary care settings through improved education is the next aim, but there are needs for improvement for all professionals and at all levels within the health care system.

Keywords Musculoskeletal diseases; Education, Medical, Undergraduate/standards; Education, Medical, Graduate/standards; Education, Medical, Continuing; Curriculum/standards; Clinical competence/standards (*source: MeSH/NLM*)

Mots clés Appareil locomoteur, Maladies; Enseignement médical premier cycle/normes; Enseignement préparatoire diplôme médical (USA)/normes; Enseignement médical post-universitaire; Programme études/normes; Compétence clinique/normes (*source: MeSH, INSERM*)

Palabras clave Enfermedades musculoesqueléticas; Educación de pregrado en medicina/normas; Educación de postgrado en medicina/normas; Educación médica continua; Curriculum/normas; Competencia clínica/normas (*fuentes: DeCS, BIREME*).

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Voir page 681 le résumé en français. En la página 681 figura un resumen en español.

Introduction

Musculoskeletal conditions are common and consume enormous social and health care resources. The direct costs are only a quarter of the indirect costs, which comprise sick leave, sick pensions, early retirement and the inability to support oneself. The consequences of this inability may be even more serious in developing countries. Worldwide, up to 15 million injured persons survive road traffic accidents, most of whom will suffer sequelae of musculoskeletal trauma.

Patients with complaints about bones and joints are often ignored and their problems underestimated by doctors. This is partly a reflection of inadequate education at undergraduate level and partly the result of the common notion that we all have to live with aches and pains and there is nothing that can be done about them. Today, however, new treatment options are available that can improve the patient's functioning and diminish the pain.

Surveys show that undergraduate medical students spend very few hours on the musculoskeletal system, both in basic science and in clinical training (1, 2). It would be considered negligent for a medical graduate to be incompetent

at adequately assessing the heart or lungs, yet it is quite common for students to leave medical school without being able to make a general assessment of the musculoskeletal system. Furthermore, training in orthopaedics and rheumatology are rarely mandatory in systems with rotating internships or in family practice training programmes, despite the large number of patients treated by doctors in these programmes (3).

A number of different medical specialties are involved in treating patients with musculoskeletal complaints, usually working in teams with other health professionals, such as physiotherapists, but often without a multispecialty focus. In order to truly improve the outcome of treatment for musculoskeletal conditions it is important that experts in the various specialties work more closely together and look for commonality of approach, as they often treat the same patients but from different angles.

For the future, it is essential that education at all levels pays proper attention to training in musculoskeletal conditions, in view of their prevalence in society and the need for doctors to be able to manage them appropriately. This paper discusses the present situation regarding musculoskeletal training at the undergraduate and postgraduate levels. As a

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possible solution, recommendations for core content of a musculoskeletal course have been developed through the Bone and Joint Task Force on Education. Teaching methods and assessment are discussed as methods to ensure a minimum level of competence. In addition, specialty training and continued medical education are considered.

Undergraduate education: current situation

Medical teaching in musculoskeletal disorders in all parts of the world is currently brief and not directly relevant to the knowledge and skills commonly required for management of these conditions in an outpatient setting. The preclinical curriculum devotes only 3% of its time to the teaching of musculoskeletal injuries and diseases. The subsequent clinical undergraduate years frequently contain little training in this area, and the elective programmes available to medical students and interns usually emphasize surgically managed musculoskeletal problems, which results in a bias towards more severe cases that are not relevant to the future practice of most doctors (4).

In Canada in the 1980s, medical schools offered an average of 35 hours for teaching musculoskeletal disorders out of 1500 hours of preclinical teaching — 2.33% of the total curriculum (5) — and the subject was obligatory in only 12% of medical schools. In 2001, mandatory musculoskeletal education in Canada represented 2.26% of the average medical school curriculum (1) and a typical medical school offers 77 hours of preclinical and 33 hours of clinical musculoskeletal education. Only five of the sixteen medical schools require exposure to musculoskeletal rotations (orthopaedics, rheumatology and/or rehabilitation medicine).

In 1987, according to the European League Against Rheumatism (EULAR) survey in 19 countries, average rheumatology teaching consisted of 16 hours (4–40 hours) of lectures and 2 weeks (0–12 weeks) attending rheumatology clinics (6). In the United Kingdom, the majority of medical schools include rheumatology clinical skills training in the curriculum for all their students, but in over 20% of the medical schools up to half the students received no clinical rheumatology teaching at all (7). Only 2% of the available teaching time during the clinical years (2.7 weeks in three years) is devoted to trauma and orthopaedic surgery (2). If accident and emergency medicine and rheumatology are included, musculoskeletal teaching represents less than 4% of the curriculum, with a decrease over the last decade from 6% (7, 8).

Undergraduate education in rheumatology in Argentina, Bolivia, Brazil, Chile and Uruguay are considered insufficient: graduates are expected to become general practitioners (GPs) without having the necessary knowledge for adequate management of patients with the most common rheumatic disorders (9). Inadequacies in undergraduate education have similarly been noted in South African medical schools (10) and in several Asian Pacific countries (11), related in part to lack of an appropriate faculty. Similar data on training in orthopaedics and rehabilitation medicine are not available. As a result, general and primary care physicians have a poor foundation of knowledge and insufficient competency in these areas.

The experience and teaching given is not always appropriate to future needs. In elective 4–6-week orthopaedic training programmes in United States medical schools, 88% of the time involved hospital-based teaching of musculoskeletal problems requiring surgery, leaving very little time for the outpatient clinic (12). There is also a lack of appreciation of the importance of psychological factors in chronic musculoskeletal disease (13) and in the attitudes of medical students to disabled people (14).

In a recent survey by the Bone and Joint Decade of undergraduate teaching in different specialties in 32 countries (K. Dreinhöfer, personal communication, 2003), median teaching time was: orthopaedics, 30 hours of lectures and courses; trauma surgery, 21 hours; rheumatology, 26 hours; and physical medicine rehabilitation (PMR), 20 hours. Considering that the average length of undergraduate medical education is six years and that in many countries these courses are not obligatory, these comparisons demonstrate a significant disparity between the actual clinical caseload of musculoskeletal disorders and the quality and extent of medical education in musculoskeletal medicine.

Postgraduate training: current situation

Musculoskeletal complaints are the second most common reason for consultation, exceeded only by disorders of the respiratory system. In many countries this group of conditions constitutes 14–28% of primary care practice (3) and visits to emergency services (15). A study in Australia revealed that only 10% of 166 medical inpatients underwent a musculoskeletal examination, despite the fact that 40% had a documented history of musculoskeletal symptoms at admission (16). In another survey, 80% of nearly 400 Australian interns failed in assessing disability and handicap (17).

Many GPs and family doctors do not have adequate training and consequently lack the competency, skills and confidence to manage musculoskeletal disorders in their daily practice: they may not recognize conditions or be aware of what can be achieved by appropriate care.

In elective programmes only 3.5% of rotating postgraduate interns selected orthopaedic surgery, and less than 1% had training in rheumatology, sports medicine and physical medicine combined (4). Only 10% of the vocational training schemes for GPs in the United Kingdom include orthopaedics (8). A survey of general practice trainees (18) demonstrated that 35% had not received any tutorials on rheumatological topics; 65% of trainees had tutorials for about two hours instead of the recommended 280 hours per year of total teaching in their GP training (19). In the USA, family practice graduates reported a lower level of confidence in their physical examination, radiographic evaluation, diagnosis and treatment of musculoskeletal patients compared with their confidence levels in dealing with other patients, despite training rotation on an orthopaedic service during their residency (20, 21). Those with training periods of eight weeks or longer, however, reported higher confidence in all areas (20).

The majority of GP trainees in the United Kingdom felt confident in performing regional musculoskeletal examinations and managing specific conditions, but not in injection techniques. Overall, they perceived the amount of

rheumatology education during their vocational training as inadequate (18). Primary care physicians in Canada have also been shown to be significantly more confident with a cardiovascular examination than with a musculoskeletal examination (22) and, in particular, lack confidence in joint injections and aspirations and more rarely encountered problems. The highest level of confidence was observed for using non-steroidal anti-inflammatory drugs (NSAIDs) and managing common musculoskeletal disorders, but the unnecessary use of diagnostic tests, inappropriate prescription of NSAIDs, low use of patient-centred options and lack of diagnostic suspicion of uncommon but dangerous conditions were cause for concern (22).

Examination is known to drive learning. In examinations, students and trainee GPs are seldom assessed for their competency to take an appropriate history and to examine the musculoskeletal system. A change has been reported in the United Kingdom, however, with clinical skills being tested in 64% of medical schools in 1997 compared with 22% in 1990 (7). Lack of assessment means that graduate physicians may enter clinical practice with deficient knowledge and skills needed to assess and treat these conditions.

What needs to be done

The main task is to set agreed standards for undergraduate and postgraduate medical education. Establishing standards with clearly defined outcomes is the most powerful way of influencing the competence of future doctors in assessing patients with musculoskeletal conditions. One of the key actions for the Bone and Joint Decade is to increase awareness of musculoskeletal conditions, including awareness among physicians. As education is the most important method of providing sustainable and long-term effects in the health care community, a task force focusing on educational issues has been set up through a global network, with the aim of ensuring global standards adaptable to local needs.

Undergraduate curriculum

In developing an undergraduate curriculum, a structured plan of content from the preclinical teaching of basic science to the clinical competencies defined as the ultimate outcome of the programme must be identified and agreed upon by the faculty concerned. A clear strategy for each component and consecutive building of knowledge and skills will ensure that students have the ability to recognize and evaluate patients with musculoskeletal complaints at the end of their medical school training. The enormous expansion of knowledge in medicine and the additional roles of doctors as leaders, administrators and team-workers are also relevant to musculoskeletal conditions and affect demands on training. It is essential to agree on an outcome defined by core knowledge and core skills, in order to avoid overload of the curriculum.

As general goals, upon graduating from medical school every new doctor should be able to assess (by appropriate history-taking and examination) a patient with locomotor symptoms by: differentiating normal from abnormal in terms of structure and function; determining relevant investigations and interpreting the results; formulating a limited differential diagnosis; recognizing the impact of the problem on the individual; and making an appropriate management plan for medical, surgical and rehabilitation services (23).

Preclinical education. The preclinical teaching of basic science should include cell biology, anatomy and pathophysiology of bones, joints and muscles and form the foundation for the clinical training phase. The locomotor system can here serve as a useful model including a range of aspects from cell regulation and tissue repair to biomechanics.

Clinical education. The focus of a clinical undergraduate course in musculoskeletal medicine should be on clinical skills and knowledge of common conditions. In addition, since many patients suffer from long-term chronic pain, it is imperative to understand this and to have an attitude that is appropriate to treating patients with such conditions.

We have developed core recommendations for a curriculum with emphasis on basic skills and basic knowledge that should be mandatory for all doctors regardless of their future specialty (23). For example, it is important for a gynaecologist to know whether a patient with a hip replacement can sit in the examination chair; for a gastroenterologist to be able to balance the needs of a person with rheumatoid arthritis for anti-inflammatory analgesics against their risk of gastrototoxicity; and for a cardiologist to know about joint replacement procedures so as to estimate the cardiac demands during surgery.

The key message is thus that all doctors need a minimum competence in evaluating patients with musculoskeletal conditions, combined with basic knowledge. The exact content of any curriculum needs to be defined in the context of local needs, the relative prevalence and incidence of various conditions, and local resources. In general, most common conditions are the same around the world, including: fractures caused by high-energy trauma or related to bone fragility; low back pain; joint conditions such as osteoarthritis, rheumatoid arthritis and gout; and infections. The minimum competence is to be reached by all students at the end of their undergraduate education. Competence includes development of an appropriate attitude in managing patients with chronic conditions, which most often involves chronic pain. Additional levels of competence are added depending on future postgraduate specialty training.

The recommendations are applicable worldwide and have been developed with the involvement of medical educators from all over the world, including Egypt, Germany, India, Malaysia, South Africa, Sweden, and the USA. They should be promoted within the WHO educational network.

Teaching methods. The majority of medical schools have curricula with varying degrees of vertical or horizontal integration between preclinical and clinical training. Traditional teaching methods (such as lectures and apprenticeship) are widely complemented with problem-based learning from the first year of study. Teaching methods should, however, be regarded as tools, the precise method within each module to be determined by the specific objectives for each training session, whether it is an element of knowledge, examination of a joint or reduction of a fracture. Clinical skills are best learnt in the real-life situations of outpatient clinics, emergency services or primary care, but clinical teaching alone does not give sufficient competence without formal instruction as well (24).

A number of methods are suitable for teaching musculoskeletal conditions. Problem-based learning is useful in the

preclinical phase, preferably complemented by case studies of the more complex problems in the clinical phase, with inclusion of social aspects of management.

Competence in clinical examination gives confidence, and a simple screening examination has been developed with the “GALS” (gait–arms–legs–spine) screen (25). Students who had formal instruction in the GALS screen were as proficient in examining the locomotor system as they were regarding other organ systems (26).

Assessment. The examination should promote strategic and deep learning over memory recall (27). Examination of the student with regard to the musculoskeletal system must use reliable and validated tests and should be consistent with the objectives and priorities set for the course. In order to determine if competence has been achieved in all three areas (practical skills, theoretical knowledge and attitude), more than one test has to be used. The matched essay questions (MEQ) method of assessing reasoning as well as factual knowledge is particularly useful for musculoskeletal conditions. This form of examination has the advantage of testing knowledge at different levels, but also allowing for the use of modified authentic clinical problems in the test situation. In addition, it is relatively easy to administer and grade.

To test practical skills, an objective structure clinical examination (OSCE) is recommended. This examination can also, to a certain extent, test attitude, which is the most difficult area to evaluate (28). To further promote active participation by the students, the use of the portfolio model has several advantages to both students and teachers. During their rotation, the students are required to record tasks that have been performed and skills that have been demonstrated. Since there are many practical core items in musculoskeletal teaching, the students can be asked to record continuously their own activities in examination, but also to obtain signature after, for example, participation at total hip replacement surgery.

Time. As mentioned above, increase in medical knowledge gives rise to the demand for inclusion of new subjects in the curriculum. However, curriculum time in medical schools is not expandable, so it is necessary to consider redistributing the available curricular hours and increasing the efficiency of their use. Nevertheless, a certain amount of time is needed to master practical skills and to meet a sufficient number of patients in order to gain experience. It is also necessary to allow time to digest, to reflect on and to incorporate the new knowledge and experience for long-term retention. Our recommendations are for a course of at least six weeks at the undergraduate level in order to require a minimum level of competence. This should be compared with the 3–6 months allotted to, for example, specific training in internal medicine.

Postgraduate programme

In many countries, graduation from medical school is followed by an internship, often rotating, in order to be exposed to the major prevailing conditions. Rotation may often include internal medicine and general surgery but not specialties dealing with musculoskeletal conditions. Considering the frequency of consultation for these conditions, those in an advisory capacity should strongly promote

rotations in orthopaedics or rheumatology during this important phase of professional development.

Family practice. Most patients with musculoskeletal complaints will be assessed and treated within primary care settings. Many — even most — primary care or family practice programmes do not include rotations in rheumatology, orthopaedics or rehabilitation, which is a gross underprovision for the health needs of the population. To make a difference several approaches may be used: increase training at the undergraduate level leading to a higher standard at the time of graduating; influence present and future training programmes to include training at units within these specialties; and proactively participate in continuing medical education programmes in family practice. The latter approach has been successfully tested in Canada, where orthopaedic and rheumatology specialists participated in an injection-skills acquisition programme (29). Development of collaborative programmes is required, with shared care and assigned contact persons between family practice and specialist units.

Specialist training. The focus of this article is on those not specifically training in musculoskeletal-related specialties. There is increasing sub-specialization, however, and greater possibilities of what can be achieved through drug therapies and advances in surgical technology. At the same time there is a call for a more holistic approach to the patients and their problems, favouring a multiprofessional approach. There is therefore a clear need for more interaction and overlap: specialists in orthopaedics, rheumatology and rehabilitation should have cross-specialty rotations in order to foster a greater understanding of the respective conditions and treatment possibilities. A person with back pain may present to a rheumatologist, orthopaedic surgeon or rehabilitationist, so there should be a common understanding and approach to management of the condition even if the specific interventions used by the specialists differ. Similarly, different specialists may share the management of a patient with rheumatoid arthritis or osteoarthritis. There is no reason for differences in the basic understanding of the conditions, the problems they cause, pathogenesis and the principles of management, but there is a need for a better understanding of what each specialty can offer. Increased interaction during training is likely not only to improve the combined care of the patient but to also lead to a more integrated approach to research in order to improve future knowledge and treatment. Standards for specialist training are established in Europe (30) and other parts of the world, and these standards need to incorporate such recommendations. In addition, education programmes are in action to promote exchange of professionals with transfer of knowledge to developing countries (31). In a global perspective it is even more important to emphasize that all training must be adapted to local pathology and the delivery of care adjusted to conform to ethnic and cultural beliefs as well as resources.

Continuing medical education and continuing professional development

Learning is lifelong, and specialist training should extend throughout a physician's professional career. Advances in

medicine are rapid; all cannot be learnt during initial training, and there is natural public and political concern that the highest standards of care are consistently delivered. Maintenance of professional competence is essential through continuing medical education (CME) with a focus on a physician's personal and professional development and individual needs, that is, continuing professional development (CPD).

It should be the personal obligation of all specialists to update themselves regularly and monitor their performance to ensure the continuing delivery of appropriate care. This is compulsory in many countries, with a minimum requirement: usually defined in terms of time spent pursuing educational activities such as meetings or courses, and using some system of credits. Audit is a way of monitoring processes and outcomes to identify and subsequently investigate differences in care that require education to overcome. Recertification is becoming a requirement in an increasing number of countries. Standards for CME/CPD are being established for the various musculoskeletal professional disciplines (30). It is important that such CME activity is also multidisciplinary, with combined case discussions and educational meetings.

Conclusions

The importance of musculoskeletal conditions is underrecognized in undergraduate curricula of medical schools and general postgraduate training programmes in most countries, considering the impact they have on health care and society. The reasons for this lack of recognition are not uniform but relate to an ignorance of the magnitude of the impact of the conditions, the health and disease panorama of individual countries or regions throughout the world, and, most importantly, to the conventional wisdom of both doctors and the public that there is a lack of treatment possibilities. Increased awareness of this imbalance between needs and educational priorities is a first step towards change and improving the situation and a common ground for the action of WHO and the Bone and Joint Decade. Agreeing upon recommendations for a curriculum in musculoskeletal conditions represents a major step forward. ■

Conflicts of interest: none declared.

Résumé

Une amélioration de la formation de tous les médecins aux affections du système ostéo-articulaire est indispensable

Personne n'est entièrement à l'abri d'une affection du système ostéo-articulaire, qu'il s'agisse de problèmes courants comme l'arthrose et la lombalgie, ou d'atteintes gravement incapacitantes telles que les traumatismes des membres ou la polyarthrite rhumatoïde. De nombreux problèmes ostéo-articulaires sont chroniques. Les symptômes les plus répandus sont la douleur et l'incapacité qui, tout en nuisant à la qualité de la vie des personnes touchées, les empêchent en outre de subvenir à leurs besoins et de mener une existence indépendante. On estime que les atteintes du système ostéo-articulaire sont la cause d'une consultation sur quatre dans les services de soins primaires et qu'elles représentent jusqu'à 60 % de toutes les pensions d'invalidité. Or il n'y a pas de commune mesure entre l'incidence de ces affections sur les personnes et la société et l'enseignement qui est dispensé aux étudiants en médecine et aux médecins, où ils devraient puiser les

compétences et la confiance nécessaires. De nombreux étudiants en médecine ne sont pas formés à l'évaluation clinique des malades présentant une affection osseuse ou articulaire. Dans le cadre de la Décennie de l'os et de l'articulation, des experts du monde entier, sensibles aux problèmes d'enseignement, ont préconisé un programme d'études propre à améliorer la formation des futurs médecins aux affections ostéo-articulaires. L'objectif est que toutes les écoles de médecine assurent un cours de médecine ostéo-articulaire axé sur l'évaluation clinique, les problèmes ostéo-articulaires fréquemment vus en externe et la reconnaissance des urgences. L'objectif ultérieur est l'amélioration, par la formation, des compétences en matière de prise en charge des problèmes ostéo-articulaires dans les services de soins primaires, mais des améliorations sont nécessaires pour tous les professionnels et à tous les niveaux du système de soins de santé.

Resumen

La mejora de la formación de los médicos en materia de trastornos musculoesqueléticos, una medida indispensable

Casi todo el mundo padece a lo largo de su vida algún problema relacionado con el sistema musculoesquelético, desde una dolencia muy corriente como la osteoartritis o la lumbalgia hasta casos gravemente discapacitantes de traumatismos de las extremidades o de artritis reumatoide. Muchos de los problemas musculoesqueléticos son afecciones crónicas. El dolor y la discapacidad son los síntomas más comunes, que repercuten no sólo en la calidad de vida individual, sino también, lo que es muy importante, en la capacidad de las personas para ganarse la vida y ser autónomas. Se ha estimado que una de cada cuatro

consultas de atención primaria se debe a problemas del aparato locomotor, y que estos trastornos pueden representar hasta el 60% de todas las pensiones de discapacidad. Sin embargo, la enseñanza que se imparte a los estudiantes y graduados -y en consecuencia la competencia y la seguridad de muchos médicos- no está a la altura del impacto de esos trastornos en los individuos y la sociedad. Muchos estudiantes de medicina carecen de formación clínica para evaluar a los pacientes con problemas osteoarticulares. Bajo los auspicios del Decenio de los Huesos y las Articulaciones 2000-2010, expertos de todo el

mundo interesados en la enseñanza han formulado recomendaciones para un programa de estudios de pregrado a fin de mejorar la formación en materia de trastornos del aparato locomotor en las escuelas de medicina. En todas estas escuelas debería impartirse un curso de medicina del aparato locomotor centrado en la evaluación clínica, los problemas musculoesqueléticos de tipo ambulatorio más corrientes y la identi-

cación de las urgencias. El próximo objetivo es mejorar la competencia en el manejo de los trastornos del aparato locomotor en los entornos de atención primaria mediante una mejor enseñanza, pero las necesidades de mejora abarcan a todos los profesionales y todos los niveles del sistema de atención de salud.

References

1. Pinney SJ, Regan WD. Educating medical students about musculoskeletal problems. Are community needs reflected in the curricula of Canadian medical schools? *Journal of Bone and Joint Surgery. American volume* 2001;83:1317-20.
2. Williams JR. The teaching of trauma and orthopaedic surgery to the undergraduate in the United Kingdom. *Journal of Bone and Joint Surgery. British volume* 2000;82:627-8.
3. Rasker JJ. Rheumatology in general practice. *British Journal of Rheumatology* 1995;34:494-7.
4. Craton N, Matheson GO. Training and clinical competency in musculoskeletal medicine. Identifying the problem. *Sports Medicine* 1993;15:328-37.
5. Association of American Medical Colleges 1987–1988 curriculum directory. Washington (DC): Association of American Medical Colleges; 1987.
6. Bjelle A. Rheumatology curriculum for medical students. *British Journal of Rheumatology* 1991;30:123-4.
7. Kay LJ, Deighton CM, Walker DJ, Hay EM. Undergraduate rheumatology teaching in the UK: a survey of current practice and changes since 1990. Arthritis Research Campaign Undergraduate Working Party of the ARC Education Sub-committee. *Rheumatology* 2000;39:800-3.
8. Booth A, Wise DI. General practice training in musculoskeletal disorders. *British Journal of General Practice* 1990;40:390.
9. Onetti CM. Undergraduate education in rheumatology in Latin America. *Journal of Rheumatology* 1999;26 Suppl 55:22-3.
10. Kalla AA. Undergraduate rheumatology teaching in Africa. *Journal of Rheumatology* 1999;26 Suppl 55:26-8.
11. Lien IN. Undergraduate education in rheumatology in Asian Pacific countries (APLAR). *Journal of Rheumatology* 1999;26 Suppl 55:19.
12. Di Paola M, Bennet GC, Shearer JR. Orthopaedic teaching in United Kingdom medical schools. *Medical Teacher* 1986;8:155-8.
13. Dequeker J, Rasker JJ, Woolf AD. Educational issues in rheumatology. *Baillière's Best Practice and Research. Clinical Rheumatology* 2000;14:715-29.
14. Rasker JJ. Attitude education in rheumatology. *Journal of Rheumatology* 1999;26 Suppl 55:41-2.
15. De Lorenzo RA, Mayer D, Geehr EC. Analysing clinical case distributions to improve an emergency medicine clerkship. *Annals of Emergency Medicine* 1990;19:746-51.
16. Ahern MJ, Soden M, Schultz D, Clark M. The musculo-skeletal examination: a neglected clinical skill. *Australian and New Zealand Journal of Medicine* 1991;21:303-6.
17. Crotty M, Ahern MJ, McFarlane AC, Brooks PM. Clinical rheumatology training of Australian medical students. A national survey of 1991 graduates. *Medical Journal of Australia* 1993;158:119-20.
18. Lanyon P, Pope D, Croft P. Rheumatology education and management skills in general practice: a national study of trainees. *Annals of the Rheumatic Diseases* 1995;54:735-9.
19. Crawley HS, Levin JB. Training for general practice: a national survey. *BMJ* 1990;300:911-5.
20. Matheny JM, Brinker MR, Elliott MN, Blake R, Rowane MP. Confidence of graduating family practice residents in their management of musculoskeletal conditions. *American Journal of Orthopedics* 2000;29:945-52.
21. Saywell RM Jr, O'Hara BS, Zollinger TW, Wooldridge JS, Burba JL, McKeag DB. Medical students' experience with musculoskeletal diagnoses in a family medicine clerkship. *Medical Teacher* 2002;24:186-92.
22. 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.
23. Woolf AD, Akesson K, Walsh N. Core recommendations for a musculoskeletal curriculum. Submitted for publication.
24. Schwind CJ, Boehler ML, Folse R, Dunnington G, Markwell SJ. Development of physical examination skills in a third-year surgical clerkship. *American Journal of Surgery* 2001;181:338-40.
25. Doherty M, Dacre J, Dieppe P, Snaith M. The "GALS" locomotor screen. *Annals of the Rheumatic Diseases* 1992;51:1165-9.
26. Fox RA, Dacre JE, Clark CL, Scotland AD. Impact on medical students of incorporating GALS screen teaching into the medical school curriculum. *Annals of the Rheumatic Diseases* 2000;59:668-71.
27. McManus IC, Richards P, Winder BC, Sproston KA. Clinical experience, performance in final examinations, and learning style in medical students: prospective study. *BMJ* 1998;316:345-50.
28. Tomblinson P, Fox RA, Dacre JA. Defining the content for the objective structured clinical examination component of the professional and linguistic assessments board examination: development of a blueprint. *Medical Education* 2000;34:566-72.
29. Bellamy N, Goldstein LD, Tekanoff RA. Continuing medical education-driven skills acquisition and impact on improved patient outcomes in family practice setting *Journal of Continuing Education in the Health Professions* 2000;20:52-61.
30. Woolf AD. Specialist training in rheumatology in Europe. *Rheumatology (Oxford)* 2002;41:1062-6.
31. Dormans JP. Orthopedic surgery in the developing world — can orthopedic residents help? *Journal of Bone and Joint Surgery. American volume* 2002;84:1086-94.