

The current status of sports medicine training in United States internal medicine residency programmes

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Objective: To determine the general status of sports medicine training in internal medicine residency programmes in the United States.

Methods: A cross sectional survey of the programme directors and chief residents of each of the 407 accredited internal medicine programmes listed in the 1999–2000 Graduate Medical Education Directory.

Results: The questionnaire was returned by 231 of 404 (57%) programme directors and 233 of 404 (58%) chief residents. A chief and director of the same programme (paired responses) replied from 144 of 404 (36%) programmes surveyed. A formal sports medicine curriculum was reported by 22.1% of programme directors. Programmes with a formal curriculum were 2.9 times more likely to offer any of the sports medicine educational experiences ($p < 0.0001$; Cochran-Mantel-Haenszel). Programmes with block rotations were more likely to include all of the educational experiences surveyed than those without ($p < 0.002$ for each; χ^2 test). A total of 162 programmes included sports medicine as part of other rotations. Most programmes only included sports medicine as part of other rotations: 44.6% (103/231) of all programmes and 63.6% (103/162) of programmes with sports medicine as part of other rotations. Some 29.9% (69/231) of directors reported having an elective, and 3.9% (9/231) reported a required rotation. Almost a quarter (21.7%; 50/231) of directors reported that their residents received no clinical experience in sports medicine.

Conclusions: Little attention is given to the subject of sports medicine when internal medicine residency curricula are developed in the United States. Thus only a small percentage of American internal medicine residency programmes provide significant training in sports medicine.

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Sports medicine is a broad field derived from many basic and clinical disciplines. In 1993, the American Board of Internal Medicine, the American Board of Family Practice, the American Board of Pediatrics, and the American Board of Emergency Medicine jointly established certification in primary care sports medicine. This group also better defined primary care sports medicine as "a body of knowledge and broad area of health care which includes exercise as an essential component of health throughout life, medical management and supervision of recreational and competitive athletes and all others who exercise, and exercise for prevention and treatment of disease".^{1,2} After the 1993 conference, sports medicine training for US primary care residents became a focus of discussion. In 1996, the American Academy of Family Physicians published core educational guidelines on sports and recreational medicine for all family practice residents.³ Although there are guidelines for sports medicine training in paediatrics⁴ and increased recognition for the need to adequately train paediatric residents in sports medicine, studies of sports medicine education in paediatric residencies have identified suboptimal sports medicine educational experience.^{5–7}

Although sports medicine education has been addressed with varying degrees of success in the training of American paediatric and family practice residents, less focus has traditionally been placed on this area in internal medicine residency programmes. The current residency review committee guidelines for internal medicine residency programmes published by the Accreditation Council for Graduate Medical Education addresses sports medicine in three separate parts of the document.⁸ Most significantly, under the heading of special educational requirements, the topic of sports medicine is addressed as follows: "It is desirable that all residents receive instruction in the areas of preparticipation sports assessment, injury prevention, evaluative management and rehabilitation

related to athletic and recreational injuries". One example of a successful focused effort to teach musculoskeletal examination to internal medicine residents in the United States was published by Stirling.⁹ However, little other information is available on education of American internal medicine residents in musculoskeletal and sports medicine topics.

The main purpose of this study is to determine the general status of sports medicine training in United States internal medicine residency programmes. Do programmes have a specific sports medicine curriculum? Is sports medicine education available for internal medicine residents? Also, using chief residents as a sample group of recent graduates, we assess resident opinion on the adequacy of their sports medicine educational experiences. Finally, again using chief residents as a sample of recent graduates, we evaluate how comfortable newly graduated American internal medicine residents feel with diagnosing and managing common sports medicine related problems.

METHODS

The study was approved by a local institutional review board. A two part questionnaire (fig 1) was used to perform a cross sectional survey of programme directors and chief residents for all 407 accredited internal medicine programmes in the United States listed in the 1999–2000 Graduate Medical Education Directory.¹⁰ The questionnaire was created on the basis of previous studies in other primary care residency programmes^{5–7} and published sports medicine curricular guidelines.^{1–4,11,12} Programme directors were mailed only the first part of the questionnaire (fig 1A). In a separate mailing, chief residents were sent both parts (fig 1A,B). A repeat mailing was sent to those who did not respond to the initial survey. Finally, a reminder was mailed to those who failed to respond after the second mailing.

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10. Did you complete your residency at the institution where you are now serving as chief resident? (Circle) Yes No
11. Did you complete the sports medicine rotation? (Circle) Yes No None Available
12. Indicate (by circling) the adequacy of your educational experiences in the following:
(1 = none, 2 = very little, 3 = some, 4 = satisfactory, 5 = excellent)
- | | | | | | |
|---|---|---|---|---|---|
| Lectures/didactic sessions in sports medicine | 1 | 2 | 3 | 4 | 5 |
| Sports medicine clinic | 1 | 2 | 3 | 4 | 5 |
| Onfield/sideline coverage | 1 | 2 | 3 | 4 | 5 |
| Casting/splinting/taping | 1 | 2 | 3 | 4 | 5 |
| Working with athletic trainer | 1 | 2 | 3 | 4 | 5 |
| Working with sports physical therapist | 1 | 2 | 3 | 4 | 5 |
| Working with high school athletic program | 1 | 2 | 3 | 4 | 5 |
| Working with college athletes | 1 | 2 | 3 | 4 | 5 |
| Working as a team physician | 1 | 2 | 3 | 4 | 5 |

13. Indicate (by circling) your comfort level in the management of the following conditions:
(1 = uncomfortable, 2 = somewhat comfortable, 3 = comfortable, 4 = very comfortable, 5 = authoritative)

Preparticipation evaluation	1	2	3	4	5
Acute knee injury in an athlete	1	2	3	4	5
Chronic knee pain in an athlete	1	2	3	4	5
Acute ankle sprain	1	2	3	4	5
Lower back pain in an athlete	1	2	3	4	5
Acute neck injury in an athlete	1	2	3	4	5
Concussion injury in an athlete	1	2	3	4	5
Shoulder pain in an athlete	1	2	3	4	5
Osgood Schlatter's disease	1	2	3	4	5
"Shin splints"	1	2	3	4	5
Infectious mononucleosis in athletic participation	1	2	3	4	5
Exercise induced asthma	1	2	3	4	5
Weight management in a wrestler	1	2	3	4	5
Heat illnesses in athletes	1	2	3	4	5
Amenorrhea in the adolescent athlete	1	2	3	4	5
Elbow pain in a thrower	1	2	3	4	5
Heart murmur in an athlete	1	2	3	4	5
Performance enhancers and supplements in athletes	1	2	3	4	5

The End. Thank you.

Figure 1 Continued

directors are used. For the percentage of sports medicine as part of other rotations, 95% confidence intervals for proportions (based on normal approximation) are computed. The χ^2 test of independence is used to assess the relation between different types/sizes of programmes and sports medicine block

rotations. Homogeneity of odds ratios among sports medicine educational experiences is tested using the Breslow-Day test, followed by Cochran-Mantel-Haenszel testing of significance of odds ratios. Testing is performed at 5%, and two tailed tests are used for all analyses.

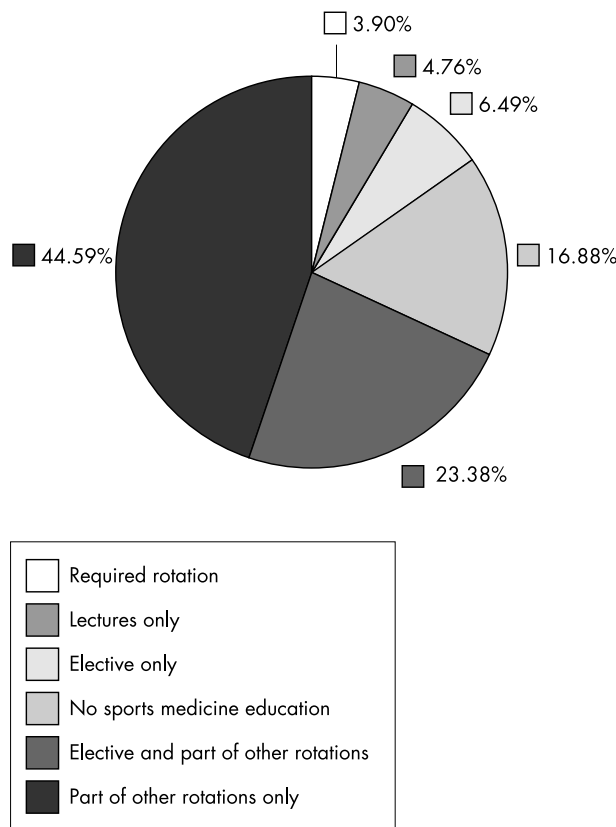


Figure 2 How sports medicine is offered.

Table 1 Programme directors' description of sports medicine included as part of other rotations

Rotation	Number reporting (n=162)	Mean (SEM) % time sports medicine
Adolescent medicine	47 (29.0%)	10.4 (6.5)
Orthopaedics	104 (64.2%)	23.7 (18.2)
Ambulatory medicine	106 (65.4%)	10.3 (9.2)
Emergency medicine	64 (39.5%)	10.3 (7.8)

Percentages add up to more than 100 because more than one area could be chosen.

The analysis is performed using SAS (for Windows 8.2) (SAS Institute Inc, Cary, North Carolina, USA), and some graphs are produced using SPSS statistical software.

RESULTS

At least one response (chief resident, programme director or both) was received from 310 of 404 programmes surveyed (77%). Overall, 231 of 404 (57%) programme directors and 233 of 404 (58%) chief residents returned the questionnaire. We received the questionnaire from both the chief resident and programme director for 144 of the 404 programmes (36%).

Only a small minority, 22.1% (51/231), of programme directors reported having a formal sports medicine curriculum. Less than half of programme directors (37.7%; 78/207 with 24 not responding) reported offering a block rotation in sports medicine. As could be expected, programmes with a sports medicine fellowship at their institution are more likely to have a block rotation in sports medicine available to their residents (54% v 33.9%; χ^2 $p = 0.0106$). However, the size of a programme does not influence whether a block rotation is available: 35.5% of small and medium programmes with 60 or

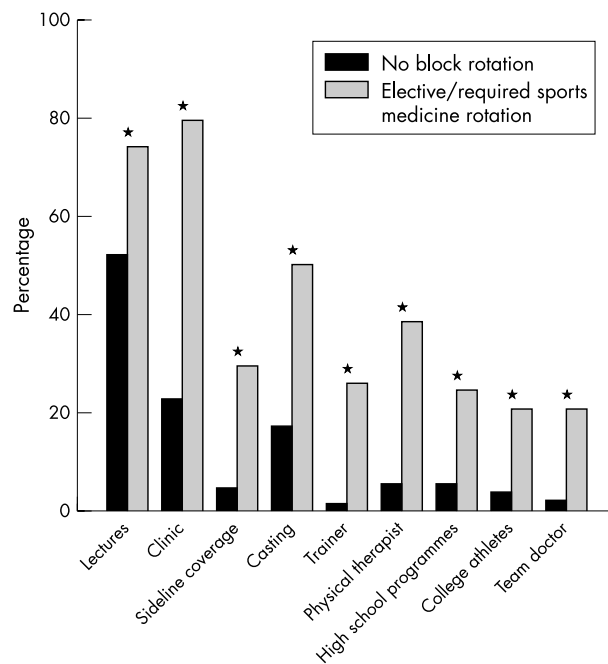


Figure 3 Educational experiences in programmes with a block rotation compared with programmes with no block rotation. *Significant difference, $p < 0.002$.

less total residents have a block rotation compared with 44.2% of large programmes ($p = 0.267$). In addition, the type of programme (university v community based) has no influence on availability of a block rotation in sports medicine, with block rotations available at 40.5% of university based programmes and 34.0% of community based or combination programmes ($p = 0.492$).

Overall, the greatest number of programme directors, 44.6% (103/231), reported that sports medicine education is offered to their residents as part of other rotations only. A significant proportion of programme directors (16.9%; 39/231) reported having no sports medicine educational activities for their residents, and another 4.8% (11/231) provide lectures as the only sports medicine educational experience for their residents. The remaining programme directors reported having an elective rotation as well as including sports medicine as part of other rotations, having only an elective rotation without inclusion of sports medicine in other rotations, or having a required sports medicine rotation (fig 2).

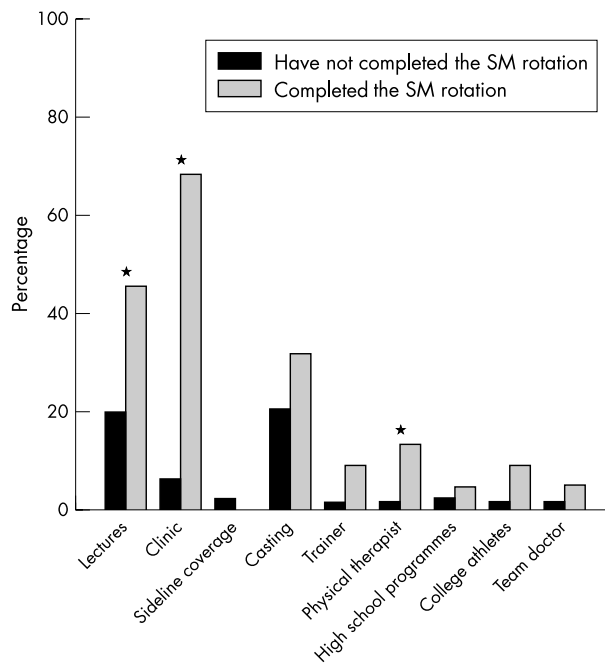
On further analysis, 70.1% (162/231) of programme directors reported that sports medicine is included as part of other rotations. The vast majority of these acknowledged including sports medicine as part of other rotations only (103/162) or including sports medicine as part of other rotations and also having an elective rotation available (54/162). A few programme directors (5/162) require a sports medicine rotation and include sports medicine education as part of other rotations.

Of the rotations in which sports medicine education is included, the greatest number of programme directors reported sports medicine as part of an orthopaedic rotation (104/162 or 64.2%) or ambulatory rotation (106/162 or 65.4%). Fewer reported sports medicine as part of an adolescent rotation (47/162 or 29.0%) or emergency medicine rotation (64/162 or 39.5%). The orthopaedic rotation devotes the most time to sports medicine (mean (SEM) 23.7 (18.2)%) (table 1).

Programme directors' responses to questions on individual educational experiences show that 59.1% of programmes have lectures on sports medicine topics and 42.2% have a sports medicine clinic experience for their residents. Some 28.3% of programme directors reported that casting/splinting and taping instruction is included in their resident's educational

Table 2 Responses of chief residents to the adequacy of their educational experiences

	1 = None	2 = Very little	3 = Some	4 = Satisfactory	5 = Excellent	Median
Lectures	38.9% (82)	38.4% (81)	12.3% (26)	8.1% (17)	2.4% (5)	2
Sports medicine clinic	72.6% (151)	14.4% (30)	6.2% (13)	4.8% (10)	1.9% (4)	1
Onfield/sideline coverage	92.8% (193)	5.3% (11)	1.4% (3)	0.5% (1)	–	1
Casting/splinting/taping	53.6% (111)	24.6% (51)	16.9% (35)	3.9% (8)	1% (2)	1
Working with athletic trainer	93.7% (195)	3.8% (8)	1% (2)	1.4% (3)	–	1
Working with sports physical therapist	89.4% (186)	7.7% (16)	1.9% (4)	1% (2)	–	1
Working with high school athletic programme	93.7% (195)	3.8% (8)	1.9% (4)	0.5% (1)	–	1
Working with college athletes	90.4% (188)	7.2% (15)	1.4% (3)	1% (2)	–	1
Working as team doctor	90.8% (188)	7.2% (15)	1% (2)	1% (2)	–	1

**Figure 4** Educational experiences of chief residents who had or had not completed a sports medicine rotation. SM, Sports medicine. *Significant difference, $p < 0.02$.

experience, and 16.4% reported that working with a sports physical therapist is included. Only 13% and 11.7% of programme directors reported sideline coverage and working with high school athletic programmes respectively as part of their residents' educational experiences. Fewer than 10% of programme directors reported that their residents work with an athletic trainer or college athletes, or function as a team doctor as part of their education. Programmes with a formal curriculum are 2.9 times more likely to offer any of the sports medicine educational experiences surveyed than those without a formal curriculum (Cochran-Mantel-Haenszel $p < 0.0001$; 95% confidence interval for odds ratio of 2.2 to 3.8). Programmes with block rotations are significantly more likely to include all of the educational experiences investigated (fig 3).

There were no significant differences between the responses of chief residents and programme directors when we received paired responses to any of the questions in the first half of the survey.

Chief residents answered "none" or "very little" in response to questions on the adequacy of their educational experience in the selected areas of sports medicine surveyed (table 2). Residents who had completed a sports medicine rotation were significantly more likely to give acceptable ratings ("some", "satisfactory", or "excellent") than those who did not take the rotation for their educational experiences in lectures ($p =$

0.0073), attending a sports medicine clinic ($p < 0.0001$), and working with a sports physical therapist ($p = 0.0168$). Similar trends are observed for working with college athletes ($p = 0.0879$) and working with an athletic trainer ($p = 0.0879$). There is no significant difference between residents who completed a sports medicine rotation and those who did not in their rating of experience in onfield/sideline coverage at sporting events, casting/splinting/taping experiences, working with high school athletes or working as a team doctor (fig 4).

Despite the paucity of educational experiences in sports medicine, the median comfort level for each of the sports medicine conditions surveyed is at least "somewhat comfortable". Chief residents are "comfortable" or "very comfortable" with management of several of the specific conditions asked about including preparticipation evaluation, acute ankle sprain, lower back pain in an athlete, infectious mononucleosis in athletic participation, exercise induced asthma, amenorrhoea in the adolescent athlete, and heart murmur in an athlete (fig 5). Completion of a sports medicine rotation makes chief residents 2.4 times more likely to respond with "comfortable", "very comfortable", or "authoritative" (Cochran-Mantel-Haenszel $p < 0.0001$, 95% confidence interval 2 to 3.1).

DISCUSSION

Although programmes with a formal sports medicine curriculum are more likely to include the sports medicine educational activities investigated, only a small minority of programme directors reported a formal curriculum. In addition, having a block rotation also carries a greater likelihood of having the individual educational experiences investigated, but few programme directors reported having a required sports medicine block rotation. The presence of an elective block rotation in a programme does not reveal how many residents are actually participating in the elective and therefore receiving the sports medicine education, and this is not assessed in the study. Finally, most programme directors reported that sports medicine education exists as part of other rotations, but, except for orthopaedics, the amount of time given over to sports medicine is quite small. From the directors' descriptions of their programmes, their residents seem to receive little sports medicine education.

The responses from the chief residents concur with the curricula descriptions of the programme directors, as they reveal inadequate educational experiences during their residencies in the areas of sports medicine investigated. Although the areas of educational experience surveyed are not comprehensive, we believe that they represent the key elements of sports medicine education based on published guidelines for sports medicine curricula and communications with subspecialists trained in sports medicine. Given the universally poor rating of experience in these key elements of sports medicine education by the chief residents, it is not difficult to extrapolate that sports medicine education for the residents surveyed was overall inadequate.

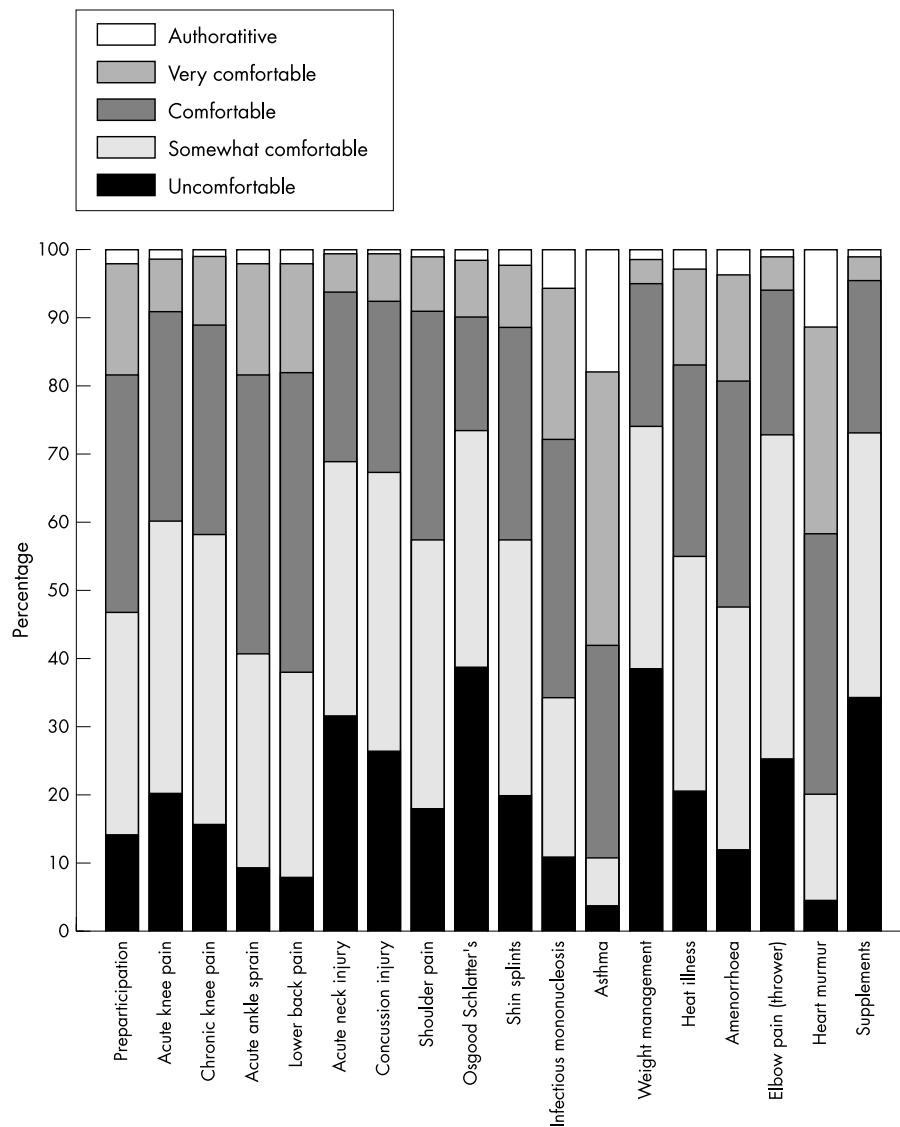


Figure 5 Chief residents' comfort level in the management of selected sports medicine related conditions.

However, chief residents reported more comfort with management of common sports medicine illnesses/injuries than would be expected from their ratings of their educational experiences. They could possibly have gained competence in these conditions on other rotations, and, as expected, they tended to be more comfortable with conditions commonly encountered on typical internal medicine rotations such as exercise induced asthma, infectious mononucleosis, and heart murmur. They could also have gained competence during their own ambulatory care clinic and tended to be more comfortable with the musculoskeletal conditions seen most commonly in ambulatory care, including preparticipation examinations, acute ankle sprain, and low back pain, and less comfortable with other musculoskeletal problems. However, this may not explain the overall high level of comfort described. In addition, those trained in general internal medicine who supervise resident clinics may themselves not be efficient/comfortable treating musculoskeletal complaints and thus may not be teaching residents the most appropriate treatments for these conditions. Another possible explanation is that the chief residents have learned from experience outside the structured residency curriculum, such as while "moonlighting". Finally, it is possible that their comfort level indicates only a personal sense of comfort and camouflages

inadequate/incomplete or inappropriate management of those conditions.

This study has limitations. No specific definition of "formal curriculum" for sports medicine was given in the survey. It was assumed that the programme directors would understand "formal curriculum" as defined objectives and content such as is seen in other areas of training in residency. No differentiation was made between elective educational experiences and those in which all residents participate. This was to allow maximum response. We recognise that those with a personal interest in or exposure to sports medicine may have been more likely to respond to the questionnaire. Failing to include rheumatology and rehabilitation medicine as choices for the question on sports medicine included as part of other rotations may have excluded some positive responses. With regard to the chief residents' surveys, their responses may not be representative of all newly graduated internal medicine graduates. Also, it may be difficult for a chief resident to assess his or her adequacy of educational experience if he or she does not know what is expected. Finally, because comfort level rating is not an objective criterion, it does not tell us if the management considered by the chief resident is in fact appropriate.

Take home message

More attention should be paid to sports medicine during the development of internal medicine curricula in the United States because most current internal medicine residents receive little training in this specialty.

Our study indicates that little attention is given to sports medicine during the development of educational curricula for internal medicine residents in the United States. We have also shown a lack of sports medicine educational experiences for most American internal medicine residents, which results in inadequate training in sports medicine.

Some may argue the need to focus on sports medicine in internal medicine residency training. A similar debate over the importance of sports medicine training in paediatric residency programmes continues. However, paediatric residents are now recognising the importance of sports medicine education in their training.¹³ Several studies have shown that nearly 20% of patient visits to primary care doctors are for musculoskeletal complaints.¹⁴ We are also increasingly prescribing exercise as prevention and treatment for a wide variety of common illnesses including obesity, osteoporosis, depression, coronary artery disease, hypertension, and dyslipidaemia.¹⁵ ¹⁶ If we are training internal medicine residents to provide primary care for adults, and not simply as a prelude to subspecialisation, it would seem prudent to train them in exercise and exercise associated illness and injuries during their residency.

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