International differences in sport medicine access and clinical management

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Summary

I undertook the 2012 ECOSEP travelling fellowship, sponsored by Bauerfeind, between May and August 2012, which involved visiting 5 European sport medicine centres and spending approximately one week in each centre. The 5 centres included: National Track and Field Centre, SEGAS, Thessaloniki, Greece; Professional School in Sport & Exercise Medicine, University of Barcelona, Spain; Sport Medicine Frankfurt Institute, Germany; Isokinetic Medical Group, FIFA Medical Centre of Excellence, Bologna, Italy, and Centre for Sports and Exercise Medicine, Barts and the London School of Medicine and Dentistry, Mile End Hospital, England.
Throughout the fellowship, the clinical cases which were routinely encountered were documented. The following sections detail my experiences throughout the fellowship, the sports of the athletes and the injuries which were treated at each of the sport medicine centres during the fellowship visit and the different forms of management employed.

Key words: sport medicine, travelling fellowship, sport exercises.

Week 1 - National Track and Field Centre, Thessaloniki, Greece

The Greek Sport Medicine Centre treats professional track and field athletes from Northern Greece and covers an athletic population of approximately 150 athletes. The clinic is staffed by 1 Sport & Exercise Medicine SEM Physician, 3 physiotherapists and one Massage therapist with access to one gymnasium for rehabilitation. The centre also includes an Isokinetic Dynamometer either for rehabilitation and strength testing. Athletes can book same-day appointments or through the administrative department by telephone the previous day. A weekly multi-disciplinary meeting is also held with all clinical staff present to discuss interesting clinical cases.
Nine track and field athletes were reviewed during my stay at the centre; 4 females and 5 males. The average age of the athletes was 21 years. The presenting problem of the athlete was imaged using ultrasound by the sport doctor reviewing them at the initial consultation.
The injuries over the one week period included 3 hamstring strains, 1 hamstring tendinopathy, 1 quadricep strain, 2 meniscal knee pathologies and 2 low back pains (Tab. 1). There were no upper limb injuries. The majority of diagnoses were based on clinical findings or ultrasound imaging and only 1 MRI was performed to identify an L4 disc prolapse.
An investigation unique to the Greek clinic is the use of goniometry to help grade hamstring strains. Malliaropoulos et al.[1] reviewed 165 track and field athletes with acute, first-time, unilateral hamstring strains and compared this to a control group. They found that active range of motion at the knee at 48 hours post-injury can predict recovery time from a hamstring strain in elite athletes. The use of this experimental technique needs trialled within further athletic populations but initial results appear promising in providing the sport physician with a cheap and objective measure of grading hamstring strains whilst also providing a prognostic time-frame to the athlete.
During the placement, the centre also undertook pre-participation health screening for the Greek international volleyball team of 14 athletes. The screening involved an electrocardiogram (ECG) recording, BP and cardiovascular examination by a cardiology consultant as well as full blood count (FBC), kidney function (U&E), plasma glucose, CRP, creatinine phosphokinase (CPK), and liver function blood tests (LFTs). This is in contrast to the European Society of Cardiology[2] and International Olympic Committee[3] which advise only to perform a history, physical examination and ECG for pre-participation screening of young competitive athletes.
Another common treatment modality which was employed within the clinic was extracorporeal shock wave therapy (ESWT). ESWT likely works by causing microtrauma to the area from repeated shock waves and this then causes neovascularisation, the new blood vessels reported to aid tissue healing. ESWT is presently used in the treatment of post-traumatic myositis ossificans[4], stress fractures[5], calcific tendinopathy of the shoulder[6] and plantar fas-

Table 1. Area of the body injured in the athletes reviewed in the five different international sport medicine centres.

Area injured	Greece (n=9)	Spain (n=21)	Germany (n=40)	Italy (n=30)	England (n=6
Thigh/hamstring	5	-	1	1	-
Knee	2	6	9	19	2
Cervical/Lumbar/sacral spine	2	1	2	3	-
Lower leg/calf	-	4	4	1	3
Ankle	-	2	8	-	-
Hand	-	2	1	-	-
Hip/groin	-	1	5	-	-
Pre-participation medical assessment	-	1	4	-	1
Asthma	-	1	-	-	-
Mental health	-	1	-	-	-
URTI	-	1	-	-	-
Drug testing	-	1	-	-	-
Foot	-	-	4	-	-
Elbow	-	-	2	-	-
Shoulder	-	-	-	5	-
Wrist	-	-	-	1	-

n = number of athletes seen in each clinic.
URTI = upper respiratory tract infection.

ciopathy[7] amongst others. Level I evidence is available in favour of the use of ESWT, and further randomised controlled trials are being performed to strengthen the evidence for its use.

Week 2 - Professional School in Sport Medicine, University of Barcelona, Spain

Within the Barcelona centre there are various departments including physiology, Sport & Exercise Medicine, nutrition, podiatry, psychology, physiotherapy and biomechanics although the two biggest departments are Sport & Exercise Medicine and Physiology. The centre also includes a strength laboratory with isokinetic muscle testing machines for different areas of the body. The centre serves a permanent athletic population of approximately 250 athletes with nine full-time doctors and eight full-time physiotherapists. Athletes treated were from sports including tennis, golf, gymnastics, weight-lifting, fencing, volleyball, track and field, and handball amongst others.

The Sport & Exercise Medicine department provides a medical drop-in clinic every day. Athletes can book same-day appointments and this is staffed by approximately three sport doctors. A weekly multi-disciplinary meeting is also held with all departmental staff present to discuss interesting clinical cases.

The patient IT notes within the centre are integrated with the hospital patient IT notes. Thus athletes can be referred for investigations on the Spanish public health system, which allows ease of investigation and follow-up as colleagues from different medical specialities can view all the clinical notes. This appears to allow a more holistic approach to the athlete with comprehensive medical and scientific input.

The Sport & Exercise Medicine Physicians at the centre are directly involved with the undergraduate medical school teaching. During my week placement, I was involved with teaching lower limb anatomy to first year medical students. This not only appears well received by the medical students who receive relevant functional and clinical anatomy knowledge, but also by the sport medicine doctors who regularly refresh their anatomical knowledge.

Vitamin supplementation is a growing industry within sport medicine, but with little evidence to support its use[8]. Supplementation offered to athletes within the centre included vitamins C, D and E, calcium, omega, magnesium, and creatinine. The only supplements which have limited evidence for use outwith a balanced diet include creatinine, caffeine and bicarbonate. Creatine[8] supplements can increase the amount of creatine phosphokinase in muscles and thus improve the performance in single or multiple sprints. It may also lead to gains in muscle mass. Caffeine in quantities of 2-3mg/kg body weight may prove effective in improving endurance performance[8]. Bicarbonate loading in a dose of 0.3g/kg body weight before an event appears to help buffer the effects of lactic acid within the working muscles and therefore reduce the negative effects of lactic acid[8]. However bicarbonate supplementation is limited by its gastrointestinal side-effects. Further research is required to support the use of other supplements.

The average age of the athletes treated over the week was 21 years. This included 21 athletes; 14 females and 7 males. Every presenting problem was generally imaged via ultrasound by the attending sport medicine doctor. The commonest sports were track and field athletes and gymnasts (Tab. 2).

The majority of injuries were from the lower limb. The commonest area injured was the knee and the commonest injury here was meniscal pathology (Tab. 1). The 2 upper limb injuries were both from the hand – an ulnar collateral ligament injury of the thumb – and a trapezoid stress fracture. Imaging techniques were commonly employed to support clinical findings with five patients having an MRI, one CT and one bone scan performed.

Other consultations included out-of-competition drug testing, biomechanical assessment and maximal exercise

Table 2. Sports of the athletes reviewed in the five international sport medicine centres.

Sport	Greece (n=9)	Spain (n=21)	Germany (n=40)	Italy (n=30)	England (n=6)
Track and field	9	4	5	-	-
Gymnastics	-	4	1	-	-
Handball	-	3	1	-	-
Martial arts	-	2	2	1	1
Golfer	-	1	-	-	-
Weight-lifter	-	1	-	-	-
Volleyball	-	1	4	-	-
Football	-	1	5	8	1
Motor sports	-	1	-	-	-
Walker	-	1	3	-	1
Hockey	-	1	2	-	-
Water polo	-	1	-	-	-
Tennis	-	-	7	1	-
Jogger	-	-	3	1	2
Triathlete	-	-	3	1	-
Cyclist	-	-	2	-	-
Floorball	-	-	1	-	-
No sport	-	-	1	17	-
Boxing	-	-	-	1	-
Fencer	-	-	-	-	1

n = number of athletes seen in each clinic.

testing as well as pharyngitis and depression. The last two conditions are important considerations for the skill make-up of a sport physician – general medical issues are seen regularly at sport medicine clinics as well as sport injury pathology. Mental health issues are also common and often undetected in sport medicine[9] and so the sport physician must have a high level of suspicion for diagnosing mental health complaints.

One treatment modality commonly employed within the centre was platelet-rich plasma (PRP) injections. PRP[10] is reported to improve tissue healing in both bony and soft tissue injuries. PRP[10] is hypothesised to provide growth factors that aid neovascularisation and increase the blood supply and nutrients required for damaged cells to regenerate. PRP use has grown within sport medicine as it is thought to enhance healing and therefore athletes can recover more rapidly from injuries and reduce their time to return to play[10]. However further randomised controlled trials are required to support its use in different sport medicine pathologies.

Week 3 - Sport & Exercise Medicine Frankfurt Institute, Germany

Within the Frankfurt centre, the sport medicine and physiology centres are separate, similar to Barcelona. The centre reviews approximately 400 Olympic level athletes, 1,000 regional level athletes and then private referrals within Frankfurt and the surrounding area. The centre employs four doctors and approximately ten physiotherapists to care for these athletes. The doctors at the clinic use chiropractic techniques on their patients in everyday practice.

In contrast to other departments, Frankfurt does not employ compartment pressure testing but is trialling the use of microdialysis therapy to diagnose compartment syndromes and the facility is hoping to publish a paper on its preliminary results within the next year.

Overall forty patients were reviewed; 25 males and 15 females. The average age was just over 38 years. The different areas of the body injured and the sports of the athletes are included in Tables 1 and 2 respectively.

The commonest injury was meniscus pathology at the knee, followed by Achilles tendon pathology. Sixteen of the patients were imaged using an MRI and nearly every patient received ultrasound imaging at initial consultation.

Common treatment modalities used in Frankfurt include steroid joint injections and the use of homeopathic medications with steroid for joint injections as well as hyaluronic acid joint injections. However, intra-articular hyaluronic acid injections in a systematic review and meta analysis by Arrich et al.[11] are not considered clinically effective for knee osteoarthritis and are found to be associated with a greater risk of adverse events. This view is supported by NICE[12], and they advise that intra-articular hyaluronic acid injections should not be used for the treatment of osteoarthritis in general.

Another important consideration for sport physicians is to be aware of conditions that can masquerade as sport injuries[13]. One athlete who presented with multiple joint pains and nail changes was suspected of having psoriatic arthropathy, and was referred to a rheumatology consultant for appropriate investigation and management.

Week 4 - Isokinetic Medical Group, FIFA Medical Centre of Excellence, Bologna, Italy

This medical centre treats a mixture of private medical patients and professional athletes. The facilities at Isokinetic include 3 rehabilitation gymnasiums, a swimming pool, 3

pitches for outside rehabilitation, an MRI scanner, and research centre. The Sport & Exercise Medicine Physicians also have access to physiotherapists, chiropractors, nutritionists, and psychologists within the centre. The clinic is staffed by seven full-time doctors, twenty-one physiotherapists and two chiropractors.

The difference between Bologna and the other sport medicine centres is that the Sport & Exercise Medicine Physicians do not perform ultrasound on their patients, but refer to a specialist musculoskeletal radiologist for scanning.

During my placement, I reviewed 30 patients. The average age of the clients was 38 years. The areas of the body injured and the main sports of the athletes are included in Tables 1 and 2 respectively. The commonest injury seen within the clinic was ACL (anterior cruciate ligament) ruptures and this is typical for the clinic, as it received much publicity through rehabilitating the famous footballer Roberto Baggio after an ACL reconstruction in just 76 days in 2002.

A lot of the patients attending the clinic do not actually play any sport, and indeed fund the treatment privately. This is an important point – physical activity promotion should be used in the treatment of a number of medical conditions[14] and thus sport medicine is not just for elite athletes. This should be taken into consideration when looking at the skill mix within the public health services (the NHS within the UK) and therefore the need for sport medicine doctors to work permanently within the NHS and support the work of the established medical specialities.

Week 5 - Centre for Sports and Exercise Medicine, Barts and the London School of Medicine and Dentistry, Mile End Hospital, England

The department is staffed by 4 full-time doctors and 2 physiotherapists with input from other specialities including podiatry and radiology. Bed-side ultrasound is commonly employed to aid diagnosis. The centre receives referrals from the UK public health service (NHS) and reviews approximately 2,800 patients per year. A weekly multi-disciplinary clinic is held which reviews all diagnostically challenging cases. Imaging modalities are freely available within the clinic as patients can be referred on the UK public health service (the NHS).

Over the course of the week I reviewed 6 cases; 4 males and 2 females. The average age of the cases was 40 years. The area of the body injured and the sports of the athletes are included in Tables 1 and 2 respectively, with the commonest injury presenting at the clinic being Achilles pathology.

Only 6 clinical cases were reviewed because my stay at the clinic was only for 4 days and I also attended and presented at 2 conferences during my stay. At the 14th Annual Centre for Sports and Exercise Medicine Scientific Conference I presented my recent research work on physical activity assessment and promotion in primary care and then also discussed my experiences of the 2012 ECOSEP travel scholarship. I also presented at the ECOSEP Student Sport & Exercise Medicine Conference on physiological and clinical aspects of medical problems encountered at mass participation events. The travel fellowship has therefore given me experience of presenting and teaching at international conferences. This is imperative as sport medicine develops as a discipline.

A new procedure which is being developed by prof. Maffulli at the centre is Achilles tendon reconstruction using the semi-tendinosus hamstring tendon. This operation is called the check-rein procedure and the centre is publishing the results of 25 case reports using this technique with 2 year follow-up later this year.

Similarities between centres

Although the five Sport Medicine centres spanned five European countries there were some similarities in how they managed sport injuries.

- Multi-disciplinary working and communication is used throughout the centres with most centres holding a weekly multi-disciplinary meeting to discuss interesting and/or challenging cases.
- Annual health screens were also undertaken for elite athletes and this is in keeping with the advice from the European Society of Cardiology[2] as well as the International Olympic Committee[3].
- Ultrasound is also commonly employed in the clinics as a "stethoscope"[15] to provide immediate imaging of the presenting problem.
- Throughout all five sport medicine clinics there is very little use of anti-inflammatory medication.

Differences between centres

Differences between the centres include use of homeopathic remedies to treat sport injuries and the ease of onward referral for further imaging, with some centres having their own MRIs and therefore access to same-day scanning. The extent of the multi-disciplinary team on offer to the athlete varies throughout the clinics and is dependent on the funding available to each centre. Access to the clinics for athletes also differed between the centres with some athletes offered same day appointments via a drop-in service, other centres offering a booking system with the athletes seen within a few days or a few months if the patients were referred through the public health service.

Strengths and weaknesses

Each of the five centres was visited for a period of one week and ideally I would have spent more time in each of the clinics. However, I was limited by time and availability and each of the supervising sport physicians felt the cases reviewed were typical of their work load. At each of the clinics, I was generally supervised by one sport physician and the cases reviewed may therefore reflect their particular area of interest within sport medicine. I did however spend time with the majority of the profession-

als involved in each centre and therefore cases reviewed should be reflective of the cases seen in each clinic.

Impact of findings for a sport medicine specialist

The Bauerfeind 2012 ECOSEP Travelling Fellowship has provided me with an invaluable experience as I attempt to establish myself as an internationally renowned Sport Physician. The fellowship has confirmed to me that a sport physician needs to have adequate experience of different imaging modalities, including experience of interpreting MRIs and the use of ultrasound as a "stethoscope" in sports medicine[15]. Sport physicians can be involved with medical teaching, for example anatomy teaching, and thus improve the applicability of medical education. There also appears to be a focus of sport medicine injuries around the lower limb and therefore a sport physician needs to have proficiency in examining these areas.

Sport medicine is a new speciality, with experimental techniques and treatments becoming increasingly common within day-to-day practice. There is a need to therefore employ evidence based medicine principles when evaluating new treatments to ensure that only techniques with strong evidence for their use are employed. It is also important not to forget rheumatological conditions which can masquerade as sport medicine conditions and therefore to consider an appropriate differential diagnosis in the sport medicine clinic[13].

Sport Medicine is not just for elite athletes but can be used in the treatment of a multitude of chronic health conditions. As well as the traditional treatment modalities, exercise prescription should be considered in the treatment of common health conditions. Including sport physicians within the public health service and particularly, I feel, within primary care will help the health services shift their focus from the management of chronic disease to prevention and thus improve the sustainability of public health services.

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