

How evidence based is the management of two common sports injuries in a sports injury clinic?

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Objectives: To examine the diagnosis and management of adults attending a sports injury clinic, to establish to what extent the management of the two most common injuries treated at this clinic is evidence based, and to explore factors that affect management.

Methods: A retrospective examination of 100 random case notes extracted age, sex, sport, type and site of injury, treatment, and outcome. Systematic literature reviews examined the extent and quality of scientific evidence for the management of the two most commonly presenting injuries. A clinical attachment period and practitioner interviews allowed recognition of factors impinging on management decisions.

Results: Patellofemoral pain syndrome (PFPS; 10% of all injuries) and Achilles tendinopathy (6% of all injuries) were the most commonly presenting injuries. The mean (SD) number of treatments used for PFPS was 2.8 (0.9). The mean number of treatments used for Achilles tendinopathy was 3.7 (1.0). Clinicians reported that personal experience formed the basis of management plans in 44% of PFPS cases and 59% of Achilles tendinopathy cases, and that primary research evidence only accounted for 24% of management plans in PFPS and 14% in Achilles tendinopathy. Practitioners were unaware of literature supporting over 50% of the treatment modalities they used. However, clinicians were often using evidence based treatments, unaware of the supporting research data.

Conclusions: This study highlights a lack of evidence base, a lack of knowledge of the research evidence, and a lack of management based on the current evidence that is available for these conditions. Practitioners practised evidence based medicine in under 50% of cases.

The rapidly increasing numbers participating in sports activities have resulted in a parallel increase in sports related injuries.¹ Although the conditions presenting to sports injury clinics have been documented, the extent to which common managements are evidence based has not been established.

Evidence based medicine is "the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients".² The practice of evidence based medicine involves integrating individual clinical expertise with the best available external evidence from systematic research.^{3–4} Without current best evidence, management plans may become out of date, to the detriment of patient care.⁵

The randomised controlled trial (RCT), and especially the systematic review of several RCTs, has become the "gold standard" for judging the efficacy of medical treatments.² If no RCTs have been carried out in a certain area, the next best external evidence in the "hierarchy" of trial quality should be consulted.⁶ Research evidence can generally be described as being primary, secondary, or unspecified.⁵ Primary evidence includes all original research studies, whereas secondary evidence includes reviews of primary research in the form of journal articles, textbooks, or lectures. The computerisation of bibliographies and the development of software that permits the rapid location of relevant evidence have made it easier for busy clinicians to access published literature.⁷

Much of sports medicine has developed empirically, and current practice often reflects practitioner experience rather than the evidence base.⁸ There is increasing emphasis on evidence based management in other disciplines, such as in general practice where 81% of management decisions may be evidence based,⁹ but only recently is this paradigm evident in sports medicine.⁵ RCTs comprise only 3% of research, with observational studies being more common.⁸ However, to ensure the credibility of sports medicine, clinical treatments should be built on the highest quality research evidence.¹⁰

Evidence exists for the medical treatment of musculoskeletal injuries, but most studies involve general populations and are not specific to subjects with sports related injuries.¹¹

The practice of evidence based management is difficult to evaluate.¹² Nevertheless, data describing the effectiveness of evidence based medicine are growing as it spreads to new settings. Short term trials have shown better and more informed clinical decisions after even brief training in critical appraisal.¹³

This study aims to examine the diagnosis and management of 100 randomly selected adults attending a sports injury clinic, and to establish to what extent the management of the two most commonly presenting injuries treated at this clinic is evidence based. It is hypothesised that many management plans in sports medicine will be empirical, whereas few will be supported by observational or RCT data.

METHOD

Stage 1: to establish the diagnosis and management of the most common injuries

After permission by Lothian Regional Health Board ethics committee, 100 adults who had completed a course of treatment at a private physiotherapist led sports injury clinic were identified. Although attached to a UK university, the clinic serves a general population of people involved in sport. Physiotherapists routinely make the diagnoses and the management plans, only referring to doctors if required. Every 10th patient was selected from the beginning of an alphabetical list of all patients presenting to the clinic within the last 12 months. Any patient under the age of 16 was excluded. A case note examination extracted date of birth, sex, principal sport, whether injury occurred in principal sport, site of injury,

Abbreviations: ACL, anterior cruciate ligament; ITB, iliotibial band; MCL, medial collateral ligament; PFPS, patellofemoral pain syndrome; RCT, randomised controlled trial

diagnosis, and treatment; all notes were complete for these parameters. The data were entered into a Microsoft Excel spreadsheet, and basic frequency analysis undertaken.

Stage 2: to establish the extent of evidence available to manage the two most common conditions

Systematic literature reviews were designed and carried out to examine the extent and quality of recent scientific evidence for the management of the two most commonly presenting injuries identified in stage 1. The number of systematic reviews was limited to two for practical and time reasons, with the two most common conditions found at stage 1 used, as these reviews related to the greatest workload at the clinic. It has been suggested that medical research papers published within the past seven years can be considered recent.¹¹ To avoid missing pertinent articles, five databases were searched from 1997 to the present: Medline, Web of Science, EMBASE, SportDiscus, and The Cochrane Library. The search criteria "patellofemoral" OR "patello-femoral" AND "pain" AND "syndrome" AND "treatment" OR "management" was used in one case. The search criteria "Achilles tendinopathy" OR "Achilles tendonitis" OR "Achilles tendinosis" AND "management" OR "treatment" was used in the other. Papers not directly relevant to the management of these two specific conditions were excluded. Reference lists of identified papers were scanned, and appropriate papers reviewed. Any new papers in turn had their reference lists scanned, this process continuing until no new papers were identified. In this study, evidence was classified according to

quality of design (specifically evidence from RCTs), evidence from other high quality research studies, and expert opinion.

Stage 3: to determine the basis of management plans

A two month attachment as a clinical observer, viewing the management of conditions by the treating practitioners allowed recognition and exploration of the factors apart from research evidence that impinge on management decisions. All practitioners were interviewed to establish the basis for each management plan using a semistructured interview guide (appendix). These interviews were audio taped, transcribed together with field notes, and then analysed considering the role of primary evidence, secondary evidence, previous experience, advice from colleagues, and patient factors in their management decisions. In cases where personal experience or advice from colleagues was cited as the basis of management plans, practitioners were asked if they were aware of any research evidence evaluating the treatment modality used.

Where practitioners cited primary or secondary research evidence as the basis for management plans, the specific articles were sought to ensure that the reference was valid and had been interpreted appropriately.

RESULTS

Diagnosis and management of the most common injuries

The mean (SD) age of the sample was 35 (12.5) years; 63% were male. There were 25 different principal sports, with running (16%), general fitness training (11%), and soccer (10%) being the most common.

Of all injuries investigated, 73% were in the lower limb, with the most common sites being the knee (29%) and ankle (23%). Within these sites, the most common injuries were patellofemoral pain syndrome (PFPS), representing 34% of knee injuries and 10% of all injuries, and Achilles tendinopathy contributing 26% of ankle injuries and 6% of all injuries. Figure 1 summarises the diagnoses of presenting knee and ankle injuries.

Patients diagnosed with PFPS were prescribed a mean (SD) of 2.8 (0.9) treatments, with exercises to improve strength in the vastus medialis muscle group prescribed in all cases (table 1). Patients diagnosed with Achilles tendinopathy were prescribed a mean (SD) of 3.7 (1.0) treatments, with deep friction massage prescribed in all cases (table 2).

Extent of evidence available to manage these two conditions

In the literature search, Medline produced 55 hits, Web of Science 49 hits, SportDiscus 134 hits, EMBASE 66 hits, and The Cochrane Library four hits. The entire search produced 68 relevant papers (21 original research studies, 47 reviews).

Five of the 10 modalities identified in the literature were supported by RCTs, three by other high quality research studies, and two by expert opinion. There was one treatment with RCT evidence that was not used by the clinicians studied (Protonics neuromuscular system). There was one treatment with supporting evidence from non-RCT studies (orthosis), and one supported by expert opinion (electromyographic feedback treatment) that were not used. Three modalities used had no evaluation studies in the literature search (advice, stretching, and cryotherapy). Table 1 summarises the level of supporting evidence for PFPS treatment modalities.

Achilles tendinopathy

Medline produced 48 hits, Web of Science 63 hits, SportDiscus 47 hits, EMBASE 48 hits, and The Cochrane Library four hits. The entire search produced 29 relevant papers (eight original research studies, 21 reviews).

Two of the 10 modalities identified in the literature were supported by RCTs, three by non-RCT studies, and five by

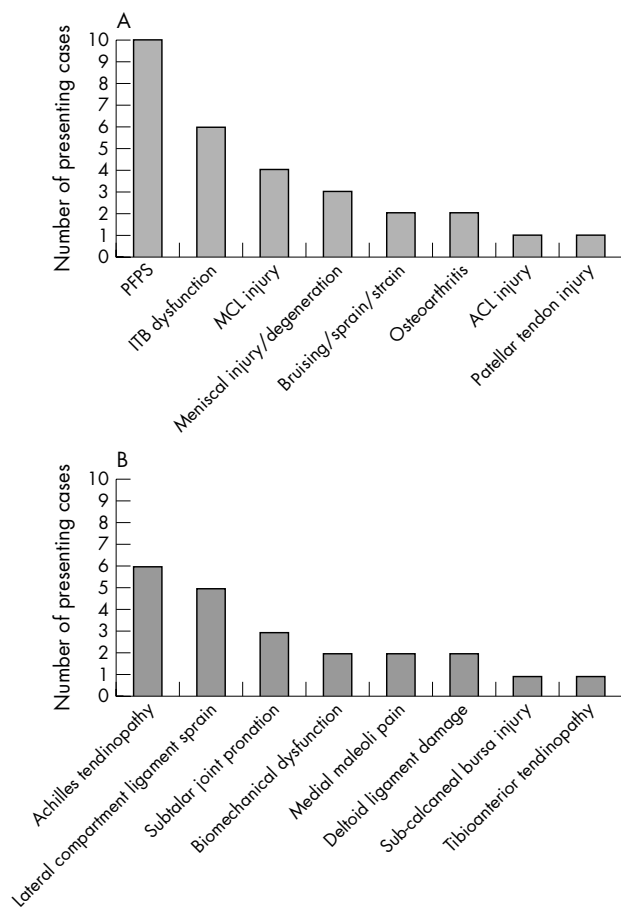


Figure 1 Diagnoses of (A) presenting knee injuries (n = 29) and (B) presenting ankle injuries (n = 23). ACL, Anterior cruciate ligament; ITB, iliotibial band; MCL, medial collateral ligament; PFPS, patellofemoral pain syndrome.

Table 1 Level of supporting evidence for patellofemoral pain syndrome treatment modalities found in the literature search and the percentage of cases in which treatment modalities were used (non-exclusive)

Treatment	Level of evidence	% of cases used
Open and closed kinetic chain exercises for vastus medialis	A	100
Acupuncture	A	20
Patellar taping	A	20
Ultrasound	A	10
Protonics neuromuscular system	A	0
Isokinetic exercise programmes for vastus medialis	B	100
Patellar mobilisation	B	20
Orthosis	B	0
Electromyographic feedback treatment	C	0
Interferential	C	20
Cryotherapy	None	20
Stretching	None	20
Advice	None	20

Level of evidence: A, evidence from randomised controlled trials; B, evidence from other high quality research studies; C, expert opinion (no research evidence).

expert opinion. There was one treatment with RCT evidence that was not used by the studied practitioners (microcurrent treatment). Two modalities supported by non-RCT trial data (soft tissue mobilisation and ultrasound guided injection of sclerosing agent) and four modalities supported by expert opinion (corticosteroids, cryotherapy, non-steroidal anti-inflammatory drugs, and rest) were also not used. All these modalities were potentially available at the clinic, either directly or through referral to the clinic doctor. Six of the eight modalities used had no evaluating studies in the literature search, including the two most commonly used modalities. Table 2 summarises the level of supporting evidence for Achilles tendinopathy treatment modalities.

Basis of management plans

All treating practitioners were female physiotherapists and had a mean (SD) of 16 (12) years clinical experience since original training. They were all actively involved in undergraduate sports medicine teaching. Five of these six practitioners responsible for the management of 15 out of the 16 cases of PFPS and Achilles tendinopathy agreed to be interviewed for the study. The non-respondent had ceased to work at the clinic.

PFPS

All practitioners prescribing vastus medialis strengthening exercises did so as a result of primary (43%), secondary (43%), or unspecified (14%) evidence. All the clinicians used

personal experience to select the exercises they found most effective from a series in the literature. All practitioners using acupuncture had attended a weekend course, and cited the teaching received on the course as the basis for its use. In 50% of cases, those who had used mobilisations did so as a result of reading a chapter in a book.

The use of patellar taping was based on primary evidence in 67% of cases, and on unspecified literature in 33% of cases. Despite being aware of much supporting research evidence, several practitioners opted not to read it as they felt it would not influence their decision. Others opted not to use patellar taping because they preferred to put the onus on the patient in rehabilitation. The use of proprioception exercises was based entirely on secondary evidence.

In all cases where practitioners used ultrasound, interferential treatment, cryotherapy, or stretching, they did so as a result of previous personal experiences. Figure 2A summarises the factors reported by clinicians as the basis for their management decisions in PFPS.

Achilles tendinopathy

All practitioners making use of eccentric loading programmes did so as a result of primary (75%) or secondary (25%) evidence. The use of acupuncture was based entirely on an evidence based weekend course. Of cases where stretching was used, 60% were based on previous experiences, with the remaining 40% being based on unspecified literature.

Table 2 Level of supporting evidence for Achilles tendinopathy treatment modalities found in the literature search and the percentage of cases in which treatment modalities were used (non-exclusive)

Treatment	Level of evidence	% of cases used
Eccentric training programmes	A	66.7
Microcurrent treatment	A	0.0
Non-surgical versus surgical	B	100.0
Soft tissue mobilisation	B	0.0
Ultrasound guided injection sclerosing agent	B	0.0
Rest	C	0.0
Corticosteroids	C	0.0
Cryotherapy	C	0.0
Non-steroidal anti-inflammatory drugs	C	0.0
Deep friction massage	None	100.0
Stretching	None	83.3
Interferential	None	50.0
Acupuncture	None	33.3
Ultrasound	None	16.7
Podiatry	None	16.7

Level of evidence: A, evidence from randomised controlled trials; B, evidence from other high quality research studies; C, expert opinion (no research evidence).

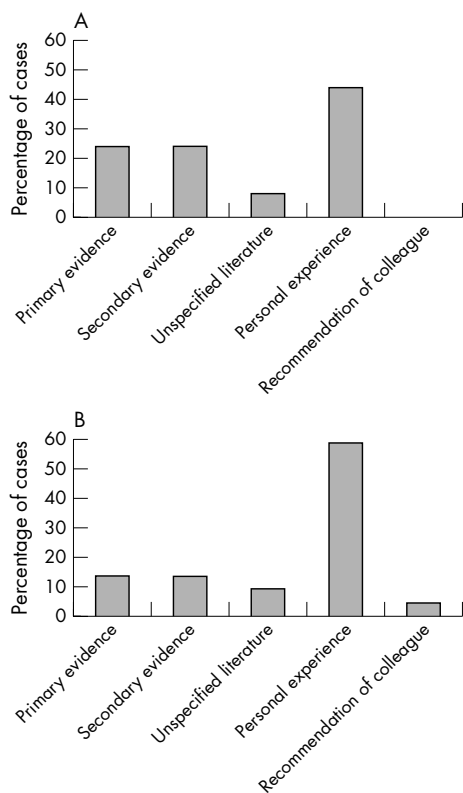


Figure 2 (A) Factors reported by clinicians to impact on their management decisions in patellofemoral pain syndrome. (B) Factors reported by clinicians to impact on their management decisions in Achilles tendinopathy.

The use of ultrasound was based on personal experience in 50% of cases and on secondary evidence in the remaining 50%. When using deep friction massage and interferential treatment, all practitioners based their use on personal experience. All practitioners referring their patients for podiatry did so as a result of discussions with podiatrists. Figure 2B summarises the factors reported by clinicians as the basis for their management decisions in Achilles tendinopathy.

In all cases where personal experience or the experiences of others was cited as the basis for using a treatment modality, practitioners said that they were not familiar with any literature evaluating that modality.

In the three cases where practitioners cited primary research evidence as the basis for management plans, the specific articles were analysed and found to be valid and interpreted appropriately. These three articles had been identified by the systematic reviews. Established textbooks were most commonly cited as secondary evidence to justify treatment plans. No relation between the length of clinical experience and use of research evidence was apparent.

DISCUSSION

Consistent with previous research,¹⁴ the most common sites of injury were found to be the knee (29%) and ankle (23%). PFPS and Achilles tendinopathy were the most common specific injuries. Although many previous studies describe the common sites of injury,¹⁴ there is a lack of published data comparing the frequencies of specific injuries.

By comparing the results of two systematic literature reviews with the actual management plans, it was noted that, in the management of both injuries, the treatment modalities supported by most scientific evidence were not the modalities

most commonly used by practitioners at the clinic. There could be various reasons why this was so.

Firstly, there are major deficiencies in the evidence supporting some aspects of sport and exercise medicine.³ This is highlighted in the paucity of papers retrieved by the literature searches on the management of two common injuries. The evidence base for the management of common conditions in other specialties is generally much better developed. The large number of different treatments suggests that there is no definitive evidence of best practice. Experimental data evaluating only 37% of modalities used by practitioners was identified in the literature searches. Some of the rarest conditions in other areas of medicine, such as cardiology, have more evidence supporting their treatment.¹⁵ Practitioners alluded to this, remarking that they were aware that the literature base in sports medicine was smaller than in other clinical fields.

Secondly, despite the above factors, there were a number of treatments supported by RCT data and other high quality studies that the practitioners did not use, suggesting a lack of awareness of current literature. In fact, practitioners were only aware of the research in 42% of modalities identified as having an evidence base. Practitioners often used treatments unaware of supporting literature, even though such evidence did exist.

Thirdly, a lack of confidence using the literature may have accounted for practitioners relying more on personal experiences than research evidence. However, it might then be expected that many management plans would be shared by colleagues. The present study found this not to be true, with practitioners contradicting one another (particularly apparent in the use of patellar taping). Although it is possible that these differences may have arisen from individual interpretations of the literature or after discussion with colleagues, it appears most likely that practitioners based many treatments on individual experiences alone. This may have been due to convenience, as using research evidence requires practitioners to regularly consult the literature to update knowledge,¹⁶ a time consuming task for busy clinicians.

Fourth and finally, practitioners also reported that "patient factors" (such as a fear of acupuncture needles) sometimes influenced management plans. However, clinicians combined these factors with previous experience and/or research evidence. In some cases, practitioners prescribed treatments considered ineffective by evidence based medicine. Reasons for this included the potential for a positive placebo effect or to relieve patient fears that nothing was being done.

There were several limitations of the present study. Firstly, a prospective design might have been considered as an alternative to the retrospective methods used. The advantage of such an approach would have been an ability to ask practitioners about management plans as they treated patients. However, this might have allowed clinicians to alter their management plans because of the study, and thus carry out unnatural actions or introduce bias.

In assessing the management plans adopted, case note examination alone did not reveal differences in circumstances. Therefore this study used interviews to gather data on the basis of the management plans. Qualitative methods are best for exploring complicated and personal issues, and for eliciting private rather than public accounts.⁶ The advantages of interviews in this case included adaptability and an ability to clarify answers immediately. A semistructured format for the interview was formulated to encourage consistency between interviews.

In conclusion, this study found PFPS and Achilles tendinopathy to be the most commonly presenting injuries at a sports injuries clinic. Also highlighted was a lack of evidence base, with recent experimental data evaluating only 37% of modalities used by practitioners. Furthermore, of this very limited evidence base, practitioners were only aware of research

What is already known on this topic

- Practitioners managing sports injuries rely on experience/expert opinion to inform much of their clinical practice
- Most other specialties are increasingly using an evidence based approach to patient management

What this study adds

With respect to the treatment of commonly presenting injuries to a sports injury clinic

- there is a lack of evidence to guide management and a lack of knowledge of the available evidence
- there is a lack of management based on the current evidence that is available for these conditions

supporting 42% of those modalities detailed in the literature. Finally, and most importantly, this study shows a lack of management based on the current evidence that is available for these conditions, with practitioners practising evidence based medicine in under 50% of cases. As this study took place in a large clinic where undergraduate teaching takes place, it is likely that the practice at this clinic is better informed than average. Further research is indicated to test the generalisability of the findings in different clinical settings.

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APPENDIX

INTERVIEW GUIDE USED WITH PRACTITIONERS TO ESTABLISH THE BASIS OF EACH MANAGEMENT PLAN

After explanation of the study and before asking any questions, the practitioner is invited to read through the notes of the individual patient concerned.

1. Can you remember this specific case?
2. Was this a straightforward diagnosis?
 - if not, why not?
3. When you have diagnosed PFPS/Achilles tendinopathy do you personally have a set protocol that you generally follow in the treatment of this condition?
 - If so, has it changed at all since you first devised it?
 - What is the basis of your protocol (refer to every specific feature, primary/secondary evidence)?

- If evidence based, ask if they can cite a reference.
4. Go through each specific feature of the management plan and elucidate the basis of the management plan, i.e. why did you use that treatment?
 5. What are your expectations of the treatment of PF syndrome?
 - did you expect this patient to make a full recovery?
 6. What is your definition of evidence based medicine?

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COMMENTARY

This is an important contribution to the debate on evidence based practice in sports and exercise medicine and raises several important points. It is clear from the literature search performed that there is a lack of evidence to inform our management of even the most common sports injuries, and we continue to rely on personal experience and expert opinion to a worrying degree. The contrast with other medical specialties is highlighted, and now that sport and exercise medicine has been recognised as a new medical specialty in the United Kingdom, this is an area that will have to be addressed. The lack of awareness of the relevant literature admitted to by more than 50% of the practitioners surveyed raises concerns, especially when one of the reasons given for not consulting the literature was a belief that it would not influence their management strategies. Clearly there is a need to integrate a new culture of critical appraisal into our clinical practice. The authors of this study are to be congratulated on highlighting an issue that will become increasingly important if sport and exercise medicine is to take its place alongside other established medical specialties. Indeed BASEM has acknowledged this when recently updating its aims to include the fostering of evidence based practice in the management of sports related injury.

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