

Evidence Review

Knee Arthroscopy in Under 35 year olds in comparison to Conservative Management.

Questions to be addressed:

What is the evidence of clinical and cost effectiveness of Knee arthroscopy in under 35 year olds with Acute knee injury compared to conservative treatment?

Reason for review:

NHS Birmingham and Solihull CCG and Sandwell and West Birmingham CCG, requested a rapid evidence review of the clinical and cost effectiveness of knee arthroscopy in patients who are under 35 years and have had an acute meniscal or anterior cruciate ligament (ACL) tear. The review was requested because of the influx of prior approval requests for this cohort of patients following injury for instance while playing sports. This cohort of patients is not currently considered in the national policy for Knee Arthroscopy which covers the cohort of over 35 year olds with degenerative diseases of the knee.

Options for commissioners:

1. Due to insufficient quality of evidence demonstrating that Knee arthroscopy in cases of acute knee injury in under 35 year olds is no more effective than conservative treatment, develop a commissioning policy that clearly stipulates that the intervention is not routinely commissioned, until more evidence is available.
2. Due to the lack of evidence for the clinical effectiveness for Knee arthroscopy in acute knee injury compared to conservative treatment, develop a commissioning policy that considers that the cohort of patients with acute ACL tears should undergo a minimum of 12 weeks of conservative treatment following which, where symptoms persist should be considered for knee arthroscopy in line with restricted criteria.

Summary

The conditions relevant to this scope for acute meniscal tear and acute anterior cruciate ligament (ACL) tear.

Background

The 3 bones that meet in the knee are the:

- thigh bone (femur)
- shin bone (tibia)
- kneecap (patella)

(See Figure 1)

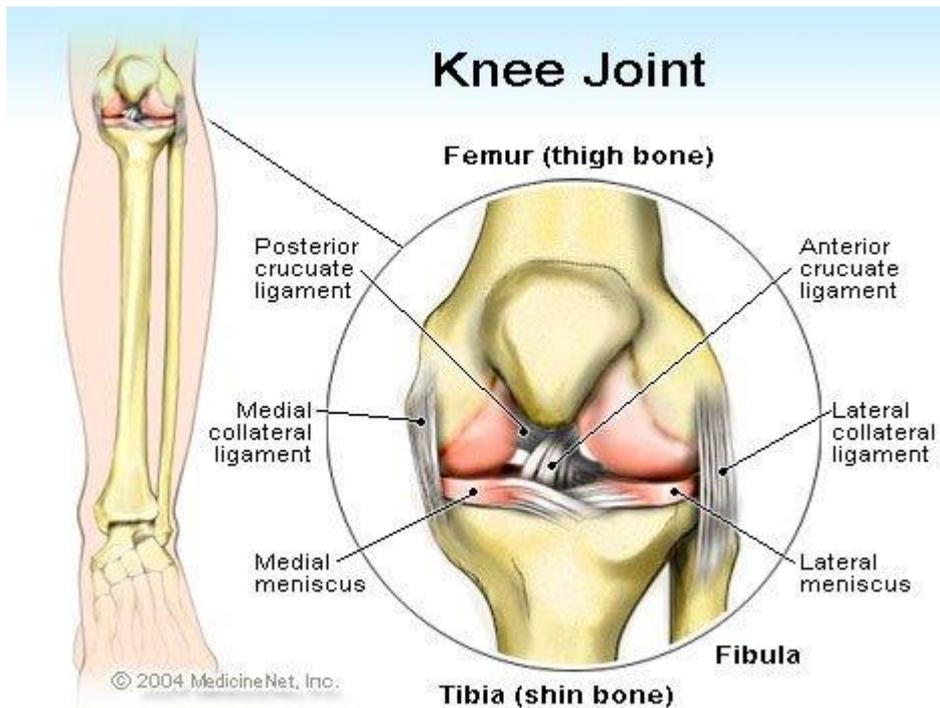


Fig 1: The Knee Joint (Source: https://www.emedicinehealth.com/torn_acl/article_em.htm#what_is_the_anatomy_of_the_knee)

These bones are connected by 4 ligaments – **2 collateral ligaments on the sides of the knee and 2 cruciate ligaments inside the knee.** Ligaments are tough bands of connective tissue. The ligaments in the knee hold the bones together and help keep the knee stable.

The menisci are thick pads of cartilage tissue within the knee which act as shock absorbers to absorb body weight and help improve smooth movement and stability of the knee.

The two main areas within the knee which may be damaged by an acute injury include:

1. Menisci (cartilage)
2. Ligaments

- **Menisci.**

What is the knee meniscus?

The menisci are thick pads of cartilage tissue within the knee which act as shock absorbers to absorb body weight and help improve smooth movement and stability of the knee. Each knee joint contains a medial and lateral meniscus (inner and outer meniscus).

What is a meniscal injury?

There are varying degrees of damage you can do to your menisci. These range from bruising them through to having large tears. Meniscal tears can occur with sport through twisting the knee whilst the foot is still in contact with the ground. In severe injuries, other parts of the knee may also be damaged in addition to a meniscal tear. For example, you may also sprain

or tear a ligament. Meniscal cartilage does not always heal very well once it is torn. This is mainly because the central area of the meniscus does not have a good blood supply. The outer edge of each meniscus has some blood vessels, but the area in the centre has no direct blood supply.

- **Ligaments - Anterior Cruciate Ligament (ACL); Posterior Cruciate Ligament (PCL); Medial Collateral Ligaments (MCL)**

What are the Knee Ligaments?

The Ligaments found within the knee are tough bands of tissue joining the thigh bone to the shin bone at the knee joint. The ligaments run diagonally through the inside of the knee and around each side to give the knee joint stability. They also help to control the back-and-forth movement of the lower leg.

What is an injury of the ligament?

Knee injuries can occur during sports such as skiing, tennis, squash, football and rugby. Ligament injuries, in particular Anterior Cruciate Ligament (ACL) injuries are one of the most common types of knee injuries, accounting for around 40% of all sports injuries.

You can tear your ligaments if your lower leg extends forwards too much. It can also be torn if your knee and lower leg are twisted.

Common causes of a ligament injury include:

- landing incorrectly from a jump
- stopping suddenly
- changing direction suddenly
- having a collision, such as during a football tackle

The intervention

Knee arthroscopy is one of the most commonly performed surgical procedures. In it, a miniature camera is inserted through a small incision (portal). This provides a clear view of the inside of the knee. Your orthopaedic surgeon inserts miniature surgical instruments through other portals to trim or repair the tear.

- **Partial meniscectomy:** In this procedure, the damaged meniscus tissue is trimmed away.
- **Meniscus repair:** Some meniscus tears can be repaired by suturing (stitching) the torn pieces together. Whether a tear can be successfully treated with repair depends upon the type of tear, as well as the overall condition of the injured meniscus. Because the meniscus must heal back together, recovery time for a repair is much longer than from a meniscectomy.

- **Reconstructive Ligament surgery:** A torn ligament cannot be repaired by stitching it back together, but it can be reconstructed by attaching (grafting) new tissue on to it. The ligament, for example the ACL can be reconstructed by removing what remains of the torn ligament and replacing it with a tendon from another area of the leg, such as the hamstring or patellar tendon. The patellar tendon attaches the bottom of the kneecap (patella) to the top of the shinbone (tibia).

Conservative Management

The RICE protocol is effective for most sports-related injuries. RICE stands for:

- **Rest:** Take a break from the activity that caused the injury. Your doctor may recommend that you use crutches to avoid putting weight on your leg.
- **Ice:** Use cold packs for 20 minutes at a time, several times a day. Do not apply ice directly to the skin.
- **Compression:** To prevent additional swelling and blood loss, wear an elastic compression bandage.
- **Elevation:** To reduce swelling, recline when you rest, and put your leg up higher than your heart.

Other conservative management includes Non-steroidal anti-inflammatory medicines which are drugs like aspirin and ibuprofen which assist by reducing pain and swelling.

1 Context

1.1 Introduction

A knee arthroscopy is a type of keyhole surgery used to diagnose and treat problems of the knee joint. Knee arthroscopy is usually done under a general anaesthetic, but a patient may be able to have it under local anaesthetic, depending on the anaesthetist or surgeon's advice.

With this procedure, the surgeon through a small incision that measures only few millimetres, introduces optics in the joints. It is a system of lenses, which usually measure 3-5mm in diameter, and are located in a metal tube in the dimension of a pencil, and allows concentrated artificial light to flow into the joint through this system.

There is a special camera attached to the optics that can monitor the interior part of the joint and transfers the image onto a high resolution monitor. In this way arthroscopy gives the surgeon a view of all joint structures, also of ones that cannot easily be seen in classical surgeries or are even inaccessible to examine. In addition to the incision, which is necessary for introducing the optics, there is normally also needed one or more extra, also only few millimeters small incisions, through which we can insert different operative instruments into the joint. These different sensors, tongs, clips, miniature motorized, and electric instruments are used for the surgical procedure performed in the interior part of the joint.

The procedure can take up to 2 hours depending on the clinical presentation and patients may be able to leave hospital within a few hours. Physiotherapy and pain management will be recommended as required by the surgeon.

1.2 Existing national policies and guidance

- No NICE Guidelines

2 Epidemiology

The knee is injured more frequently than any other joint in the body because it is part of a weight-bearing limb, and second, it does not have the stability procured by the joint congruity of the hip and ankle [10].

Meniscal tears are responsible for 750,000 arthroscopies per year in the US and are the most common soft tissue injury to the knee joint [8]. Traumatic meniscal tears most commonly occur in young, active people during twisting sports such as football and basketball.

3 Findings

3.1 Evidence of effectiveness

3.1.1 A high quality RCT [1] enrolled active adults, 18 to 35 years of age, with an acute anterior cruciate ligament tear occurring not more than four weeks. These were the highlights from the RCT:

- In this high quality randomised controlled trial with minimal loss to follow-up, a strategy of rehabilitation plus early ACL reconstruction did not provide better results at five years than a strategy of initial rehabilitation with the option of having a later ACL reconstruction.
- Results did not differ between knees surgically reconstructed early or late and those treated with rehabilitation alone. These results should encourage clinicians and young active adult patients to consider rehabilitation as a primary treatment option after an acute ACL tear [1].
- This RCT is considered high quality with long follow-up – moderate confidence that evidence reflect true effect in absence of other directly comparable evidence.
- After five years in this randomised controlled trial, it was found that there was no statistically significant differences in pain, symptoms, function in activities of daily living, function in sports and recreation, knee related quality of life, general physical or mental health status, current physical activity level, return to pre-injury activity level, radiographic osteoarthritis, or meniscus surgery between patients assigned to rehabilitation plus early anterior cruciate ligament reconstruction and those assigned to initial rehabilitation with the

option of having a later reconstruction if needed [1]. The results also showed no difference between early or late surgical reconstruction and rehabilitation alone.

- No evidence that arthroscopy improves quality of life compared to conservative treatment at five years. However, the intervention is normally performed on an otherwise young and healthy cohort of patients. Due to short duration nature of the injury, high health utility and low or moderate capacity of intervention to improve the health state the capacity of the intervention to improve quality of life is low. [1]

3.1.2 A systematic review of meniscal tear surgery types was considered including arthroscopic versus open surgery but not surgery versus conservative treatment. [2]

3.1.3 A further systematic review with patients where the mean age was 26.2 was considered. Though the review isn't specifically on patients under 35, the findings of this study suggested that there was no statistically significant difference in outcomes between those patients who underwent earlier compared to delayed ACL reconstruction [3].

3.2 Clinical effectiveness

1 randomised controlled trial (RCT) and 2 systematic reviews were highlighted from the search.

The RCT is high quality and clear, but both of the systematic reviews, although they agree with the RCT findings, do not fully reflect the evidence selection criteria (PICO – Population, Intervention, Comparator, Outcome) used. This means that overall there is moderate confidence that the evidence reflects the true effect of the defined intervention.

RANDOMISED CONTROLLED TRIAL

1. Treatment for acute anterior cruciate ligament tear: five-year outcome of randomised trial [1]:

ABSTRACT

Objective: To compare, in young active adults with an acute anterior cruciate ligament (ACL) tear, the mid-term (five year) patient reported and radiographic outcomes between those treated with rehabilitation plus early ACL reconstruction and those treated with rehabilitation and optional delayed ACL reconstruction.

Design Extended follow-up of prospective randomised controlled trial.

Setting Orthopaedic departments at two hospitals in Sweden.

Participants 121 young, active adults (mean age 26 years) with acute ACL injury to a previously uninjured knee. One patient was lost to five-year follow-up.

Intervention: All patients received similar structured rehabilitation. In addition to rehabilitation, 62 patients were assigned to early ACL reconstruction and 59 were assigned to the option of having a delayed ACL reconstruction if needed.

Main outcome measure: The main outcome was the change from baseline to five years in the mean value of four of the five subscales of the knee injury and osteoarthritis outcome score (KOOS4). Other outcomes included the absolute KOOS4 score, all five KOOS subscale scores, SF-36, Tegner activity scale, meniscal surgery, and radiographic osteoarthritis at five years.

Results: Thirty (51%) patients assigned to optional delayed ACL reconstruction had delayed ACL reconstruction (seven between two and five years). The mean change in KOOS4 score from baseline to five years was 42.9 points for those assigned to rehabilitation plus early ACL reconstruction and 44.9 for those assigned to rehabilitation plus optional delayed reconstruction (between group difference 2.0 points, 95% confidence interval -8.5 to 4.5; $P=0.54$ after adjustment for baseline score). At five years, no significant between group differences were seen in KOOS4 ($P=0.45$), any of the KOOS subscales ($P\geq 0.12$), SF-36 ($P\geq 0.34$), Tegner activity scale ($P=0.74$), or incident radiographic osteoarthritis of the index knee ($P=0.17$). No between group differences were seen in the number of knees having meniscus surgery ($P=0.48$) or in a time to event analysis of the proportion of menisci operated on ($P=0.77$). The results were similar when analysed by treatment actually received.

Conclusion: In this first high quality randomised controlled trial with minimal loss to follow-up, a strategy of rehabilitation plus early ACL reconstruction did not provide better results at five years than a strategy of initial rehabilitation with the option of having a later ACL reconstruction. Results did not differ between knees surgically reconstructed early or late and those treated with rehabilitation alone. These results should encourage clinicians and young active adult patients to consider rehabilitation as a primary treatment option after an acute ACL tear.

SYSTEMATIC REVIEWS:

1. Surgical interventions for meniscal tears: a closer look at the evidence [2].

ABSTRACT:

The aim of the present study was to compare the outcomes of various surgical treatments for meniscal injuries including (1) total and partial meniscectomy; (2) meniscectomy and meniscal repair; (3) meniscectomy and meniscal transplantation; (4) open and arthroscopic meniscectomy and (5) various different repair techniques. The Bone, Joint and Muscle Trauma Group Register, Cochrane Database, MEDLINE, EMBASE and CINAHL were searched for all (quasi) randomized controlled clinical trials comparing various surgical techniques for

meniscal injuries. Primary outcomes of interest included patient-reported outcomes scores, return to pre-injury activity level, level of sports participation and persistence of pain using the visual analogue score. Where possible, data were pooled and a meta-analysis was performed. A total of nine studies were included, involving a combined 904 subjects, 330 patients underwent a meniscal repair, 402 meniscectomy and 160 a collagen meniscal implant. The only surgical treatments that were compared in homogeneous fashion across more than one study were the arrow and inside-out technique, which showed no difference for re-tear or complication rate. Strong evidence-based recommendations regarding the other surgical treatments that were compared could not be made. This meta-analysis illustrates the lack of level I evidence to guide the surgical management of meniscal tears. Level I meta-analysis.

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Conclusions: This meta-analysis illustrates the lack of level I evidence to guide the surgical management of meniscal tears.

Level of evidence: Level I meta-analysis.

2. Early versus delayed surgery for anterior cruciate ligament reconstruction: a systematic review and meta-analysis [3].

ABSTRACT:

There is no consensus in the literature regarding the optimal timing of surgical reconstruction of the ruptured anterior cruciate ligament (ACL). Previous authors have suggested that early reconstruction may facilitate an early return to work or sport but may increase the incidence

of post-operative complications such as arthrofibrosis. This study systematically reviewed the literature to determine whether ACL reconstruction should be performed acutely following rupture. Medline, CINAHL, AMED, EMBASE databases and grey literature were reviewed with a meta-analysis of pooled mean differences where appropriate. Six papers including 370 ACL reconstructions were included. Early ACL reconstructions were considered as those undertaken within a mean of 3 weeks post-injury; delayed ACL reconstructions were those undertaken a minimum of 6 weeks post-injury. We found there was no difference in clinical outcome between patients who underwent early compared to delayed ACL reconstruction. However, this conclusion is based on the current literature which has substantial methodological limitations.

3.3 Cost effectiveness

No studies were found to demonstrate the cost effectiveness of Knee arthroscopy in acute indications in under 35s.

3.4 Magnitude of Health Improvement Benefit

There was no increased risk of osteoarthritis or meniscal surgery if the ACL injury was treated with physiotherapy alone compared with if it was treated with surgery. Neither was there any difference in patients' experiences of function, activity level, quality of life, pain, symptoms or general health.

Measures included Knee injury and osteoarthritis outcome score (KOOS), the Medical Outcomes Study 36-item short-form health survey (SF-36), and the Tegner activity scale. In the full analysis set, the mean change in KOOS4 score from baseline to five years was 42.9 points for patients assigned to rehabilitation plus early anterior cruciate ligament reconstruction and 44.9 points for those assigned to rehabilitation plus optional delayed reconstruction (between group difference 2.0 points, 95% confidence interval -8.5 to 4.5; $P=0.54$ after adjustment for the baseline score). No statistically significant differences were found in KOOS4, any of the five individual subscales of KOOS, SF-36, or Tegner activity scale between the two treatment strategies at five years or in the change between two and five years. Knee stability at rest at five years was statistically significantly better in knees assigned to early anterior cruciate ligament reconstruction [1].

There is a small indication in favour of surgical intervention for multi-ligament injuries [1].

3.5 Safety

- Mild chondral injury often occurs at the time of ACL tearing, as the femur and tibia bang against each other [5].
- Increasing age, height, weight, and BMI may also increase the risk for meniscal and articular cartilage injury [6]. Over time, recurrent instability episodes may cause further cartilage damage. Although no method yet exists for fully restoring normal

articular cartilage, techniques can be combined with ACL reconstruction to address full-thickness chondral defects.

- Bone bruising may accompany ACL tears and is thought to set in motion a biochemical cascade, which, even in reconstructed knees, may lead to post-traumatic arthrosis [7].
- Risks of the surgery include infection, DVT/venous thrombo-embolism, neurovascular injury, loss of motion, patellofemoral pain, harvest site pain, patellar fracture, tendon rupture, and pain from hardware [8].
- More serious problems are much less common, occurring in less than 1 in 100 cases [9]. They include:
 - a blood clot that develops in one of the limbs – known as deep vein thrombosis (DVT), it can cause pain and swelling in the affected limb
 - infection inside the joint – known as septic arthritis, it can cause fever, pain and swelling in the joint
 - bleeding inside the joint – which often causes severe pain and swelling
 - accidental damage to the nerves near the joint – which can lead to temporary or permanent numbness and some loss of sensation

3.6 Equity issues

The prevalence of knee pain (lasting for more than 1 week in the past month) was 19% in a community-based survey of people 16 years of age or older registered with one of three general practices near Manchester [4]. Responses were received from 4515 people (78.5%).

The prevalence of knee pain increased with age in both sexes. The age-standardized prevalence of knee pain was equal for men and women, but prevalence was higher in older women than in older men. In people 75 years of age or older, the prevalence in women was 36% and in men was 27%. The prevalence of knee pain with disability was 6%, and the prevalence of moderate or severe knee pain was 12%. It was estimated (from a survey of a subset of initial responders) that 13% of people had consulted their GP for knee pain.

Limited information available particularly under the age of 35. However, no obvious inequalities have been identified in younger age group.

4. Activity and finance

At all levels, injury is a constant threat, and, of all injuries, those of the knee fulfil the athlete's greatest fear of spending a long time out of action. This is confirmed by a study from Sheffield, which showed the knee to have been the most commonly injured joint and soccer and rugby to have the highest risks [11].

Not only may a knee injury require surgery followed by months of rehabilitation, but permanent disability from both sport and work may be the outcome. Indeed, a large study from Scandinavia found that the most common cause of permanent disability following a sports injury was injury to the knee.

There is little work on the pattern of knee injuries in the United Kingdom [11], although a multicenter study is currently in progress. The work that has been carried out abroad, however, has produced some interesting information. It is not widely appreciated that ligament damage to the knee is more common than any other type of knee injury pathology.

Many medical students, general practitioners, and paramedics may be familiar with the story of a weight bearing, twisting injury producing a meniscal tear; however, there is generally a profound ignorance about the history and signs of the more common (and potentially more devastating) ligament injuries. The “miscellaneous injuries” category takes up a quarter of the total, and this is made up of a selection of pathologies such as contusions of the knee and traumatic bursitis. Projecting from American figures, a casualty department covering a population of 400 000 should expect to see about 500 significant knee injuries a year [11].

5. Summary of findings

- Absence of systematic review evidence which fits the specified PICO.
- Conservative management – such as rehabilitation shows as good outcomes if not better than arthroscopy, however there may be an indication in multiligament injuries.
- With reference to specific disease related to the knee, the review found no evidence that arthroscopy prevents further conditions such as osteoarthritis
- Not much evidence was available to form conclusive recommendations for knee arthroscopy following acute meniscal tear.
- No definite length of period for conservative management was evident in the review undertaken.

6. Search Strategy

The following databases are routinely searched: NICE Clinical Guidance and full website search; NHS Evidence and NICE CKS; SIGN; Cochrane; York; and the relevant Royal College and any other relevant bespoke sites. A Medline search was also undertaken and a general google search for key terms carried out.

The search identified publications with relating to acute knee injuries and the abstracts and titles were then sifted to select those that met the criteria in the PICO below. Where there was ambiguity in the PICO criteria, the reviewer also referred to the wording of the research question for this evidence review, which specified that the intervention of interest was knee arthroscopy.

6.1 PICO parameters:

Population: Under 35 years, Acute Meniscal Tear or Anterior Cruciate Ligament Tear

Intervention: Knee arthroscopy with repair of tear

Comparator / Control: Conservative management; physiotherapy, analgesia, steroid injections

Outcome: Improved knee function; pain; mobility

7 References

- [1] Treatment for acute anterior cruciate ligament tear: five-year outcome of randomised trial. *BMJ* 2013; 346 doi: <https://doi.org/10.1136/bmj.f232>
- [2] Mutsaerts ELAR, van Eck CF, van de Graaf VA, Doornberg JN, van den Bekerom MPJ. Surgical interventions for meniscal tears: a closer look at the evidence. *Arch Orthop Trauma Surg* 2016;136:361-37
- [3] Smith TO, Davies L, Hing CB (2010) Early versus delayed surgery for anterior cruciate ligament reconstruction: a systematic review and meta-analysis. *Knee Surg Sports Traumatol Arthrosc* 18:304–311
- [4] Webb,R., Brammah,T., Lunt,M., et al. (2004) Opportunities for prevention of 'clinically significant' knee pain: results from a population-based cross sectional survey. *Journal of Public Health (Oxford)*. 26(3), 277-284
- [5] Brophy RH, Zeltser D, Wright RW, et al. Anterior cruciate ligament reconstruction and concomitant articular cartilage injury: incidence and treatment. *Arthroscopy*. 2010;26:112-120. <http://www.ncbi.nlm.nih.gov/pubmed/20117635?tool=bestpractice.com>
- [6] Bowers AL, Spindler KP, McCarty EC, et al. Height, weight, and BMI predict intra-articular injuries observed during ACL reconstruction: evaluation of 456 cases from a prospective ACL database. *Clin J Sport Med*. 2005;15:9-13. <http://www.ncbi.nlm.nih.gov/pubmed/15654185?tool=bestpractice.com>
- [7] Mandalia V, Fogg AJ, Chari R, et al. Bone bruising of the knee. *Clin Radiol*. 2005;60:627-636. <https://bestpractice.bmj.com/topics/en-gb/589/complications#referencePop109>
- [8] Rodkey WG, Steadman JR, Li ST. A clinical study of collagen meniscus implants to restore the injured meniscus. *Clin Orthop Relat Res*. 1999:S281-92. <http://www.ncbi.nlm.nih.gov/pubmed/10546653?tool=bestpractice.com>
- [9] NHS website: <https://www.nhs.uk/conditions/arthroscopy/>
- [10] Kruseman N, Geesink RGT, van der Linden AJ *et al*. Acute knee injuries: diagnostic & treatment management proposals. <http://arnos.unimasas.nl/show.cgi?fig1?46875>
- [11] Steve Bollen: Injuries of the sporting knee - Epidemiology of knee injuries: diagnosis and triage <https://bjsm.bmj.com/content/34/3/227.2>