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EULAR /EFORT Recommendations for the Diagnosis and Initial Management of Patients with Acute or Recent Onset Swelling of the Knee

Landewé RBM[1], Günther KP[2], Lukas C[3], Braun J[4], Combe B[5], Conaghan PG[6], Dreinhöfer K[7], Fritschy D[8], Getty J[9], van der Heide HJL[10], Kvien TK[11], Machold K[12], Mihai C[13], Mosconi M[14], Nelissen R[15], Pascual E[16], Pavelka K[17], Pileckyte M[18], Puhl W[19], Punzi L[20], Rüther W[21], San-Julian M[22], Tudisco C[23], Westhovens R[24], Witso E[25] and van der Heijde DMFM [26]

1) Maastricht University Medical Center, Maastricht, The Netherlands; 2) Universitäts-klinikum Carl Gustav Carus, Dresden, Germany; 3) Hospital Lapeyronie, Montpellier, France; 4) Rheumazentrum Ruhrgebiet, Herne, Germany; 5) Hospital Lapeyronie, Montpellier, France; 6) Chapel Allerton Hospital, Leeds, United Kingdom; 7) Universität Ulm, Ulm, Germany; 8) Hôpitaux Universitaires de Genève, Geneva, Switzerland; 9) British Orthopaedic Association, London, United Kingdom; 10) Leiden University Medical Center, Leiden, The Netherlands; 11) Diakonhjemmet Sykehus, Oslo, Norway; 12) Vienna Medical University, Vienna, Austria; 13) Cantacuzino Hospital, Bucharest, Romania; 14) IRCCS Policlinico San Matteo and University of Pavia, Pavia, Italy; 15) Leiden University Medical Center, Leiden, The Netherlands; 16) Hospital General Universitario de Alicante, Alicante, Spain; 17) Institute of Rheumatology and Charles University, Prague, Czech Republic; 18) Hospital of Kaunas University of Medicine, Kaunas, Lithuania; 19) Klinik Oberstdorf, Oberstdorf, Germany; 20) University of Padova, Padova, Italy; 21) Universitätsklinikum Hamburg-Eppendorf, Hamburg, Germany; 22) University Clinic of Navarra, Pamplona, Spain; 23) University of Rome, Rome, Italy; 24) University Hospitals KU Leuven, Leuven, Belgium; 25) Norwegian Orthopaedic Association, Trondheim, Norway; 26) Leiden University Medical Center, Leiden, The Netherlands

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Correspondence to:
Robert B.M. Landewé, MD, Professor of rheumatology
Maastricht University Medical Center
Department of Internal Medicine / Rheumatology
P.O.Box 5800
6202AZ Maastricht
The Netherlands
Email : r.landewe@mumc.nl

Abstract

Objectives: The European League Against Rheumatism (EULAR) and the European Federation of National Associations of Orthopaedics and Traumatology (EFORT) have recognized the importance of variation in diagnostic and therapeutic performance across disciplines, have found consensus in starting task forces aiming at achieving diagnostic and therapeutic uniformity, and have identified medical conditions with which representatives of both organizations will frequently be confronted in common clinical practice.
The aim was to establish recommendations for the diagnosis and initial management of patients presenting with acute or recent onset swelling of the knee.

Methods and results: The EULAR standard operating procedures for the elaboration and implementation of evidence-based recommendations were followed. Eleven rheumatologists from 11 countries and 12 orthopedic surgeons from 7 countries met twice under the leadership of two conveners, a clinical epidemiologist and a research fellow. After carefully defining the content and procedures of the task force, research questions were developed, a comprehensive literature search was performed and the results were presented to the entire committee. Subsequently, a set of 10 recommendations was formulated based on evidence from the literature if available, and after discussion and consensus building.

Conclusion: This is the first combined interdisciplinary project of rheumatologists and orthopedic surgeons, successfully aiming at achieving consensus in the diagnosis and initial management of patients presenting with acute or recent onset swelling of the knee.

Introduction

Many musculoskeletal complaints with which patients present to healthcare workers go beyond the domains of one medical specialty. For example, patients with low back pain presenting to the general practitioner can be diagnosed and treated by the latter, or can be referred for further diagnosis and treatment to the neurologist, the orthopedic surgeon or the rheumatologist. In several countries in Europe, the existing health care system allows a patient with low back pain to consult one of these disciplines at their own instigation. Increasingly, and often by virtue of cost considerations and patient safety, medical disciplines in Europe are urged to develop protocols for common medical conditions, in order to streamline the diagnostic process and eliminate diagnostic variation, to prevent unnecessary diagnostic action and to contain costs. Obviously, these medical disciplines tend to focus their diagnostic endeavors on diseases belonging to the core domains of their specialty. Orthopedic surgeons may tend to focus on surgically remediable problems, while rheumatologists may focus on inflammatory causes of back pain.
Remarkably, the consequences of this heterogeneous diagnostic behavior for the patient have rarely if ever been subject of scientific research.

The two professional organizations European League Against Rheumatism (EULAR) and the European Federation of National Associations of Orthopaedics and Traumatology (EFORT) have recognized the importance of variation in diagnostic and therapeutic behavior across disciplines, have found consensus in starting task forces aiming at achieving diagnostic and therapeutic uniformity, and have identified medical conditions with which representatives of both organizations will frequently be confronted in common clinical practice. As a starting point, EULAR and EFORT agreed in trying to find consensus in the diagnostic procedures to be performed in patients presenting with acute or recent onset of swelling of the knee. This topic was chosen for several reasons: First, acute or recent swelling of the knee constitutes a relatively frequent medical problem both in the rheumatologic and orthopedic clinic. Second, a wide spectrum of conditions and diseases belonging to both specialties may underlie the presenting symptom of swelling of the knee. Third, the definition of acute or recent onset swelling of the knee was considered to be relatively unambiguous.
It was decided upfront that this first combined task force should follow the EULAR standardized operating procedures for the elaboration and implementation of evidence-based recommendations (1), appreciating that many relevant aspects may not find a solid basis in scientific literature, but are nevertheless important with respect to finding consensus among experts across disciplines.

Methods

The general approach to this project followed the EULAR standardized operating procedures for the elaboration and implementation of evidence-based recommendations. The process started with the formation of an executive committee under auspices of the presidents of EULAR (TKK) and EFORT (WP). The executive committee comprised the conveners (DvdH, KPG), a clinical epidemiologist (RL) and a research fellow (CL), who had been invited by EULAR and EFORT on the basis of previous expertise in the process of elaborating evidence-based recommendations. Subsequently, the executive committee invited 11 rheumatologists and 12 orthopedic surgeons (the expert committee) that were selected on the basis of their field of interest and knowledge, while taking care of broad coverage concerning the content of the topic (eg. rheumatologic experts covered early arthritis, imaging, reactive arthritis, crystal arthopathies etc), as well as appropriate geographic

distribution across Europe. The selected orthopedic surgeons have been nominated by several European orthopedic specialty societies involved in the management of patients with knee disorders (EPOS, EBJIS, ERASS, ESSKA, EMSOS, EFOST).
The expert committee met for the first time in October 2007 (first meeting) and for the second time in April 2008 (second meeting)

Definitions
During the first meeting, the experts rapidly obtained consensus about how to define the problem of acute swollen knee, so that it would become accessible for literature research without differences in interpretation:

1. The region of interest was defined as *every anatomical structure of the knee, both intra-articularly and periarticularly*
2. Swelling was defined as *an increase in volume of the region of interest*

The expert committee found it more difficult to conceptualize *acute* because it was felt that the terminology *acute* has a connotation of emergency and danger that would imply that a patient should be evaluated without any further delay. Experts considered swelling of *recent onset* more relevant to be included in this exercise, and decided to focus on acute and recent onset swelling of the knee, rather than on acute swelling of the knee alone. Important in the definitions of both *acute* and *recent onset* is at least the time point at which the patient recognizes the problem that leads him to seek medical help (the precise time point of a sudden event (eg. trauma) versus the recognition of a definite change in a condition (eg. arthritis)). Important for the delineation of *recent onset* is how a condition with a sudden onset (eg. within hours or days) evolves over time. There was consensus among experts about a reasonable time frame covering the concept of *recent onset* as being 4 to 6 weeks at most, but it was recognized that a precise delineation in terms of time frame could not be given.

During the first meeting, the experts also discussed the target population for these recommendations as well as the audience for whom these recommendations are primarily meant.
Target population was defined as follows:
All patients newly presenting to a physician with a history or examination finding suggesting onset of swelling (defined as an increase in volume) within a recent time (ie up to 4-6 weeks) in every anatomical structure of the knee, intra-articularly and periarticularly

Target audience for these recommendations was defined as follows:
Health care workers (allied health professionals, general practitioners, rheumatologists, orthopaedic surgeons, emergency department physicians, other medical specialists, students in related areas) working in the field of musculoskeletal diseases

Scope
The expert committee also decided that this task force should constrain its efforts to the diagnosis and initial management of patients with acute or recent onset swelling of the knee. The committee recognised that further treatment of this condition is entirely dependent on the diagnosis, and therefore refers to recommendations and guidelines pertaining to specific conditions and diseases (eg. the management of patients with gout and early arthritis).

Research questions
The expert group first discussed the different kinds of pathologies underlying the symptom of acute and recent onset swelling of the knee. The following aggregated list of underlying

causes was agreed upon, and it was decided that this list would serve as a template for further literature research:

Table 1. Conditions underlying acute or recent onset swelling of the knee

• Degenerative diseases including osteoarthritis
• Inflammatory diseases (arthritis)
• Traumatic conditions
• Infections
• Neoplasms and malformations
• Haematologic conditions (haemophilia, use of anticoagulants)

They subsequently discussed and formulated a number of research questions that should guide the literature research, and serve as a basis for recommendations. Research questions reflect the priorities of the expert members with respect to the relative importance of the topic. Subsequently, a systematic literature search was performed by the research fellow (CL) after translating the research questions in relevant key words (Table 3). The results of the search were aggregated and fed back to the expert committee, and suggestions and comments by the experts complemented the results of the systematic literature search.
At a second meeting, the results of the systematic review were discussed and consensus statements on specific recommendations were developed.

Table 2. Search strategy

Research question	Sources and keywords	Number of hits	Relevant articles
Is it possible to estimate the incidence and prevalence of acute swelling of the knee in the general population? Is it possible to estimate the distribution of underlying causes in the general population?	• **Pubmed "**knee AND (prevalence OR frequency)" + related articles and references in relevant articles • **Abstracts of EULAR and ACR congresses** ("knee" in title)	6066	20 (4 in congress abstracts)
Should the recognition of swelling of the knee be based on patient report only, on physical examination or on additional tests? Which questions should a front line physician ask to a patient presenting with acute or recent onset swelling of the knee? What physical examination should be performed?	• **Pubmed "**History Taking, Medical AND knee" + each test independently + related articles and references of relevant articles • **Abstracts of EULAR and ACR congresses** ("knee" in title)	89	9 (1 in congress abstracts)
Under which circumstances is a delay in referral acceptable, and under which circumstances should a patient be referred immediately? By whom and to whom should a patient with acute or recent onset swelling of the knee be referred for further evaluation?	• **Pubmed "**Knee AND (effusion OR swell* OR swoll*) AND (aetiology OR cause OR etiology)" + related articles and references of relevant articles • **Abstracts of EULAR and ACR congresses** ("knee" in title)	1051	5 (2 in congress abstracts
Which additional tests should be performed?	• **PubMed "**Magnetic Resonance Imaging AND knee" **"**(Ultrasonography OR Doppler Ultrasonography, Doppler) AND knee" + related articles and references of relevant articles • **Abstracts of EULAR and ACR congresses** ("knee" in title)	5060 1581	14

Results

In Table 2 the number of identified articles in the literature referring to the outlined questions is summarized. In general, the database of identified articles was very weak and several research questions could not be answered exactly (eg. incidence and prevalence of acute swelling). Therefore the expert group had to develop the formulation of a consensus statement on specific recommendations mainly based on their experience. In total 10 recommendations were prepared encompassing recognition, referral, history, physical examination, laboratory tests, synovial aspiration, imaging, diagnostic procedures, diagnosis and initial management.

1. Recognition

A patient presenting with acute swelling of the knee should undergo thorough clinical examination in order to confirm swelling

The incidence and prevalence of the symptom of acute or recent onset of swelling of the knee in the general population has not been subject of detailed research in appropriate studies. The lifetime prevalence of swelling of the knee has been reported as 27% in a British study (2) and 10% in an Italian study (3). Ten percent of the 1404 male responders to the British survey have reported swelling in the past month. Life time prevalence of knee symptoms has expectedly been reported to be higher (54% in the British study and 17% in a Scandinavian study (4), but knee symptoms may often include pain without (acute) swelling. Another means to get some insight in the importance of the topic is to start with a well-defined diagnosis (eg. osteoarthritis of the knee) and to determine the point-prevalence in an unselected population. Such studies have been performed with regard to symptomatic osteoarthritis of the knee, and the point prevalence has been reported as 5.4 to 10.1%, dependent on the study (5-8). The major limitation of using this type of information, of course, is that osteoarthritis of the knee may present with acute swelling of the knee according to the definition described above in only a minority of cases. So, although precise incidence figures are lacking, it may be assumed, based on life time prevalence figures and on figures pertaining to related symptoms (pain) and conditions (osteoarthritis), that acute or recent onset swelling of the knee is not a rare condition. For example, of the first 94 patients in a very early arthritis clinic in Tallin, 39 patients presented with knee swelling (12 monoarticular, 18 oligoarticular and 9 polyarticular) (9).

The wording of the first recommendation finds its basis in that both rheumatology experts and orthopaedics experts voiced the experience that a considerable proportion of patients consulting the medical specialist with an acute or recent onset swelling of the knee in fact do not have swelling at all or swelling that fits the definition above (increase in volume)(10). Most probably, these ‘false-positive referrals’ occur more frequently in case of self-referral, but the topic has not been subject of research in the past. It was broadly agreed that the specialist (either rheumatologist or orthopaedic surgeon) should establish whether or not there is indeed swelling (increase in volume) present, although sparse literature suggests that intra-observer variation in determining the presence or absence of fluid in the knee joint is moderate at best (10-12), while inter-observer reliability was poor in 2 studies (11, 12) and moderate in another (13).

2. Referral

Patients with a suspicion of septic arthritis or trauma with an onset of swelling within 12 hours, should be referred immediately to a physician experienced in musculoskeletal diseases

Bone tumours are rare but patients with a suspicion of bone tumour should be referred to an orthopaedic surgeon within one week. Patients with a suspicion of inflammatory arthritis should be referred to a rheumatologist within 6 weeks

Interestingly, rheumatologist experts mentioned septic arthritis as the cause of acute knee swelling that must not be missed. Orthopaedic surgeons considered malignant bone tumour as a diagnosis that should not be missed. Both conditions are rare and form only a tiny minority of all patients referred because of acute or recent onset swelling of the knee.
There was broad consensus in the group that a suspicion of septic arthritis should be considered an emergency, because untreated septic arthritis can be life threatening, especially in immune-compromised patients (those who use immunosuppressive drugs or are in bad physical condition), and infection may rapidly destroy the joint. Risk factors for septic arthritis are well documented and include high age, co-morbid diseases such as diabetes and RA, recent joint surgery (or intra-articular intervention), hip or knee prosthesis and recent skin infection (14).
Patients with a trauma, who have a rapid onset of swelling (arbitrarily established as swelling within 12 hours post-trauma) should be immediately referred because of the suspicion of fracture, which needs immediate treatment.
Among orthopaedic surgeons, there was the unanimous opinion that a suspicion of bone tumour justifies a semi-acute referral (<1 week) to an orthopaedic surgeon, preferably an expert in the field of bone tumours, in order to initiate an appropriate diagnostic work-up.
Recent advances in the field of early arthritis, including the rapidly growing experience from early arthritis clinics and their implementation in common clinical practice, now justifies the recommendation that patients with early arthritis should be seen within 6 weeks by a rheumatologist (15).
The wording 'physician experienced in musculoskeletal diseases' was chosen deliberately, in order to make clear that both rheumatologists and orthopaedic surgeons can appropriately manage patients with these (sub)acute problems. Similarly, the term "rheumatologist" is meant to highlight that specialized knowledge in that medical field is of primary importance, although physicians from different European medical subspecialties (i.e. within internal medicine and orthopaedic surgery) can reach that level of specialist competence.

3. Medical history

<u>In addition to taking a conventional medical history (including previous and concomitant diseases and medication), specific information should be obtained about traumatic versus non-traumatic causes, the speed of onset, the characteristics of pain, first- versus recurrent episodes, the presence of fever, the involvement of other joints and/or back, and a recent history of infection</u>

This recommendation stresses the importance of careful history taking and was underscored by all orthopaedic and rheumatologic experts. A careful distinction between trauma and non-traumatic causes of acute swelling of the knee is pivotal at an early stage, because treatment of traumatic causes is usually different from treatment of non-traumatic causes, and fits the specialty of orthopaedic surgery better than that of rheumatology. Questions about co-morbidity as well as medication may point to increased risk of infection, malignancy and haemorrhage, whereas the speed of onset and pain characteristics may inform the clinician about degenerative and inflammatory diseases. Fever and a recent history of infection may point to joint infection, but fever can also be a symptom of reactive arthritis as well as (pseudo)gout, whereas the question about the involvement of other joints and back elicits information about inflammatory rheumatologic conditions.
This recommendation is a typical example of a recommendation that has been completely based on expert experience and consensus. None of the items mentioned in the text has been subjected to scientific validation, as far as we know, except the presence of fever (which was paradoxically found to be inversely related to the presence of a septic arthritis) (14). The list

of items should also not be regarded as complete, since context-specific questions may guide the physician to a specific diagnosis (an appropriate example may be questioning about a recent tick-bite in regions of high prevalence of Lyme's diseases). Similarly, a history of a recent genitourinary or gastrointestinal infection may direct the focus to reactive arthritides even if such triggering infections may also be asymptomatic (16).

4. Physical examination

Physical examination of a patient presenting with an acute or recent onset swelling of the knee should first focus on the affected knee and should include the unaffected knee, as well as an appropriate assessment of the other joints. A general physical examination should be performed on indication.

The examination of the knee should include the localisation and characteristics of the swelling (intra- versus extra-articular), the detection of effusion, testing stability, general or local tenderness, skin temperature and appearance, the range of motion, and a muscular and neurovascular assessment.

After history taking, physical examination was unanimously considered an obligatory part of the diagnostic management of a patient with acute or recent onset swelling of the knee. It was noted that physical examination should not only focus on the affected knee, but should also take the unaffected knee and other joins into consideration for two reasons: first, in order to compare findings, and second in order to obtain information about the involvement of other joints. The issue of general examination was discussed, and it was agreed that a general physical examination is only valuable if there is an indication that the recent onset knee swelling is part of a systemic illness that may affect other organ systems. Examples are inflammatory rheumatologic diseases, vasculitis and malignancy.

The second recommendation under this bullet addresses the content of the examination of the knee, which has been a topic of recent methodological research. Wood et al have investigated the inter- and intraobserver variation in detecting several localizations of swelling in and around the knee (12). They found remarkably low kappa values for observing all kinds of swelling across investigators (from zero to 0.65). Intra-observer agreement was somewhat better (kappa: from 0 to 1.0) but still far from optimal for several locations. Specific tests for swelling, such as 'bulge sign', 'balloon sign', 'patellar tap' and the palpation of a popliteal cyst, also yielded a disappointingly low level of inter-observer agreement, and a somewhat higher but still unacceptable level of intra-observer agreement. In the same study intra- and interobserver agreement of skin temperature was also investigated with very similar results as to the detection of effusion.

Solomon et al reviewed a number of widely applied tests for the examination of the knee joint. These tests serve to detect joint instability (Lachman test, anterior drawer test, lateral pivot shift test) and torn meniscus (Apley compression test, McMurray test)(17). Hegedus et al performed a systematic review of a number of these tests in which they established the sensitivity and specificity of each test with regard to the underlying condition these tests are referring to (18). Of interest, there is one study suggesting that standardization of the knee examination in patients with moderate to severe osteoarthritis may lead to an acceptable level of reliability regarding most of the investigated tests (19). The general conclusion, however, was that both sensitivity and specificity of these tests fall short in order to make them appropriate instruments in the diagnosis of acute and recent onset swelling of the knee.

The experts discussed the sparse information from literature and recognised that the performance of the investigated aspects of physical examination was rather poor. They also recognised, however, that in clinical practice it is the combination of signs and symptoms rather than one positive or negative test that points a clinician towards a diagnosis (pattern recognition). In light of the broad implementation of all these tests and manoeuvres in

common clinical practice, they decided to recommend accordingly, while making the proviso that none of these tests and manoeuvres of physical examination of the knee should be used as a gold standard.

5. Laboratory tests

In patients presenting with an acute swollen knee of traumatic origin laboratory testing is not helpful in making a diagnosis. In patients presenting with an acute swollen knee of non-traumatic origin, normal acute phase reactants and normal white blood cell count may be helpful in decreasing the probability of inflammatory diseases including especially septic arthritis. Other laboratory tests should be performed on indication

The experts unanimously agreed that laboratory tests are of limited help in patients with an acute or recent onset of knee swelling. The exception stems from the literature research, which yielded a study summarizing the contribution of white blood cell count and acute phase reactants to making a diagnosis of septic arthritis in multiple studies (14). White blood cell count and acute phase reactants may help in excluding septic arthritis if their level is in the normal range. Apart from white blood cell count and an acute phase reactant, the experts agreed that no other laboratory tests should be used generically, which means without specific indication. For monitoring purposes, the experts recommended a baseline value of CRP if inflammatory arthritis was suspected or diagnosed (especially infection).

The situation becomes different if a specific condition is suspected. Common examples are the determination of serum uric acid concentration in cases of gout, and serum rheumatoid factor in case of RA. Measurement of serum uric acid has to be interpreted with caution in the diagnosis of gout. Asymptomatic hyperuricaemia (that is, in the absence of gout) is common, and during the gout attacks the renal clearance of urate increases and serum uric acid may be normal.

6. Joint fluid aspiration

In the diagnostic process of a patient presenting with an acute swollen knee joint fluid aspiration should be performed in patients suspected of having septic, crystal or inflammatory arthritis. Joint fluid should be examined macroscopically and microscopically for leucocytes, crystals and bacteria (gram-staining and culture). In cases of significant traumatic effusion without radiographic evidence of a fracture, aspiration of hemarthros can be performed as well.

In case of suspicion of a tumor joint fluid aspiration should not be performed.

There is one systematic review confirming the diagnostic accuracy of white blood cell count and percentage of polymorphonuclear cells in joint fluid with regard to making a diagnosis of septic arthritis (14). Although gram staining and culture are the gold standard for a diagnosis of septic arthritis, the clinician often cannot wait to commence treatment, and knowledge about the white cell count as well as the percentage of polymorphonuclear cells may help in making a treatment decision. The general conclusion is that the probability of septic arthritis increases by increasing joint fluid white cell count and increasing percentage of polymorphonuclear cells. The degree of macroscopic cloudiness of the joint fluid relates in most occasions to its cell content and may guide the clinician towards joint inflammation. Joint infections produce cloudy to purulent-looking joint fluid, but exceptions are not infrequent. Joint fluid originating from non-inflamed joints is usually transparent. Joint fluids with a cell count >50.000 cells/uL are classified as septic, but infections may occur with lower cell counts and counts in the septic range may be due to crystal arthritides and other causes. Cell counts >1.500 cells/uL. usually originate from inflamed joints.

A diagnosis of crystal arthropathy relies on the detection of crystals, and joint fluid aspiration is mandatory as a diagnostic procedure.
There was less consensus about the usefulness of joint fluid aspiration in case of haemarthros. In general, the unexpected aspiration of blood from the joint may raise the suspicion of osteochondral fracture if radiographic evidence is absent, and diagnostic evaluation could be extended (eg. computer tomography or magnetic resonance imaging). Evacuation of haemarthros after a reported history of joint trauma was considered only helpful in cases with major effusion and no acutely scheduled surgical intervention (i.e. conservatively treated ligament injury).
If a tumour is suspected, aspiration should be avoided because of the theoretical risk of spreading of malignant cells.

7. Imaging

In patients presenting with an acute swollen knee a plain X-ray of the affected joint in two planes (preferably a weight bearing AP view) should be performed. In specific situations additional X-rays may be helpful.
Ultrasound (US) may be helpful in detecting joint effusion and synovial hypertrophy if clinical examination is doubtful. US, MRI and other imaging modalities may be helpful in detecting intra- and extra-articular structural abnormalities and should be performed on indication.

It was generally considered useful to perform an X-ray of the affected knee if a patient presents with acute or recent onset swelling of the knee. The main reason is to find a fracture in case of trauma. A second reason is to detect erosive disease in case of RA, cartilage calcification in chondrocalcinosis, or thinning of the cartilage of the knee (joint space narrowing) as in osteoarthritis or RA. Though the diagnostic performance of a plain X-ray has not been carefully investigated, experts considered this procedure obligatory in view of the potentially rather high diagnostic yield, the good tolerability and the low costs. There was some deliberation about the usefulness of performing a plain X-ray of the unaffected knee; rheumatologists may do this, while orthopaedic surgeons usually do not. Consensus could not be reached, and it was decided to leave the unaffected knee out of the recommendations. Additional X-rays were considered to be potentially useful if an inflammatory rheumatologic condition (RA, PsA, AS) was suspected.
The second part of this recommendation refers to the usefulness of ultrasound (US) and magnetic resonance imaging (MRI) in patients with acute or recent onset swelling of the knee. A number of studies have addressed the diagnostic performance of US and to a lesser extent MRI against clinical examination. Karim et al reported that the sensitivity and specificity were far better for US as compared to clinical examination when histological findings after arthroscopy were considered the gold standard for inflammation (20). Apart from that, acceptable figures for inter-and intraobserver reliability were reported in this study, just as in a previous study examining the sources of variation with US examination of the knee (21). Kane et al investigated the diagnostic performance of US in comparison with clinical evaluation and came to similar conclusions (22). US was also evaluated in comparison to MRI with respect to detecting joint effusion, Baker's cysts and synovial membrane thickening. Overall, US performed as well as MRI. However, sensitive imaging procedures may lead to an overestimation of pathology, since two studies have reported abnormal findings in healthy individuals without knee symptoms (23, 24).
The experts considered the published evidence and concluded that especially US, and potentially MRI, could be helpful in making an appropriate diagnosis in a patient presenting with acute or recent onset swelling of the knee. They recognised that its greatest yield could

be in detecting joint effusion and/or inflammation in knee joints with a doubtful result after clinical examination. Whether or not a more sensitive detection of fluid and inflammation leads to a better outcome in the long term remains to be seen.

8. Diagnostic procedures

In patients presenting with acute swelling of the knee, diagnostic arthroscopy is only recommended in exceptional cases (eg. for a biopsy).

We could not find studies in literature that have systematically investigated the usefulness of diagnostic arthroscopy in patients with an acute or recent onset swelling of the knee of undefined origin. There was broad consensus among orthopaedic and rheumatologic experts that diagnostic arthroscopy does not have a place in patients presenting with acute or recent onset swelling of the knee. Exceptional cases in which diagnostic arthroscopy could be considered are a suspicion of infection by M. tuberculosis or by yeasts. In light of the invasiveness of the procedure and the risk of complications, the expert committee felt unanimously that arthroscopy for diagnostic purposes solely cannot be justified and should therefore be abandoned. Note that this recommendation does not extend to therapeutic arthroscopies, but with the proviso that the therapeutic manoeuvres should be based on carefully obtained diagnostic information.

9. Diagnosis

On the basis of the procedures described thus far it should be attempted to make an appropriate diagnosis which should be the basis for further therapeutic decisions. Meanwhile, general measures can be useful to relieve symptoms

This recommendation is included to stress the importance of an appropriate diagnosis before a therapy is started. The expert committee voiced the experience that all too often a therapy is started without exact knowledge about the cause of the knee swelling. In light of the causal heterogeneity with regard to acute or recent onset swelling of the knee, and the differences in treatment decisions that should follow, the expert committee recommends all necessary efforts to make an appropriate diagnosis, in consideration of the fact that such a diagnosis may be as unspecific as “undifferentiated arthritis”, after careful exclusion of other causes. Since this diagnostic process may take time, the committee advocates general measures to relieve pain and other symptoms.

10. Initial management

General measures to relieve pain and swelling in patients presenting with an acute swollen knee should be tailored to the individual patient and may include partial- or non-weight-bearing, splints, cold packs, the prescription of simple analgesics and non-steroidal anti-inflammatory drugs if not contraindicated. Antibiotics should not be started before appropriate diagnostic sampling has been performed. Intra-articular steroids should not be administered unless an appropriate diagnosis has been made and contraindications have been ruled out.

This recommendation spells out the kind of general measures that are mentioned in the 9th recommendation. It should be stressed that none of these measures described here have appropriately been tested in randomised controlled trials. As such, this set of general measures forms the aggregated experience of the orthopaedic and rheumatologic experts in the room. Two therapeutic measures (antibiotics and intra-articular steroid injection) are specifically referred to in the text of the 10th recommendation, since they constitute rather specific measures but are often applied when a diagnosis has not (yet) been made, in order to relieve symptoms (corticosteroid injections) or as a precaution (empirical antibiotics). The

committee unanimously agreed that this should be avoided until an appropriate diagnosis was made or relevant diagnoses are ruled out.

Discussion:

Using the template of EULAR's standardised operating procedures for the elaboration and implementation of evidence-based recommendations, we have established a set of recommendations that is endorsed by two professional organisations: EULAR and EFORT. They represent the major medical specialties in the field of musculoskeletal medicine, orthopaedic surgery and rheumatology.

The main aim was to find consensus with regard to a mutual field of interest, in order to better streamline professional opinions and performances across medical disciplines, and to avoid unnecessary variation in practice performance, that is difficult to explain to patients, colleagues and decision makers.

The first topic of interest was chosen for reasons of convenience: 'acute or recent onset swelling of the knee'. This topic indeed provided common grounds, which is necessary for a fruitful interdisciplinary discussion. Undoubtedly, the choice of the topic is of pivotal importance for the success of the process. If inter-disciplinary opinions are very conflicting, the probability of establishing a consensual list of recommendations is probably low. Somewhat surprisingly, 'acute or recent onset swelling of the knee' was not a topic in which opinions were extremely divergent, and it was not difficult at all to arrive at recommendations that were endorsed both by rheumatologists and orthopaedic surgeons. Although this experience is encouraging with regard to future endeavours of consensus, it should be noted that the process of seeking expert consensus that we used may work well in the expert committee, but has no bearing surface outside the committee. EULAR therefore considers implementation of the recommendations as one of the most important steps of the entire procedure (1).

A methodological limitation of a 'convenient topic' may be that the process of literature research becomes subordinate to the aim of achieving consensus. It was known in advance that the construct of 'acute or recent onset swelling of the knee' probably was too specific to expect a great yield from literature research. A well recognised but complicating factor was that clinical research often has a particular disease as a starting point, rather than a symptom or a sign, and is usually carried out within the boundaries of a particular medical discipline. As a consequence, the yield of the literature research was very poor, stressing and confirming the paucity of 'symptom-driven research', especially if that symptom or sign covers different medical disciplines. A formal rating of the level of evidence supporting every recommendation was therefore disappointing (Category 4 for all recommendations), and the consequent rating of the strength of the recommendation yielded Level D.
The status of this set of recommendations therefore deviates from the status of other EULAR-endorsed sets of recommendations in rheumatology, in that the scientific strength of the recommendations does not surpass that of expert consensus. But consensus among specialists is a *conditio sine qua non* before fruitful research can be initiated, and this set of recommendations could also be seen as hypothesis generating, in addition to recommendations for clinical practice. Every separate recommendation is a testable hypothesis that could be challenged in future clinical research performed by representatives of both professional organisations, in order to increase scientific evidence to such a level that a

truly evidence-based set of rigorous recommendations becomes within the scope of a task force like ours. It is therefore that these recommendations deserve an update after approximately 5 years, so that new clinical evidence that has become available can be critically weighed and incorporated in the recommendations. In the mean time, both international societies will start to implement these recommendations by using them as a template for discussions with the stakeholders of the target population (general practitioners and other health care professionals), thus stressing the importance of uniformity of practice performance.

It is recommended to further endorse such task forces, that may explore and weigh existing evidence at the interface of specialities and establish research agendas for the next decade, in order to improve the care for patients that are presented to orthopaedic surgeons as well as to rheumatologists. After this successful start, future collaborative task forces may also include representatives of patients, general practitioners and paramedic health professionals, in order to further increase the bearing surface of the expert committee.

Table 3: Recommendations for the diagnosis and initial management of patients presenting with an acute or recent onset swelling of the knee

Recognition	A patient presenting with acute swelling of the knee should undergo thorough clinical examination in order to confirm swelling
Referral	Patients with a suspicion of septic arthritis or trauma with an onset of swelling within 12 hours, should be referred immediately to a physician experienced in musculoskeletal diseases Bone tumours are rare but patients with a suspicion of bone tumour should be referred to an orthopaedic surgeon within 1 week. Patients with a suspicion of inflammatory arthritis should be referred to a rheumatologist within 6 weeks
History	In addition to taking a conventional medical history (including previous and concomitant diseases and medication) specific information should be obtained about traumatic versus non-traumatic causes, the speed of onset, the characteristics of pain, first- versus recurrent episodes, the presence of fever, the involvement of other joints and/or back, and a recent history of infection
Physical examination	Physical examination of a patient presenting with an acute or recent onset swelling of the knee should first focus on the affected knee and should include the unaffected knee as well as an appropriate assessment of the other joints. A general physical examination should be performed on indication. The examination of the knee should include the localisation and characteristics of the swelling (intra- versus extra-articular), the detection of effusion, testing stability, general or local tenderness, skin temperature and appearance, the range of motion, and a muscular and neurovascular assessment.
Laboratory tests	In patients presenting with an acute swollen knee of traumatic origin laboratory testing is not helpful in making a diagnosis. In patients presenting with an acute swollen knee of non-traumatic origin, normal acute phase reactants and normal white blood cell count may be helpful in decreasing the probability of inflammatory diseases including especially septic arthritis. Other laboratory tests should be performed on indication
Joint fluid aspiration	In the diagnostic process of a patient presenting with an acute swollen knee joint fluid aspiration should be performed in patients suspected of having septic, crystal or inflammatory arthritis. Joint fluid should be examined macroscopically and microscopically for leucocytes, crystals and bacteria (gram-staining and culture). In cases of significant traumatic effusion without radiographic evidence of a fracture, aspiration of hemarthros can be performed as well. In case of suspicion of a tumor joint fluid aspiration should not be performed.
Imaging	In patients presenting with an acute swollen knee a plain X-ray of the affected joint in two planes (preferably a weight bearing AP view) should be performed. In specific situations additional X-rays may be helpful. US may be helpful in detecting joint effusion and synovial hypertrophy if clinical examination is doubtful. US, MRI and other imaging modalities may be helpful in detecting intra- and extra-articular structural abnormalities and should be performed on indication.
Diagnostic procedures	In patients presenting with acute swelling of the knee, diagnostic arthroscopy is only recommended in exceptional cases (eg. for a biopsy).
Diagnosis	On the basis of the procedures described thus far it should be attempted to make an appropriate diagnosis which should be the basis for further therapeutic decisions. Meanwhile, general measures can be useful to relieve symptoms
Initial management	General measures to relieve pain and swelling in patients presenting with an acute swollen knee should be tailored to the individual patient and may include partial- or non-weight-bearing, splints, cold packs, the prescription of simple analgesics and non-steroidal anti-inflammatory drugs if not contraindicated. Antibiotics should not be started before appropriate diagnostic sampling has been performed. Intra-articular steroids should not be administered unless an appropriate diagnosis has been made and contraindications have been ruled out.

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R BM Landewé, KP Günther, C Lukas, et al.

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