

Department of Social Protection

Rheumatoid Arthritis

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1. Overview and Definition of Rheumatoid arthritis

1.1 Overview

Rheumatoid arthritis is a chronic inflammatory systemic disease (NICE, 2009) which is variable in its effects but can progress swiftly to become severe and disabling in a short period of time (Young, 2000). The disease primarily affects the synovial joints, resulting in pain, deformity and eventual functional limitation, causing substantial morbidity and accelerated mortality (Cush et al, 2007). The condition also has widespread extra articular manifestations including vasculitis, inflammation in the heart and lungs and peripheral neuropathy. The disease confers an increased risk of many other diseases including cardiovascular disease, pulmonary dysfunction, renal disorders and intestinal pathologies, along with a significantly increased risk of premature death (NCCCC, 2009).

In economic terms rheumatoid arthritis is a costly disease, both at a personal and at a societal level (Cush et al, 2008). It is a condition which has a peak onset during middle age, therefore predominantly affecting individuals of working age (Bevan et al, 2009). Approximately 75% of new diagnoses are of individuals who are working at the time of diagnosis (NAO, 2007).

Research confirms the devastating effect the disease may have; the ability to work is affected in around 50% of individuals within 5 years (WHO, 2003), with every third individual diagnosed with RA becoming work disabled. Up to 85% of individuals with RA who are able to work will experience lost days due to the condition, losing almost 40 days per year on average (Burton, Morrison, Maclean and Ruderman, 2006). Others more severely affected will be unable to continue working. Young et al. (2002) reported that 22% of individuals diagnosed with RA will stop working altogether within 5 years due to their condition, and a further 18% will cease to work within 5 years of diagnosis due to a combination of RA and other factors such as depression. Other studies have reported the incidence of work related disability to be even higher - up to 50% (Young, 2000).

In terms of cost to the Irish economy this results in a considerable annual burden. Research by Arthritis Ireland in 2008 estimated the annual indirect cost of lost production time due to all forms of arthritis to be €1.6 billion, and found that 70% of individuals diagnosed with RA in Ireland were not able to work outside their home (Bevan et al, 2009).

In terms of direct healthcare costs, rheumatoid arthritis also consumes considerable costs and resources in its management. Estimates in the UK reveal that care for the estimated 580,000 individuals with the condition costs the NHS £560 million annually to treat, with the majority of the costs arising in the acute setting (National Audit Office, 2009). The cost to the economy in the UK in terms of sick leave and disability arising from rheumatoid arthritis alone is estimated at £1.8 billion per year, with incapacity benefits alone estimated at £122 million (Hansard, 2009). Overall, the total cost to the UK economy of rheumatoid arthritis may be as high as £4.8 billion per year (NICE, 2009). Applying these figures to Irish prevalence rates would estimate the total cost to the Irish economy of rheumatoid arthritis may be £330 million annually.

These very significant costs can be allayed to some extent, as there is considerable evidence that early diagnosis and intervention is extremely effective at limiting disability. The National Audit Office in the UK estimates that treating 10% of new patients within 3 months of diagnosis could result in productivity gains of £31million for the economy due to reduced sick leave and lost employment (NAO, 2009).

1.2 Definition of Rheumatoid arthritis

Rheumatoid arthritis is a chronic inflammatory disease, producing joint damage mediated by cytokines, chemokines, and metalloproteases. It is speculated that rheumatoid arthritis is a relatively new disease because there is a surprising lack of historical evidence for its existence (Hansen, 1995). The disease is systemic, characteristically affecting the synovial joints and periarticular synovial structures (bursae and tendon sheaths) in particular). This typically starts with the small bones of the hands and feet, although any joint can be involved. In advanced cases of the condition, most joints are become affected. The systemic nature of the condition means that many other organs may become involved as the condition progresses. Examples of extra-articular involvement can include symptoms and effects such as fever, weight loss, fatigue or weakness, swollen lymph nodes, anemia, nodules, dry eyes, fibrosis of the lungs, fluid in the chest cavity, vasculitis, neuropathy, GI, and kidney disease.

The trigger for the disease is not known, but is thought to be autoimmune. The condition is variable in its initial presentation. Symptoms can occur either as a single episode of stiff and painful joints which may last some months, or as an aggressive and destructive condition which progresses rapidly, and if unchecked, leads to severe physical disability. Characteristically however the disease usually presents as a small joints bilateral polyarthritis. The condition is follows a pattern of remission and relapse over many years.

The main joint pathology in rheumatoid arthritis is an auto-immune mediated thickening and inflammation of the synovial membrane, which becomes infiltrated with inflammatory cells. The synovial lining layer involves vascular tissue, termed pannus, which grows over cartilage and causes erosion of articular cartilage and underlying bone due to its high content of macrophages and osteoclasts. With time this results in degeneration of the cartilage and the joint.

Plasma cells in the subsynovium synthesise large quantities of immunoglobulin much of which is IgG and IgM rheumatoid factor (i.e. immunoglobulin with reactivity to self Ig-G and IgM). These autoantibodies form immune complexes that activate complement and this can cause and maintains local inflammation.

Rheumatoid nodules develop in about 30% of patients with RA. They are granulomas consisting of a central necrotic area surrounded by palisaded histiocytic macrophages, all enveloped by lymphocytes, plasma cells, and fibroblasts. Nodules and vasculitis can also develop in many visceral organs. Other granuloma formation may be seen on the surface of the pleura, pericardium and endocardial valves.

Systemic or extra articular features (detailed earlier in this section) occur in 8-12% of

individuals with Rheumatoid Arthritis and are associated with significant morbidity and increased mortality (Turesson et al, 2002). Many of these features are associated with increased inflammation markers and disease activity, re-iterating the need for early, aggressive treatment (Levesque, 2008).

1.3 American College of Rheumatologists Classification of Rheumatoid Arthritis

This classification system is the most commonly used classification for rheumatoid arthritis; however it is important to note that the classification system was defined for research purposes and was not primarily aimed at providing a classification for clinical diagnosis. The 2009 National Institute of Clinical Excellence Guidelines (NCCCC, 2009) comment that given the importance of early intervention, any persistent synovitis with characteristics suggestive of rheumatoid arthritis should be treated as rheumatoid arthritis to attempt to prevent joint deterioration, whereas this classification system would exclude such presentations on duration grounds.

The 1987 American College of Rheumatology Classification Criteria for Rheumatoid Arthritis (Arnett et al, 1987) states that individuals must have at least four of the following seven criteria, the first four to have been present for at least 6 weeks:

- Morning stiffness lasting at least 1 hour before maximal improvement
- Soft tissue swelling in three or more joints
- Swelling in hand joints
- Symmetric joint swelling
- Erosions or decalcification on x-ray of hand
- Rheumatoid nodules
- Abnormal serum rheumatoid factor.

1.4 International Classification of Diseases; 10th Edition (ICD-10) Classification

The World Health Organisation, in the 10th Edition of the International Classification of Diseases (ICD-10) (World Health Organisation, 2007); classifies rheumatoid arthritis under Inflammatory polyarthropathies and applies the following diagnostic classification for Rheumatoid arthritis:

M05 Seropositive rheumatoid arthritis (excluding rheumatic fever, juvenile rheumatoid arthritis, RA of spine)

M05.0 Felty's syndrome - rheumatoid arthritis with splenomegaly and leukopenia

M05.1+ Rheumatoid lung disease

M05.2 Rheumatoid vasculitis

M05.3+ Rheumatoid arthritis with involvement of other organs and systems

M05.8 Other seropositive rheumatoid arthritis

M05.9 Seropositive rheumatoid arthritis, unspecified.

2. Epidemiology

The worldwide prevalence of rheumatoid arthritis is estimated to vary between 0.5 to 1.5% with geographic variances (Jonsson, 2008). The prevalence is estimated to be much lower in developing countries than the western world.

In Ireland, the exact prevalence has not been established, however studies in Dublin indicate a prevalence rate could be estimated at 0.5% (Power et al, 1999). A more recent estimate from Arthritis Ireland (2009) suggests there are 40,000 individuals with rheumatoid arthritis in Ireland which would equate to a prevalence of 1.22% (NAOb, 2009).

The condition is two to three times more common in women (NRAS, 2006). Arthritis Ireland (2009) estimates that 70% of the rheumatoid arthritis affected by the disease in Ireland are women.

Peak age of onset worldwide is between 35 to 45, again with geographic variances (Bone and Joint Decade, 2005).

There is no explanation of the reason for the geographic variances (NAOb, 2009).

There are no predictions for the future prevalence of rheumatoid arthritis, although some studies are indicating a decline in incidence (Silman, 2002), and an increase in the average age of onset (Kaipiainen-Seppanen, 1996). A suggested reason for the decline in rheumatoid arthritis is hygiene (Silman, 2002).

Rhematoid arthritis is associated with an increased risk of premature death. This is commonly due to cardiovascular disease, with studies indicating that individuals with rheumatoid arthritis have an accelerated rate of developing atherosclerosis, driven by inflammatory processes similar to those in rheumatoid disease (Wallberg et al, 2000). The increased risk of cardiovascular disease may also reflect the use of certain medications in the treatment of rheumatoid arthritis (Buch, 2002).

3. Aetiology

3.1 Overview

Although rheumatoid arthritis is regarded as an autoimmune disease, details of its pathogenesis remain unclear. It is probably a multifactorial disease which occurs when several risk factors occur simultaneously.

There is considerable evidence for an important genetic component and a substantial portion of this risk seems to lie in the presence of class II allele human leukocyte antigen (HLA-DRw4) (Gregersen et al, 1987). Variants of PTPN22 and other genes have also been identified as risk factors for RA (van der Helm-van Mil et al, 2007).

There are a number of non-genetic factors which have been suggested. Predominant non-genetic theories include suggestions that an infective cause or trigger is involved, and that environmental influences may play a part. Several observations suggest that the inflammation in rheumatoid arthritis is a T-Cell mediated phenomenon.

Cigarette smoking is also thought to play a role. It has been suggested that the risk of developing rheumatoid arthritis is almost twice as high in smokers than in non-smokers (Silman, 2000). More recent studies indicate that the risk is especially high in males who are rheumatoid factor positive, and in both male and female heavy smokers (Sugiyama et al, 2010).

The onset of rheumatoid arthritis has a seasonal variation, onset of the condition occurs almost twice as commonly in the winter than in other seasons. The reason for this is not known.

4. Diagnosis

4.1 Overview

Early diagnosis is key to the management of rheumatoid arthritis, in order to prevent damage to joints and extra-articular complications, to avoid costly medical treatment and surgical interventions, and to prevent the development of functional limitation (Bevan, 2009). There are a number of challenges to achieving this early diagnosis.

Evidence indicates that one of the main barriers to the early initiation of treatment for rheumatoid arthritis is that an affected individual may not recognise the potential severity of the symptoms, and therefore delays seeking a medical opinion (Kumar et al, 2007). Public awareness of rheumatoid arthritis as a condition is not high. Although the common symptoms and signs are joint swelling, stiffness and deformity, nodules, vasculitis and malaise, this is often of slow onset with progressive joint involvement which may mean that an individual considers the symptoms to be minor – or mistakenly attributes the symptoms to normal signs of the aging process – and does not recognise the need to seek early intervention and treatment.

Estimates from the National Audit Office in the UK (NAO, 2009) suggest that around 50-75% of individuals with RA do not visit their GP until their symptoms have been present for more than three months. They also suggest that around 20% of rheumatoid arthritis sufferers wait over a year before first seeking medical help.

Delays also occur once an individual has presented to their GP. As rheumatoid arthritis is not common, the average GP can expect to see an undiagnosed case of rheumatoid arthritis approximately every two years (NCCCC, 2009). The condition is also highly variable in presentation, and has no precise diagnostic or laboratory test which would confirm that rheumatoid arthritis is present. In the early stages of the disease with milder onset most laboratory investigations and x-rays are likely to be normal, particularly if the joint involvement is limited to the small bones of the hands or feet (NCCCC, 2009). An initial approach of prescribing simple analgesia may be extremely effective in controlling symptoms (but not the progression) of the disease – leading to a false reassurance that the individual's symptoms do not indicate the presence of a significant disease. In the early stages of rheumatoid arthritis, it can therefore be very difficult to diagnose unless the GP has specialist knowledge about the condition.

The NAO report referred to above, estimates that the average rheumatoid arthritis sufferer will visit a GP at least 4 times before being referred to a specialist. Moreover, almost 20% of patients will visit their GP more than 8 times before a possible diagnosis of rheumatoid arthritis is considered, and referral to a specialist arranged (NAO, 2009). However, many GPs will request rheumatoid factor pathology tests and x-rays prior to referral to a specialist. It is suggested this delay may be unnecessary, as up to half of all individuals with rheumatoid arthritis will not test positive for rheumatoid factor. Though x-ray investigations may be useful in confirming a suspected diagnosis, they are often normal in early presentations of the condition.

Evidence also suggests that despite the evident benefits of early treatment when a firm diagnosis is made within 3 months from the onset of symptoms, only 10% of individuals with rheumatoid arthritis will, in fact, receive a diagnosis within three months of the development of their symptoms (NAO, 2009).

NAO modelling studies for the UK propose that although treating individuals much sooner would increase the immediate direct costs of treatment of rheumatoid arthritis, (especially given the fact that many of the rheumatoid arthritis treatments which are effective are also costly) the indirect cost savings of early rheumatoid arthritis intervention far outweigh these increased costs. Estimates reveal that increasing the proportion of people diagnosed within the recommended 3 month time window from 10 to 20 per cent would initially increase costs to the NHS by £11 million over five years in terms of increased drug expenditure, but increased care costs would become cost neutral after 9 years. However, in terms of productivity gains, this would save £31 million to the UK economy due to reduced sick leave and lost employment. The report suggests that this would also result in an increased quality of life of >4% in the first 5 years in terms of quality adjusted life years (QALY) gained (NAO, 2009).

NOTE: There are a number of GPs who use the American College of Rheumatologists diagnostic criteria to imply a diagnosis of rheumatoid arthritis (NAO, 2009). It is strongly suggested by the recent NICE guidance (NCCCC, 2009), that this criteria is not used for diagnostic purposes as the criteria were primarily designed for research purposes rather than clinical practice, Rigid application of those criteria are not appropriate for the detection of early cases of rheumatoid arthritis.

4.2 Clinical Features

Presentation of rheumatoid arthritis is extremely variable but typically follows a relapsing and remitting course. The condition should be suspected in any patient with persistent synovitis, where no other obvious cause can be found (see differential diagnoses). Onset of the condition can be acute with simultaneous inflammation in multiple joints but is more often insidious with progressive joint involvement. The small joints of the hands (PIP and MCP) and feet (MTP) are often the first joints to be affected, and progression is usually symmetrical. Wrists, elbows and ankles are also typically involved but any joint may be affected

The condition results in joints becoming tender, swollen and warm with both stiffness and limitation of function; resulting in both active and passive movements becoming limited. Affected joints can feel 'boggy' and tender on palpation. The stiffness results from joint effusion and florid synovitis and is commonly worse in the morning or after periods of inactivity, but does not usually improve after 30 minutes as with osteoarthritis.

Pain is present which is worse at rest or after periods of inactivity. Tenderness of affected joints is a very sensitive sign and synovial thickening, eventually of all affected joints, is a most specific sign.

Inflammatory tenosynovitis can erode through tendons causing rupture and compression of nerves by synovitis and this can commonly lead to compression

syndromes such as carpal tunnel syndrome.

It should be noted that the diagnosis of rheumatoid arthritis can be challenging in women. This is due to hormonal influences affecting how the condition behaves – for example, use of the oral contraceptive pill postpones or modifies the presentation. Clinical signs of rheumatoid arthritis may vary in line with the menstrual cycle and can either abate or flare in pregnancy or during the post-partum period.

Rheumatoid Arthritis is a systemic disease and can present with a number of extra-articular conditions, especially as the condition progresses and disease activity increases. Signs of systemic involvement include fever, anorexia, fatigue, swollen lymph nodes, anaemia, nodules, dry eyes, fibrosis of the lungs, fluid in the chest cavity, vasculitis, neuropathy, GI, and kidney disease.

Signs and symptoms of rheumatoid arthritis and presentation of the condition can also be affected by the presence of comorbid conditions.

After a variable period of time, rheumatoid arthritis may become inactive and may then be described as “burn out”. At this stage there may be no swelling or redness, but deformed joints, surgical scars and muscle wasting may all be evident.

4.2.1 Joint Involvement

Individual joints may be affected as follows:

- **Cervical spine** - this is commonly involved and can result in neck pain or stiffness, paraesthesiae and sensory changes. Other features in the more advanced stages include abnormal gait and urinary retention if there is spinal cord compression, or a "Cock robin" posture develops due to erosion of vertebral body (ies) in cervical and upper thoracic areas. In advanced disease subluxation of the atlanto-axial joint may be life-threatening.
- **Hands and wrists** - Fixed deformities (especially flexion contractures), may develop rapidly; ulnar deviation of the fingers with an ulnar slippage of the extensor tendons off the metacarpophalangeal joints is typical, as are swan-neck and boutonnière deformities. Over time the metacarpophalangeal joints sublux. Range of movement and strength may be dramatically reduced. Carpal tunnel syndrome can result from wrist synovitis pressing on the median nerve.
- **Feet and ankles** – Metatarsophalangeal joints, talonavicular, subtalar, and ankle joints can be involved. Other conditions include hallux valgus (lateral deviation of the toes); Dorsal subluxation of the metatarsophalangeal joints; metatarsalgia; collapse of the medial and lateral arches resulting in pes planus and heel valgus (which is often accelerated by rupture of the tendon of tibialis posterior); Hammer toes, are likely to be encountered.
- **Shoulders** - Effusions with inflamed rotator cuff tendons give rise to painful abduction arcs and loss of shoulder movements. Rupture of the rotator cuff can occur.

- **Elbows** - 75% of patients with rheumatoid arthritis complain of elbow pain, 20% severely. Joint effusions, progressing to bony destruction may occur. Range of movement and strength decreases, especially in pronation and supination.
- **Hips** - Subtle reduction of internal rotation. Though active synovitis may be severe and result in painful limited movements at the hip joint in all planes.
- **Knees:** These joints may also be involved.
- **Temporo-mandibular joints:** These joints may also be involved with pain, tenderness and swelling.

4.2.2 Patterns of Onset

There are a several distinct patterns of onset of rheumatoid arthritis. These include:

- **Insidious onset:** In 70% of cases, increasing joint involvement develops over weeks or months. This has a relatively poor prognosis. Usually peripheral small joint involvement is followed by proximal joint (knees and hips) involvement.
- **Palindromic;** In about 20% of patients, persistent joint disease is preceded by self limiting attacks of a few days of synovitis in various joints. About 50% of patient who have these self limiting attacks eventually develop chronic rheumatoid arthritis.
- **Explosive onset:** 10% of cases show precipitate onset with severe symmetrical polyarticular involvement occurring over 24 to 48 hours. Paradoxically they seem to do better in the longer term
- **Systemic onset:** Fever, myalgia, weight loss, anaemia, pleural effusions and vasculitic lesions may be severe sometimes in the absence of marked joint pathology. It is particularly common in middle aged men.
- **Mono and Pauci articular onset:** Patients with limited joint involvement, usually young women, who are persistently seronegative for rheumatoid factor; usually pursues a benign course.
- **Polymyalgic onset:** Limb girdle muscle symptoms may precede overt arthropathy particularly in the elderly. It may be difficult to differentiate from polymyalgia rheumatica initially. There is an impressive response to steroids initially but less so with progression of synovitis.

4.2.3 Non-Articular Involvement

The degree of non-articular involvement (the systemic features of the disease) varies and may precede articular disease. Non-articular symptoms include:

- General malaise – which can vary from a feeling of being a bit ‘off colour’ to marked fatigue

- Fever
- Sweats
- Weight Loss
- Involvement of other body systems (for example eye, lungs, heart)
- Lymphadenopathy

4.3 Other History

4.3.1 Family History

A family history of rheumatoid arthritis has been shown to be a risk factor for developing the disease in a number of studies. Recent research suggests that a positive family history in first degree family relatives is strongly linked to the early appearance of significant radiographic (x-ray) joint damage (Rojas-Villarraga et al, 2009). The condition is strongly associated with the inherited tissue type Major histocompatibility complex (MHC) antigen HLA-DR4 (most specifically DR0401 and 0404).

4.4 Physical Examination

In the early stages of rheumatoid arthritis it is possible that physical examination may reveal little or no physical signs. The first physical signs are usually soft 'boggy' type swellings resulting from synovitis. Knee effusions are also common. Crepitus may be detected in early disease of degenerative joints.

In one third of individuals rheumatoid nodules can be found – these are hard, firm swellings over extensor surfaces.

A common measure of progression which is carried out during physical examination in a joint count; tenderness and swelling are measured separately. Swollen joint count is a better measure of inflammation than tender joint count because tenderness may be due to other causes whereas swelling is usually not.

4.5 Investigations

There is no single investigation which can confirm a diagnosis of rheumatoid arthritis. Investigations should be used to support a clinical diagnosis, as many investigations may show normal results when rheumatoid arthritis is present.

Until recently, Rheumatoid Factor (RF) was the first line investigation used to support diagnosis of rheumatoid arthritis. More recently, an assay of anti-CCP (antibody to cyclic citrullinated peptide) has become available and is showing promise of increased sensitivity and specificity (67% and 95% respectively, versus

69 and 85% for RF). Its exact role is yet unclear (Nishimura, 2007). However, recent National Institute of Clinical Excellence (2009) guidance has suggested that in view of the increased cost of anti-CCP, research is needed to confirm if this test is cost-effective for all cases of rheumatoid arthritis, or just for cases where RF assay has not confirmed a diagnosis (e.g. RA strongly suspected, but RF assay negative).

4.5.1 Laboratory Investigations

Other laboratory investigations which may be of value include:

- Inflammation markers - erythrocyte sedimentation rate (ESR) or C-reactive protein (CRP) or plasma viscosity - markers are usually raised in rheumatoid arthritis (but may be normal). It should be noted though, that baseline CRP has been shown to be a poor predictor of whom will develop rheumatoid arthritis (Aho, et al, 2000; Van Aken et al, 2006; Koiyula et al, 2007)
- Full blood count (FBC): Normochromic, normocytic anaemia and reactive thrombocytosis common in active disease
- Urea & electrolytes (U&E) to provide a baseline renal function measurement – most treatments for rheumatoid arthritis can have an adverse effect on renal function
- Liver function tests (LFT): Mild elevation of alkaline phosphatase and gamma-GT common in active disease.
- Uric acid/ synovial fluid analysis will assist in excluding polyarticular gout
- Urinalysis Microscopic: haematuria/proteinuria may suggest connective tissue disease
- Rheumatoid factor (RF) - It should be noted this is only positive in 60-70% RA patients.
- Antinuclear antibody (ANA) Positive in SLE and related conditions, and in up to one third of RF-positive RA patients. This test may show some positivity in approximately 10% of individuals who have no disease present.

4.5.2 Imaging

Imaging investigations which may be of value include:

- Radiological Investigation – this may show periarticular osteopenia and/or erosions. A chest x-ray is often performed to exclude lung involvement.
- Ultrasound and magnetic resonance imaging – Evidence suggests that ultrasound and MRI scans are highly sensitive at detecting synovitis, erosions and early inflammatory and damage signs that would not be detected on conventional x-rays (Conaghan et al, 2003; Wakefield et al, 2000). There is little evidence however, on the long term significance of these findings (NCCCC, 2009)

5. Differential Diagnosis

There are a number of conditions which should be considered as a differential diagnosis from rheumatoid arthritis. These include:

- Osteoarthritis – some of the differentiating features are the easing of morning stiffness in osteoarthritic patients, the lack of inflammation and pattern of joint involvement with the disease of linked systemic features.
- Viral Arthritis (e.g. varicella)
- Reactive arthritis (e.g. post viral infection, gout), conditions which arise from crystal deposition in joints may mimic the swelling and redness of rheumatoid arthritis
- Seronegative spondylarthropathy
- Connective tissue disease such as lupus erythematosus - rheumatoid arthritis shares many features with other collagen vascular diseases, particularly SLE
- Polymyalgia rheumatica, particularly in the elderly
- Polyarticular gout
- Fibromyalgia
- Systemic disease which present with arthropathy such as sarcoidosis
- Amyloidosis
- Inflammatory bowel disease - Crohn's disease and ulcerative colitis are both frequently associated with inflammatory joint manifestations

(SIGN, 2000; NHS Institute for Innovation and Improvement, 2009)

6. Treatment

6.1 Treatment Options for Rheumatoid Arthritis

Treatment options for rheumatoid arthritis have changed dramatically over the last decade, with a differing approach to the initiation of disease modifying anti-rheumatic drugs, and the development of new and more effective medications meaning that early and aggressive intervention can often achieve disease remission before substantial joint damage and disability have occurred.

6.1.1 Treatment Goals

The ultimate treatment goal is remission – complete suppression of disease activity (WHO, 1994). This overarches other treatment goals which include:

- Control synovitis
- Relieve Pain
- Maintain functional ability
- Improve and maintain quality of life
- Minimise adverse events, particularly from pharmacological therapy
- Provide cost effective treatment

6.2 Non-Pharmacological Therapies

6.2.1 Patient Education & Self Management Plans

In line with many other long term and chronic diseases; patient education and the use of self management plans are recommended for people with rheumatoid arthritis. Also in line with many other conditions, there is little evidence to support the hypothesis that effective patient education will improve outcomes; however there is clear observational evidence that individuals with rheumatoid arthritis wish to be well informed about their condition, and would like written and verbal information to be provided to them.

The 2009 NICE guidelines note the lack of evidence supporting the use of patient education and self management plans but in view of the noted wish of individuals to be well informed about their condition, recommend the use of techniques such as lay-lead patient education programmes, and the provision of written and verbal information in order to improve an individual's understanding of their condition and counter any misconceptions they may have.

(NCCCC, 2009)

6.2.2 Occupational Therapy

Occupational therapy covers a wide range of interventions and therapies which can provide considerable benefit for those people with rheumatoid arthritis. Activities include interventions such as work place assessments, employer liaison, functional capacity evaluation, stress and pain management techniques, counselling and family support. Interventions also include the provision of functional aids and assistive devices, hand and upper limb therapy, assessment of housing needs and environmental modifications; and the provision of self management advice and techniques (NCCCC, 2009).

Joint protection interventions such as adaptation of movement patterns or the use of assistive devices and fatigue management strategies in terms of rest regimens, energy conservation techniques, etc, have been reported to result in a reduction in pain and physical symptoms, and to improve functional ability (Masiero et al, 2007).

Psychological techniques such as relaxation, imagery, stress management and cognitive coping skills have also been shown to reduce pain and improve functional ability, however the benefit of such techniques depends on the nature and duration, as well as the specific techniques which are used (Astin, 2007; NCCCC, 2009).

6.2.3 Physiotherapy

Thorough evaluation of benefits to be gained from physical therapy and baseline data gathering should be performed initially, including functional assessment (transfer status, gait analysis, activities of daily living etc.), range of movement of all joints, strength, posture and respiratory status. This gives a baseline for future reference and an accurate and objective basis for treatment goals (Ganz et al, 1998). The aim of physiotherapy is to reduce pain and stiffness, prevent deformity and maximise function and to improve independence and quality of life. Activities can be active (such as education and exercise), and passive (isometric or range of movement exercises, thermotherapy, electrotherapy such as Transcutaneous Electrical Nerve Stimulation (TENS) or ultrasound therapy).

Exercise and physiotherapy are used to maintain or to improve muscle tone in order to prevent or correct deformities and to maintain or increase joint mobility and function.

Exercise has been shown to be particularly beneficial to people affected by rheumatoid arthritis as they are often physically inactive (Sokka et al, 2008). Studies reveal that there is a higher risk of cardiovascular disease and osteoporotic fractures in individuals affected by rheumatoid arthritis than in the general population (Turesson, et al, 2007).

6.2.4 Splinting

Splinting can be used with the aim of resting inflamed joints, providing stabilisation and with the aim of preventing deformity and contractures. The 2009 NICE guidelines commented that there was little evidence to support an improved outcome with the use of splints, but recognised that many rheumatoid arthritis sufferers found symptomatic relief through their use (NCCCC, 2009).

6.2.5 Podiatry

Evidence suggests that almost all rheumatoid arthritis sufferers will experience problems with the bones of the feet, and that this is a significant cause of pain, mobility impairment and functional limitation (Wickman et al, 2004). 25% of individuals with rheumatoid arthritis report that problems with their feet are the main cause of their walking impairment, with 75% reporting that the effect of the condition of their feet contributes to their functional limitations (Kerry et al, 1994).

There are a variety of different aids which can be useful in terms of footwear. Appropriate footwear and orthoses are effective with regards to comfort level, and stride speed and length (MacSween et al, 1999). Custom built shoes have been shown to be effective, but mass produced (and therefore cheaper) insoles have less efficacy (NCCCC, 2009).

6.2.6 Dietetics

Both weight management particularly when weight bearing joints are involved, and interventions to address cachexia where patients do less well and have poorer functional status can be effective (Helliwell et al, 1984). Analysis of clinical trials of fish oil supplementation in RA concluded that while there was reduction in the number of tender joints and in duration of morning stiffness, no effect was seen on disease activity or progression of RA (Fortin et al, 1995).

6.3 Pharmacological Therapies

The most effective pharmacological therapies in the treatment of rheumatoid arthritis are the disease modifying anti-rheumatic drugs (DMARDs). There is strong evidence from a large number of studies to support the use of this class of drugs as early as possible following the onset of symptoms (NCCCC, 2009). Commencement of early and aggressive therapy has been shown to be the most effective factor in preventing ongoing morbidity and disability, and decreasing mortality rates (Pincus and Callahan, 1986; NCCCC, 2009). It is therefore suggested that DMARDs are commenced within the first three months of the onset of symptoms, although there is some evidence to suggest that this 'window of opportunity' may be extended if combination DMARD therapy is used (Mottonen et al, 2002)

6.3.1 Analgesics and Non-Steroidal Anti Inflammatory Drugs

Adequate pain control is the most common priority for individuals with rheumatoid arthritis (NCCCC, 2009). This will often be achieved as the disease is brought under control once DMARD therapy is commenced, but in some individuals, particularly those with a degree of joint damage, analgesia will become a regular requirement. However, the NICE 2009 guidelines comment that there are few good quality trials which focus on pain control specifically in rheumatoid arthritis, and none which look at analgesia in recently diagnosed patients (NHS Institute for Innovation and Improvement, 2009; NCCCC, 2009).

The two common analgesics groups used for rheumatoid arthritis are paracetamol,

either with or without codeine (prescribed separately); and non-steroidal anti-inflammatory drugs (NSAIDs). There is good evidence to support the use of paracetamol and/or codeine in chronic pain and in osteoarthritis (see **chronic pain** and **osteoarthritis protocols**). It would seem logical that this evidence would apply to rheumatoid arthritis also (NCCCC, 2009). If used, codeine should be prescribed separately rather than in combination products such as co-codamol, in order to allow better titration of the two products to achieve optimum pain control with the minimum dose of codeine possible (NHS Institute for Innovation and Improvement, 2009).

The second analgesic group commonly used for rheumatoid arthritis consists of NSAIDs such as ibuprofen, naproxen, and diclofenac. Others that can be considered include cyclo-oxygenase-2 (COX2) inhibitor drugs (e.g. rofecoxib, celecoxib and etoricoxib) which also have an anti-inflammatory and analgesic effect. NSAIDs have a number of adverse effects, the most significant of these being adverse gastrointestinal and cardiovascular effects. NSAIDs and COX2 inhibitors should be prescribed accompanied by a proton pump inhibitor (PPI) to protect against adverse gastrointestinal effects.

In terms of pain relief, analgesics and NSAIDs should be used as required, but at the lowest effective dose for the shortest period of time possible to avoid adverse side effects. If high levels of analgesia are required, or required for long periods, the NICE 2009 guidelines recommend that the disease status should be reviewed, in order to ensure there is adequate disease control (NCCCC, 2009).

6.3.2 Disease Modifying Anti-rheumatic Drugs (DMARDs)

The term DMARD originally referred to a class of drugs which affected biological markers of disease progression such as erythrocyte sedimentation rate (ESR), haemoglobin or autoantibody levels but now is more commonly used to refer to types of drugs which alter or halt disease progression and joint damage. As well as the beneficial effects in terms of structural joint damage, DMARDs act to intervene in positive feedback loops which occur as part of the inflammatory signalling response to the condition. Halting this specific effect has been shown to have a considerable beneficial effect on the progression of rheumatoid arthritis.

The approach for introduction of DMARD preparation used to be focussed on the detection of actual joint damage on radiographical examination, however more recently there is a wealth of evidence to suggest that DMARDs are at their most effective when introduced as early as possible once diagnosis has been confirmed, and to some extent should be considered in all cases of persistent synovitis even if a formal diagnosis of rheumatoid arthritis has not been confirmed (NCCCC, 2009).

Although considered 'older' than some of the more recently developed drugs, methotrexate is one of the more commonly used preparations, as the adverse effects are more controllable and can be easily monitored. Methotrexate is also commonly used in combination with other DMARD or biologic therapies, and if tolerated and not contra-indicated should be a first line choice for rheumatoid arthritis (NCCCC, 2009). Evidence suggests a combination of DMARD therapy is superior to monotherapy and newly –diagnosed individuals with *active* RA should be commenced on combination of DMARDs (including methotrexate and at least one other DMARD, plus short-term glucocorticoids). Once effective disease control is

achieved, the dosage of the combination therapy should be 'stepped down' to the lowest effective level whilst still achieving symptom relief.

Commonly used preparations are:

- DMARDs:
 - azathioprine
 - ciclosporin (cyclosporine A)
 - D-penicillamine
 - gold salts
 - hydroxychloroquine
 - leflunomide
 - methotrexate (MTX)
 - minocycline
 - sulfasalazine (SSZ)
- Cytotoxic drugs:
 - Cyclophosphamide

There are a number of potentially severe adverse side effects, many of which are intolerable to the individual and results in discontinuation of a particular drug. Adverse effects include liver, renal and bone marrow toxicity, pneumonitis (MTX), allergic skin reactions, autoimmunity and infections.

6.3.3 Biological Agents (Biologics)

Biologics are a class of drugs which are genetically engineered, and have been shown to slow the destruction of the joints and reduce inflammation more effectively than DMARDs. They represent a major break through in the treatment of rheumatoid disease. However they can be extremely expensive. They work by acting at various points on the immune pathway to suppress the reaction which results in inflammation and comprise of tumour necrosis factor antagonists (TNFAs) and other preparations such as cytokine inhibitors.

It is estimated that in the NHS, the cost of prescribing this form of therapy to individuals with rheumatoid arthritis equates to £160 million annually – accounting for the highest pharmaceutical spend in some hospitals (Bevan et al, 2009). However, for some individuals they are far more effective than traditional DMARDs in controlling symptoms and progression of the disease. They can be used alone but are more commonly used in combination with traditional DMARDs, particularly methotrexate.

Common biologics are:

- Tumour necrosis factor alpha (TNF α) blockers
 - etanercept
 - infliximab
 - adalimumab
 - certolizumab pegol (Cimzia)
 - golimumab (Simponi)
- monoclonal antibodies against B cells
 - rituximab (Rituxan)
- Interleukin 1 (IL-1) blockers
 - anakinra
- Interleukin 6 (IL-6) blockers
 - tocilizumab (an anti-IL-6 receptor antibody) (RoActemra, Actemra)
- T cell costimulation blocker –
 - Abatacept

A Cochrane review which overviewed research on the efficacy of six different biologics concluded that most were effective in controlling the symptoms of rheumatoid arthritis, in slowing the progression of the disease and reducing disability. They stated anakinra was slightly less effective than the other biologics which were reviewed. However, etanercept was stated to have fewer adverse effects (Singh et al, 2009) than the other drugs involved in their review.

Each drug has specific circumstances in which it should be used and can require careful prescription. A careful screening process to ensure suitability should be completed before prescription or administration. There are a number of reported side effects including toxicity.

6.3.4 Glucocorticoids

This class of drugs has been used in the treatment of rheumatoid arthritis for many decades, but with caution as the high doses involved can result in severe side effects. Their use is controversial (BMJ Best Practice 2009) as the evidence base supporting their use is limited. However observational studies show people with RA receive benefit from their use. They appear to have some disease modifying action and provide a contribution to overall disease control. In view that the observational evidence strongly supports their use, particularly because of the speed with which they bring symptoms under control (while traditional DMARDs can take some weeks

to have an effect). The NICE 2009 guidelines thus recommend their use as an adjunct to combination DMARD therapy.

Use of these drugs may alter and mask the symptoms of rheumatoid arthritis so should only be used once a formal diagnosis has been made (NHS Institute for Innovation and Improvement, 2009).

6.4 Surgical Interventions

Despite recent advances and development of pharmacological therapies for rheumatoid arthritis, and the introduction of early and aggressive treatment, there will be a number of affected individuals who will nonetheless develop irreversible joint or tendon damage (NCCCC, 2009). Surgical interventions can provide a return of functional ability, a decrease in symptoms and pain, and avoid deformity and disability. Typically, surgical interventions include joint replacement, (commonly hip, knee, shoulder, elbow and hand joints), but also include other procedures such as synovectomies, wrist stabilisation, forefoot arthroplasties and excision of the head of the radius, etc.

The most successful procedures for the complications of rheumatoid arthritis are carpal tunnel release, resection of metatarsal heads, total knee arthroplasty (after which synovitis disappears) and total hip arthroplasty.

Early consideration should be undertaken for surgery, as evidence suggests that intervention is more successful before substantial joint damage has occurred, or disability developed.

In the people with rheumatoid arthritis where optimal non-surgical treatment is not achieving disease control they should be referred for surgical opinion; particularly if there are any of the following features:

- Persistent pain due to joint damage or other identifiable soft tissue cause.
- Worsening joint function.
- Progressive deformity.
- Persistent localized synovitis.

A surgical opinion should also be sought before damage or deformity becomes irreversible, if there are any of the following:

- Imminent or actual tendon rupture.
- Nerve compression (for example carpal tunnel syndrome).
- A stress fracture.

(NHS Institute for Innovation and Improvement, 2009).

7. Prognosis (Main Prognostic Factors)

All studies of RA over ten years or more show severe morbidity (Pincus and Callahan, 1993). Patients who are seropositive for rheumatoid factor appear to have a more severe course of the disease.

Spontaneous remission in RA usually occurs within the first two years.

However 50 - 90% of those affected have progressive disease and even after five years of anti-rheumatic drug therapy, complete remission is rare.

Almost 50% of patients show joint space narrowing and/or erosion in the first two years, therefore permanent articular damage is often present which is progressive in almost all patients.

About 50% of maximum scores for joints space narrowing and radiographic erosion are seen by five years of disease.

Decline in functional status is seen in most patients with RA over periods longer than a decade. Many patients, however, show an improvement in morning stiffness over this time suggesting “burn out” but this still leaves significant losses in functional capacity.

Formal education level is highly predictive of morbidity and mortality in RA, a more formal education correlating with less morbidity and mortality. A hypothesis has been proposed that low formal education is a variable that identifies behavioural risk factors predisposing to the aetiology and poor outcomes of most chronic diseases and is probably related to efficiency in using medical services, problem solving capacity, sense of personal responsibility, capacity to cope with stress, life stress, social isolation, health focus of control and learned helplessness (Pincus, 1993).

7.1.1 Markers of a Good Prognosis

Evidence suggests that early and aggressive therapy, and a good response to treatment is a marker of a good prognosis. Achieving the treatment goal of complete remission from the disease within 2 years will also act as a positive prognostic marker.

It is also considered a marker of good prognosis if the disease remains confined to the hands and feet in its effects.

The more widespread use of DMARDS and Biological Agents could result in a complete reassessment of the pessimistic prognosis for RA as described in the section above.

7.1.2 Markers of a Poor Prognosis

Evidence suggests the presence of the following factors indicates a poor prognosis for rheumatoid arthritis (SIGN, 2000; NCCCC, 2009):

- rheumatoid factor positive (Wolfe et al, 1993)
- anti-CCP antibodies
- rheumatoid nodules
- elevated inflammatory markers (ESR, CRP)
- poor grip strength
- increasing number of swollen joints
- Adverse social circumstances and lower socioeconomic level (Callahan et al, 1996; McEntegart et al, 1999; EARS Study Group, 2000)
- Early radiological erosions (Corbett et al, 1993)
- Evidence of decreased functional ability early (or prior to) in the onset of the disease (Pincus and Callahan, 1986; Wolfe et al, 1993)

7.1.3 Disability and Occupational Factors

Evidence suggests that functional limitations will affect most individuals with rheumatoid arthritis to some extent, with severe limitation and disability affecting up to half of sufferers within 10 years of initial diagnosis (Maini, 2004).

Poor outcomes in terms of functional disability correlate with female gender and seropositivity.

Estimates vary but it is thought that a reduction in occupational function will affect around 50% of individuals within 5 years (WHO, 2003), with every third individual diagnosed with RA becoming work disabled. Young et al. (2002) reported that 22% of individuals diagnosed with RA will stop working altogether within 5 years due to their condition, and a further 18% will cease to work within 5 years of diagnosis due to a combination of RA and other factors such as depression. Other studies have reported the incidence of work related disability to be even higher - up to 50% (Young, 2000).

Work disability has been primarily studied for patients under care referral centres and may not represent all patients with rheumatoid arthritis (Pincus, 1993).

7.1.4 Mortality

Estimates of the life-shortening effect of Rheumatoid arthritis vary from study to study; however it is accepted by most that rheumatoid arthritis may result in a reduction in life expectancy of 5-10 years. Factors which contribute to this, include:

- Young onset age
- Long disease duration

- Presence of certain comorbidities
- Severe course of the disease (poor functional ability, poor overall health status)
- Significant joint damage
- Repeated admissions to hospital
- Involvement of organs other than joints

(John et al, 2008)

7.2 Comorbidities

7.2.1 Ischaemic Heart Disease

A 2005 study by the Mayo Clinic noted that people affected by exhibit RA a doubled risk of heart disease, independent of other risk factors such as diabetes, alcohol abuse, and elevated cholesterol, blood pressure and body mass index. The mechanism by which rheumatoid arthritis causes this increased risk remains unknown. The presence of chronic inflammation has been proposed as a contributing factor, although it is also thought that individuals with rheumatoid arthritis develop atherosclerosis faster than the general population. Heart disease is estimated to account for half of all deaths in people with rheumatoid arthritis. It is also suspected that some DMARDs (particularly anti-TNF drugs) and Non steroidal Anti-inflammatory Drugs may contribute to this risk.

(John et al, 2008)

7.2.2 Infections and Cancers

There is an increased risk of infections and certain cancers in individuals with rheumatoid arthritis. This may be due to the inflammatory and immune involvement of the condition, but is also thought to be partially due to the effect of the strong medications involved in the treatment of the condition. Certain DMARDs, particularly in the biologic class, have been linked to increased incidence of infections such as tuberculosis. Individuals treated with anti-TNF drugs are up to twice as likely to develop a serious infection, usually shortly after starting the drugs.

(John et al, 2008)

7.2.3 Lung Disease

10-20% of deaths in individuals with rheumatoid arthritis are due to lung conditions. This is either the result of damage to the lungs due to the systemic complications of rheumatoid arthritis, or due to an increased risk of chest infections. Scarring of the lungs due to the potential adverse effects of certain medications may also be a contributing factor.

(John et al, 2008)

8. Information Gathering at the In Person Assessment

An important feature of the musculoskeletal system is that any impairment alters the biomechanics of contralateral joint structures or those continuous in the kinetic chain. This usually also increases baseline energy expenditure for activity. It should be remembered that unlike degenerative diseases of the musculoskeletal system functional loss tends to occur early in the disease process in RA rather than in later years

Pain, deformity, muscle wasting, flexion contracture and joint destruction may all contribute towards functional impairment.

Extra-articular manifestations of the disease may further contribute towards the overall level of functional impairment.

Common measurements of overall severity of disease include grip strength, global severity, joint count, morning stiffness, HAQ-DI scale, ESR and haemoglobin level.

Signs of synovitis are most useful in the assessment of disease activity.

The reduction in the range of movement is a useful indicator of current or potential functional problems. An indication of the activities of daily living likely to be affected beyond certain impairments of joint movement is given in **Appendix B – Functional Effects of Rheumatoid Arthritis**

Most individuals with early rheumatoid arthritis can perform tasks of daily living, although with discomfort or impaired efficiency. This is achieved because people adapt and work within their pain and limited joint movement. When contractures or joint deformity progresses beyond a certain range for a joint the impairment will result in a functional deficit (Dalgas et al, 1994). In some people affected by RA, as previously noted, the onset may be acute with severe inflammatory polyarthritis which severely limits function of the affected joints and is often accompanied by severe fatigue and malaise.

Functional disability progresses more rapidly in the first few years than in the latter course of the disease and 50% of patients have considerable difficulty performing their pre-morbid domestic, work and social functions within six years of their first clinic visit.

Pain, which is unpredictable and varies in intensity and duration, is a key feature of RA and night time pain often contributes to sleep disturbance (Ferguson et al, 1996).

Fatigue due to poor sleep and functional impairment may both adversely affect social activity which in turn may adversely affect mood. This may account for depressive symptoms occurring more commonly in those suffering from RA than in the general population.

It may be appropriate also to carry out a full mental health assessment of each claimant due to the increased incidence of depression in claimants with RA. This, of course, will depend on the individual claimant's presentation and general effect.



In association with



9. Analysis of Effect on Functional Ability

Eligibility to DSP's various Illness-related schemes and the Activation Programme is determined primarily by the degree of Ability/Disability and its expected duration.

The degree of Ability/Disability assessed, using the following Indicators, can be based on the Ability/Disability Profile illustrated below.

9.1 Indicators of Ability/Disability

Normal

- May give a history of intermittent joint pain
- On no regular prescribed medication for the condition
- No regular GP attendance
- No problems with upper or lower limb function affecting walking, sitting, bending or stairs. Can fully self care.
- No restriction of upper or lower limb function observed during interview and examination
- Normal gait
- Clinical findings normal

Mild

- May have a history of a single episode of stiff and painful joints lasting several months particularly affecting hands and feet
- Attends GP
- Symptoms well controlled on analgesics and NSAIDs
- No problems with walking, sitting, bending, on stairs or with self care
- No hospital referral
- No restriction of joint movements on observation
- Normal gait
- Clinical findings normal

Moderate

- History of symmetrical joint pain and stiffness

- RA proven by laboratory tests or X-ray
- Inadequate pain relief on standard treatment
- Pain may disturb sleep
- Attending hospital clinic but no surgical intervention planned
- May be attending physiotherapy/occupational therapy
- Some restriction in walking ability but may be helped by orthopaedic shoes
- May require help with washing and drying hair and help with upper garments
- May have difficulty with fine movements i.e. buttons
- Some restriction of movement of upper and lower limb function observed during interview and examination
- Some joint deformity, wasting of intrinsic muscles and rheumatoid nodules may be present
- Restricted movement will be present in affected joints
- Recent history of persisting stiffness in the morning or following inactivity

Severe

- Under hospital review and surgery planned to affected joint/s.
- On maximum medication
- Bilateral joints affected and movement in some may be restricted to <50% with associated pain
- May have difficulty with walking bending and difficulty on stairs even with aids
- May require help with dressing and toileting
- Can only lift light objects with either arm
- Significant restriction of movement in affected joints observed during interview and examination
- Abnormal gait
- Joint deformity, wasting of intrinsic muscles in the affected joints will be present on examination along with Rheumatic nodules
- Significant restriction in joint movement will be present and reduced power e.g. grip

Profound

- May have a history of proven RA for several years
- Attends hospital clinic
- May have had previous surgery
- On maximum medication
- May have a history of systemic affects of RA and be on appropriate treatment
- Likely to have significant difficulty with all upper and lower limb function
- Significant difficulty with walking and may require a wheelchair outdoors
- Help required with all aspects of self care
- Severe restriction of joint movements observed during interview and examination
- Joint deformity, muscle wasting and evidence of previous surgery may be present on examination

9.2 Ability/Disability Profile

Indicate the degree to which the claimant's condition has affected their ability in ALL of the following areas.					
	Normal	Mild	Moderate	Severe	Profound
Mental health/Behaviour	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Learning/Intelligence	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Consciousness/Seizures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Balance/Co-ordination	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vision	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hearing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Speech	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Continence	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reaching	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Manual dexterity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lifting/Carrying	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bending/Kneeling/Squatting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sitting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Standing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Climbing stairs/Ladders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Walking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

10. Summary of Scheme Criteria

Appendix A - Extra-articular Manifestations of Rheumatoid Arthritis

A.1 Common Extra-articular Manifestations of Rheumatoid Arthritis

System	Effect
Skin	Subcutaneous nodules. Vasculitis. Thinning and ulceration.
Eyes	Episcleritis (<1%). Keratoconjunctivitis sicca (15-25%).
Cardiac	Pericarditis and pericardial effusions – 50% of asymptomatic patients undergoing echocardiography have evidence of pericarditis [12] Constrictive pericarditis. Aortitis Conduction defects Coronary arthritis Myocarditis
Respiratory	Crico-arytenoid joint inflammation. Interstitial lung disease (frequently found at autopsy). Visceral nodules. Pleural effusions. Bronchiolitis obliterans. Pulmonary arteritis.
Neurological	Atlanto-occipital subluxation and spinal cord compression. Carpal tunnel syndrome and entrapment neuropathy. Mononeuritis multiplex. Muscle wasting. Peripheral neuropathy.
Haematological	Anaemia of chronic disease. Thrombocytosis
General	Rheumatoid nodules are characteristic and are found in 25-50%. They form subcutaneously in bursae and along tendon sheaths, over pressure points e.g. olecranon, ulna border of forearm. Achilles tendon and ischial spines. Splenomegaly and lymphadenopathy. Sjögrens syndrome. Sicca symptoms – dry mouth. Low grade fever. Amyloidosis in internal organs.

Appendix B - Functional Effects of Rheumatoid Arthritis

B.1 Functional Effects on Joints

The effects on functional ability of rheumatoid arthritis disease progression on different joints are listed below.

Joint	Reduction to	Effect on
Temporo-mandibular	< 2.5 cms of opening	Biting, eating
Temporo-mandibular	Fusion	Chewing
Shoulder	< 90° Abduction	Washing , dressing
Elbow	< 140° Flexion	Dressing (top buttons)
Elbow	< 80° Flexion	Carrying a shopping bag
Elbow	< 40° supination	Use pen or pencil
Elbow	< 60° pronation	Operating yale type lock
Hip	< 110° flexion	To rise unaided
Hip	< 90° flexion	To sit comfortably
Knee	< 90° flexion	To rise unaided
Knee	< 45° flexion	Walk or use stairs
Knee	< Full extension	Walking steadily
Knee	> 20° fixed flexion deformity	Fatigue on walking
Ankle	< 20° plantar flexion < 10° dorsiflexion	Difficulty walking

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