

Rehabilitation of Patients with Rheumatic Diseases

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- In the care of disabled individuals, the current system of health care delivery and education largely focuses on a disease-centered medical model that fails to consider the role of society and the interaction of the disabled individual in that society over a lifespan.
- A more holistic approach to the care of disabled individuals considers the impact of environmental factors on the patient and provides a biopsychosocial orientation rather than a purely medical one.
- Holistic health approaches promote optimal function of the disabled person by considering not only the underlying rheumatic disease but the individual as a whole functioning person. Central to this health promotion is involvement of patient responsibility for his or her health and well being, including physical, psychological, social, and societal aspects.
- Multidisciplinary efforts are important to effective rehabilitation of patients disabled by rheumatic disease. Critical members of the multidisciplinary team are the rheumatologist, orthopedist, physical and occupational therapists, rehabilitation nurse, psychologist, social worker, and vocational rehabilitation specialist.

Rehabilitation of patients with rheumatic diseases addresses activity limitation and mobility as primary factors. It utilizes all healing disciplines and technologies with an emphasis on preservation and restoration of function. Medical, surgical, psychological, and physical treatments are utilized, with the rheumatologist as leader and coordinator of the interdisciplinary team. This program can provide functional success even if control of the disease process is suboptimal.

CLASSIFICATION OF FUNCTIONING, DISABILITY, AND HEALTH

The World Health Organization (WHO) in 2001 published the International Classification of Functioning, Disability, and Health (ICF) (1). This was an attempt to understand and categorize the experiences of people living with chronic illness. Much of current health care delivery and education continues to follow the medical model and to attribute disability to a disease-related deficit that prevents normal function. This model, however, fails to consider the role of society and the interaction of the disabled individual in that society over a lifespan. The ICF approaches health and disability

as an integrated model that uses neutral terminology, includes environmental factors, and provides a biopsychosocial model of orientation rather than a purely medical model.

In the ICF classification, a health condition (disease or disorder) may influence body functions (physiologic and/or psychologic) or structures (anatomic parts), an activity that an individual does (e.g., walking), and the individual's participation in his or her life and environment (e.g., job, sports, recreation). The health condition, body functions, activities, and participation all interrelate and are influenced by personal (e.g., age, coping style) and environmental (e.g., architecture, social attitudes) factors. Functioning and disability are multidimensional. Functioning can be considered the positive abilities which encompass and result from a bodily structure or function, activities, and participation. Disability would be the negative aspect of function or restriction of activity and limitation of participation. Activity occurs at the individual level and participation at the societal level. Hence, a disease (health condition) may result in impairment of a body function that has impact on activity and participation, and the latter may interrelate. Activity is functioning at the level of the person and may be limited in nature, duration, and quality. Participation is involvement in life situations in relation to impairments, activities, health conditions,

TABLE 36-1. RHEUMATIC DISEASES: EXAMPLES OF DISABILITIES.

HEALTH CONDITION	BODY FUNCTION IMPAIRMENT	ACTIVITY RESTRICTION	PARTICIPATION IMPAIRMENT
Rheumatoid arthritis	Knee pain, small flexion contracture	Unable to walk long distances	Unable to participate in recreation (e.g., golf, walking)
DLE, face and scalp	Hair loss and skin depigmentation	None	Social activity restrictions (social phobia, shyness)
Scleroderma	Raynaud's phenomenon	None	Unable to participate in winter sports
Polymyositis	Proximal muscle weakness	Limited on stairs	Unable to enter house, public buildings, curbs
SLE	Photosensitivity	None	Unable to participate in outdoor activities
Ankylosing spondylitis	Back pain and stiffness	Limited ability to lift and bend	Unable to do medium and heavy jobs, limited in recreation (e.g., bowling)

ABBREVIATIONS: DLE, discoid lupus erythematosus; SLE, systemic lupus erythematosus.

and contextual factors, and may be restricted in nature, duration, and quality. Examples of rheumatic disease disablements are illustrated in Table 36-1. In the ICF model, medical treatment would be directed toward the health condition and its influence on bodily function. Rehabilitation therapies would address limitation of activity and participation. Public education, legislation, and universal architecture design would improve limited participation by the disabled community.

REHABILITATION TEAM AND SETTING

A holistic health approach is indicated to promote optimal function. This approach deals not just with the remission or absence of the underlying rheumatic disease, but promotes consideration of the individual as a whole functioning person. Central to this health promotion is involvement of patient responsibility for his or her health and well being, including physical, psychological, social, and societal aspects.

A health team, with multidisciplinary expertise, can help achieve optimal outcomes. In the hospital, this team may consist of rheumatology as team leader, along with occupational therapy, physical therapy, psychology, social work, rehabilitation nursing, and orthopedic surgery. Integral to this rehabilitation team is the patient who must accept responsibilities for selection of realistic goals and their implementation. In early disease and in the outpatient setting, it may be unnecessary to have all disciplines assist in the rehabilitation process. In advanced complicated disease, where there are disease elements, problems with mobility, impaired activities of daily living, depression, job loss, and insurance loss, the expertise of a team is required. The team leader selects

the appropriate consultations as problems arise, assures that there is communication between team members, and that realistic achievable goals are selected.

Rehabilitation should start with the first doctor visit and extend throughout the course of the disease. During early disease, the physician can address most functional problems with attention to the medical regimen. Rehabilitation can occur in a physician's office and by selected referral to the needed discipline: mobility problems can be referred to physical therapy for outpatient treatment; activities of daily living problems can be referred to occupational therapy; and psychological problems can be referred to the psychologist, as examples. With more advanced disease, short duration inpatient rehabilitation should be considered, where more intense treatment can be provided. Daily observation of the patient will permit fine adjustments of medical and therapy programs.

In the United States, diagnostic related groups (DRGs) govern the current medical care system and reimbursement for inpatient stays. This has been designed to reduce the total cost of health care in the United States and has been successful in doing so. For acute illnesses both inpatient stays and health care costs have been reduced. Inpatient rehabilitation is not defined by the DRG system but has also responded to the trend of reduced inpatient days. Currently, inpatient care is reserved for patients who have the most advanced rheumatic disease with the most functional impairment.

The requirements for inpatient hospitalization are dictated by Medicare rules. Currently, Medicare requires that patients with rheumatic disease have reductions in activities of daily living and mobility that have not responded to outpatient treatment. The illness must be sufficiently severe to require daily monitoring by

physicians and health professionals. Eighteen hours of multidisciplinary inpatient treatment from two major rehabilitative disciplines (physical therapy, occupational therapy, and speech therapy) must be provided weekly. Social work and psychological rehabilitation can be given during the hospitalization and may contribute 3 hours of adjunct therapy to the required 18 hours of treatment.

A transitional inpatient care unit or skilled nursing facility can be used for patients who have significant functional problems and do not need 3 hours of daily treatments but require at least one modality for 1 hour daily. This should be considered for patients who have less disability and require skilled nursing as well as functional training (e.g., postoperative total joint arthroplasty strengthening and gait training). The goal for both inpatient and outpatient programs is maintenance of the rehabilitative program by the patient in their environment.

Clinical trials have shown that there is a beneficial response to multidisciplinary team care when compared to regular outpatient care. For active rheumatoid arthritis, improvement from inpatient rehabilitation was maintained for up to 2 years (2). The greatest changes were seen at 2 weeks after discharge when there was statistical improvement in the Ritchie articular index, number of swollen joints, disease activity by visual analogue scale (VAS), pain by VAS, and physician global assessment. At 4 weeks, 7 of 39 patients who had received inpatient rehabilitation had achieved American College of Rheumatology ACR20 status or better compared to none receiving outpatient treatment. At 1 year, improved disease activity by VAS was still significantly greater for the inpatient group and ACR20 or better was 46% in the inpatient group compared to 23% in the outpatient group. Recent reports have shown that outpatient multidisciplinary treatment is as effective as inpatient care. Patients treated as outpatients had significant improvement over time of functional status, quality of life, health utility, and disease activity (3). Additionally coordination of this care by a clinical nurse specialist was equally effective at a reduced overall cost. The importance of multidisciplinary care is established. Additional work is needed before it can be recommended that all patients will do well with outpatient care. At this time the setting is to be determined by the skilled rheumatologist and not by economics alone. It is likely that inpatient care is best for those with the greatest disability.

In addition to rheumatoid arthritis, multidisciplinary rehabilitation treatment is efficacious in ankylosing spondylitis (4). Considering the inflammatory nature and multi-articular nature of many other rheumatic diseases, it is reasonable to think that rehabilitative medical therapies would be beneficial and should be available to all patients.

PATIENT ASSESSMENT

In addition to the usual rheumatologic history and physical, an assessment of the patient's function is needed. This is obtained most effectively by indirect questions; for example: "How does your arthritis affect your life?" and "Describe to me what you do on a usual day." This will give the patient an opportunity to relate functional impact of the rheumatic disease on activities that are important to him or her. From this information, mutually agreed upon goals formulated by the patient and health care team can be made. All team members should obtain discipline-specific history. Inquiries should be made about activities of daily living, including personal grooming and toileting, eating, transfers and ambulation, vocational activities including homemaking, and hobbies and other avocational activities. Activities of daily living are usually described as independent, supervised, assisted, or unable. Dressing is further subdivided into ability to do upper body and lower body dressing.

The occupational therapist should record specific hand and upper extremity function, including ability with power grip, power and precision pinch, pill handling, and cylindrical grasp. Physical therapy activities should be recorded, stressing trunk and lower extremity functions and mobility activities, such as being able to prone, side lie, roll from side to side, to go from supine to sitting and from sitting to standing, to ambulate, and ability to climb stairs. Ambulation can be divided into household and community, with and without aids or wheelchair assistance.

Because the rheumatic diseases affect primarily the musculoskeletal system with resultant problems related to mobility, muscular strength, and joint range of motion, the physical examination is likewise functionally oriented. Manual muscle testing is a common way of measuring strength (Table 36-2). This is graded from 0 to 5, no motor activity to normal strength. It is impor-

TABLE 36-2. GRADES OF MUSCLE STRENGTH: MANUAL MUSCLE TESTING.

GRADE	DESCRIPTION
5 (normal)	Full ROM against gravity, strong resistance
4 (good)	Full ROM against gravity, some but not full resistance
3 (fair)	Full ROM against gravity, no resistance
2 (poor)	Full ROM, gravity eliminated
1 (trace)	Slight contracture, no ROM
0 (zero)	No muscle activity demonstrable

ABBREVIATION: ROM, range of motion.

tant to remember that normal strength has great variability and is dependent upon sex, size, and training status, and normal individuals with normal strength can lose considerable motor function before it is detectable by an examiner. Range of motion is measured by a goniometer and deviations from normal are noted. Particular attention should be given to alignment, noting flexion contractures, instabilities, and deformities.

There are multiple ways of recording longitudinal function. The most commonly used in the rheumatologic community is the ACR Functional Classification, groups I to IV (see Appendix I). This classification is useful for broad grouping of individuals and measures normal function to incapacitation (where assistance in ambulation and activities of daily living is needed). The ACR classification has broad usage and is time-tested but insensitive to small functional changes. Other useful functional assessment tools are the Arthritis Impact Measurement Scale, the Stanford Health Assessment Questionnaire, and the Functional Impact Measure. Each of these scales relies upon self-administered reports or professional observation of functional activities. They can be used in large studies to measure functional change and have utility in both large groups and individuals in an office or hospital practice. The ICF (1) provides a framework for research into the disabling processes and has proposed comprehensive core sets that can be applied to clinical settings by defining what to measure. Those that apply to rheumatology include core sets for rheumatoid arthritis, osteoarthritis, and osteoporosis. These core sets are currently being validated.

PAIN CONTROL

Pain is a frequent chief complaint and a cause of inactivity and loss of function for patients with rheumatic disease. Patient cooperation and success with rehabilitative treatments cannot be achieved if patients have pain. Disease control through standard medical regimens is sometimes the most efficient way of controlling pain and, hence, improving activities. Supplemental use of intra-articular glucocorticoids in resistant joints can control inflammation and pain, prevent flexion contractures, and improve range of motion and function. The use of topically applied medications (e.g., capsaicin and salicylic acid cream) is also to be considered, particularly as an adjunct to physical therapy and occupational therapy treatments. Oral analgesics, including low-dose nonsteroidal anti-inflammatory drugs (NSAIDs) and narcotics, are useful adjuncts to physical therapeutic programs when given 20 to 30 minutes before the onset of the exercise program. They can be used on an occasional basis to permit normal exercise or work periods.

PHYSICAL MODALITIES

Heat and Cold

Of the physical modalities that are commonly prescribed for musculoskeletal illnesses, heat and cold have the largest body of literature to support their use. Heat and cold have been used for centuries in musculoskeletal impairments, especially in acute injuries. There is no evidence that harm is done when these modalities are applied properly, and the potential improvement in pain, muscular spasm, and ability to participate in an active exercise program all have positive benefits for patient outcome. Their low cost and ease of use permit their use in the outpatient clinic, private office, and home. Most trials in musculoskeletal disorders report beneficial effects including reduced pain and muscle spasms, increased circulation, and improved range of motion (5). Temperature change occurs in the skin, deeper tissues, and on occasion, joint cavities. In addition to beneficial effects in clinical conditions, there is experimental evidence for diminished pain response to both heat and cold in experimental animal models with induced joint inflammation. Heat or cold treatment did not change joint inflammation, but secondary pain response and behavior were improved (6).

A systematic review of the medical literature for clinical benefit from heat and cold treatment showed little controlled data with accepted quality criteria of randomization and double-blinding; however, of those studies that did meet these criteria, heat and cold had no effect on the objective measures of disease activity, including inflammation (7). All patients reported that they preferred heat or cold therapy to no treatment but there was no preference for either modality. Because there are no harmful effects from heat or cold, it should be prescribed as a home treatment as needed for pain relief.

Heat therapy is usually given as a superficial application to the skin of hot packs, electrical pads, water baths, paraffin wax, or thermal packs. The use of water baths or whirlpool can be combined with active or passive motion to improve joint range. Thermal packs contain a chemical agent which upon activation produces heat by an exothermic reaction. They have no advantages over electrical heating pads or moist heat and have the disadvantage of one-time usage and increased cost. Heat therapy is contraindicated when there is loss of normal sensation and diminished or faulty blood supply.

With thermal therapy, deeper heating of tissues can be achieved by the use of therapeutic ultrasound. There are no controlled trials to indicate its utility in the rheumatic diseases. It has the disadvantage that it cannot be performed in the usual office setting but must be in a specialist's office with the associated inconvenience and increased cost.

Cold reduces pain, muscular spasm, and circulation, causing vasospasm and associated decrease in tissue metabolism, inflammation, and edema. It is standard treatment for immediate care after musculoskeletal injury because of these effects. Cold is applied locally for up to 30 minutes and produces a cooling of the skin and subcutaneous tissues. Deep cooling does occur and is dependant on application time and soft tissue depth.

Cold is typically prescribed as ice packs, reusable gel packs, chemical packs, or by ice massage directly over the painful area. Chemical packs produce cold by an endothermic reaction, but they have little utility except on an infrequent basis because of their expense and one-time use. Cooling sprays, such as ethyl chloride, are used commonly in rheumatology in a “spray and stretch” technique especially for painful syndromes of the neck and back. The skin is superficially cooled by the spray, resulting in relief of pain and muscular spasm. Active or passive stretching can then be achieved.

Electrical Stimulation

Transcutaneous electrical nerve stimulation (TENS) may be used for outpatient treatment of pain. A low voltage electrical stimulus is delivered to the skin either intermittently or continuously by activation of a battery-operated device worn about the waist. The patient can activate and control intensity as needed. It is administered for non-inflammatory conditions, particularly chronic pain from osteoarthritis of the back, knee pain, chronic shoulder pain, or pain in other major joints of the body. TENS is usually given to patients who are resistant to heat, cold, stretching, exercise, and other modalities. A careful review of trials comparing TENS to placebo in knee osteoarthritis demonstrated superiority for TENS in pain relief and improvement of knee stiffness (8). Despite the lack of controlled trials showing efficacy in other conditions, TENS has high patient acceptance and will likely continue to be commonly prescribed.

Hydrotherapy

Hydrotherapy combines exercise therapy and warm water emersion. It may be given on an intermittent basis as an outpatient or on a sustained basis in the form of spa therapy, one of the oldest treatments for rheumatic disease. The aim is to decrease pain, relieve suffering, and promote a feeling of wellness. There are few controlled trials of this treatment. However, there is some indication that, when administered on a regular basis as an outpatient, patients who received hydrotherapy had greater benefit than those who were treated by seated emersion in water, land exercises, or relaxation therapy (9). This improvement was both physical and emotional as reflected by the AIMS-2 questionnaire. A more extensive systematic review of the pub-

lished literature for spa therapy showed many flaws in the designs of the treatments with lack of standardized treatments, infrequent comparison groups, inconsistent intention-to-treat groups, and little evidence of outcome measures such as quality-of-life measurements. The conclusion was that spa therapy could not be supported as a recommended treatment in spite of consistently positive findings in the trials and acceptance by patients (10). Positive effects from spa therapy may be influenced by environmental changes such as freedom from work and household duties, mental and physical relaxation, and pleasant spa scenery that are unrelated to the water therapy.

Rest

Rest prescription may be local or systemic. It reduces acute inflammation and pain, and promotes normal joint position. Local rest is achieved by use of splints or braces, systemic rest by bed rest. Short periods of rest as part of a comprehensive program will permit patients to participate in exercise programs and work activities. Prolonged rest is to be avoided because both local and systemic rest are associated with significant muscle loss. Only a few weeks of local immobilization can reduce muscle mass by 21% (11). About one third of patients with rheumatoid arthritis will show improvement with bed rest that is similar to that seen with activity (12). There is increasing evidence that prolonged bed rest as a primary treatment for medical conditions is not helpful and should not be prescribed routinely. This includes its use in rheumatic disease rehabilitation. Some medical conditions, including acute back pain and postoperative hip surgical patients, may worsen with bed rest (13).

Exercise Therapy

Exercise therapy must take into consideration the underlying disease activity, including degree of inflammation, joint stability, muscle atrophy, and anticipated short- and long-term functional goals. Prescribed exercise may be active or passive, assisted, resistive, or aerobic.

Passive exercises may be administered by a physical therapist in which stretch and gentle range of motion exercises are given with a goal of maintaining range and reducing contractures. They are used for conditions associated with severe pain and weakness such as acute inflammation, acute myositis, and in the postoperative period. Active exercise may be assisted in painful and weak conditions in which the person is unable to complete full range of motion. Isometric exercise, in which there is active muscle contracture without muscle shortening or joint motion, will maintain muscle strength and is prescribed as initial therapy for those unable to tolerate range of motion due to pain, for example, postoperative joint arthroplasty.

Most patients with rheumatic disease will benefit from a resistive and aerobic exercise program. Resistive exercises should be tailored to the individual, the area of weakness, and the underlying disorder with a goal of increased strength and endurance. Aerobic and resistive exercises are beneficial for osteoarthritis (OA). Walking and resistive exercise administered for 1 hour three times a week in patients with osteoarthritis of the knee is associated with less pain, less disability, and greater flexion strength (14). Similar but lesser effects are seen with OA of the hip. Results include mild-to-moderate improvement in pain, disability outcome measures, and greater benefit on patients' global assessment (15). Exercise therapy improves aerobic capacity and motor strength for patients with rheumatoid arthritis without worsening pain or disease activity (16). In ankylosing spondylitis, recreational exercise of at least 30 minutes daily improved pain and stiffness (17). When prescribed with back exercises 5 days a week, health status improved as measured by the Health Assessment Questionnaire Disability Index (HAQ-DI). The greatest benefit was seen in those with early disease. In patients with systemic lupus erythematosus, aerobic exercises and strengthening did not worsen disease activity and were associated with decreased fatigue and improvement in functional status, strength, and cardiovascular fitness (18).

AMBULATORY AIDS

Canes, crutches, and walkers are prescribed to improve gait, including weakness, pain, and instability of lower extremity joints. The most useful canes are those made of wood or aluminum. They should be inexpensive and lightweight, easily adjusted for height, have a comfortable grip and wide rubber tip to firmly grip smooth floor surfaces. Cane length should be fitted so that the elbow is flexed 30°. With the use of a single cane or crutch at least 25% of normal weight bearing can be shifted from a weak or painful joint to the opposite limb. With bilateral support, up to 100% of weight bearing can be unloaded from a painful lower extremity to the upper extremities. Some patients will carry a cane and not use it for support. They use it only as a signal to others that they have ambulatory problems and should be given a greater courtesy when met.

Patients should be instructed on the proper use of an ambulatory aid. Single support is carried contralateral to the painful leg. It is advanced and used to bear weight during stance on the opposite leg. Multiple tips (e.g., a quad cane) will provide increased security for those with impaired proprioception or balance problems. For patients such as those with rheumatoid arthritis who cannot bear weight on the wrist or have significant hand deformities, ambulatory aids can be

modified to accommodate these problems with forearm troughs, custom hand grips, and Velcro straps. These are fitted with the elbow at 90° flexion to avoid wrist and hand stress.

Crutches are prescribed for more severe problems and provide increased support when used bilaterally. They should be adjusted so that no pressure occurs on the axillae. Instruction needs to be given about proper weight bearing on the upper extremities with the wrist and elbow in extension. With crutch use, patients may use minimal or no weight bearing on a painful or weak leg. They will be most useful in the postoperative period and for acute injuries and illnesses. Platform crutches should be prescribed for patients with significant hand and wrist arthritis and discomfort with conventional crutches.

Walkers provide a wider support base than do canes or crutches for those who need greater ambulatory stability. They must be lightweight so they can be picked up and advanced. Wheels, brakes, and seats can be attached for patient comfort and safety. They are useful in the postoperative period, and for the elderly, frail, and those who need maximum support for balance.

Wheelchairs should be prescribed when community ambulation is impaired. Patients who are limited to household ambulation will have increased independence with a wheelchair for community activities. A manual wheelchair is advised for people with normal upper extremity function and strength and endurance sufficient to propel the chair. Manual wheelchairs, which are propelled by family, can be prescribed for the postoperative period and for the frail and elderly who do not wish to travel alone. Electric wheelchairs and carts should be prescribed for those with poor upper extremity function.

UPPER EXTREMITY AIDS

There are a large variety of commercially available assistive devices to improve activities of daily living for impaired upper extremity function. Pinch and grasp can be improved by having build-up handles on tools, cookware, and eating utensils. Power equipment such as electric knives and tools can substitute for decreased power grip and poor upper extremity strength. Reachers can be used to retrieve objects from the floor and shelves. Sock cones and long handle shoehorns will facilitate donning and doffing socks and shoes. Dressing sticks can assist those with impaired shoulder mobility. Long-handled brushes, combs, and sponges can improve upper extremity grooming and perineal care.

Dressing can be facilitated by attention to detail of clothing. Problems with pinch can improve by using button hooks, zippers with tabs, and Velcro closures for

clothing and footwear. Elastic closures for trousers and V necks for pullover sweaters and blouses will also facilitate dressing.

Home safety and accessibility can be assessed via home visits by a physical and occupational therapist. Those who have mobility impairments can be aided by installation of half steps, ramps, and handrails in entryways. Doorways should be wide to permit walker or wheelchair access. Furniture placement and room size should be sufficient for easy mobility with walking aids and wheelchairs. Scatter rugs and loose electrical cords should be removed. For those with knee and hip problems including limited mobility and strength, the addition of 4-inch-thick, high density foam cushions or blocks under the chair legs can increase chair height and improve ability to rise from the seated posture. Raised toilet seats will facilitate transfer on and off of the toilet. Within the bathroom, rubber mats should be placed on tub and shower surfaces to facilitate traction and prevent falls. Grab bars and tub and shower benches should be utilized if patients have problems with balance and are at risk of falling. Handheld shower nozzles can facilitate bathing.

Orthotic Devices

Splints and braces are useful for improving stability and reducing pain and inflammation. Because effective orthoses restrict motion, short-term use is recommended to preserve muscle strength. Splints for the upper extremity are commonly used and they have general patient and physician acceptance (Table 36-3). Although pain and inflammation are reduced, there are no studies to indicate that deformities are prevented. Wrist orthoses may decrease hand function in the short term as measured by grip strength and finger and hand dexterity (19). These potential adverse effects are not an issue for patients because most will continue to wear the splints when given an option to discontinue them. Consultation with an orthotist or occupational therapist for a custom-

made device is indicated for severe deformities in which immobilization is needed for pain relief and improved stability.

Orthoses that immobilizes the wrist are of value in carpal tunnel syndrome. The wrist is immobilized in a neutral position with 20° to 30° of extension of the hand at the wrist. Ring splints are useful for flexible swan neck deformities of the digits and can improve pinch strength by putting the proximal interphalangeal (PIP) joint in a slightly flexed and more functional position for precision pinch. They are not effective for fixed deformities and there are no studies to support prolonged use of ring splints for deformity prevention. Ring splints may be made of silver to enhance cosmesis and wearing compliance.

The carpometacarpal (CMC) immobilization splint (thumb post splint) is quite effective for degenerative CMC joint disease and can be used when patients have flare-ups and pain at the base of the thumb. Coupled with this, activity that increase forces across the CMC joints, such as power pinch, should be reduced. One common way of avoiding this is to increase the size of pens and pencils by using a rubber or foam grip and reminding the patient that light touch with writing instruments will prevent pain.

Casting with plaster or lightweight fiberglass can be used for immobilization as a trial to see if pain is improved before more expensive orthoses are made (e.g., ankle or foot braces) and prior to surgical arthrodesis. If cast immobilization results in pain relief, then a rigid orthosis or arthrodesis will be associated with improved pain and function.

LOWER EXTREMITY ORTHOSES

The simplest orthoses for restricting range of motion and decreasing pain would be the use of elastic bandages, elastic or neoprene sleeves, and taping. For degenerative arthritis of the knee, many patients will have improve-

TABLE 36-3. COMMON UPPER EXTREMITY ORTHOSES.

DISORDER	DEFORMITY	PROBLEM	SOLUTION
RA	Flexible swan neck deformity of fingers	None; clicking; cosmetic appearance	Ring splints (stabilizes PIP in flexion)
Carpal tunnel syndrome	None	Night pain, dysesthesias	Wrist splint, 20°–30° extension
OA of first CMC	None	CMC pain with pinch	Thumb post splint, thumb spica
RA	None	Pain; inflammation of wrist, MCPs, and PIPs	Hand-resting splint (resting posture from wrist to DIPs)
Mallet finger	Flexion of DIP	None	Rigid DIP splint, 20° hyperextension

ABBREVIATIONS: CMC, carpometacarpal; DIP, distal interphalangeal; OA, osteoarthritis; PIP, proximal interphalangeal; RA, rheumatoid arthritis.

ment with use of an elastic or neoprene sleeve to reduce range of motion. Patella taping has been shown to improve knee pain and function for people with patellofemoral joint arthritis and abnormal tracking. Taping the knee to promote normal patella tracking reduced knee pain by 25% compared to a control group (20). For people who have marked weakness and deformities, consultation with an orthotist or an orthopedic surgeon skilled in biomechanics is useful for more extensive bracing. Disadvantages to more extensive bracing are high cost and a low rate of wearing compliance.

Shoeware

Foot pain and deformities are common in rheumatoid and degenerative arthritis. They can be easily handled by attention to shoeware (Table 36-4). The most important thing about shoeware is that the upper should be soft and the toebox should be deep and wide enough to accommodate deformities. This will prevent rubbing, blisters, and skin breakdown.

Many patients with rheumatoid arthritis will have pain on the soles of the feet, particularly at the metatarsal areas where deformities of cock-up toes and prominent metatarsal heads with anterior displacement of the fat pad is common. Because of these deformities, metatarsalgia, callosities, and breakdown can occur. This can be avoided by the use of inserts, metatarsal pads placed proximal to the metatarsal heads on the inner sole of the shoe, or external metatarsal bars placed proximal to the metatarsal heads. Commercially available inserts of high density polypropylene may be satisfactory for metatarsalgia and painful bony prominences. For persistent symptoms, referral to an orthotist for a custom-made polypropylene insert or a molded insert is indicated. The use of sandals and custom made shoeware from molded impressions may permit patients to ambulate pain-free. Randomized control trials support decreased pain with walking and stair climbing, and more minutes of pain-free walking with foot ortho-

ses and special shoeware (21). These trials found no evidence of harm from orthoses and shoeware.

VOCATIONAL REHABILITATION AND DISABILITY

Musculoskeletal diseases are the leading cause of disability and absence from work in the United States (22). Rheumatoid arthritis is associated with a high disability rate and more than one third of working persons with rheumatoid arthritis are no longer able to work after 5 years (23). For systemic lupus erythematosus, after 3 years, 40% of persons are no longer working (24). One of the goals of rehabilitation is to maintain employability. Achievement of this goal may require job modification, job retraining, and vocational rehabilitation. Among patients with arthritis and musculoskeletal disorders, reported response rates for return to employment after vocational rehabilitation vary from no response to 71% (25,26). The main impediment to successful vocational rehabilitation is disability insurance payments. Among patients with rheumatoid arthritis, high pain level, older age, and lower education are also barriers for re-employment. For patients with systemic lupus erythematosus, low educational level, receiving Medicaid, no medical insurance, physically demanding jobs, poverty, and greater disease activity were all predictors of early work disability. Race, sex, cumulative organ damage, and disease duration were not significant predictors of work disability (24).

The Social Security Administration administers the uniform disability program throughout the United States. There are two programs for which patients are eligible, Social Security Disability Insurance (SSDI) and Social Security Insurance (SSI). For SSDI, patients must meet the requirements of being disabled and having paid into the Social Security system for the required amount of time, usually 40 quarters. For SSI eligibility, patients must be disabled and have reduced income, but

TABLE 36-4. SHOEWARE SPECIFICS.

DISEASE	DEFORMITY	PROBLEM	SOLUTION(S)
RA/OA	Hallux valgus with bunion formation	Pain, inflammation	Wide, soft, deep toebox; stretch medial leather
RA	Cock-up toes	Pain, redness, ulcers on dorsum of toes	Deep toebox; soft leather upper; stretch upper; donut pads; sandals
RA	Valgus hindfoot	Hindfoot pain	Medial wedge; lace-up canvas ankle support; ankle-hind foot orthosis
RA	MTP subluxation with callosities	Metatarsalgia	Metatarsal bar; metatarsal pad; sole inserts
OA	Hallux rigidus	First MTP pain	Metatarsal bar; rigid sole; rocker bottom sole

ABBREVIATIONS: MTP, metatarsal phalangeal; OA, osteoarthritis; RA, rheumatoid arthritis.

there is no work requirement. Under the Social Security system, disability is defined by law and essentially means an inability to do any type of work regardless of previous job or experience. The definition is “inability to engage in any substantial gainful activity by reason of a medically determinable physical or mental impairment(s) which can be expected to result in death or which has lasted or can be expected to last for a continuous period of not less than 12 months” (27).

Once the decision to apply for disability is made, it is important that longitudinal evidence-based information is provided to the Social Security office that demonstrates the impact of the illness on function and ability to work. To apply for disability under the Social Security system, patients must complete an application at the local district office. The application is then reviewed to see whether the patient is eligible for disability. If they meet the requirements of disability, payment will be granted. If they do not, then additional medical information will be requested from the patient and the physician. If needed, a consultative examination by a medical or psychological expert will be requested and paid for by the Social Security Administration. If disability is not allowed, then appeal by the patient is permitted and a court hearing before an administrative law judge is held. At that meeting, patients are queried about how the rheumatic disease affects their life and ability to work. Patients can present additional medical information and have witnesses and a lawyer as their advocate to interpret the legal aspects of disability. When disability is granted, law determines payment made. In addition to the monthly payment, patients on SSI are eligible for Medicaid immediately and those on SSDI are eligible for Medicare after 2 years.

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