DATE: 9 FEBRUARY 2024

Clinical practice guideline for physiotherapy in haemophilia

Practical recommendations for primary care physiotherapists in the treatment of persons with haemophilia

EAHAD
European Association for Haemophilia and Allied Disorders

Welcome to the clinical practice guideline for physiotherapy in haemophilia

This guide is intended for physiotherapists working in primary care (i.e. every physiotherapist working outside a haemophilia treatment centre) who are treating people with a coagulation disorder, the guide reads for both adult and paediatric physiotherapists. The recommendations serve as a guideline for shaping the treatment of musculoskeletal conditions in persons with these rare disorders.

The development of this guideline is initiated by the Van Creveldkliniek (UMC Utrecht) and compiled in collaboration with European expert physiotherapists in the field of bleeding disorders, the Dutch Association of Haemophilia Patients (NVHP), the Dutch Association of Haemophilia Practitioners (NVHB), Physiotherapists Committee of the European Association for Haemophilia and Related Disorders (EAHAD) and the Royal Dutch Society for Physiotherapy (KNGF).

Where possible, the recommendations are based on scientific literature. In addition, input from experts and relevant stakeholders was used during various feedback rounds. This group consisted of physiotherapists from various European haemophilia treatment centres (HTC), patients and carers of patients, physiotherapists working in primary care, representatives of the NVHP, NVHB and the KNGF. Recommendations in this guideline provide practical tools for the physiotherapeutic treatment

of people with haemophilia. Physiotherapists using this document must adapt the treatment to the situation of the individual patient, based on clinical reasoning and shared decision-making with the patient.

The guideline is limited to recommendations for physiotherapeutic interventions, i.e. drug treatment with, for example, coagulation factors, painkillers or anti-inflammatory drugs is outside the scope of this document.

The recommendations have been composed based on the literature and expertise of people with haemophilia but can also be used as a basis for the treatment of people with other clotting disorders; such as Von Willebrand's disease or other factor deficiencies. More information on the different bleeding disorders can be found on the website of the World Federation of Hemophilia (WFH): https://wfh.org/

Content

Description of the clinical picture

2.1 General information

Haemophilia is a rare inherited blood clotting disorder that affects about 1 in 10,000 people.

People with haemophilia lack clotting factor VIII or IX, leading to insufficient clotting and consequently an increased bleeding tendency. It is a recessive X-chromosomal disorder, which therefore mainly occurs in males. Female carriers of the disease may however also have reduced clotting factor levels.

The severity of haemophilia varies depending on the percentage of coagulation factors, between mild (5-40%), moderate (1-5%) and severe (< 1%)[1]. In people with mild haemophilia, bleeding occurs mainly after surgery or trauma. Persons with lower factor levels, may also bleed without an apparent cause. Treatment of bleeding involves intravenous administration of coagulation factors[2]. People at high risk of bleeding can be treated prophylactically to prevent bleeding. Prophylactic treatment became available in the 1970s in many developed countries, which has significantly improved patients' quality of life[2,3]. Haemophilia cannot yet be cured.

In addition to haemophilia, there are other coagulation disorders that can, to a greater or lesser extent, lead to musculoskeletal complaints. Von Willebrand's disease is an inherited blood clotting disorders characterized by an impaired production or function of Von Willebrand factor (vWF).

This causes problems in the adhesion of platelets and the support of coagulation factor VIII. It occurs in both men and women and has different severities. In addition to haemophilia and Von Willebrand's disease, there are other blood clotting disorders, such as deficiencies of factor VII or XIII deficiency, which can increase the risk of muscle or joint bleeding.

Specialized haemophilia treatment centres (HTC) provide diagnostic and multidisciplinary care for people with rare coagulation disorders, including physical therapy (see: Organization of care).

[1] Knobe K, Berntorp E. Haemophilia and Joint Disease: Pathophysiology, Evaluation, and Management. Vol 1.; 2011. www.swissmedicalpress.com [2] Marchesini E, Morfini M, Valentino L. Recent advances in the treatment of hemophilia: A review. Biologics. 2021;15:221-235. doi:10.2147/BTT.S252580 [3] Hassan S, van Balen EC, Smit C, et al. Health and treatment outcomes of patients with hemophilia in the Netherlands, 1972–2019. Journal of Thrombosis and Haemostasis. 2021;19(10):2394-2406. doi:10.1111/jth.15424

2.2 Joint bleeding, arthropathy and synovitis

In haemophilia, joint bleeding is the most common type of bleeding (about 70-80% of all bleeds). Joint bleeds occurs mainly in the large synovial hinge joints such as the ankles, elbows and knees. The number of joint bleeds has decreased in recent decades due to developments in drug treatment, but they still occur[2,3]. After a joint bleed, the synovial tissue becomes hypertrophic and hyper vascularized (synovial proliferation). This is a normal reaction to joint bleeding and often recovers within a few weeks.

Bleeding in the joint can lead to damage to the cartilage and underlying bone. Cartilage damage is caused by an inflammatory process and enzymes that are released during the clearance of red blood cells from the synovial space[4]. This inflammatory process, together with the iron released from the red blood cells, results in cell death of the cartilage cells (chondrocytes). This process disturbs the balance between cartilage cell production and degradation. Immature cartilage is extra sensitive to this imbalance between production and degradation[5].

If synovial proliferation persists for more than 3 months after bleeding, it is defined as chronic synovitis. Chronic synovitis is considered a complication after joint bleeding caused by a vicious cycle of successive joint bleeds and synovial proliferation. Synovitis is characterized by relatively painless swelling. This “active” process of (subclinical) bleeding and inflammation is considered reversible, but can lead to irreversible osteochondral changes. Eventually, repeated bleeding can also lead to “inactive,” and possibly irreversible, fibrotic synovial proliferation. In the chapter on Chronic synovitis we will use the term synovitis to refer to the process of ‘active’ synovitis.

Permanent damage to the joint due to bleeding is described as Haemophilic arthropathy and has many similarities with osteoarthritis and rheumatoid arthritis. The joint damage includes cartilage loss, bone abnormalities, hemosiderin deposits in the synovium, and fibrosis of the synovial tissue. This results in painful joints, loss of range of motion and atrophy of surrounding muscles. These limitations often have an impact on ability to preform daily activities and functioning. Advanced arthropathy leads to an equines position of the ankles and a flexed position of the knees, elbows and hips. This can indirectly lead to hyperlordosis of the lumbar spine and a tilted pelvis.

[2] Marchesini E, Morfini M, Valentino L. Recent advances in the treatment of hemophilia: A review. Biologics. 2021;15:221-235. doi:10.2147/BTT.S252580 [3] Hassan S, van Balen EC, Smit C, et al. Health and treatment outcomes of patients with hemophilia in the Netherlands, 1972–2019. Journal of Thrombosis and Haemostasis. 2021;19(10):2394-2406. doi:10.1111/jth.15424 [4] Pulles AE, Mastbergen SC, Schutgens REG, Lafeber FPJG, van Vulpen LFD. Pathophysiology of hemophilic arthropathy and potential targets for therapy Pharmacol Res. 2017;115:192-199. doi:10.1016/j.phrs.2016.11.032 [5] Hooiveld MJJ, Roosendaal G, Vianen ME, Van den Berg HM, Bijlsma JWJ, Lafeber FPJG. Immature articular cartilage is more susceptible to blood-induced damage than mature articular cartilage: An in vivo animal study. Arthritis Rheum. 2003;48(2):396-403. doi:10.1002/art.10769

2.3 Clinical symptoms of joint and muscle bleeds

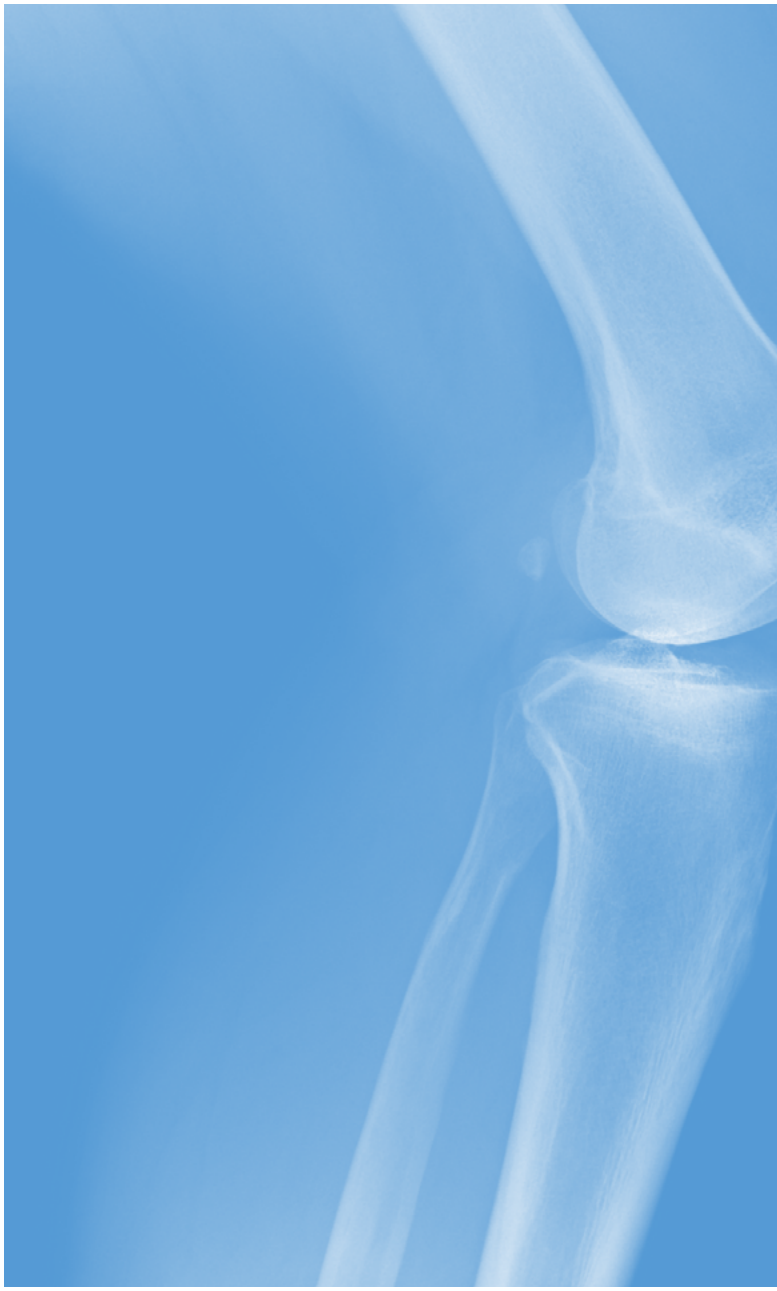
Joint bleeding in haemophilia is initially characterised by a full, stiff or tingling sensation, also known as an 'aura'. Left untreated these symptoms lead to increasing pain, swelling, warmth, limited range of movement and functional impairment. Joint bleeding itself will generally not cause a visible hematoma and swelling might be subtle. In the acute phase, the first aim is to stop the bleed by administering clotting factor.

Many symptoms associated with joint bleeding overlap with those associated with a flare-up of haemophilic arthropathy, impeding differentiation between bleeding and arthropathy[6]. Because of this challenge in differentiation, diagnostics will usually take place within the haemophilia treatment centre.

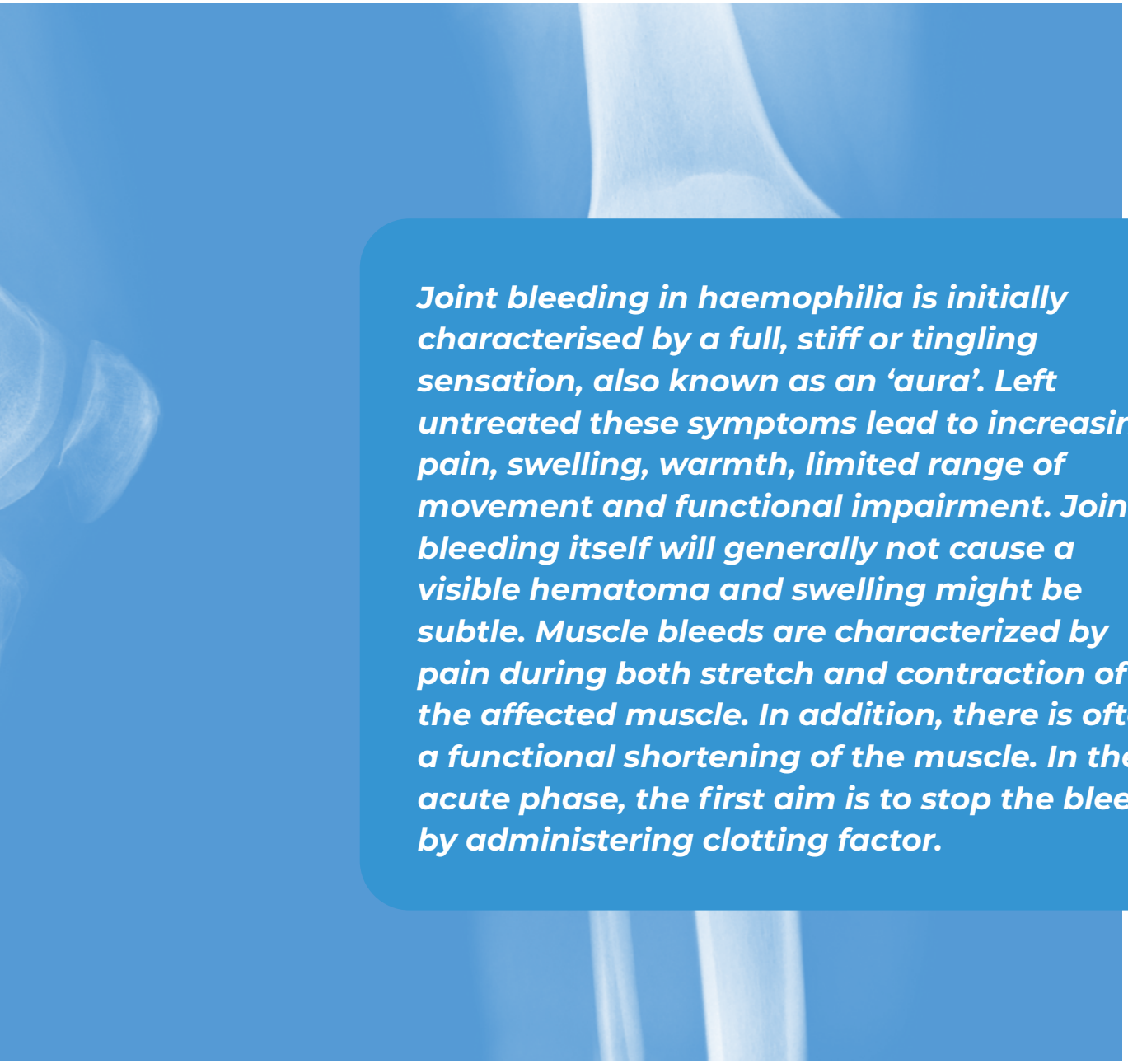
Muscle bleeding is, after joint bleeding, one of the most common types of bleeding in haemophilia. About 10-15% of the bleeds involve muscle bleeding. Muscle bleeds are characterized by pain during both stretch and contraction of the affected muscle. In addition, there is often a functional shortening of the muscle. Superficial muscle bleeding can show visible swelling and palpable hardening, while this is less evident with deeper bleeds.

Possible complications of muscle bleeds are vascular and nerve entrapment, muscle contracture or pseudotumor/cyst formation. A specific type of muscle bleed is a bleed in the iliopsoas muscle.

This type of bleed poses a significant risk of recurrence and, in addition, permanent nerve damage may occur due to compression of the N. Femoralis. Bleeding in the M. iliopsoas is characterized by groin pain and a typical flexion of the hip with lumbar lordosis and scoliosis.



[6] Timmer MA, Pisters MF, de Kleijn P, de Bie RA, Fischer K, Schutgens RE. Differentiating between signs of intra-articular joint bleeding and chronic arthropathy in haemophilia: A narrative review of the literature. Haemophilia. 2015;21(3):289-296. doi:10.1111/hae.12667



Joint bleeding in haemophilia is initially characterised by a full, stiff or tingling sensation, also known as an 'aura'. Left untreated these symptoms lead to increasing pain, swelling, warmth, limited range of movement and functional impairment. Joint bleeding itself will generally not cause a visible hematoma and swelling might be subtle. Muscle bleeds are characterized by pain during both stretch and contraction of the affected muscle. In addition, there is often a functional shortening of the muscle. In the acute phase, the first aim is to stop the bleed by administering clotting factor.

Organization of care

3.1. Haemophilia Treatment Centres (HTC)

Haemophilia is a genetic, congenital disorder which means that it is a life span disease. Each stage of life comes with different challenges. Due to the rarity of the condition, medical care for people with haemophilia and other bleeding disorders is often centralized in specialized centres (Haemophilia Treatment Centres, shortened as HTC).

Although each centre is organised differently, the usually out-patient care within the haemophilia treatment centres has a multidisciplinary character. The physician takes care of the medical treatment and coordinates the care around the patient. The nurse administers coagulation factors and teaches (carers of) patients to administer coagulation themselves. In addition, the nurse has an important role in the education of patients and the identification of problems.

The physiotherapist in the haemophilia treatment centre is, together with the physician, involved in diagnosing acute complaints and giving initial advice. In addition, regular check-ups take place to identify problems in order to start or adjust treatment in time. If complaints cannot be remedied with adequate pain medication and physiotherapy, the rehabilitation specialist and/or orthopaedic surgeon will be asked for consultation.

In addition to the physical problems, bleeding disorders have an impact on the psychosocial resilience of the whole family. The social worker or psychologist guides patients and family members in accepting and coping with haemophilia. Furthermore, practical help is offered with, for example, information at school and questions about career choice and insurance.

Medical care for people with haemophilia and other bleeding disorders is often centralized in specialized centres. Although each centre is organised differently, the usually out-patient care within the haemophilia treatment centres has a multidisciplinary character and includes physiotherapy as well as other medical professions.

3.2 Collaboration between HTC and primary care

Diagnostics for musculoskeletal complaints will usually take place in the haemophilia treatment centre. The combination of the rarity of the disease and the fact that symptoms of bleeding can be subtle makes diagnosing bleeds challenging. In the haemophilia treatment centre physical examination can be combined with ultrasound assessment to identify the cause of the complaints. Subsequently, treatment can be started immediately if necessary.

The physiotherapeutic treatment of patients with haemophilia can take place outside the haemophilia treatment center. After the patient has been consulted in the haemophilia treatment centre the physiotherapist from the haemophilia treatment centre will contact the primary care physiotherapist for a medical handover if there is an indication for physiotherapy. In case the physiotherapist is unfamiliar with haemophilia, general information about the condition, the medical treatment and contraindications will be shared with the physiotherapist. The physiotherapist from the haemophilia treatment centre remains involved during the treatment period. Situations in which contact between the primary care physiotherapist and a haemophilia treatment centre is desired are described in the section Contact the HTC.

Indication for primary care physiotherapy

A description of the indications for primary care physiotherapy are presented below for patients with in haemophilic arthropathy, after joint or muscle bleeds, in the case of chronic synovitis and around orthopaedic surgery. The sections about joint and muscle bleeds refer to the acute, subacute and post-acute phases, more information on the different phases can be found under the joint bleeding or muscle bleeding sections respectively.

4.1 Joint bleeding

- Consider not starting primary care physiotherapy treatment during the acute phase after a joint bleed. A first contact with a primary care physiotherapist can however be made.
- Consider starting physical therapy in the sub- and post-acute phase in the following circumstances:
  - If additional musculoskeletal injury (e.g. ligament injury) has been diagnosed with the onset of the bleeding.
  - If there is recurrent bleeding in the same joint and a clear haematological cause is ruled out by the HTC.
  - If recovery is not matching the expected course or in cases of delayed recovery.
  - If there is an underlying motor problem that impedes recovery from the bleeding.
  - If the person wants to return to intense sporting activities or heavy physical labour.
  - If there is an expectation that the person in question will need more intensive counselling to return to the desired level, for example in the case of psychosocial determinants influencing recovery and/or significant physical limitations.
- Continue primary care physiotherapy treatment until physical function is back to pre-bleeding status and the functional goals set have been achieved.

4.2 Chronic synovitis

The goal of the physiotherapy intervention in the treatment of synovitis is to prevent deterioration of the physical condition, without aggravating the inflammation of the synovial tissue. Treatment is not aimed at reducing the synovial inflammation per se. In the following cases, there is an indication for primary care physiotherapy:

- If clear deficits in function of the affected joint or surrounding muscles are identified or if there is a general physical deterioration.
- If the patient needs guidance on gradually increasing joint load over time.
- If the patient wants to return to high-intensity/competitive sports and/or other physically demanding activities.

4.3. Haemophilic arthropathy

- Start physiotherapy treatment for haemophilic arthropathy when:
  - The patient needs support with joint complaints that lead or might lead to limitations in daily activities and/or participation.
  - The patient is unable to achieve or maintain a desired level of independent physical functioning without support of a physiotherapist.

4.4 Muscle bleeding

- Consider not starting primary care physiotherapy treatment during the acute phase after a muscle bleed. A first contact with a primary care physiotherapist can however be made.
- Consider initiating primary care physical therapy during the sub- and post-acute phases in the following circumstances:
  - If recovery is not matching the expected course or in cases of delayed recovery.
  - If the pre-bleed (muscle) functioning is considered insufficient and there is therefore a need to improve above this level.
  - If the person wants to return to intense sporting activities or heavy physical labour.
  - If there is an expectation that the person in question will need more intensive counselling to return to the desired level, for example in the case of psychosocial determinants influencing recovery and/or significant physical limitations.

- Continue primary care physiotherapy treatment until physical function is back to pre-bleeding status and the functional goals set have been achieved.

4.5. Orthopaedic surgery

- Consider starting primary care physical therapy in the preoperative phase to be optimally prepared both physically and mentally, to become familiar with post-operative exercises and/or to practice the use of walking aids.
- Start primary care physiotherapy in all persons with haemophilia after orthopaedic surgery for the same indications as in individuals without a bleeding disorder. Take into account the points of attention described in both the pre- and post-operative phases.

Contact the HTC

Situations in which contact between the primary care physiotherapist and a haemophilia treatment centre is desired are described below. In most cases, this contact will be made with the physiotherapist working within the haemophilia treatment centre.

This contact can be initiated by both the physiotherapist in primary care or the physiotherapist working in the haemophilia treatment centre. Recommendations are divided into general recommendations that apply to each condition (including non-haemophilia-related) and recommendations for situations that are specific to certain conditions related to haemophilia.

5.1 All conditions

- Before the start of treatment in primary care, if patients with musculoskeletal complaints report to the physiotherapist without a referral (self-referred).
- If the patient has been referred to the primary care physiotherapist for treatment and does not follow the treatment for no reason provided.
- If there is an inexplicable increase in complaints or complaints develop at other locations.
- If there is no improvement in complaints within the expected period and the desired goals have not been achieved.

5.2 For specific conditions

5.2.1 Joint bleeding:

- If there is an increase in pain or swelling and/or a decrease in the range of motion.
- If the bleeding does not recover as expected and/or functional ability does not recover to the desired level.
- If there are recovery impeding factors (e.g., fear of movement, catastrophizing, inadequate coping strategies) that cannot be adequately treated in primary care.

5.2.2 Muscle bleeding:

- If neurological symptoms develop during treatment or there is a suspicion of compartment syndrome, **urgent** medical attention is required. Contact the haemophilia treatment centre **immediately** and refer the patient to the haemophilia treatment centre.

- If there is an increase in swelling or pain and/or a decrease in the range of motion.
- If muscle function does not recover as expected and/or functional ability does not recover to the desired level.
- If there are recovery impeding factors (e.g. fear of movement, catastrophizing, inadequate coping strategies) that cannot be adequately treated in primary care.

5.2.3 Synovitis:

- if there is a suspicion of bleeding, i.e. if there is an increase in swelling, pain and/or reduced range of motion in the affected joint.

Therapy recommendations

6.1. Physiotherapy after joint bleeding

6.1.1 Phases of recovery

After joint bleeding, 3 consecutive phases of recovery can be distinguished. As a complication, chronic synovitis can also develop. It should be noted that every phase could have a longer or shorter duration due to differences between individuals.

6.1.1.1 Acute phase (estimated duration 0-72 hours):

The acute phase is the period in which coagulation should be established. During this phase the formed clot is still vulnerable. Treatment goal within this phase is to support coagulation and form a strong clot that is resilient to forces. The acute phase is characterized by a painful joint, swelling and limitations of range of motion. Changes might be subtle and do not always occur to the same extent.

6.1.1.2 Subacute phase (estimated duration 4-21 days):

In the subacute phase some blood might still be present in the joint cavity and the synovial tissue is hypertrophic and vascularized. Treatment goal within this phase is to start mobilization and to balance the risk of complications due to immobilization with the risk of a re-bleed. This phase is characterized by diminished pain and an increase in range of motion of the involved joint. The joint may or may not still be swollen and warm during this phase.

6.1.1.3 Post-acute phase (estimated duration >21 days):

During the post-acute phase blood from the joint cavity is cleared and the joint is able to tolerate full loading. During this phase the joint synovium returns to the pre-bleed status (Note - that for some people this may be a return to an already pathologised synovial layer that is chronically hypertrophic). Treatment goal within this phase is to return to pre-bleed activities and participation. The post- acute phase is characterized by complete recovery to the situation before the bleed regarding joint range of motion, swelling, warmth and stability.

6.1.1.4 Chronic synovitis (recovery >3 months)

In the case of synovial proliferation (hypertrophy and vascularization of the synovial tissue) prolongs after 3 months, this is classified as chronic synovitis. Chronic synovitis is considered a complication after joint bleeding caused by a vicious circle of joint bleeding and synovial proliferation. In chronic synovitis, the joint appears swollen, but usually not tense, is often painless and slightly warm.

6.1.2 General recommendations for joint bleeding

- Ensure that education on pathophysiology and advice around joint loading are in concordance with the recommendations from the haemophilia treatment centre
  - Contact the haemophilia treatment centre to verify what information has previously been provided to the patient regarding the recovery from a joint bleed.
  - Ask whether the patient has had contact with the haemophilia treatment centre after the onset of the bleeding.
- Take personal factors into consideration when applying interventions and make sure the interventions are appropriate for the individual. Take into account, among other things; age, current and previous functioning, multi-morbidity (including multi-joint arthropathy), cognitive ability, and preferences of the individual.
- Monitor the affected joint during and after treatment and after an increase in load and/or activities.
  - Interventions and weight loading should be relatively pain-free (i.e. not cause more pain than before the bleeding in for example arthropathic joints) and not cause an increase in swelling and/or pain afterwards.
- Look for signs of fear of moving or other psychosocial factors which may inhibit recovery after bleeding.

6.1.3 Therapy in the acute phase (estimated duration 0-72 hours):

- Advise to limit the load on the joint as much as possible, for example by using crutches or a wheelchair (at the lower extremity) or wearing a sling (at the upper extremities)
  - Reducing the load lowers the risk of new bleeding and reduces the risk of bleeding-related cartilage damage.
  - Pay sufficient attention to the impact of the bleeding on daily activities and participation.
- Assess whether the pain is bearable for the person with bleeding.
  - Check that the person is able to control the pain with appropriate pain medication in consultation with the HTC.
  - Cooling (for example by ice application) and the use of transcutaneous electrical nerve stimulation (TENS) may be considered during the acute phase.
- Do not apply other forms of therapy (such as manual techniques or exercise therapy) in this phase.

6.1.4 Therapy in the subacute phase (duration approximately 4-21 days):

- Gradually increase the load on the joint as swelling and pain begin to subside, the range of motion increases, and the patient feels comfortable to begin loading the joint.
  - Gradually increasing joint load is essential to prevent complications caused by immobilization while minimizing the risk of new bleeding.
- Start gentle active exercises aimed at improving the range of motion of the affected joint.
  - Consider supporting the active exercises by applying mild mobilization techniques (supported active mobilization).
  - Avoid end-range of movement as there is the risk of impingement of the synovial tissue.
- Provide functional exercises and activities with the aim of preventing unwanted loss of muscle strength and proprioception.
  - Start light with for example isometric exercises and gradually increase load and include more dynamic exercises.
  - At this stage, do not start with explosive or eccentric exercises and avoid maximum load.
  - Ensure that the function of other joints and muscles is maintained so that deterioration due to a prolonged period of immobilization is minimized or prevented.
- If necessary, consider using tape or bandage to support the affected joint.
- Cooling (for example by ice application) and TENS can be considered at this stage for pain relief in patients with a lot of pain.
- Do not apply other treatment modalities (such as massage, dry needling/ acupuncture, shockwave, laser) after joint bleeding.
  - These therapies are not supported by scientific evidence, nor are they supported by expert opinion.

6.1.5 Post-acute phase therapy (estimated duration >21 days):

- Offer functional exercise therapy with the goal of returning to pre-bleeding levels, both in terms of joint status and in terms of activities and participation.
  - Adjust exercise therapy to fit the individual's goals and abilities (current and pre-bleeding). Tailor therapy and advice to the individual situation with the goal of returning to a level of functioning prior to the bleeding.
  - Gradually increase loading, based on swelling, pain, and joint function.
  - Offer exercises to support proprioception/balance when problems are identified in this area.
- Do not apply other treatments (such as dry needling/acupuncture, shockwave, laser) after a joint bleed.
  - These therapies are not supported by evidence, nor have they been supported by expert opinion.

6.2 Physiotherapy for chronic synovitis

6.2.1 General recommendations for chronic synovitis

- Ensure that education about pathophysiology and activities is consistent with the recommendations of the haemophilia treatment centre
  - Contact the haemophilia treatment centre to find out what information has previously been provided to the patient regarding synovitis.
  - Ask if the patient has been in contact with the haemophilia treatment centre about the synovitis.
- Consider personal factors when prescribing interventions and ensure that interventions are appropriate for the individual, taking into account, among others age, current and previous level of functioning, multi-morbidity (including multi-joint arthropathy) and preferences.
  - Carefully monitor the affected joint during and after interventions and after an increase in joint load and/or an increase in activity level.
- Check for swelling, pain and ROM. Since pain and ROM limitation are generally minimal, swelling usually provides the best clinical indication of the level of synovitis.

6.2.2 Therapy for chronic synovitis

- In the early stages, reduce joint loading and activity level based on swelling of the joint. As the swelling subsides, the load and activity level can be gradually

increased. The level of activity should be monitored and adjusted according to the degree of swelling of the joint

  - Be aware that it can take several months for synovitis to subside. Any increase in activity should be gradually increased and carefully monitored.

- Provide exercise therapy to patients with synovitis aimed at maintaining joint and muscle function of the affected joint and surrounding muscles (e.g., strength and proprioception) as well as general fitness.
- In individual cases, consider cooling (for example by ice application) to reduce pain.
- Consider using tape, braces or enhanced footwear to support the affected joint and prevent recurrent bleeding and synovial impingement.
- Do not apply other treatments (such as massage, dry needling/acupuncture, shockwave, laser).

6.3 Physiotherapy for haemophilic arthropathy

6.3.1 General recommendations

- Please note that the patient's load capacity might be lower than expected due to more profound joint damage, multiple affected joints or more (chronic) pain compared to individuals of similar age without haemophilia.
  - Adjust therapy to the individual's load capacity by starting at a lower level.
  - Consider including imaging when it is available to understand the extent of the pathology at the joint level, but keep in mind that imaging and the degree of symptoms a person experiences are only related to a limited degree.
  - Aim to gradually increase the intensity of training as the patient's load capacity improves over time.
- Make sure that the (exercise) therapy is aligned with the patient's goals and pay sufficient attention to the patient's motivation.

6.3.2 Therapy for haemophilic arthropathy

- Offer exercise therapy to all patients with haemophilic arthropathy (see Appendix 1 for recommendations on frequency, intensity, timing, and type of exercise therapy)
- Select functional exercises that include (parts of) activities that patients experience difficulties with in their daily lives, such as walking, climbing stairs or rising from a chair. Aim to improve the ability to perform activities and increase participation and link the exercise therapy to a specific goal which is jointly set in agreement

with the patient and ensure that the exercises are specific to achieve this goal.

- Tailor the treatment to the individual patient (e.g. joint status, multi-joint involvement, overall physical fitness and preferences) in a way they are able to fit the activities into daily life and sustain the increased physical activity in the long term.
- Aim to enhance self-efficacy with exercise therapy and focus on ways to continue physical activity after guidance diminishes over time.
- Consider hydrotherapy as an alternative to land-based exercises, for example, for patients with a lot of pain or a lot of functional limitations.
- When following the treatment with coagulation factors prescribed by the haematologists, there are no indications that exercise therapy causes bleeding.
- Consider manual techniques in patients with haemophilic arthropathy only in addition to exercise therapy or to create conditions necessary to start exercise therapy.
- Do not use high velocity manual techniques in patients with haemophilic arthropathy.
- When following the treatment with coagulation factors prescribed by the haematologists, there is no indication that the use of low-intensity, low force manual techniques (i.e. fascial therapy, traction, gentle joint mobilisation) causes bleeding. However, keep in mind that these techniques do not encourage self-management and do not improve self-efficacy.
- Consider contacting the haemophilia treatment centre if there are any doubts about applying certain manual therapy techniques.
- Information provided to the patient about haemophilia should be provided by healthcare professionals working at the haemophilia treatment centre.
- Contact the physiotherapist at the haemophilia treatment centre to discuss what information has been provided to the patient regarding disease specific information.
    - Do not apply any treatments other than the previously described exercise therapy, additional manual techniques or education. Examples of therapies that are not recommended are TENS, taping, dry needling/acupuncture, shockwave, laser and RICE principles.
- There is limited evidence for a beneficial effect of these other therapies in haemophilic arthropathy.

6.4.Physiotherapy after a muscle bleeding

6.4.1 Phases of recovery

After a muscle haemorrhage, 3 consecutive of recovery can be distinguished. It should be noted that each phase can last longer or shorter due to, among other things, differences between individuals, trauma mechanism and (time to) treatment. In general, intermuscular haemorrhages take less time to recover than intramuscular haemorrhages.

6.4.1.1 Acute phase (estimated duration 0-72 hours):

The acute phase is the period in which the coagulation must take place. During this stage, the clot formed is still vulnerable. The goal of treatment in this phase is to support clotting. This should eventually form a strong clot that can withstand loading. The acute phase is characterized by pain, swelling, and decreased muscle length. In some cases, there is little restriction of movement, little noticeable swelling, and/or little pain, even though there is intramuscular haemorrhage. The extent of the bleeding does not always correspond to the symptoms experienced and may therefore be underestimated. In some cases, a haematoma may also be visible, although this is not always the case.

6.4.1.2 Subacute phase (estimated duration 4-21 days):

In the subacute phase, the bleeding has stopped and a first clot has formed. However, at the beginning of this phase, the clot is still fragile and therefore caution should be exercised with regard to stretching and contraction of the affected muscle. The goal of treatment at this stage is to begin mobilizing and weigh the risk of complications from immobilization against the risk of new bleeding. This phase is characterized by an increase in muscle length and reduced pain of the affected muscle. Reduction of swelling will occur within the subacute phase, but improvements in this area may lag behind reductions in pain and increases in muscle length.

6.4.1.3 Post-acute phase (estimated duration >21 days):

During the post-acute phase, the blood in the affected muscle is resorbed. Subsequently, muscle length and strength should return to pre-bleeding function. In the post-acute phase, the risk of rebleeding decreases to pre-bleeding status. The goal of treatment in this phase is to return to pre-bleeding activities and participation. If the load capacity of the affected muscle was limited before the bleeding and there is therefore an increased risk of bleeding, it may be necessary to increase the load capacity of the affected muscle beyond the condition before the bleeding.

6.4.2 General recommendations for muscle bleeding

- Ensure that education on pathophysiology and mobilization is in line with the recommendations of the haemophilia treatment centre.

  - Contact the haemophilia treatment centre to find out what information has previously been provided to the patient regarding the recovery from the muscle bleeding.
  - Inquire whether the patient has had contact with the HTC as a result of the onset of the bleeding.

- Take personal factors into account when prescribing interventions. Ensure that interventions are appropriate for the individual, taking into account age, current and previous functioning, multi-morbidity (including multi-joint arthropathy) and preferences, among other factors. Be alert to possible compensatory strategies in the case of bi-articular muscles.
- Check the affected muscle carefully during and after interventions and after an increase in load and/or activities.
  - Interventions and loading should be relatively painless. They should not lead to a decrease in range of motion and/or cause an increase in pain.
- Be aware of possible neurovascular complications that can accompany muscle bleeding
  - Muscle bleeds may be accompanied by injury to peripheral nerves, resulting in a change in sensation and/or motor function (e.g., compression of the femoral nerve in an Iliopsoas haemorrhage).
  - Muscle bleeds can lead to compartment syndrome. The pressure in the affected muscle can be dangerously high, requiring urgent intervention. Calf and forearm muscles are most often affected.
- Look for signs of fear of moving or other psychosocial factors which may inhibit recovery after bleeding.

6.4.3 Therapy in the acute phase (estimated duration 0-72 hours):

- Avoid stretching the muscle and limit contraction (i.e. avoid (functional) movement against resistance) to reduce the risk of new bleeding. Depending on the muscle affected, this can be done using crutches or a wheelchair for lower extremity muscles or a sling for upper extremity muscles.
- Cooling (for example by ice application) or the use of transcutaneous electrical nerve stimulation (TENS) may be considered to reduce pain during the acute phase.
  - These interventions should only be used as a complement to the other recommendations.
  - Do not apply other forms of therapy (such as manual techniques or exercise therapy) in this phase.

6.4.4 Therapy in the subacute phase (duration approximately 4-21 days):

- Increase active exercises of the affected muscle gradually and within the pain threshold, at the moment when the muscle length increases, the pain begins to subside and the patient can start using the affected muscle in a comfortable way.
  - Gradually increasing the exercises is essential to prevent the occurrence of complications due to immobilization and improve resorption, minimizing the risk of new bleeding.
  - Consider antagonistic contraction within relatively pain-free limits to relax the affected muscle, using reciprocal inhibition.
- Provide functional exercises and activities to prevent unwanted loss of muscle strength and proprioception.
  - Aim to start functional exercises with only mild resistance.
  - Avoid exercises or activities that require high force or high speed of contraction of the affected muscle.
- Cooling (for example by ice application) or TENS may be considered in individual cases for pain relief in patients with a lot of pain at this stage.
- Do not apply massage therapy after a muscle bleeding.
- Do not apply a passive stretch to the affected muscle during this phase to avoid a potential new bleed.
- Do not apply other treatments (such as Dry needling/acupuncture, Shockwave, Laser) after a muscle bleeding.
  - These therapies are not supported by evidence, nor have they been supported by expert opinion

6.4.5 Post-acute phase therapy (estimated duration >21 days):

- Offer Functional Exercise Therapy to return to pre-bleeding levels or a desired higher level of function, activities, and participation
  - Adjust exercise therapy to individual goals and abilities. Tailor therapy and advice based on pain, range of movement and strength.
  - Offer strength training if a problem in muscle strength is identified. Gradually increase the intensity.
  - Apply pain-free stretches during the post-acute phase if a persistent limitation in muscle length is observed after 6 weeks.
  - Conduct coordination exercises when a problem in this area is identified.

- Do not apply other treatments (such as dry needling/acupuncture, shockwave, laser) after a muscle bleeding.
  - These therapies are not supported by evidence, nor have they been supported by expert opinion

6.5 Points of attention for physiotherapy in children

Treatment statements for adults to a large extent also apply to children with bleedings disorders. Of course, the age of the child must be taken into account and in many cases parents/guardians must be involved in the treatment. Depending on the age, it will be determined in consultation with the HTC whether the treatment should be carried out by a specialized paediatric physiotherapist or a regular physiotherapist.

6.5.1 Muscle and joint bleeding

- Consider adjusting the advice on cooling (for example by ice application) and loading the joint based on the age of the child to improve feasibility.
  - A buggy, stroller or wheelchair can be used on children who cannot use crutches due to their age or motor skills.
- Depending on the age of the child, offer exercise therapy in a more functional and playful way.
- Provide information that is appropriate for the age of the child and also provide advice to the parents/guardians.

6.5.2 Chronic synovitis

- Recommendations for activities and joint loading should be adapted to the age of the child.
- Adapt exercise therapy in a more functional and playful way for children, depending on the child's age.
- Consider contacting school and/or sports club about restricting activities/ participation in physical education and/or sports.

6.5.3 Arthropathy

- Customize exercise therapy for children with haemophilic arthropathy by adding functional exercises and elements of play. These adaptations must be appropriate for the age of the child. This means challenging children by, for example, throwing a ball, crouching down to pick up toys, or swimming.
- Do not use manual techniques in children with haemophilic arthropathy.

6.6. Points of attention for physiotherapy around orthopaedic surgeries

In general, the physiotherapy treatment in the pre- and postoperative phase of orthopaedic procedures in people with haemophilia is very similar to that in people without a coagulation disorder. However, there are a number of points to consider when treating individuals with haemophilia.

6.6.1 Points of attention in the pre-operative phase

- Be aware that the baseline condition of someone with haemophilia may be lower than that of someone without haemophilia due to arthropathy in multiple joints and/or advanced arthropathy.
    - Because of this lower baseline condition, the result of prehabilitation may not be the same as in people without haemophilia.
    - If a person is unable to improve the function of the joint to be operated on, focus therapy on improving the patient's general fitness and functioning, familiarizing themselves with post-operative exercises, using walking aids, and/or psychological support.
    - Be aware of possible arthropathy in other joints and avoid overloading the lower extremities, including the knees and ankles. Also adjust the choice of walking aids accordingly.

6.6.2 Points of attention in the postoperative phase

- Be aware to problems related to wound healing. Contact the haemophilia treatment centre if you suspect delayed wound healing.
    - In addition to problems that also occur in the general population, such as infection, haemophilia can also cause delayed wound healing.
- People with haemophilia may experience more pain and swelling in the postoperative period than people without haemophilia. This pain may be associated with the occurrence of bleeding. Contact the haemophilia treatment centre if there are concerns about the level of pain, if pain is not well tolerated, or if it interferes with therapy.
- Take into account the potential overloading of other joints during rehabilitation. Adjust the load/exercise therapy and the choice of walking aids if necessary.

6.6.3 Synovectomy

Because radiosynovectomy (treatment of joint inflammation with radioactive material) is a less common procedure in the general population, we provide specific recommendations for the postoperative phase after radiosynovectomy.

- Provide advice on return to activities of daily living in the first 2 weeks after radiosynovectomy. Be cautious with active physical therapy (e.g., resistance exercises or dynamic exercises) during this time.
- After these two weeks, provide exercise therapy aimed at improving joint function and general fitness if any problems have been identified in this area.
- Take into account the recommendations for therapy in chronic synovitis, such as:
  - Gradual increasing joint load and exercise therapy in which swelling is monitored.
  - Apply exercise therapy to improve or maintain joint and muscle function.
  - Do not apply other treatments (such as massage, dry needling/acupuncture, Shockwave, Laser).

6.7 Physical therapy for a non-haemophilia-related problem

In general, the treatment of non-haemophilia-related problems (e.g. musculoskeletal disorders of the spine or Oschgood Schlaters) in individuals with haemophilia is similar to the treatment of persons without haemophilia. However, there are a number of points that must be taken into account when treating someone with haemophilia.

- Make sure there are no underlying active haemophilia-related symptoms (i.e. bleeding or joint inflammation) when a person with haemophilia refers themselves to primary care physiotherapy with a musculoskeletal problem.
  - If there is a suspicion of an active haemophilia-related problem, first contact the HTC
- Do not apply techniques with a lot of force (e.g. high velocity mobilization techniques) and/or techniques that may cause soft tissue bruising (e.g. dry needling, shockwave, cupping) without consulting the haemophilia treatment centre.
- Be aware of any multiple joint arthropathy in individuals with haemophilia and adjust treatment accordingly.

Appendix 1: FITT FACTORS

The factors (frequency, intensity, timing and type) that guide the composition of exercise therapy in people with haemophilic arthropathy are listed below. These broadly correspond to the factors described in osteoarthritis of hip/knee. It is up to each therapist to decide to what extent these guidelines apply to the individual patient.

7.1.1 Frequency

Support the person with haemophilic arthropathy to be regularly active in daily life with the aim of meeting the physical activity recommendations proposed by the WHO*.

- Encourage the patient to increase physical activity levels (slightly) if it is found that it is not feasible to fully comply with these recommendations.
- Use supervised exercise therapy in combination with home exercises. Gradually reduce the amount of counselling over the course of the treatment period and support the patient to continue exercise therapy independently, for example by discussing ways to continue practicing after the treatment period.

: WHO recommendations on physical activity:

Children and adolescents aged 5-17 years

- should do at least an average of 60 minutes per day of moderate-to-vigorous intensity, mostly aerobic, physical activity, across the week.
- should incorporate vigorous-intensity aerobic activities, as well as those that strengthen muscle and bone, at least 3 days a week.
- should limit the amount of time spent being sedentary, particularly the amount of recreational screen time.

Adults aged 18–64 years

- should do at least 150–300 minutes of moderate-intensity aerobic physical activity; or at least 75–150 minutes of vigorous-intensity aerobic physical activity; or an equivalent combination of moderate- and vigorous-intensity activity throughout the week.
- should also do muscle-strengthening activities at moderate or greater intensity that involve all major muscle groups on 2 or more days a week, as these provide additional health benefits.
- may increase moderate-intensity aerobic physical activity to more than 300 minutes; or do more than 150 minutes of vigorous-intensity aerobic physical activity; or an equivalent combination of moderate- and vigorous-intensity activity throughout the week for additional health benefits.
- should limit the amount of time spent being sedentary. Replacing sedentary time with physical activity of any intensity (including light intensity) provides health benefits, and
- to help reduce the detrimental effects of high levels of sedentary behaviour on health, all adults and older adults should aim to do more than the recommended levels of moderate- to vigorous-intensity physical activity.

7.1.2 Intensity

Aim for the following intensity when applying strength training or aerobic exercise therapy

General Training Principles

Be sure to apply general training principles such as; Start with a warm-up, gradually increase the training load, decrease the training intensity if there is pain or discomfort. Furthermore, it is important to tailor the exercise therapy to the physical fitness level of the patient and their previous experience with training. Consider starting exercise therapy with short training bouts, which can be gradually extended as fitness increases.

Strength

Aim for a resistance that a patient can perform with 20-30 repetitions (the equivalent of 50-60% of the 1RM) or in patients with more experience exercising, aim for 8-20 repetitions (equivalent of 60-80% of the 1RM). Have the patient perform 2-4 sets with a 30-60 second break between sets.

Aerobic training

40-60% of maximum heart rate (or 12-13 on the Borg Rating of perceived exertion) or >60% of maximum heart rate (14-17 on the Borg Rating of perceived exertion) for individuals experienced in aerobic exercise.

7.1.3 Type

Combine functional training with strength and aerobic exercises.

Functional exercises

Choose activities in which a person with haemophilia experiences difficulties in their daily life, for example, walking, climbing stairs, or getting out of a chair in adults or hopping and jumping in children.

Strength

Choose exercises that target the large muscles in the upper and/or lower extremity. Have both patients with unilateral and bilateral joint complaints perform exercises for both sides. Avoid exercises with great mechanical force (e.g., leg extension in patients with arthropathy in the knee joint)

Aerobic Exercise Therapy

Select activities with a relatively low force on the joints, for example walking, cycling, rowing machine or elliptical.

Other

- Examine the balance and coordination of all patients with arthropathy and offer balance and/or coordination exercises to those where a problem in this area is identified.
- Consider stretching or active movement exercises in addition to exercise therapy when a reversible movement restriction is identified.

7.1.4 Time

Aim for a duration of 8 to 12 weeks and follow up these sessions after a few months with a few sessions that aim to monitor progress and make adjustments in case of any problems. The aim of these additional sessions is to motivate the patient to maintain the treatment effects and incorporate physical activity and/or exercise into their daily lives.

The frequency of treatment per week depends on the patient's situation (e.g. the degree of guidance that is desirable, available time, financial aspects) and the goals that have been set.

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Koninklijk Nederlands Genootschap voor Fysiotherapie

De fysiotherapeuten van Nederland

NVHP

voor iedereen met een erfelijke stollingsstoornis

European Reference Network

Hematological Diseases (ERN EuroBloodNet)

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Furthermore, it is important to acknowledge that the design of this report was carried out by the European Association for Haemophilia and Allied Disorders (EAHAD).

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We extend our sincere thanks for your assistance in disseminating this report effectively. Your collaboration is invaluable in ensuring the wider reach and impact of our efforts.

Date of report: 9 February 2024

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