



Knee and hip osteoarthritis



TEACHING MANUAL FOR PATIENT EDUCATION

Application and background

August 2021

This manual is only for use by certified GLA:D® therapists and exclusively for use in GLA:D® programmes for knee and hip osteoarthritis in Canada. Other use requires written permission from the University of Southern Denmark.

The manual is a clinical work tool and must not be handed out to patients.

The content of the manual is a summary of evidence-based recommendations and research results relevant to people with knee or hip osteoarthritis.

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August 2021

It is important that all slides are shown to all participants and that this teaching manual is used to convey the theoretical messages. The goal for the theory part is to give all participants a better understanding of osteoarthritis and motivate them for first line treatment. The logo of GLAD Denmark is used on the images of the slides/

Disclaimer: Please be advised that the logo of the GLA:D® Denmark is used on the screenshots of the slides of Session 1 and Session 2.

Session 1

Slide 1 – Welcome to GLA:D®



Welcome/introduction of self and participants. Ask:

- Why do you participate?
- What are your goals?

An example of an ice breaker activity could be - tell us your name, how long have you been feeling symptoms of osteoarthritis, what you enjoy doing the most on your spare time, and what is the biggest limiting factor in your life due to osteoarthritis.

Point out the importance of the fact that they themselves are actively involved. It is necessary that they reflect on what is said by others in the group and relate it to their own experiences.

Mention the importance of active participation and discussion. The participants are encouraged to ask questions and interrupt if anything is unclear. Remind participants to speak up if they need a break.

Remind everyone that if personal stories are shared within the group, we all agree that they will not be shared outside of the group – this is a safe and confidential space.

Slide 2 – Acknowledgements



It is important to acknowledge the founders of this great initiative from Denmark (Prof Ewa Roos and Prof Søren Skou), the GLA:D Denmark team and the GLA:D International Network.

GLA:D®, run as a not-for-profit initiative, is now an international community and receives support from all around the world, with all countries helping each other.

Slide 3 – The GLA:D® program



Scientists, certified clinicians, and all of you (the patients) are involved in GLA:D®. The program is designed for people with hip and/or knee osteoarthritis, just like you.

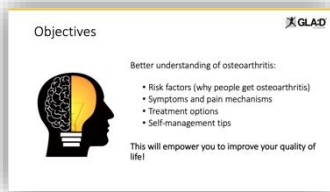
Education Sessions: The theoretical part consists of 2 education sessions. *(It is recommended that a former participant talks about his/her experiences with GLA:D® if possible).*

Exercise Sessions:

1) You will have an individual assessment to ensure that you start your exercise therapy at an appropriate individual level.

2) You will have a minimum of 12 exercise sessions - supervised group exercise sessions or unsupervised home exercise sessions. We recommend 12 or more supervised exercise sessions since that appears to be the minimum dose of an exercise program to give people a good chance of improving. Exercising in a group and having a 'coach' helps get the work done, and in a way that is tailored to you— that is why 12 supervised exercise sessions are recommended.

Slide 4 – Objectives



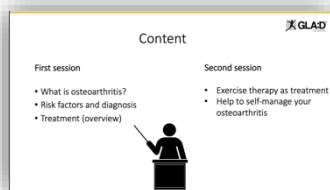
Key message: Knowledge is important to manage the disease

The objective for patient education is to give you a better understanding of the disease, risk factors, symptoms, treatment options including potential benefits and harms and what you can do to manage your symptoms.

The factors that contribute to the pain and challenges people face due to osteoarthritis are more complicated than you might think. They can include physical, mental and lifestyle factors, and we want you to understand as much as possible about all these things to help you improve your condition.

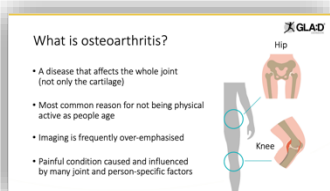
Research shows that knowledge about osteoarthritis can have a positive impact on your pain and quality of life. There are many tools or strategies on how to best deal with osteoarthritis. This is a good forum to share your tips and things that work for you and maybe get some new ones. Research shows that the best first-line treatment available for mild, moderate, and severe difficulties due to osteoarthritis is exercise, patient education and weight management (if applicable). This program will provide you with advice and tips that can be applied to the types of exercise and physical activities that you decide to continue with once you have completed the 12 neuromuscular exercise classes targeting your osteoarthritic joint.

Slide 5 – Content



Briefly present the content of this first patient education session.

Slide 6 – What is osteoarthritis?



Key message: Osteoarthritis affects the whole joint and is influenced by many factors

Osteoarthritis can affect all joints of the body where cartilage covers the ends of the bones. The joints that are most frequently affected are the hand and fingers, the knee, and the hip joint. It is a lifelong disease that affects the whole joint such as the articular cartilage, the joint capsule, ligaments, muscles, and the underlying bone.

Osteoarthritis doesn't just affect older people, but it also affects younger people's quality of life because many younger people experience pain when they do sports activities or other physical activities.

Imaging – (X-Rays, scans) is frequently over-emphasized because of a poor link between symptoms and findings on imaging. We will talk more about that later in this session.

Previously, it was thought that osteoarthritis was the result of wear and tear and that the joint was worn out. Therefore, osteoarthritis has been known as “wear and tear disease”. However, this language has led many people to believe that they cannot and should not be physically active with osteoarthritis. This is not correct, and in fact, many studies have shown that cartilage needs moderate load through physical activity, for example, walking, to keep healthy. We also know that many things that can influence your pain. As well as structures in your hip and knee joint, things like stress, thoughts and beliefs can influence how much pain you feel. In addition, osteoarthritis is

caused by several risk factors and not only because of overload during work and sport. For all these reasons, osteoarthritis is the more appropriate term for the disease.

Slide 7 – How common is osteoarthritis?

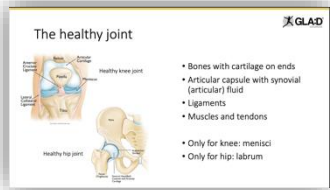


Key message: Osteoarthritis is very common

Osteoarthritis is a very common disease. It is the most common lifelong disease in people over 65 years and thus more common than high blood pressure and diabetes. A lifelong disease means that once you have developed osteoarthritis, you will have the disease for life. The symptoms may however vary and can be improved by treatment such as exercise.

The prevalence or number of people with osteoarthritis increases sharply with increasing age. 30% of all people aged 45 or more report knee and/or hip pain. Age alone does not cause osteoarthritis, i.e., not all older adults get osteoarthritis, and some people are young when their symptoms begin. People with previous knee injuries from e.g., sports have 4-6 times higher risk of developing osteoarthritis in that particular joint. For about half of these people the osteoarthritic changes of bone and cartilage are established 10-15 years after the injury.

Slide 8 – The healthy joint



Key message: To understand how osteoarthritis affects the joints, it is necessary to know about the healthy joint

The joint is the connection between two bones. Without joints we cannot move around. The ends of the bones are covered with articular cartilage, which forms sliding surfaces. The surface of cartilage is white, hard, and smooth to minimize

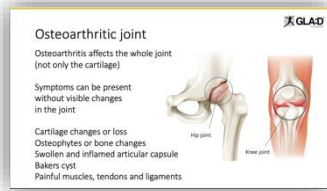
friction during movement. For the cartilage to get adequate nutrition, it needs dynamic load. Dynamic load is the repetitive cycle of load, unload, load, unload, for example when walking. The articular capsule around the joint produces synovial fluid which helps the joint to get a nutrient supply. The way cartilage works may be compared to a sponge. When the joint is loaded, fluid is pressed out from the cartilage tissue; when the pressure eases and the joint is unloaded, the fluid is sucked back into the cartilage.

Around and inside the joint are ligaments that help to mechanically stabilize the joint. The muscles help to both stabilize and move the joints. The stronger the muscles are the better they stabilize the joint and the easier it is to move around.

The knee joint has two menisci (a lateral (on the outside) and a medial (on the inside of the knee joint) meniscus) which are two C-shaped pieces of tough, rubbery cartilage that acts as a shock absorber between the shinbone and thighbone. The menisci's main task is to help distribute the body weight over the joint surfaces when walking and running and help stabilize the knee joint together with the ligaments. If the menisci are missing (because of surgery) the joint surfaces will be exposed to increased stress and osteoarthritis may develop faster.

The hip joint has a labrum which is a piece of cartilage that runs along the rim of the socket to provide a suction seal and increase stability of the hip joint (by increasing the contact surface), absorbing shock and distributing pressure during hip motion. Much like the meniscus of the knee the hip labrum may become torn or even detached from the acetabular socket.

Slide 9 – Osteoarthritic joint



Key message: Osteoarthritis affects the whole joint

Osteoarthritis affects the whole joint and not only the articular cartilage. Symptoms can be present without visible changes in the joint and in general there is a poor link between structural findings in the joint and symptoms. Many other factors have an impact on symptoms which we will discuss in session 2.

The cartilage may change, or cartilage loss may be seen on imaging, but not necessarily. Sometimes osteophytes and subchondral bone changes can be seen as well. Swollen and inflamed articular capsule is normal and Bakers Cysts are often found in the back of the knee and muscles, tendons and ligaments are often painful.

The pain associated with osteoarthritis does not come from the articular cartilage as the cartilage has no nerves. Instead, it is the surrounding structures such as bone, ligaments (connects bone to bone), joint capsule, and tendons (connects muscle to bone) that hurts.

Slide 10 – Meniscal and labral tears



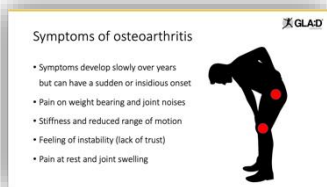
Key message: Meniscal and labral tears is part of osteoarthritis

If you are middle-aged or older and your pain is not caused by a severe joint trauma (e.g., after a fall or sports injury) the pain is most likely related to your osteoarthritis.

Very often a meniscal or labral tear is an early sign of osteoarthritis. Structures around the joint will begin to get older when you are middle-aged, the tissue is less durable, and tears may develop from an insignificant trauma or without any trauma at all. The good news is that exercise therapy works well for people with a meniscus tear or labral tear as well, with or without other signs of osteoarthritis.

For many years arthroscopy, also known as keyhole surgery, was considered necessary to treat a meniscal tear. Now international guidelines recommend against arthroscopy for middle-aged and older people with a meniscal tear, with or without imaging evidence of osteoarthritis, mechanical symptoms, and regardless of whether the symptoms came on suddenly or slow. This shift has happened because many studies from all over the world have shown that arthroscopic surgery has no better effect when compared to fake surgery where just the skin was cut, and no instruments ever got into the joint or to other treatment such as exercise. There is no strong evidence to support arthroscopy for labral tears either, so surgery should be approached with caution. Today, the same treatment is recommended for a meniscal tear as for osteoarthritis, e.g., exercise therapy.

Slide 11 – Symptoms of osteoarthritis (1)



Key message: Do you recognize the classic symptoms?

Symptom development:

The classic development of symptoms happens slowly and over years but for some symptoms develop faster. Symptoms may fluctuate. Periods of more intense symptoms can be followed by periods of reduced or no symptoms at all. The length of these different periods may vary. Many find no or poor links between the activities they do and the symptoms they experience, and it is therefore difficult to predict periods of more intense symptoms.

Pain on weight bearing and joint noises:

The first noticeable sign of osteoarthritis is often pain during weight bearing e.g., walking or running. Clicking and grinding noises can often be heard or felt from the joint. Sounds from the joint are not considered harmful.

Stiffness and reduced range of motion:

Stiffness and reduced range of motion is common, especially when it comes to straightening or bending the joint fully, for example if you squat down. Most often, the feeling is short-lived and goes away when you get up and start moving. If you are not able to straighten your leg fully, this will affect the way you walk and how you bear weight on the joint surfaces.

Feeling of instability:

Often instability or uncertainty when loading that feels like the knee or hip is about to give way is felt. A feeling of not being able to trust the joint (feeling of instability) is very common. The good news is that exercises to build your muscles will help with this feeling.

Pain at rest:

In the beginning, pain often occurs only during weight bearing; for example, when you walk or climb stairs. Later in the process, the pain may also occur at rest and at night. Interestingly, even night pain can disappear when you start exercising. Data from GLA:D® patients show that around 45% suffer from night pain when starting the GLAD® program and that night pain is reduced or even disappears completely for some participants during the training period.

Knee joint swelling:

If you have knee osteoarthritis the joint can be swollen which is a sign of inflammation. It is important to emphasize that it is not a sign of infection. (Infection would be a very hot and stiff joint accompanied with chills, fever or nausea that can sometimes occur after surgery). Normally inflammation is a very useful body reaction. It fights infections and repair injuries, but when you have developed osteoarthritis (a lifelong disease) it is not a beneficial reaction. Exercising can reduce inflammation and symptoms if it is adjusted to your needs and symptoms.

Slide 12 – Symptoms of osteoarthritis (2)



Key message: Pain location can vary

Knee osteoarthritis:

The pain can be located above the knee, at the inside of the knee, the outside, behind the kneecap or down the lower leg. Basically, all around the knee joint.

Hip osteoarthritis:

You can feel pain from hip osteoarthritis in many places, on the outside of the hip, in the groin (where the hip joint is actually located) or on the inner or outer side of the thigh, deep in the buttock or down along the thigh. Sometimes pain from hip osteoarthritis is located down towards the knee. This is because the nerves that supply the hip joint also supply the skin above the knee.

Slide 13 – Common experiences of hip and knee osteoarthritis



Key message: Which problems do you have because of osteoarthritis?

People with osteoarthritis of the hips and/or knees often report having difficulties with the following daily activities (*see slide*). Are these activities something you recognize as being difficult? Alternatively, are there other things that are not on the list that you have a hard time doing.

Slide 14 – Risk factors (modifiable)



Key message: Multiple modifiable risk factors can cause osteoarthritis

There are many risk factors contributing to development of osteoarthritis, and the risk for osteoarthritis increases with the number of risk factors you have. The risk factors can be divided into factors that we cannot change and factors that we can influence to limit osteoarthritis symptoms.

Joint injury: Joint injury prevention programs have been introduced, especially in sports where injuries in knees or hips are common. Even injuries early in life (teenage years) will increase the risk of developing osteoarthritis.

Joint overload: Exposing your joint to too much load for many hours over many years will increase the rate of developing osteoarthritis. Within some professions with heavy physical work often involving kneeling, lifting, climbing ladders and stairs, there is an increased risk of getting osteoarthritis. The same applies to people who are top athletes who often subject their bodies to excessive and repetitive loads e.g., soccer and weightlifting. How much load you can handle is individual and depends on e.g., your previous habits and exercise.

Excess weight: For every extra kilo or 2 pounds, the joint load increases 3-5 times. Relatively small reductions in body weight can provide major improvements because of the changed joint loading. The metabolic system and low-degree inflammation caused by the fat mass is also thought to be involved.

Physical inactivity: prevents the cartilage from getting the dynamic load it needs to regenerate properly. Cartilage needs the dynamic load to activate the cells and make them produce the building blocks needed to replace the pieces that are continuously broken down.

Weak muscles: In the past, it was thought that the weakness came as a consequence of the inactivity often associated with pain when using and bearing weight on the joint. While this is true, it has been shown recently that weak muscles also cause osteoarthritis to develop. The most probable reason for this relates to weak muscles being worse shock absorbers than strong muscles.

Slide 15 – Risk factors (non-modifiable)



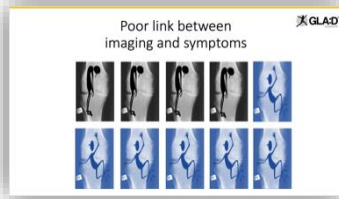
Key message: Age, sex and genetics are non-modifiable risk factors

Age: As already mentioned, osteoarthritis becomes more frequent with increasing age. This is primarily because osteoarthritic changes of cartilage and bone don't disappear, i.e., those who get osteoarthritis will still have osteoarthritis when they get older. However, that doesn't mean that symptoms will continue to get worse, they can also get better and fluctuate up and down over time.

Sex: Women are more likely to develop osteoarthritis. At an older age, women often develop osteoarthritis of the hands and of the knee, while hip osteoarthritis is more common among men.

Genetics: If one or both parents have osteoarthritis, the risk that their child will develop osteoarthritis as an adult is much higher. Recent studies however are showing that we can to some extent modify this genetic risk by adopting a healthy lifestyle.

Slide 16 – Poor link between imaging and symptoms



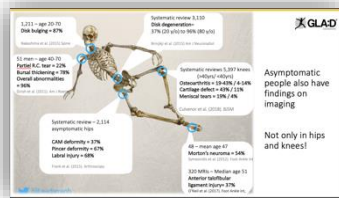
Key message: imaging is not a good method to diagnose osteoarthritis

The link between imaging changes on an X-ray and symptoms is generally poor. About half of people who experience osteoarthritis pain have no visible changes on their imaging. It is also as common to see changes on imaging that suggests osteoarthritis, while the person has no symptoms. Only about half of people with imaging changes have symptoms.

Therefore, imaging is not a good method to diagnose osteoarthritis. Imaging should primarily be used at later stages of osteoarthritis when surgery is being considered. The patient's symptoms and not the imaging changes should guide the choice of treatment. We know that exercise and weight loss (if you are overweight) are effective in reducing pain and improving physical function.

(Ask the participants how they feel about this information)

Slide 17 - Asymptomatic people also have findings on imaging

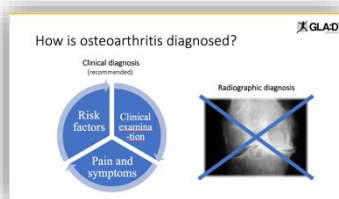


Key message: Findings on imaging are normal

The poor link between imaging and symptoms is not only related to the hip and knee joint. You don't have to read everything that is on this slide, but the picture shows us that there has been much research done on different body parts, e.g., the neck, shoulder, lower back and foot, that also shows that lots of people without any symptoms have findings on X-rays and MRIs.

Imaging is like a portrait of you from the inside. Just as we have differences on the outside like wrinkles, facial features, scars etc. We have differences on the inside. Age, lifestyle, genetics, and other factors will have an impact without necessarily causing pain.

Slide 18 – How is osteoarthritis diagnosed?

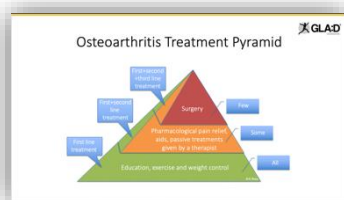


Key message: Osteoarthritis should be diagnosed without imaging

Imaging is still often used to make the diagnosis of osteoarthritis. However, the diagnosis can also be made based on symptoms, existing risk factors and findings from a clinical examination. Most clinical guidelines now tell us that imaging is no longer required for the diagnosis of knee or hip osteoarthritis.

The changes to the joint seen on imaging are reduced joint space (cartilage cannot be seen on x-ray), osteophytes (bony enlargements or bone spurs), cyst formations and increased density of the bone beneath the cartilage. Symptoms of osteoarthritis can be present 10 to 15 years before changes are seen on imaging. By listening to the patient's medical history, the occurrence of pain and other symptoms, consider risk factors and examining the joint, the diagnosis can be made early, and treatment can start earlier.

Slide 19 – Osteoarthritis treatment pyramid



Key message: Osteoarthritis treatment can be illustrated as a pyramid

There is no pill that can prevent or cure osteoarthritis. The treatment today aims at reducing symptoms and improving joint function by better understanding the disease, being better informed about the treatments available, by getting started with (neuromuscular) exercise, and finally by increasing your physical activity level and perhaps losing weight if needed. Contemporary osteoarthritis treatment can be illustrated as a pyramid.

At the bottom, on the first level of treatment, you find the cornerstone of treatments that should be offered to all patients seeking care for joint pain: education about osteoarthritis, supervised exercise therapy, and weight control. This is the treatment level that you are currently receiving.

In the middle: For some, this first level of treatment does not provide enough symptom relief and can be complemented with pain relief medications and other passive treatments that can be provided by a GLA:D® therapist e.g., passive treatments like TENS and manual therapy, braces, shoe insoles, walking aids, and in some instances injections.

The last level of treatment, at top of the pyramid, is surgery. Most people with osteoarthritis can manage their symptoms without surgery.

Slide 20 – All people should be offered first line treatment (1)

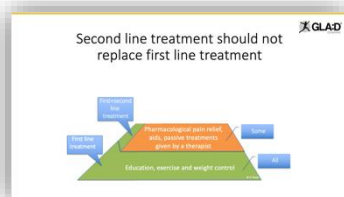


Key message: First line treatment first

International guidelines recommend that all people seeking care for osteoarthritis should be offered exercise therapy, patient education and weight reduction (if overweight). Nevertheless, many people do not adequately trial first line treatment in the first place.

Health systems all around the world do not typically support funding for appropriate first line care, and health professionals are not always trained in how to deliver it. This can be the reason why you may get are conflicting or contradictory information from different healthcare providers – even within the same profession. GLA:D® was established to provide an option to receive first line treatment according to updated international guidelines.

Slide 21 – Second line treatment should not replace first line treatment



Key message: second line treatment are rarely long-term solution

Second line treatments have varying levels of evidence to support their use. Often, they are associated with benefit in reducing pain in the short term. Second line treatments should not replace first line treatments.

Slide 22 – Non-pharmacological second line treatment



Key message: There is different short-term treatment options with lacking evidence

Supporting shoes, shoe inserts, /orthotics, taping and braces may help reduce pain and improve your confidence. However, alone, they are rarely a long-term solution.

Dry needling/acupuncture and manual therapy can help reduce pain in the short term, but long term these treatments are unlikely to help.

Using a cane or walking stick in the opposite hand when walking reduces the load on the aching joint, which may help prevent limping.

Walking poles do not provide the same support as a cane, but they provide a bigger support surface, resulting in better balance.

Hot and cold pack, and electrical stimulators like TENS machines can also help reduce pain and are easy to use independently.

These treatments should never be used in place of first line treatments such as education, exercise and weight management where indicated. Think of them as complimentary.

Slide 23 – Pain medication (1)



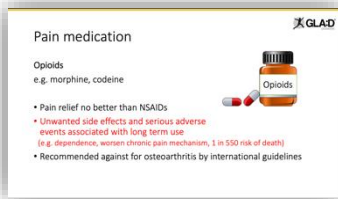
Key message: Pain medication has low pain effect and many side effects

Paracetamol has no or little effect on muscle and joint pain and has no effect compared to placebo. (A placebo is any treatment that has no active properties, such as a sugar pill.) Paracetamol is probably the safest pain medication to take. There are few side effects compared to other types of pain medication, but high doses can result in liver damage.

NSAIDs stands for non-steroidal anti-inflammatories and are estimated to be more effective for pain relief compared to paracetamol but the evidence is lacking, and they are associated with side effects for the gastrointestinal system (e.g., stomach ulcers), the kidneys and increases the risk for cardiovascular diseases. Therefore, you should avoid using NSAIDs if you have gastrointestinal diseases or other chronic diseases like heart disease or if you take medication for high blood pressure. You could consider topical applications instead like NSAID creams or gels which are also effective but safer for the stomach in small doses. The side effects for NSAIDs are dose-dependent and research has shown increased mortality after only one week of use.

If you take NSAIDs it should always be in the shortest amount of time and in the lowest possible dose and always in consultation with your doctor and after careful consideration about side effects.

Slide 24 – Pain medication (2)



Key message: Avoid opioids

Guidelines around the world recommend against taking opioids. There is no evidence that it will help, and it is addictive. To be addicted to pain medication can be dangerous and lead to mortality. In fact, opioids may make pain worse in the long term and some research indicates that 1 in 550 who regularly take opioids will die of an overdose. If you are taking

opioids and don't have a phasing out or weaning off plan, speak to your doctor about strategies to reduce your dependency without feeling sick.

Slide 25 – Cortisone (corticosteroid) injections



Key message: Injections have no long-term effects

Cortisone injections are not recommended for osteoarthritis. They have no long-term benefits and the short-term effects on pain vary a lot. It is important to know that the higher number of injections you have in the same tissue, the higher risk for tissue breakdown.

All in all, research shows that the placebo effect often is as big as the medical effect. This means that you will experience the same effect if you take pain medication or an ineffective calcium pill or saline injection. If you believe or expect the medication will give you pain relief then it will. All medication has side effects and the higher dose you take, the more side effects, you will typically experience. Therefore, continue to discuss with your GP or pharmacist and carefully consider your consumption of medication.

Slide 26 – Dietary supplements



Key message: We don't fully know the effect of most dietary supplements.

Glucosamine is naturally found in the joints. Initially, it was thought that taking glucosamine would help reduce joint pain and re-build cartilage. As we have the results of more studies comparing glucosamine and a placebo (sugar pill), it has now been shown that the effect on pain or

change cartilage structure is no different than the effects from a sugar pill. On the other hand, glucosamine has no dangerous side effects (unlike the medications we just talked about). Psychological effects of managing pain may be triggered by taking a pill we believe is effective. If you are interested in trying glucosamine it is advised that you try it for 6 weeks and then stop the treatment. If you get worse after you stopped taking glucosamine and better when you start taking it again, one can assume that the treatment has some benefit for you.

Other dietary supplements: Currently there is uncertainty about the effects of different kinds of dietary supplements such as rosehips, ginger, fish oil and other herbal products. However, it is important to emphasize that there is not the same risk of adverse effects like the pain medication we just talked about.

Slide 27 – Surgery should be a last resort



Key message: Surgery should be reserved only for people not responding to first- and second-line treatments

Slide 28 – Surgery (1)

Key message: International guidelines recommend against arthroscopic surgery for osteoarthritis

For many years, surgeons have used arthroscopic or keyhole surgery to “clean up” the joint and remove loose parts from the meniscus or cartilage, particularly after a joint injury. This procedure has many names or types including “house cleaning/joint clean up”, debridement and partial meniscectomy.

It is a very common procedure and is associated with a reduction in pain – usually about 30%. However, arthroscopy is no more effective than a placebo (fake surgery) in multiple studies of people with knee pain. Fake surgery is also associated with around a 30% pain reduction, meaning benefits are likely due to factors not related to the procedure. This could be post-surgical rehabilitation, better management of loads, reduced fear of exercise, or any number of other factors. The age of patients in these studies is 35 years and older, so not just older people. Although side effects are very rare after arthroscopic/keyhole surgery, they do exist. The most common side effects are symptomatic deep venous thrombosis, pulmonary embolism, infection, and sometimes death. Therefore, many osteoarthritis treatment guidelines from around the world recommend against performing these procedures.

Any surgical procedure has risks which must be considered.

Slide 29 – Surgery (2)

Key message: Although most people benefit from joint replacement, not all do

Joint replacement is a good operation for the right person. It should not be provided to people who have not adequately trialed first line treatments including education, supervised exercise therapy and weight management (where indicated).

Total joint replacement is a procedure in which the joint surfaces are removed and replaced by new joint surfaces made from metal and plastic. Although most people benefit from this big procedure, not all do. Most people are satisfied with the result, but at least 10-20% still have at least the same pain and other problems after the surgery. This is a major surgery that cannot be undone and, as with all types of surgery, it has side effects. Therefore, it seems wise to have fully explored and tried all other treatment options first. People who complete a program like GLA:D® may delay and perhaps prevent surgery.

If you have osteoarthritis in only one part of the knee (the inner or the outer part) the surgeon may suggest that you have an osteotomy performed. This procedure is done if one of the two joint surfaces (the inner or the outer) is largely unaffected by osteoarthritis. A wedge-shaped part of the bone is removed to re-distribute the load to the joint's healthy inner or outer surface.

Slide 30 – Exercise therapy prior to surgery

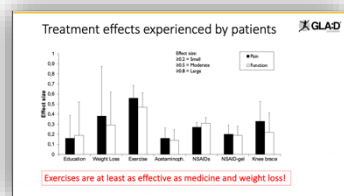


Key message: Completing an exercise program like GLA:D® means you are better prepared for the surgery

As with all surgeries, there are risks and potential complications. Completing an exercise program like GLA:D® first means you are better prepared for the surgery. You may experience faster recovery and will be well-prepared for your rehabilitation which often has the same exercise

approach. Therefore, participating in an exercise program like GLA:D® can be beneficial even though you are already signed up for surgery.

Slide 31 – Treatment effects experienced by patients

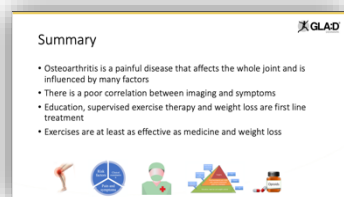


Key message: Exercise therapy is as least as effective as pain medication

This figure shows the effect from different types of treatments. The higher a box is the greater the pain relief (darker color) or improvement in physical function (white color). As you can see, exercising twice weekly for 6-8 weeks has a much greater pain-relieving effect than traditional pain medication (acetaminophen is the same as paracetamol and Aspirin,

NSAIDs are Ibuprofen, Motrin, Advil and Naproxen) or weight loss.

Slide 32 – Summary



Summarize key messages

Slide 33 – Questions?



In the next session we will go into detail about exercise as treatment for osteoarthritis, and how to cope better with everyday life.

End the session by telling when and where session 2 will take place.

Session 2

Slide 1 – Welcome to GLA:D®



Welcome the participants.

Slide 2 – Content

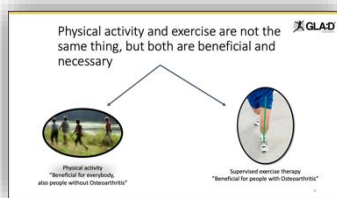


In session 1 we talked about what osteoarthritis is, about the risk factors that can cause the disease, the poor correlation between imaging and symptoms and the treatment of osteoarthritis. Do you have any questions related to session 1?

We will spend most of our time in this session talking about exercising with osteoarthritis. We will talk about why it is good for you to exercise when you have osteoarthritis, how you do it, and what to do if it causes pain.

You will also be given general tips on how you can best handle your osteoarthritis, how to continue with activities of daily living, and how to deal with difficulties related to physical activity.

Slide 3 – Physical activity and exercise are not the same thing, but both are beneficial and necessary



Key message: Exercise therapy has a specific purpose

Physical activity is good for everyone and staying active is an important part of managing osteoarthritis. Physical activity is any body movement making your heart beat more rapidly and can occur during leisure activities (walking, sport) or occupation activities (e.g., your job). At work or doing leisure activities you may do the same tasks repeatedly, which is not helping you in getting stronger. Often you do not have control of the demands put on your body (load your body undergoes) like carrying heavy boxes or digging in the garden. Your mental focus may be everything from just to have fun, to lose weight, to hang out with friends or to do the necessary daily work tasks at your job or in your home.

Exercise therapy is different from physical activity; it is carried out with a specific purpose, can be guided by a health professional, and can improve your ability to be physically active in work and leisure time. Exercise therapy can be designed to work on many things to help people with osteoarthritis and is characterized by a structured setup where you do the activity at a level that suits your fitness level; you repeat the exercises systematically, and the load or difficulty is carefully increased with time to continue to challenge you when you become better at performing the exercises. The benefits from exercise therapy can be just as good for people who are already physically active because it can be targeted to your needs.

Slide 4 – Are you physically active?



Key message: Physical activity is important for your health

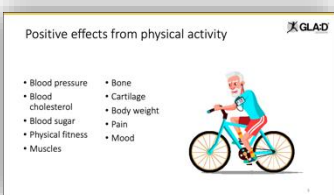
The World Health Organization (WHO) recommends that everyone, regardless of age and whether you are healthy or sick, perform a minimum of 150 minutes of moderate or 75 minutes of intensive physical activity – or any combination of these in a week to promote good health. This also applies for people with osteoarthritis. A good target is to aim for

30 minutes a day, 5 days a week.

The activity can be divided into several smaller bouts and should be done at an intensity where you start sweating and become slightly short of breath. These are signs that your body is responding positively to your efforts and is releasing the positive hormones (including endorphins) and will start the adaptation process to get stronger and more fit. Brisk walking or taking the stairs instead of the elevator is often all it takes. Anything is better than nothing!

Exercising at least twice a week where all major muscle groups are involved is good. Studies has shown that for those who are experiencing joint symptoms in their lower limbs (including hip/knee osteoarthritis), even exercising at a moderate to vigorous rate for 45 minutes per week can maintain or improve lower limb joint function.

Slide 5 – Positive effects from physical activity (1)



Key message: There are many positive effects from being physically active

Blood pressure

Exercising lowers the blood pressure and can even bring it to within normal levels.

Blood lipids or 'bad' cholesterol

If you are physically active, a larger proportion of fat is sent to the muscles, where it gets burn off, rather than being stored in the body. This is how physical activity helps to prevent cardiovascular diseases.

Blood sugar

Being physically active improves insulin sensitivity. This is how being physically active helps prevent diabetes or helps to decrease the need for medicine if you already have diabetes.

Physical fitness

Improved physical fitness reduces the perceived exertion during exercise. The heart can pump more blood with each beat, resulting in a lower heart rate and consequently you do not load the heart as much.

Muscles

During exercise, the amount of small blood vessels increases, and vascular function improves, which helps increase the blood flow to the muscles.

Bone

Research has shown that by loading bone regularly, the bone density increases. It has been demonstrated that intensive physical exercise, particularly in adolescence gives stronger bones.

Cartilage

Cartilage needs to be loaded to rebuild. Too little or too much of a load is bad for the cartilage, while a moderate load is necessary to stimulate new formation of the cartilage building blocks.

Body weight

Both the appetite and the body's energy metabolism can be affected when you exercise. Reducing weight reduces the joint load and it becomes easier to move. In addition, reducing your fat mass (if you are overweight) has a great number of other positive health effects.

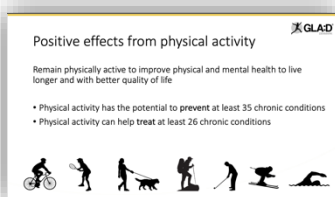
Pain relief

Exercise increases the level of endorphins, which is the body's homemade/natural morphine. The increased level of endorphins results in less pain and increased feeling of well-being.

Mood

Endorphins also act as a 'rush' of happiness, which makes you feel healthier and happier because of exercising. The brain works better, and your concentration is increased. Endorphins can act to turn down the volume on pain.

Slide 6 – Positive effects from physical activity (2)

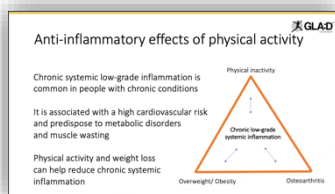


Key message: Physical activity can prevent and treat many chronic conditions

Physical activity reduces the risk of getting diseases related to sedentary behavior, such as cardiovascular disease, diabetes, dementia, and cancer. If you already have one of these diseases, getting physically active will help you deal better with the disease. It is never too late to get physically

active. Physical activity has the potential to prevent at least 35 chronic conditions and treat at least 26 chronic conditions.

Slide 7 – Anti-inflammatory effects of physical activity (1)



Key message: Physical activity can help reduce chronic systemic inflammation

Chronic systemic low-grade inflammation is common in people with chronic conditions like osteoarthritis. Unlike acute inflammation occurring from e.g., an injury to the knee or sore throat, chronic low-grade inflammation is often long-term and present throughout the body. It is

called low-grade because only a low-level rise of inflammation can be measured in blood or tissue and it can be caused by unhealthy lifestyle including inactivity, smoking and obesity. It can contribute to the development or progression of certain conditions such as cardiovascular disease, cancer, diabetes, chronic kidney disease, autoimmune and neurodegenerative disorders, and coronary heart disease. Fortunately, physical activity and weight loss can help reduce chronic systemic inflammation.

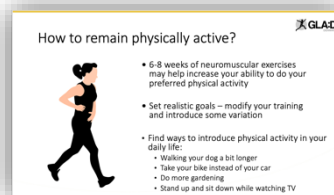
Slide 8 – Anti-inflammatory effects of physical activity (2)



Key message: Physical activity can reduce local inflammation

Local inflammation in the joint is also common in osteoarthritis and can lead to joint pain (e.g., rest pain), joint stiffness, joint swelling, and physical limitations. The anti-inflammatory effects of exercise may explain the positive effects of physical activity and exercise therapy in many diseases.

Slide 9 – How to remain physically active?



Key message: Targeted exercising and realistic goals are important to remain physically active

Some activities are harder on your joints than others. That is why targeted exercising and realistic goal setting are important. Have you always been physically active, but now been forced to quit because of pain? If so, you are not alone.

Many people with a history of joint injuries are dealing with increasing pain already at a young age. Sudden changes of direction, rapid acceleration, or deceleration and repetitive or continuous strain may cause symptoms if you have osteoarthritis. Soccer is harder on your joints than running, which again is harder than cycling. You need to be realistic, but there are things you yourself can do to remain active in your sport. Perhaps you need to modify your training and introduce some variation to avoid repetitive joint load. Or maybe you need to think in alternatives to be able to remain physically active and maintain a good quality of life.

10 min of walking a day = 70 min a week = more than 60 hours a year! At slow speed, this would be well over 200 km in a year or almost 5 marathons.

Slide 10 – Physical activity – what?



Key message: Be physically active despite your osteoarthritis

Irrespective of whether you have always been physically active and now need to think in alternatives or are new at this, it is important to find activities that you like, are fun and enjoyable. They should fit into your daily life for you to prioritize regular physical activity.

Walking

Easy to do, cheap and improves physical fitness. Consider walking with poles for balance support. You should wear proper shoes and consider shock absorbing surfaces like grass or gravel roads instead of concrete or asphalt if possible.

Cycling

Less joint load than when walking since body weight is partially unloaded. Saddle height should be adjusted so that the knee is kept slightly bended (approx. 10 °), when it is the most extended.

Swimming or water gymnastics

Water buoyancy reduces load on the joints. Many experiences a greater freedom and range of movement when exercising in water.

Dance

Wear shoes with good foot support and cushioning. Dance on floors that have a bit of cushion, for example wooden floors. Have a chair close by for relief and rest.

Gym

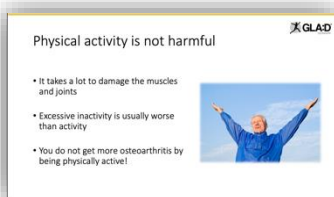
Wear shoes with good foot support and cushioning. Machines and exercise programs should first be tested under supervision to ensure good technique and that you are comfortable with the program. Training programs need to be adjusted as you improve.

Sports

There is no recommendation against contact sports (e.g., soccer, basketball etc.) when you have osteoarthritis, but you should consider the risk of injuries. You may feel less symptoms if you try tennis, badminton, or golf instead.

What are your preferred physical activities?

Slide 11 – Physical activity is not harmful



Key message: Your osteoarthritis will not get worse by being physical active

We know that the risk of damaging your muscles and joints by using them is very small. Physical inactivity is a much greater threat to joint health than overload from too much physical activity. The general rule is that

daily physical activity is good and beneficial for you and your joints, and that you don't get more osteoarthritis by being physically active. Sports at a lower level and general physical activity recommendations for good health have not been shown to be harmful in any studies. In fact, studies have shown that moderate physical activity is beneficial and can protect against osteoarthritis.

Slide 12 – Exercise therapy as treatment



Key message: Exercise therapy is effective for osteoarthritis

Different types of exercises can have positive effects on osteoarthritis symptoms, but the structure of the exercise program and the dose of exercise matters. That is why supervised exercise therapy is recommended.

Supervision increases the likelihood that you get your exercises done, but it also ensures that you get feedback to build your exercise intervention properly and individualized. You can also ask questions about the exercises, your leisure or work activities, about pain management and it is more fun to exercise with peers in a group. You may share experiences related to osteoarthritis and give each other good advice.

Slide 13 – Why exercising with osteoarthritis?

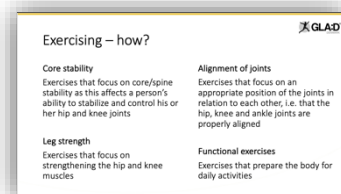


Key message: Exercise can work for all of you

In addition to the general effects from being physically active, exercise has positive effects in relation to osteoarthritis. Exercise can help you to improve your confidence in your joint and improve joint range of motion, stability, and function. This will make you able to cope with daily activities and perhaps to remain active in your favorite sport. Remember that the pain-relieving effect from exercise can be the same, no matter if you have

mild, moderate, or severe osteoarthritis on imaging, no matter what your pain intensity is and no matter how physical active you used to be before starting to exercise.

Slide 14 – Exercising – how? (1)



Key message: The training program has four basic elements

The training program in GLA:D® consists of four basic elements which help to strengthen and stabilize your joints and help you to practice appropriate movement patterns. You can use the same training program for hip and knee because some muscles are active on both joints and because weightbearing exercises is recommended for both joints.

Postural function:

These exercises help increase core stability which is a prerequisite for being able to use both legs with control and stability.

Postural orientation:

These exercises help ensure proper alignment of your body to help create safe functioning within your joints when you move through your day.

Muscle strength:

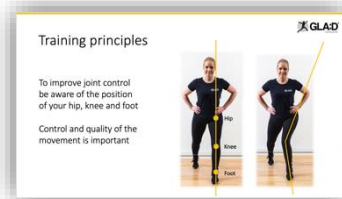
Resistance band exercises give you strong muscles that change the load on the joint and help stabilize the joints in a favorable position.

Functional exercises:

involve compound movements that prepare the body for daily activities such as rising from a chair or climbing stairs.

You will get an individualized exercise program by your GLA:D® therapist to suit you and your expectations. The GLA:D® therapist will later progress the difficulty of the exercises in a safe manner, so that you become stronger and can cope with your daily life better and better.

Slide 15 – Training principles



Key message: Neuromuscular exercises are effective

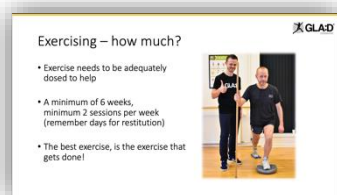
In GLA:D® we work with a neuromuscular approach. It means that the neuromuscular exercises aim at improving cooperation between your nerve system and your muscles and control how you load your joints. This can improve the way you move and can improve the muscle endurance, activation patterns and strength, along with your ability to perform common functions. This gives you more confidence to engage in other exercise and day to day activities.

By altering the dynamic alignment of your knee or hip during exercise, you can change where the forces go, and this can help reduce pain. Ideally, your knee should not fall inward or outward when you load your joints. However, this can depend on each person's structure and function.

Control and quality of the movement is required during the neuromuscular exercises. For example, we will work on teaching you to move with your knee being closer to being over your toes. We can also work on tilting your pelvis back a little (tuck your bottom under) which can change how load goes through your hip.

Neuromuscular exercises are effective at reducing pain and improving confidence in most people with osteoarthritis, even in people who are about to have a joint replacement.

Slide 16 – Exercising – how much?



Key message: Exercise needs to be adequately dosed

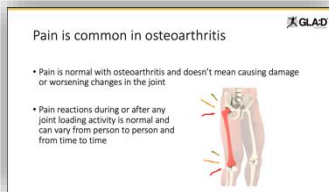
Exercise needs to be adequately dosed to help. Just like a drug, if you don't take the recommended dose, it may not work as well as it should. You need to know how to adjust the exercises depending on pain reactions and symptoms. That is why supervised exercise therapy is recommended.

Increasing the difficulty as you become better at the exercises is also important. Your GLA:D® therapist will help ensure that the difficulty is progressed in a way that optimise the outcomes of your exercise program.

12 supervised exercise sessions (6 weeks) should be the minimum period an exercise program is completed for to give it a chance to work. Research shows that shorter programs will not help, and do not allow long enough to improve strength. 12 weeks will be more effective. Completing exercise 3 to 4 times per week is likely to be more effective than 2 times per week.

After the group sessions, you will have the movement quality and control needed to continue on your own, at the gym or maybe at home. If you continue to do your exercises, you will maintain good function. The idea is to get the individual exercises to become a part of your everyday life. The best exercise is the one that gets done. If you are already physically active, you should do the smart thing and incorporate the exercises into your workout.

Slide 17 – Pain is common in osteoarthritis

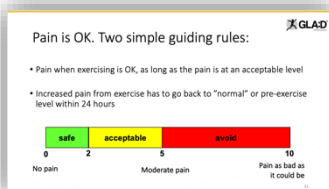


Key message: Pain when exercising is normal

It is vital to understand that pain does not equal damage. Pain is a companion to osteoarthritis, and it often hurts when you start exercising.

Pain can prevent people from exercising and be physically active. You should therefore prepare yourself for pain reactions especially in the early stage of exercise therapy. Pain during or after joint loading activities is common. Pain in your muscles after starting a new exercise is called Delayed Onset Muscle Soreness and common for everyone and can peak up to 48 hours later. After this, your muscles will get stronger, and you won't feel this pain anymore.

Slide 18 – Pain is OK. Two simple guiding rules:



Key message: Pain during and after exercising is OK

It is OK if your joint hurts when you exercise, to a certain limit. Pain during exercise is not dangerous and no studies have shown that exercise can make the osteoarthritis disease process speed up or worsen as long as the pain in your joint goes back to average pain level within 24 hours.

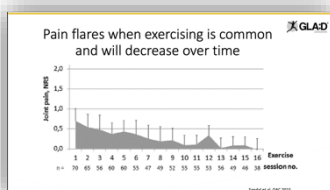
The first guiding rule is that the pain during exercise must be perceived as acceptable; that the pain level is okay. This is 5 on the pain scale which is halfway between no pain and the worst pain you can imagine. The limit of what is acceptable varies from person to person but may also vary from day-to-day for the same person. If pain is experienced as worse than what is considered to be acceptable, lower the difficulty of the exercise. Do not stop exercising but adapt the level of difficulty to make sure you perceive the pain as acceptable.

The second guiding rule is that any increase in pain during and / or after exercising should subside within 24 hours. The next day the pain should be back to the same level (or lower) than before exercising. If not, you have been exercising a little too hard and/or too long. This can then be adjusted at the next exercise session and does not mean that you should stop exercising.

These two guiding rules have been used successfully by thousands of people with osteoarthritis to help take control of pain when exercising. For most people, the pain evoked during exercise will diminish as they continue to exercise. This is true also if you have severe osteoarthritis and are considering having your joint replaced.

Talk to your GLA:D®-therapist if you get worried or unsure about how to handle the pain.

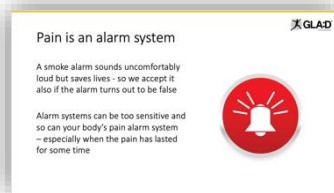
Slide 19 – Pain flares when exercising is common and will increase over time



Key message: Pain flares are common

If you feel pain worsening or other symptoms during or after exercising, it is ok and normal. These pain reactions can vary in duration and intensity, but research has shown that it decreases over time the more you exercise. Let your body react and adapt to the new working conditions and keep your GLA:D® therapist updated on your symptom pattern so he/she can adjust the exercises properly.

Slide 20 – Pain is an alarm system



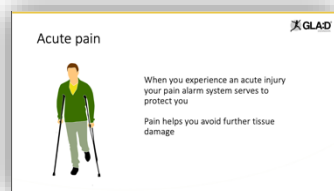
Key message: Pain ≠ damage

Pain is like an alarm system in your body. When you experience pain, you could say that your pain alarm has been activated. Your pain alarm can be compared with a smoke alarm. Just like technical errors can occur on a smoke alarm, your pain alarm doesn't always work appropriately.

The problem is that the pain alarm sometimes is activated without any danger for your body. Just like a smoke alarm can turn on by itself or if a candle has been blown out – nothing has happened, but the alarm makes us check if everything is OK. The pain alarm works in the same way.

Joints, muscles, the nerve system, and the interpretation in your brain can activate the pain alarm, but the volume of the alarm doesn't always correspond to the condition in the body. Therefore, the link between pain and tissue damage is not as consistently accurate as we would think.

Slide 21 – Acute pain



Key message: A sensitive pain alarm protects your body

A sensitive pain alarm can seem worthless and annoying, but it is an important mechanism if your body is injured. The overprotective (sensitive) pain alarm ensures that you avoid further tissue damage and makes sure that time to recover is given. This mechanism can make even your skin more sensitive.

Slide 22 – Prolonged pain

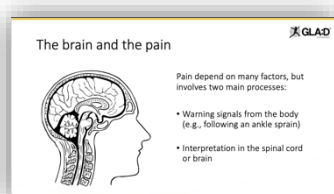


Key message: Your sensitive pain alarm can persist

The sensitive pain alarm is not very helpful in prolonged pain conditions because they are not caused by acute injury or tissue damage. The pain can continue and increase and even spread to other body parts. By learning how to handle your osteoarthritis you may decrease the sensitivity of your pain alarm. Exercise in the right amount of dose and activities in your daily

life matters. It is good to know that prolonged pain caused by osteoarthritis often is not well linked with the degree of damage or injury in the joint. The persistent sensitive pain alarm may be the answer.

Slide 23 – The brain and the pain

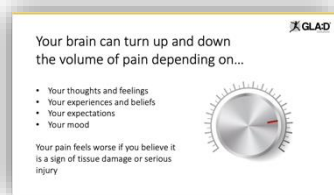


Key message: Pain depends on interpretation in your brain

Your body is controlled by your nerve system which contains your brain, your spinal cord, and all nerve fibers from all body parts. Signals are constantly sent forth and back from your brain or spinal cord to all body parts. The signals can be experienced as pain if your brain interpret them to be something you should take care of. Even though your pain is located

in your knee or hip, the pain you experience is to a great extent caused by interpretation in your spinal cord and brain. This is important to understand how pain occurs and how pain can be affected.

Slide 24 – Your brain can turn up and down the volume of pain depending on...



Key message: Mental factors can affect the pain

Your brain can turn up and down the volume of pain by releasing different substances in your body. Dopamine, endorphins, serotonin, oxytocin is called “the happy hormones” and are as pain-relieving as morphine. The hormones can help reducing the number of signals in the spinal cord which will lead to fewer signals to the brain and less pain for you.

Your brain can also release substances that will worsen your pain experience. If you are concerned, anxious or depressed, stress hormones are produced (e.g., adrenaline). Stress hormones will open the door for signals to your brain and reduce the amount of “happy hormones”. This will make you experience more pain.

Your thoughts, feelings, experiences, beliefs, expectations, and mood play an important role for which hormones that are released and has a great impact on your pain experiences. This means that the history of you and your knee or hip plays a role for the interpretation in your brain.

Slide 25 – Factors affecting pain and disability in people with knee and hip osteoarthritis



Key message: Pain and disability is multifactorial in osteoarthritis

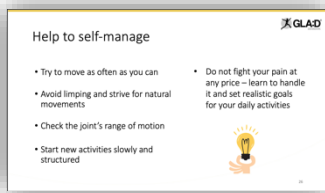
Factors that contribute to pain and disability in people with osteoarthritis are complex. Although structural changes in the joint may play a role, there are many other factors, which contribute to each person’s experience with osteoarthritis.

Your level of pain and disability is more linked to the factors listed on this slide than on structural changes found on imaging (*go through the slide*). Many of these factors can be changed with appropriate guidance and support through exercise therapy and education. Which of these factors are ones that you can relate to?

About fatigue (part of “Comorbidities and fatigue”):

One common reason that people stop doing physical activities that they like is feeling tired and having a lack of energy. The technical term for this is fatigue. Fatigue is different than ordinary tiredness. Fatigue cannot be ‘slept off’. We do not yet know the reasons for fatigue, but we know that poor physical and psychological status are related to fatigue. Being physically active and being in better physical shape helps decreasing fatigue. Consider, too, what activities you do in your everyday life that make you feel energized and which activities seem to sap your energy. Often people focus on the “must do” assignments and are left feeling like they have no energy to do the things they want to do. Doing things, you like can provide energy and help to alleviate fatigue.

Slide 26 – Help to self-manage



Key message: Tips and tricks can help you manage your osteoarthritis

- Moving around lowers the risk of stiffness in your hips and knees. Find sitting and resting positions that do not worsen your pain. Shifting positions regularly is often good. Try not to sit down for more than e.g., 20 minutes at a time.

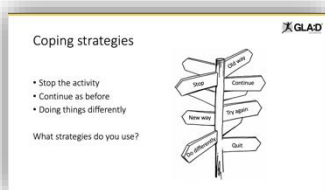
- Avoid limping or relying on one side only. It is better to use a walking aid to avoid limping. The risk of getting pain somewhere else from limping is high.

- Check if you can bend and extend your knee fully, and if you can bend and rotate your hip just as much. End positions of the joints are often not used if we are in pain. Sometimes the change comes slowly so you do not notice it. It is easier to deal with joint stiffness early (days, weeks) than late (months, years). Not being able to extend your knee or your hip fully will change the way you walk and move.

- If you start new activities, you should always start slowly and structured. This means that you should start the activity in smaller doses and adjust the activities to the pain reactions you experience. If you would like to start walking or even running, it might be a good idea to start with short distances, choose a distance where you meet a bench or two, choose a distance where you meet softer surfaces and take your time to let your body adapt to the new requirements. New activities can also be start gardening, new tasks on your job etc.

- Doing something that you like, can be a strategy to divert your attention from the pain and the thoughts associated with the pain. However, some of you may have become so good at ignoring the pain because you desperately want to play your favorite sport that you are making your symptoms worse. You need to learn how to modify your activities so that they are in line with what your body can handle.

Slide 27 – Coping strategies



Key message: You choose between three coping strategies

If an activity is problematic for you because of your osteoarthritis, you can choose between three strategies (*see slide*).

What strategies do you use?

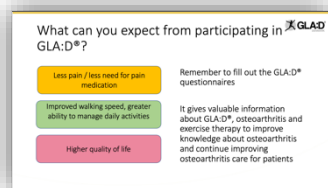
Slide 28 – Doing things differently



Key message: Consider alternative ways of doing things

Go through the slide and ask the participants if they have any experiences with these kinds of alternatives.

Slide 29 – What can you expect from participating in GLA:D®?

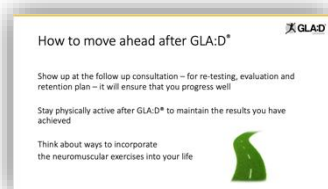


Key message: There are many benefits associated with completing GLA:D®

People that have completed GLA:D® report less pain, improved walking speed, greater ability to manage daily activities, higher quality of life, less need for pain medication and more confidence to be physically active.

Continue to talk to your GLA:D® therapist about your progress and set goals. There are a range of other treatment options available, so if you are not reaching all your goals, there may be other treatments or exercise approaches you could consider.

Slide 30 – How to move ahead after GLA:D®

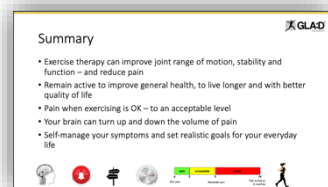


Key message: You need a plan after completion of GLA:D®

To maintain the results you have achieved here, you need to continue with the exercises. You can continue with supervised group exercise sessions, go to the gym, or do the exercises at home – it is entirely up to you. You are offered a follow-up assessment after completion of the exercise sessions.

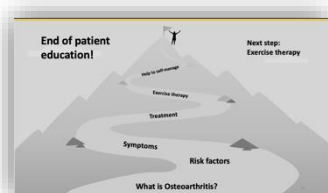
This is to make sure that you have found the right solution and to give you the opportunity to ask any final questions you may have.

Slide 31 – Summary



Summarize the most important key messages from session 2.

Slide 32 – End of patient education



You have now reached the top of the educational osteoarthritis mountain and you know need to actively learn how to use this information. Next stop is exercise therapy. Do you have any final questions?

End the session by telling when and where the exercise sessions will take place. Tell the participants what to bring/wear, procedure for cancelling a session or other practical aspects.