External Fixation
Patient Education Guide

Hoffmann® LRF
Next Generation External Fixation
Team Contacts

Surgery Date: ______________________________

Targeted Removal Date: ______________________________

Orthopaedic Surgeon:

Name: ______________________________

Email: ______________________________

Telephone Number: ______________________________

Emergency/After Hours Number: ______________________________

Clinic Nurse:

Name: ______________________________

Email: ______________________________

Telephone Number: ______________________________

Physical Therapist:

Name: ______________________________

Email: ______________________________

Telephone Number: ______________________________
Purpose

Your doctor has provided this instructional brochure to help answer questions you may have about your external fixation device. This brochure is aimed to educate you on how to keep your pin sites clean, make adjustments to your frame, and provide you with some basic information regarding the treatment process.

What is external fixation?

You may be familiar with some of the typical approaches used in treating a broken bone. Casts, splints, and braces are often used to hold the bone in place throughout the healing process. Today, advancements in surgery have expanded our options to treat fractures. Internal fixation is when a surgeon uses plates or screws to hold the bone in place. External fixation accomplishes this through the use of specialized bone screws (pins) or tensioned wires. These pins and wires are attached to the external fixation device which remains outside the body and secures the bone in a proper alignment. External fixation can also be used to correct bone or soft tissue deformities. Once the frame is secured to the bone, the frame may be gradually adjusted to fix the deformity and bring the leg into a normal anatomical position.

Why is circular external fixation used?

The primary potential advantage of using circular fixation comes from the added ability to use wires. Pins only travel through part of the bone while wires travel entirely through the limb. When tensioned, wires become stiff enough to effectively hold the bone in place. Using a ring allows the surgeon to secure the wire on both sides and apply tension to increase the wires rigidity. Wires are often times used in areas of the body where a pin may be too large, for example the toes.
Circular fixation can be used to treat a broad spectrum of conditions. See below for some of the indications that your frame may be used for.

- **Open and closed fractures** - Open fractures occur when the fractured bone protrudes outside of the skin. In a closed fracture, the broken bone does not puncture through the surface of the skin.

- **Post-traumatic joint contracture** - When a bone is fractured near a joint, thickening of the tendons and ligaments may occur. This thickening may lead to a reduced amount of motion in the joint.

- **Fractures and disease** - Infections of the bone may require removal of the infected area. This removal of bone may result in a loss of length and create a subsequent deformity.

- **Pseudoarthrosis or non-union of long bones** - Sometimes the body cannot heal the fracture site on its own and needs interventional support to stimulate the healing process.

- **Limb lengthening** - If a growth defect is present that leaves a limb disproportionately shorter than the other, a limb lengthening procedure can be performed to bring that bone out to length.

- **Correction of bony or soft tissue deformity** - Soft tissue deformities such as clubfoot and bony deformities such as bow legs can both be treated using external fixation.

- **Joint arthrodesis** - Often times when a joint becomes too painful due to symptomatic arthritis, the surgeon will elect to fuse the joint, removing all of it's motion.

- **Bone reconstruction procedures** - Injuries that result in a bone becoming fractured in multiple locations can be reconstructed using external fixation.

- **Charcot foot reconstruction** - In patients with Charcot, the quality of bone is often deteriorated to the point where the bone cannot provide and hold the same structure as normal bone would. In these situations external fixation can be used to help maintain proper bone alignment until the condition can be treated and fusion of the joints can occur.
What is Hoffmann LRF?

Hoffmann LRF is a circular fixation system that uses a combination of pins and wires to hold the limb in place. Depending on your condition, the frame may be periodically adjusted to gradually move into proper alignment, or to transport healthy bone to fill a void. The LRF device is comprised of rings and struts that are used to securely fasten the pins and wires in place.

If your surgeon decides that you will need to make adjustments to the device, he will instruct you on the specific part of the frame that needs to be adjusted. It’s important that you only make adjustments to this part of the frame. Touching other areas of the frame may result in a delay in your treatment plan or cause further injury to the affected limb. Always contact your surgeon if you notice any part of your frame that looks damaged or observe any loose components.

During the course of treatment your surgeon may provide you with updates on the progress of your correction. If needed the adjustment schedule section of this guide may be filled out to help clearly indicate when and how often you will need to adjust your frame. Further along in this guide you will find detailed information on how to make your adjustments.
In order for your treatment to be as successful as possible it's important to be able to identify your core team contacts. In order to help you with this process there is a section for you to fill in all of the contact information for your core team on the back page of this booklet.

The Players

**You** - The single most important player in the team is you. In order for your treatment to go as planned you will have to take an active role in ensuring that you are focused on taking care of yourself. Providing accurate feedback to your team and monitoring your condition is important to ensure that your treatment will go as smoothly as possible.

**Family/Significant Other** - Your support system also includes those who you surround yourself with on a daily basis. They can help keep you motivated and mentally strong throughout the process. You should keep them informed about planning aspects and they should be well versed in how the process is scheduled to evolve.

**Surgeon** - Your surgeon plays an active role in assessing your progress throughout the treatment process. Giving your surgeon feedback is important so that they can put together an accurate depiction of your overall health status. Your surgeon may alter something during one of your visits or instruct you to do something different than what he had initially advised.

**Clinical Nursing Staff** - Your nursing staff will often be the person who will answer any questions you may have and help advise you along the way.

**Physical Therapist** - Your physical or occupational therapist will assess your movement abilities and help get you mobile as soon as possible.
**Adjustment Cautions**

Prior to making an adjustment, make sure you’re in a seated position located in both a clean and quiet area. Standing up while making adjustments is not advised and may lead to an increased risk of falling.

Your adjustment driver should be fully engaged with the 5mm actuation square on the strut (see Figure A for reference) before attempting to make an adjustment. Avoid accidentally rotating your hand as this may lead to an unintended adjustment of the strut.

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**Note**

When making adjustments, use caution not to accidentally adjust the wrong frame components. Only make adjustments to the prescribed strut.

Figure A
Making Adjustments

Adjustments may need to be made to your frame periodically throughout the course of your treatment. You and your doctor will review the adjustment schedule prior to making any adjustments.

You will need to use the adjustment driver pictured in Figure B to make adjustments to the frame. The counter wheel located on the adjustment driver can be used to keep track of your daily corrections. The wheel is numbered from 1-4 and should be rotated every time you make an adjustment Figure C.

Adjustment Driver and Counter Wheel

![Adjustment Driver and Counter Wheel](image)

**Note**

The counter wheel should be turned every time an adjustment is made. The number aligned with the dot indicator should reflect the number adjustments you have made.
Anterior Gradual Correction (Front Adjustment)

Prior to making an adjustment, make sure you're in a seated position. To make an adjustment, place the head of the adjustment driver onto the square peg located on top of the adjustment strut. Every turn applies 1/4mm of motion and is denoted by an audible and tactile "click".

Depending on your construct, the adjustment strut may be mounted either at the front or rear of the frame. Your doctor should advise you as to the location of the adjustment strut prior to any adjustments being made.

For an adjustment strut that is placed on the front side of the frame, rotate the driver clockwise to flex the foot upwards.
**Posterior Gradual Correction (Rear Adjustment)**

To make an adjustment, place the head of the device onto the square peg located on top of the adjustment strut. Every turn applies 1/4mm of motion and is denoted by an audible and tactile "click".

For an adjustment strut that is placed in the rear of the frame, rotate the driver counter-clockwise to flex the foot upwards.

*Turn adjustment driver COUNTER-CLOCKWISE to make adjustment*
Adjustment Checks

Lengthening Scale

Note
Adjusting the strut 4 times daily will result in 1mm of correction. Although this is the most common schedule, your surgeon may specify an alternative adjustment plan for you. Always consult your physician with questions regarding your adjustment plan.

Strut Adjustment Markers

Visual indicators are located on the top portion of the adjustment strut. The dot indicators (see image on right) will rotate as you make each adjustment to help you visually identify when an adjustment has been completed. You'll also know an adjustment turn has been made by both hearing and feeling a click.
Bone Transport / Lengthening

Prior to making an adjustment, make sure you’re in a seated position.

Identify the struts as laid out by your doctor’s prescribed adjustment schedule.

Your doctor may also select a different strut layout specific to your treatment plan. If this is the case, your strut layout will be indicated by your surgeon here.
Bone Transport / Lengthening

To make an adjustment, place the head of the driver onto the square peg located on top of the adjustment strut. Every turn applies 1/4mm of motion and is denoted by an audible and tactile "click".

Ensure that the driver is rotated in the correct direction for each strut as prescribed in your adjustment plan; struts will not necessarily all be turned in the same direction. Be sure to adjust all struts according to your prescription.
Caution: Before making any adjustments, make sure that you are in a seated position in a quiet place void of distractions. Standing up while making adjustments is not advised and may lead to an increased risk of injury.

**Step 1: Look**

Make sure you are aware of the location of the adjustment strut. The adjustment strut can either be located in the front or back of the frame. Your doctor should instruct you as to the location of the adjustment strut before leaving the office.

Visually locate the square peg at the top portion of the strut and place the blue adjustment driver on top. Make sure to seat the adjustment driver onto the peg without applying any inadvertent turning motion.

**Step 2: Adjust**

Make the prescribed adjustment(s) according to the corrective plan laid out by your doctor. Be sure to adjust in the correct direction (clockwise or counter-clockwise) denoted by your doctor in the correction plan.

**Step 3: Check**

Once adjustment(s) are completed, check that you have changed the counter wheel on your adjustment driver to keep track of this adjustment, and that it matches the numeric dimple display on the strut. Additionally, check that the length scale reading on the strut matches the intended value in the corrective plan. These steps will ensure that adjustments were made correctly and in the correct direction.
Pin Tract Care

Your doctor may recommend different cleaning techniques or solutions depending on the type of external device and the extent of your injury or fracture. Always use care when cleaning your external fixation device. Wash your hands well before cleaning your pin sites or the device. Be gentle and thorough, and dry all areas thoroughly. The cleaning process should be performed routinely even if your doctor has prescribed antibiotics as a preventative measure.

Get Organized

Since you'll be cleansing your pin sites and the device at least twice a day, you should gather everything you'll need and keep it handy and dry in a central location. You'll need cleansing solution (sterile water), disposable cups, sterile cotton swabs, sterile gauze pads (in two-inch and four-inch squares) and a small trash bag to dispose of waste.

Cleanse the pin sites

After washing your hands thoroughly, doctors recommend drying with a fresh paper towel and discarding after use. Use your fingertips to lightly touch and press the skin around the pins. This will encourage any drainage to come to the surface. Use a cotton swab saturated with cleansing solution to remove any crust or drainage from the pin sites. Always work in a gentle, circular motion, moving away from the site. Use a fresh swab for each pin site.

Note

Keeping pin and wire sites clean is extremely important in order to avoid infection. Pets should be kept away from the affected leg in order to minimize the risk of exposure to bacteria. The leg should be treated as an open wound and kept free of any debris.
When returning home after surgery you will need to follow the care instructions provided to you by your physician. Crutches are usually recommended to help facilitate movement and avoid the transfer of weight onto the device.

Simple tasks such as standing up and sitting down should be done with extra care. When standing up from a seated position, make sure to push off with your hand located on the affected side (side with external fixation device). With the other hand simultaneously push down onto the crutch until your weight is completely supported by the crutch and the unaffected leg. When going to sit down make sure to back up to the edge of the chair while using your affected side’s arm for support as you lower into a seated position.

Precautions should be taken when navigating throughout your home. Handrails located near the toilet and other locations where standing up and sitting down are recommended. Make sure to move slowly and carefully when moving over uneven surfaces.

During the course of treatment sleeping will be an important part of your recovery process. Allowing ample time for sleep will allow your body to heal at its most efficient level and provide you with the necessary strength needed to move around the next day. Sleeping can only be done while lying on your back. You may want to put a soft covering around your device to prevent any damage to bedding.
Maintain Your Health

Stop Smoking - Most surgeons will not put an external fixation device on a patient unless they quit smoking prior to the surgery. The nicotine contained in cigarette smoke has a negative effect on your body’s ability to heal and the overall health/quality of your bone. Your surgeon will likely perform several blood tests prior to surgery to ensure that there are no trace amounts of nicotine in your blood. Talking to your surgeon about joining an ex-smoker program is a great way to help you stay on track during the course of your treatment and having that support system in place will help.

Weight - Diet plays a large role in the body’s healing process. Maintaining a healthy diet will allow your body to fight off infections and reduce the amount of fatigue you experience. Your surgeon may offer a suggestion as to what your ideal body weight should be.

Pain Management - Experiencing pain immediately following surgery is normal. However, throughout the course of treatment it is important that you manage your pain efficiently and notify your doctor of any changes in pain during the course of treatment. Not managing your pain may result in bad postures or habits that can inhibit your treatment and have detrimental effects on your body and joints.
Pin Tract Care Cont'd

Clean the pins

Use a fresh two-inch sterile gauze pad to clean each pin. For the first few days, your doctor may advise you to wrap sterile gauze around each pin site. Once no further drainage is present, the pin sites may be left uncovered.

Clean the device

Use cotton swabs and the larger gauze pads to clean the entire device carefully. Dispose of all the soiled swabs and pads. Wash and dry your hands.

Shower

After 10 days or so (your doctor will advise you), you may be allowed to shower with your external fixator. After showering, dry the device thoroughly with a clean towel and follow all other cleaning instructions for the pin sites. Be sure to talk with your doctor if you have any questions on how to care for your device and the pin sites.

Infection Symptoms

There is an inherent risk of infection with any exposed wound. Contact your doctor immediately if you observe redness or swelling at the pin site, thick or colored discharge, tenderness or pain, or any wiggling, play or movement within the pins.

Nerve Issues

Pay attention to possible signs of nerve damage. If you start having pain in area's other than the pin/wire sites, it may be a sign that nerve damage is occurring. Any decreased or increased sensitivity in the area of the external fixation device should be reported to your surgeon as soon as possible. This may be an indicator of possible nerve irritation.
Frequently Asked Questions

How long will I need to wear the device?
How long the device will need to be worn is specific to each patient. The type of correction that is trying to be achieved, general health of the patient, and other outlying variables are all important factors in determining how long the frame will need to be worn. On average an external fixator may be worn anywhere from three to twelve months. That average may lengthen if the patient is otherwise unhealthy or has factors that inhibit or factors that inhibit the healing/treatment process.

Who should I contact for questions or issues?
You should always consult your surgeon if you have any questions or concerns during the course of treatment. If you experience difficulty while adjusting the frame, do not overstress the components by forcing the adjustment. Overstressing the components by applying excessive amounts of force may result in problems with the frame. Instead, contact your surgeon and inform him of the complications you are experiencing.

Do I need to cover the frame while it is being worn?
Wearing a cover over the frame is not mandatory, however sometimes covers can be a good option if you are travelling outside or in areas where debris can fall into the frame. Make sure to treat the frame site as an open wound and keep it clear of any debris. Using bandages and sterile dressings is a good way to ensure that your pin sites remain bacteria free.

What is the fastest rate a frame can be adjusted?
Typically, a bone can grow as fast as 1mm a day, which is why the average adjustment schedule involves making four adjustments daily that equate to 1mm. Other factors that affect this rate include but are not limited to a patients age, lifestyle, and overall health.
Can I walk while wearing the device?
Whether or not you can walk while wearing the device depends on several variables that your doctor will take into consideration before giving you post operative instructions. When the external fixation device is located on a foot, it is typically outfitted with rocker shoes at the base to allow for walking/weight bearing. As always, your doctor may advise you to not walk for a certain amount of time post surgery.

Surgeon Response

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## Adjustment Chart

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The information presented in this brochure is for educational purposes only. Stryker is not dispensing medical advice. Please speak to your doctor to decide which type of surgery is right for you. Only your doctor can make the medical judgment which products and treatments are right for your own individual condition. As with any surgery, trauma carries certain risks. Your surgeon will explain all the possible complications of the surgery, as well as side effects. Additionally, the lifetime of a trauma product is not infinite and varies with each individual. Also, each patient will experience a different post-operative activity level, depending on their own individual clinical factors. Your doctor will help counsel you about how to best maintain your activities in order to potentially prolong the lifetime of the device. Such strategies include not engaging in high impact activities, such as running.

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