

# Sensory re-learning for the hand - after nerve repair - Phase 1 (1 of 4)

## The early stages

After a nerve injury in the hand, wrist or arm, there is a loss of feeling (sensation) in the area that the nerve used to supply. It can help to think about this as cutting the electric cable that supplies electricity to a lamp – once the cable is cut, the light goes out. However, unlike an electric cable where the copper wires can be re-joined, in the body new nerve fibres have to regrow from the point of injury. As a rough estimate, for about a year, the nerve fibres regrow at 1mm a day. However, once the nerve has regrown, it still takes time for the sensation to return to normal - often between 3 to 5 years. The recovery of normal sensation is affected by many factors and is not guaranteed. Sensory re-learning techniques may help to give the nerve the best chance of recovery.

Recovery of feeling in the hand involves the whole of the nervous system: both the nerves in the limb and the brain. The brain receives, interprets and understands the sensation from the hand and processes these inputs in a dedicated area of the brain – we call this the handmap. As new nerve fibres grow, the brain has to learn to communicate with these new nerves, which involves the brain having to re-programme the sensations that it feels by re-organising the handmap. We call this process of re-programming the brain plasticity.

Goran Lundborg, a hand surgeon who has done much research in this area, says that after nerve injury and repair, “the hand speaks a new language to the brain”. Rather like learning any new language, there are exercises that you can practice. These will help you to gain the best recovery in sensation that you can. The amount and quality of sensory recovery that can be achieved is individual and depends on a wide range of factors including the nature and severity of your injury and your age. Full normal recovery is very unlikely, so achieving the best possible result through sensory re-learning exercises is very important.

The exercises are in two phases for the early and late stages of the recovery process:

1. **Phase 1** – this is the first stage where there are areas of the skin with no feeling at all – the skin is numb. At this stage the handmap in the brain will disappear as the brain is not receiving any information from the hand or limb.
2. **Phase 2** – at this stage some of the nerve fibres have regrown and there are early signs of sensory recovery such as pins and needles,

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shooting electrical pains, and awareness of cold objects. For a young man with a nerve injury at the wrist, it could typically take about 3 months from the time of nerve repair to reach Phase 2.

All the sensory re-learning exercises require the same effort on your part as are needed to learn any new skill – patience, practice, attention, repetition and most importantly, the motivation to do it. The exercises are best undertaken little and often, in a relaxed, pleasant and quiet environment. Throughout the whole of your rehabilitation period you will be encouraged to learn how to use your hand as normally as possible, despite loss of feeling. However, you must make sure that your hand is safe and be careful around dangerous objects, especially those that are sharp or hot. The exercises involve the need to think about what you are feeling and seeing in your injured hand, as compared to your uninjured hand. This type of concentration will help your brain to think about what it should be feeling, compared to the new disordered information it is receiving. Where possible it helps to complete exercises where other senses can also be used such as smell, sound and taste. Using other senses that are working normally will help to improve the re-learning process.

## Exercises for Phase 1

In this phase the main goal of sensory re-learning exercises is to stimulate and maintain the handmap in the brain. This is done by tricking the brain into believing that the injured hand still has sensation, such as by doing mirror therapy exercises. Exercises also stimulate the handmap in your brain that belongs to the uninjured hand. When this happens, the handmap for the uninjured hand sends signals across to the handmap for the injured hand – acting as a gentle reminder to your brain that your injured hand is still there, even though it won't be able to send messages.

## Sensory re-learning exercises that you can complete even when your hand is covered by dressing or splints

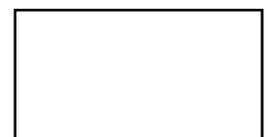
Your therapist will demonstrate and explain which of the activities from the list below you need to complete and how often you should do them. Please complete these exercises frequently throughout the day – a minimum of 4 times if possible.

### 1. Think about feeling



Watch other people using their hands. Think about the object that they are touching and imagine how this would feel, such as soft, hard, cold, rough, and smooth. This is especially useful if the item has a strong smell such as an orange or makes a sound such as a bunch of keys.

You can also use pictures which show hands touching different types of materials. Think about what the sensations would be like.



## 2. Touch your hand

Gently touch or tap through your dressings over the whole of your hand. Think about the feeling, especially in the areas of the hand that have no sensation.



## 3. Pictures of hands

Look through magazines and newspapers at pictures of people. Think about the hands in the photograph, working out if they are left or right. Circle the hands that correspond to your injured hand.

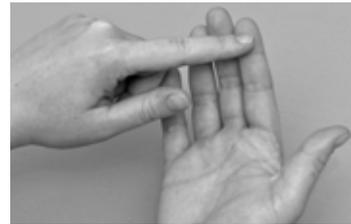


# Sensory re-learning exercises that you can complete once your dressings have been removed

## 1. Touch the areas of your hand that have no feeling

Stroke a small area of your hand where you cannot feel. Really concentrate on watching yourself do this exercise.

In addition, ask someone else to touch your injured hand and at the same time, touch the same place on your uninjured hand. Make sure that you watch



both hands carefully and concentrate on the feeling in your uninjured hand. By talking to yourself, you will be reminding your brain what the feeling should be like in your injured hand.

## 2. Mirror therapy exercises

Position a large mirror so that your uninjured hand is in front of the mirror and your injured hand is behind the mirror; for example this can be easily achieved using a mirror on the back of a door. You are aiming to create an illusion for your brain, that the reflection of your uninjured hand in the mirror is



your injured hand. Depending on your injury, with both hands practice the gentle movements that you have been taught by your therapist. Your injured hand needs to try to copy the movement of your uninjured hand. However, during this exercise make sure that you keep looking in the mirror and watching the reflection – do not watch your injured hand which must stay behind the mirror. Sometimes this can feel very strange. Should you start to feel sick, stop doing the exercise. Mirror exercises are best practised for a few minutes at a time, little and often throughout the day.

Depending on your injury and how well you can use your injured hand, the mirror exercises can be progressed to picking up small objects with both hands, such as nuts, screws or dried pasta. You can also complete this exercise with small pieces of different fabrics or materials such as towelling, tissue, sandpaper or wool.



As before, make sure that you keep your injured hand behind the mirror and concentrate on the reflection in the mirror. It will help if you use small familiar objects that you have around your own home that mean something to you. Your brain will be tricked into believing that the reflection is your injured hand feeling the objects and it will send signals to the handmap for the injured hand.

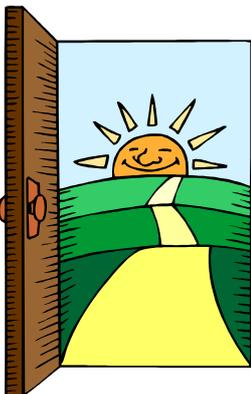
If you have any questions or queries, please do not hesitate to contact your therapist:

Name .....

Occupational Therapist

Physiotherapist

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