Moving Forward After Stroke

On average, by the time you finish reading this handout, four people in the United States will experience a stroke. Stroke is the third leading cause of death, and one of the highest contributors of long-term disability. One in three stroke survivors needs help with basic day-to-day activities.

One of the most common disabilities following a stroke is weakness or paralysis on one side of the body—the opposite side from the damaged area of the brain. One-sided paralysis is termed hemiplegia, while weakness on one side is called hemiparesis. Common problems associated with these conditions include:

- **Spasticity.** Muscles involuntarily contract (shorten or flex), resulting in stiff and tight extremities.
- **Foot drop.** When walking, the front part of the foot on the weak side "catches" or drags along the ground when the foot moves forward to step. This may result in stumbles, falls and the use of additional energy while walking. Foot drop is often caused by a combination of spasticity, sensory disturbance, muscle weakness and reduced range of motion at the ankle.
- **Atrophy.** Muscles in the weak or paralyzed extremity lose mass and become weaker from non-use.
- **Sensory disturbances.** Recognizing the position of an extremity in space is hindered. Also, the ability to sense touch, pain or temperature is reduced.
- **Range of motion.** Joints lose their ability to move through the full range of motion. This loss can be either active (the patient can't move the joint because of muscle weakness or paralysis) or passive (someone assisting the patient can't move the joint, often due to spasticity or contracture). A contracture occurs when the tendons and ligaments around the joint tighten or shrink, due to the long-term lack of motion in that joint.
- **Learned non-use.** This is a common post-stroke phenomenon that's caused by a lack of movement and practice in the paralyzed or weak extremity. As a result, a person may neglect or forget that he has a weak or paralyzed limb.
- **Poor circulation.** Limited movement of the paralyzed limb can result in the extremity turning a bluish color and feeling cold to the touch.

REGAINING MOVEMENT

When your muscles become weak or paralyzed, one of the first steps in rehabilitation is to promote independent movement to control the problems associated with hemiplegia or hemiparesis.

FES systems can reduce spasticity, improve range of motion and volitional muscle control, and restore hand and walking function.

You should engage in exercises that actively move your extremities, and incorporate your hemiplegic extremities during functional activities, such as bathing, dressing and walking, to facilitate motor relearning.

An important element in relearning to use a hemiparetic extremity is repetitive practice—much like learning any new skill, such as playing an instrument or hitting a golf ball. Over time, this repetitive practice can reteach the brain to perform tasks.

However, many patients can't participate in functional training activities because hemiparesis limits upper or lower extremity functions. Rehab therapies can help, such as functional electrical stimulation (FES).

UNDERSTANDING FES

Using specially placed electrodes, FES systems apply low-level stimulation to specific muscles in weak or paralyzed limbs to help perform functional tasks. Patients with hemiparesis can learn to use FES systems to assist repetitive therapeutic activities, such as grasping and releasing objects with the weak hand, straightening the elbow and lifting the foot to prevent toes from dragging during walking.

FES systems may also minimize sensory disturbances by stimulating receptors in the skin, muscles and joints. Because the stimulation causes muscles to contract, FES also may help increase strength, maintain or increase range of motion, and improve local blood circulation.

Using FES for spasticity has been well documented in the literature. The majority of patients with stroke and brain injury experience pain relief and restored movement through spasticity reduction.

Before starting a FES program, your physician or therapist should perform a thorough evaluation to determine possible contraindications or relevant precautions. For the best chance of a successful outcome, your clinician may recommend using an FES system at work and at home.

Recently there have been significant advances in small, wearable FES systems for home use. These systems can reduce spasticity, improve range of motion and volitional muscle control, and restore hand and walking function.

Stroke is the leading cause of serious, long-term disability among American adults. New technology is minimizing its effects and allowing survivors to carry on with their lives. ■

Information adapted from *Stroke, The Journal of Rehabilitation Research and Development,* and the International Functional Electrical Stimulation Society.

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