

NATIONAL INSTITUTE FOR HEALTH AND CARE EXCELLENCE

Interventional procedures consultation document

Nerve transfer to restore upper limb function in tetraplegia

Tetraplegia is when both the arms and legs are partly or totally paralysed because of nerve damage caused by trauma to the spinal cord in the neck. Some people with nerve damage lower in the neck can have nerve transfer to try and improve function in the upper limbs. This procedure involves connecting an undamaged, functioning, but non-essential nerve near the injury to the damaged essential nerve. The aim, with specialised physiotherapy, is to recover strength in the muscles supplied by the nerve, and restore arm and hand function.

The National Institute for Health and Care Excellence (NICE) is looking at nerve transfer to restore upper limb function in tetraplegia. NICE's interventional procedures advisory committee has considered the evidence and the views of specialist advisers, who are consultants with knowledge of the procedure.

The committee has made draft recommendations and we now want to hear your views. The committee particularly welcomes:

- comments on the draft recommendations
- information about factual inaccuracies
- additional relevant evidence, with references if possible.

This is not our final guidance on this procedure. The recommendations may change after this consultation.

After consultation ends:

- The committee will meet again to consider the original evidence and its draft recommendations in the light of the consultation comments.
- The committee will prepare a second draft, which will be the basis for NICE's guidance on using the procedure in the NHS.

For further details, see the [Interventional Procedures Programme process guide](#).

Through our guidance, we are committed to promoting race and disability equality, equality between men and women, and to eliminating all forms of discrimination. One of the ways we do this is by trying to involve as wide a range of people and interest groups as possible in developing our interventional procedures guidance. In particular, we encourage people and organisations from groups who might not normally comment on our guidance to do so.

To help us promote equality through our guidance, please consider the following question:

Are there any issues that require special attention in light of NICE's duties to have due regard to the need to eliminate unlawful discrimination, advance equality of opportunity, and foster good relations between people with a characteristic protected by the equalities legislation and others?

Please note that we reserve the right to summarise and edit comments received during consultations or not to publish them at all if in the reasonable opinion of NICE, there are a lot of comments, or if publishing the comments would be unlawful or otherwise inappropriate.

Closing date for comments: 22 January 2017

Target date for publication of guidance: April 2018

1 Draft recommendations

1.1 The evidence on efficacy of nerve transfer to restore upper limb function in tetraplegia is limited in quantity. There are no major safety concerns. Therefore, this procedure should only be used with special arrangements for clinical governance, consent, and audit or research.

1.2 Clinicians wishing to do nerve transfer to restore upper limb function in tetraplegia should:

- Inform the clinical governance leads in their NHS trusts.

- Ensure that patients understand the uncertainty about the procedure's safety and efficacy, and provide them with clear written information to support [shared decision-making](#). In addition, the use of NICE's [information for the public](#) [[URL to be added at publication]] is recommended.
- Audit and review clinical outcomes of all patients having nerve transfer to restore upper limb function in tetraplegia. NICE has identified relevant audit criteria and is developing an audit tool (which is for use at local discretion), which will be available when the guidance is published.

1.3 Patient selection and treatment should be done by a multidisciplinary team with expertise in managing spinal cord injury, and nerve and tendon transfers. This team should typically include 2 hand surgeons, an occupational therapist, a physiotherapist with experience in neurorehabilitation, a neurorehabilitation consultant and a neurophysiologist.

1.4 NICE may update the guidance on publication of further evidence.

2 The condition, current treatments and procedure

The condition

2.1 Tetraplegia is typically caused by cervical spinal cord injuries, with associated complete or incomplete loss of muscle strength in all 4 extremities. The exact symptoms depend on the location and extent of injury. The most common neurologic level of injury is the fifth cervical vertebra. This results in loss of upper limb function and the inability to carry out activities of daily living.

Current treatments

- 2.2 Restoring upper limb function is an important rehabilitation aim in people with tetraplegia. Conservative treatment options include a comprehensive program of physical and occupational therapy, including orthoses and functional electrical stimulation. Surgical techniques to restore function of the upper limb (elbow, thumb and finger extension, wrist movement, hand opening and closing, and pinch and grip) include neuroprostheses, tendon transfer, nerve transfers, reconstructive surgeries or a combination of these procedures.

The procedure

- 2.3 In this procedure, the nearest functional undamaged and non-essential nerve is used as the donor nerve.
- 2.4 Under general anaesthesia, with the patient in a supine position and with their arms on a board, the damaged nerve is exposed and the extent of damage is defined neurophysiologically. The closest functional donor nerve is identified. It is then isolated, divided, transferred and joined to the selected damaged nerve while avoiding tension in the donor nerve. The aim is to re-innervate the target muscles and improve limb function.
- 2.5 Post-operatively, the patient needs nerve and muscle rehabilitation training to recover the strength of the re-innervated muscles and improve activities of daily living.
- 2.6 Nerve transfers may sometimes be combined with tendon transfers.

3 Committee considerations

The evidence

- 3.1 To inform the committee, NICE did a rapid review of the published literature on the efficacy and safety of this procedure. This comprised a comprehensive literature search and detailed review of the evidence from 5 sources, which was discussed by the committee. The evidence included 1 systematic review and 3 case series and one case report, and is presented in table 2 of the [interventional procedures overview](#). Other relevant literature is in additional relevant papers in the overview.
- 3.2 The specialist advisers and the committee considered the key efficacy outcomes to be: restoring meaningful function and improving quality of life.
- 3.3 The specialist advisers and the committee considered the key safety outcomes to be: infection, deep vein thrombosis and pulmonary embolus.
- 3.4 Patient commentary was sought but none was received.

Committee comments

- 3.5 This treatment can make a life changing difference to patients with tetraplegia who would otherwise have a poor quality of life.
- 3.6 Specialists in brachial plexus injury may be able to help assess and manage this condition.
- 3.7 All patients need to have rehabilitation for a long time after having this procedure.

Tom Clutton-Brock

Chairman, interventional procedures advisory committee

December 2017