

Nerve transfer to partially restore upper limb function in tetraplegia

Interventional procedures guidance

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[nice.org.uk/guidance/ipg610](https://www.nice.org.uk/guidance/ipg610)

Your responsibility

This guidance represents the view of NICE, arrived at after careful consideration of the evidence available. When exercising their judgement, healthcare professionals are expected to take this guidance fully into account. However, the guidance does not override the individual responsibility of healthcare professionals to make decisions appropriate to the circumstances of the individual patient, in consultation with the patient and/or guardian or carer.

Commissioners and/or providers have a responsibility to implement the guidance, in their local context, in light of their duties to have due regard to the need to eliminate unlawful discrimination, advance equality of opportunity, and foster good relations. Nothing in this guidance should be interpreted in a way that would be inconsistent with compliance with those duties.

Commissioners and providers have a responsibility to promote an environmentally sustainable health and care system and should assess and reduce the environmental impact of implementing NICE recommendations wherever possible.

1 Recommendations

- 1.1 The evidence on efficacy of nerve transfer to partially 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 partially 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](#) is recommended.
 - Audit and review clinical outcomes of all patients having nerve transfer to partially restore upper limb function in tetraplegia. NICE has identified relevant audit criteria and has developed an [audit tool](#).
- 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 a surgeon with experience in the surgical management of tetraplegia and nerve transfer, an occupational therapist, a physiotherapist with experience in spinal injury rehabilitation, a spinal injuries 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 neurological 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 non-functioning nerve is exposed and the degree of paralysis 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 1 case report, and is presented in table 2 of the [interventional procedures overview](#). Other relevant literature is in the appendix of 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 Three commentaries from patients who had experience of this procedure were received, which were discussed by the committee.

Committee comments

- 3.5 This treatment can make a life-changing difference to patients with tetraplegia and could potentially enhance 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 and regular follow-up for a long time after having this procedure because recovery is prolonged.

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Endorsing organisation

This guidance has been endorsed by [Healthcare Improvement Scotland](#).

Accreditation

