BSCN/ANS Guidance on appropriate/inappropriate referral for neurophysiological testing

BSCN
Founded as the EEG Society in 1942

INTRODUCTION/CONTEXT

The growing demand for healthcare services, particularly in specialised areas, has led to significant challenges in ensuring that patients receive timely and appropriate investigations. As patient numbers increase, healthcare systems are increasingly facing the dual pressures of rising demand and limited capacity. This imbalance often results in delays, misallocation of resources, and referrals which have a low probability of contributing usefully to patient management. To address these challenges, it is essential to explore innovative approaches to working practices that can make best use of available resources and improve patient outcomes.

An important approach to the problem is referral management. By providing guidance to referrers on the importance of accurate and appropriate referrals, we can ensure that patients are seen in the most appropriate clinics and receive the most suitable tests at the right time.

These guidelines provide a 'menu' of ideas and options which services can customise to their own particular circumstances. They are drawn from wide consultation but especially with departments that have successfully employed these approaches to shorten waiting lists and improve the yield of useful findings from their investigations.

These recommendations may be used in two ways, as guidance to referring clinicians regarding what should and should not be referred for neurophysiological testing, and as a checklist and support for senior staff in neurophysiology services who are triaging referrals and deciding whether requests are justified or not.

GENERAL REFERRAL QUALITY

Good clinical practice requires high quality communication between the referrer and the neurophysiology department. ANY referral may be returned to the referrer for clarification if important relevant clinical information is omitted. Ideally all requests should pose a clear clinical question.

In the following tables indications for testing are grouped into 'Green', 'Amber' and 'Red' columns. These categories do not imply that testing should always be requested for a 'Green' indication, nor that they should never be requested for a 'Red' indication but a far more detailed explanation of the necessity for the test should be provided for diagnoses in the red column, preferably by direct discussion with the neurophysiologist before referral. Local pathways and NICE guidance should also be followed.

INDICATIONS FOR EEG

Diagnostic group	Green	Amber	Red
	Good evidence that a test will help to answer the question in at least some cases	Testing may be useful in some circumstances	Testing is unlikely to provide a reliable answer or further insights
Epilepsy	Diagnosis/monitoring of status epilepticus	Breakthrough seizure in known epileptic	Diagnosis of episodic symptoms which are not likely to be epileptic, eg syncope (npte b) (Dantas 2012) (Kuo 2019) (Smith 2001)
	Classification of epilepsy/seizures (Hasan 2021)		
	NEAD (record attack)	Assessment of seizure frequency in older children and adults	
	Investigation of possible clinical or aEEG seizures in neonates		
	Detection of clinically 'occult' seizures in neonates with:		Typical febrile seizures in children (Harini 2015) (Kuturec 1997)
	Post-op heart surgery for CHD	Prediction of seizure recurrence on withdrawal of AED	
	Neonates on ECMO		
	HIE +/- therapeutic hypothermia		
	Ischaemic stroke		
	Intracranial haemorrhage		
	Preterm <32w CGA with additional risk factors		
	Intracranial infection		
	Encephalopathy (beyond HIE)		
	Suspected inborn errors of metabolism		
	To assess seizure control after treatment in neonates		
	Assessment of treatment outcome in ESES and Hypsarrhythmia		
Encephalopathy	Prognostication after hypoxia due to cardiac arrest	Slowly progressive cognitive decline (where there is uncertainty as to whether organic cause)	
		Acute encephalopathy (auto-immune or infectious)	
Other		Transient global amnesia	Migraine/headache (de Tommaso 2019)

INDICATIONS FOR EMG/NCS

Reasons for carrying out peripheral neurophysiology are varied and not always to determine the presence or absence of a single diagnosis. They may be done to narrow a differential diagnosis, categorise the type of pathology (eg demyelinating vs axonal neuropathy), measure severity, provide prognosis, evaluate change over time or map out the distribution of nerve or muscle involvement. Requests should make clear the purpose(s) of the test.

Group	Green	Amber	Red
	Good evidence that a test will help to answer the question in most cases	Testing may be useful in some circumstances, often when this diagnosis is part of a differential	Testing is unlikely to provide a reliable answer to the question but exceptional cases should be discussed with neurophysiology
Mononeuropathies	Median (CTS - wrist)	Median (pronator)	Tibial at ankle, Tarsal tunnel syndrome
	Ulnar (elbow or wrist)	Anterior interosseous nerve	Radial tunnel syndrome'
	Radial ('Saturday night' wrist drop)	Posterior interosseous nerve	Meralgia paraesthetica (Scholz 2023)(Hui 2006)
	Fibular (fibular head)	Pudendal (when requested by a specialist)	Piriformis syndrome
	Long thoracic (wing scapula)		Morton's neuroma
			Calcaneal nerve
Nerve injuries	Median (and distal branches)	Lateral cutaneous nerve of the forearm	
	Ulnar (and dorsal ulnar cutaneous)	Medial cutaneous nerve of the forearm	Small cutaneous sensory branches (some may be demonstrable
	Radial	Saphenous nerve	on ultrasound but this usually has no therapeutic implications)
	Musculocutaneous	Medial plantar nerve	
	Spinal accessory	Lateral plantar nerve	
	Femoral		
	Sciatic		
	Sural		
	Superficial fibular		
	Axillary nerve		
Polyneuropathies	Vasculitic neuropathy/Mononeuritis multiplex	Unspecified 'polyneuropathy' (Castelli 2020)	Diabetic sensory polyneuropathy
	Immunologically mediated neuropathy	Critical illness neuromyopathy	Chemotherapy related neuropathy
	Inherited neuropathy		Alcoholic and nutirional neuropathy
	Differentiating axonal vs demyelinatiing		(Callaghan 2014)
			Length dependent sensory neuropathy, age >70 y
			Small fibre neuropathy (Raasing 2021)(Hovaguimian 2011)
Radiculopathy		Cervical radiculopathy	
		Lumbar radiculopathy	
		Differentiating radiculopathy vs peripheral nerve	
Muscle disease		Polymyositis/Dermatomyositis	Steroid myopathy
		Inclusion body myositis	Polymyalgia rheumatica
		Genetically determined myopathy	
		Differentiating neurogenic vs myopathic weakness	
	Myasthenia gravis (ocular/bulbar/generalised)		
	Congenital myasthenic syndromes		
Neuromuscular conduction defects (antibody or genetic testing usually first line)	LEMS		
	Botulism		
Others	Anterior horn cell disorders/MND	Diabetic radiculoplexopathy	
	Brachial Neuritis/Neuralgic Amyotrophy	Orthostatic tremor	

Symptomatic presentations for which EMG/NCS is generally NOT required as an initial investigation	**Explanation**
Intermittent paraesthesiae related to position (e.g. leaning on elbow)	Usually no investigation required at all
Pain anywhere as an isolated symptom	Never an indication for neurophysiology
Fasciculations without weakness (Ramahi 2014) (Kaufman 2007)	May be justified if severe patient anxiety
Speech/swallowing disturbance, in the absence of other signs/symptoms	Full SLT and neurology assessment first
Thoracic sensory symptoms	Not amenable to neurophysiology
Numb/dysaesthetic patch(es) not conforming to peripheral nerve distributions	Worth testing for neuropathy as a last resort
Aching muscles in the absence of weakness or elevated CK	
General considerations	
It is rarely justifiable to repeat neurophysiological testing at very short intervals (<2-4 weeks) in the absence of clear clinical change in the patient	
Short duration symptoms (< 6 weeks) should usually not be investigated except: (Kamble 2019) (Parry 1992)	
Acute neuromuscular presentations (GBS, Poisoning, Myasthenic crisis)	
Nerve injuries - discuss directly with neurophysiologist as timing of investigation will vary greatly depending on circumstances and expertise	
Investigations already done at another institution should not be repeated without making a serious attempt to obtain the prior results	
Carrying out nerve conduction/EMG studies in very longstanding nerve injuries (>5y) is very unlikely to add anything to clinical management	

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