WELCOME TO NEUROLOGY

BLEASDALE WARD

STUDENT NURSES

Bleasdale Ward Mission Statement

Whilst on placement at Bleasdale ward you will be welcomed by the multi-disciplinary team. We are committed to providing students a positive and inclusive learning environment where they feel valued and a part of our team. Students will be supported to fulfil their learning goals, develop their skills and abilities and to get involved as much as possible.

Opportunities on the ward;

- Nursing admission
- Care of patient and families/partners
- Observations to include Neuro observations
- Handover of patients at the end of a shift
- Record keeping and documentation
- Interpretation of NMC Code of Professional Conduct and relationship to practice
- Co-ordination and organisation of relevant investigations
- Nursing role in investigative procedures i.e. lumbar puncture, muscle biopsy
- Preparation and calculation and monitoring of Intravenous therapy
- Preparation and administration of subcutaneous and intramuscularly injections
- Assessment of patient regarding self-administration of medication
- The administration of medication
- Liaising and referring to members of the multidisciplinary team
- Primary care referrals
- Discharge planning
- Discharge
- Pre-operative assessments
- Insertion/removal of urinary catheter
- Pain assessment
- IV Therapies

Specialist skills that can be learnt;

- GCS
- Neurological observations
- Administering IVIG, IVMP
- Apo morphine trials
- Assist in Lumbar punctures

Clinical Placement Area – Neuro-Sciences RPH

Placement Name	Bleasdale Ward
Placement Address	Brock Assessment Centre Royal Preston Hospital Sharoe Green Lane Fulwood Preston PR2 9HT
Telephone Number	01772 524960/524312
Contact Name	Sr. Emma Noon (Ward Manager) Sr Madeleine Carter Sr Liz Hodkinson Sr Bethany McGeorge SN Natalie Dixon (LEMS)
Type of Placement	Adult Branch/Elective
Details of type of clients being dealt with	Adults requiring admission for acute or chronic neurological conditions such as: Myesthenia Gravis, Guillian Barre, Muliple Sclerosis, Motor Neurone Disese, Parkinsons Disease, Epilepsy or a deterioration of these conditions. They may also be admitted with no definitive diagnosis. Patients are admitted for investigations, diagnosis and/or a change in drug management. Medical admissions can be moved to us for discharge planning, further investigations and can be admitted straight from EDU. It is a 21 bedded ward with 18 beds for neurology and 3 beds for neurological rehabilitation.
Type of experience which may be gained from this placement	Bleasdale can offer you experience in the management, delivery and evaluation of care to patients suffering from conditions described above, plus experience in: Management of very dependent patients Managerial experience Multidisciplinary team working. Attendance at case conferences Complex discharges
Special knowledge and information which would be useful to the student	Basic human anatomy and physiology Risk Assesments – falls,VAD, MUST, , fluid balance charts, food charts, management of specialized intravenous drugs,

	neurological observation charts, intentional rounding, positional charts, wound documentation
Recommended reading	Hickey J.V. (2002) The Clinical Practice of Neurological and Neurosurgical Nursing. 4th Ed. Neuromedical and Neurosurgical Nursing by Lindsay, Bone & Callander Student information pack which explains terminology Internet searches on related conditions

Clinical Skills List

Bleasdale offers the student nurse excellent opportunities to learn new and improve many clinical skills, of which many will be transferable across all areas of adult nursing including:

Transferable Skills:

- Measurement and recording of systemic and neurological observations including pulse oximetry and how to interpret findings
- General hygiene, oral care, nutrition and hydration
- Management and administration of IV fluids and antibiotics.
- Blood glucose testing and recording of results
- Preparation and administration of insulin
- Dressings and wound care
- Admissions and Discharges – referrals to MDT members
- Drug administration - orally, intramuscular, inhalation, subcutaneous and suppositories

Specialist skills:

- Care management of the dependant patient suffering from the conditions described
- Airway management and tracheostomy care (not offered currently) including oral suction
- Management of confused patient with dementia/post ictal/mental capacity issues
- Care of patients receiving IV steroids/IVIG/IV drugs
- Management of dysphagia with NGs, PEGs, RIGGs
- Insertion and management of catheters (female catheterization only, not male)
- Managment of ON/OFF charts for patients with Parkinson's disease
- Management of apomorphine pumps for patients with Parkinson's disease
- Management of heparin infusions
- Mangement of insulin infusions
- Management of seizures
- Management of complex wounds

Learning opportunities available:

Bleasdale offers many learning opportunities including:

- You will contribute to the care management of patients providing effective nursing care through planning and management of and including general hygiene, pressure area care, oral care, nutrition and hydration.
- Being involved with the admission procedure is an ideal opportunity to learn about your patients and develop and effective care plan. This will also aid the building of a therapeutic relationship.
- How to assist with full neurological assessment and learning about the Glasgow Coma Scale.
- You will learn about the management of patients with major disabilities, including airway management, how to care for patients with respiratory failure and the importance of oxygen therapy and monitoring airways through the use of spirometers.
- You will be involved with the pre and post procedure care of patients undergoing angiograms, lumbar puncture, EEG's, EMG's VEP's SSEP's CT, MRI/MRA, PET and DAT scans, muscle biopsies, plasmapheresis, heparin, methyl prednisolone or immunoglobulin infusions.
- You will contribute to the multi-disciplinary team, including medics, specialist practitioners, OT's, Physio's, Dieticians and Speech and Language Therapists.
- You will also be given the opportunity to spend time with the Neuro Muscular, Motor Neurone, Multiple Sclerosis, Epilepsy, and Parkinsons Disease Specialist Nurses.
- This MDT working will develop your communication skills and you will be involved with 'hand-over' reporting, either verbal or written.
- You will have the opportunity to develop your organisational skills and learn about ward management, time management whilst developing your inter-personal skills, by taking charge of a group of patients or the ward for a span of duty, attending ward rounds where possible
- You will be given the opportunity to participate in drug administration and develop an understanding of the most common medicines used within this ward.
- You will develop and understanding of how to care for patients with epilepsy and the medication used to control this.
- You will learn how to effectively manage pain in relation to neurological conditions.
- You will learn about the importance of management of intravenous fluid replacement therapy, including care of cannula site.
- You will begin to understand the management of confused patients with dementia/post ictal
- Communication skills will be further enhanced as you develop experience in communicating with patients with dysphasia or aphasia due to cerebral vascular disease or bulbar palsy.
- You may have the opportunity to care for patients who have undergone insertion of NG.OEG tubes, learning how manage the tubing and feeding.
- You will learn how to manage patients with MRSA and other infectious conditions requiring isolation or 'barrier nursing techniques'.
- You will develop skills in aspects of wound care including the different types of dressings, creams, managing infection control and safe disposal of clinical waste.
- You may have the opportunity to observe and perform urinary catheterisation and learn

how to care for the catheterised patient, including fluid balance and the use of monitoring equipment such as the bladder scanner.

- You may be involved with palliative care and nurse patients through the process of dying. This will give you the opportunity to assist with the support and counselling given to the patients relatives/significant others.
- You will have the opportunity to attend teaching sessions provided by medics and clinical tutors.
- You will learn about the use of medical devices such as infusion devices, BM devices, spirometers, syringe drivers and apomorphine pumps.

Spoke Placements

As within all area of nursing, Bleasdale has liaisons with many other departments in order to provide a multidisciplinary service. The following list is a guide only:

Neuro Xray to observe MRI & CT Scans, PET/DAT Scans, angiograms & myelograms
Neuro physiology to observe EEG, EMG/NCS, VEP, SSEP
Endoscopy to see insertion of Gastrostomy Tubes
Epilepsy and Dystonia Clinics – spending time with the specialist nurses
Visits with the specialist nurses ie: MND, MS, Parkinson Disease, Epilepsy, Neuro muscular
Dieticians
Speech and Language – with possible opportunities to watch a video fluroscopy

Aids available in the moving and handling of patients/clients?

Arjo hoist
Dextra hoist
P.A.T. slide
Electronic beds
REturn
Patients own sticks, frames and wheelchairs

What would be important to read?
Eg) Health & Safety policy, manual handling, Marsden manual etc.

Trust policy of Confidentiality issues and IT access
Infection control
Manual handling
Health and safety
Patient information leaflets and advice sheets
Ward profile
Information and teaching packages available in resource room

Shift Times

Day shift – 07:00 – 19:30 ½ hour break
Night shift – 19:00 – 07:30 ½ hour break

Shifts can be negotiable in case of problems. Advance notification is essential.

Bleep System and use of

Dial 66 and wait for message
Enter bleep number of the person you require
Wait for message
Enter ward extension number
Wait for message that your paging request has been accepted
Replace receiver

Emergency Number 2222

(state whether arrest, fire, security alert)

Students are expected to report to nurse in charge prior to bleeping medical staff. Bleep numbers are available on office notice board

Opportunities for patient education/health promotion

On Bleasdale we try to promote independence and give health education to all our patients. Students will be able to contribute to health promotion issues such as:

Smoking cessation and nicotine replacement therapy
Nutrition and dietary advice
Alcohol consumption advice – referrals to HALs
Management of disability
DVT prevention and use of anti-embolic stockings
Helping to educate patients on correct mobilisation and exercising of limbs
Medication advice, including advice regarding sub-cutaneous injections/pumps.
Bowel management
Advice regarding Intermittent Self Catheterisation
Management of PEG tubes and feeds, including educating relatives and carers in these issues
We provide health promotion leaflets and patient information leaflets regarding procedures and other treatments
Discharge advice for patients needing continuing care including MDT case conferences which involves patients, relatives and carers.

Last Updated: August 2021

LEARNING RESOURCES

There is a plentiful supply of learning resources on the ward providing information about training and education within the trust. There is also plenty of information available on the ward about learning opportunities and learning resources. These can be located on the student nurse board and in the staff room. There is also access to clinical educators with vast experience in neurology. There is also an orange folder located in the main ward office, provided by the university for the pre reg students.

The LEMS for the ward is SN Natalie who allocates the students to the appropriate mentors and is responsible for the students off duty.

Neurology is now a specialist medical ward within the medical directorate. Also within Brock assessment centre is the neuro rehab unit where some of the patients from Bleasdale can go. Visits can be arranged, especially if you want to follow the patient journey through their hospital stay.

An essential part of the patient's journey requires the input of several different members of the multi- disciplinary team. There are dedicated neurology physios, OTs, case managers, dietitians, speech and language therapists and specialist nurse practitioners. All of these can provide teaching and learning opportunities.

This pack provides some basic information on the central nervous system which will help with understanding of the diseases/viruses that can affect the patients on the ward.

THE BRAIN

The brain is one of the largest and most complex organs in the body and is made up of more than 100 billion nerves that communicate in trillions of connections called synapses.

The brain is made up of many specialized areas that work together.

- The cortex is the outermost layer of brain cells. Thinking and voluntary movements begin in the cortex.
- The brain stem is between the spinal cord and the rest of the brain. Basic functions such as breathing and sleeping are controlled here.
- The basal ganglia are a cluster of structures in the centre of the brain. The basal ganglia coordinate messages between multiple other brain areas.
- The cerebellum is at the base and the back of the brain. The cerebellum is responsible for coordination and balance.

The brain is also divided into several lobes

- The frontal lobes are responsible for problem solving and judgement and motor function
- The parietal lobes manage sensation, handwriting and body position
- The temporal lobes are involved with memory and hearing
- The occipital lobes contain the brains visual processing system

The brain is surrounded by a layer of tissue called the meninges. The skull (cranium) helps protect the brain from injury.

CSF Cerebrospinal spinal fluid

CSF is a clear, colourless fluid which has several functions.

- Buoyancy – the actual mass of the brain is about 1400 grams, the net weight of the brain suspended in CSF is equivalent to 25 grams. This allows the brain to exist in neutral buoyancy enabling it to maintain its density without being impaired by its own weight.
- Protection – protects the brain tissue from injury when jolted or hit
- Chemical Stability - CSF flows through the inner ventricular system in the brain and is absorbed back into the bloodstream, rinsing metabolic waste from the central nervous system through the blood brain barrier. This allows for homeostatic regulation of the distribution of neuroendocrine factors, to which slight changes can cause problems or damage to the nervous system.
- Prevention of brain ischaemia – decreasing the amount of CSF in the limited space inside the skull decreased total intracranial pressure and facilitates blood perfusion.
- Clearing waste

CSF occupies the subarachnoid space and the ventricular system around and inside the brain and spinal cord. CSF occupies the space between the arachnoid mater (the middle layer of the brain cover, the meninges) and the pia mater (the layer of the meninges closest to the brain).

CSF is produced in the choroid plexus, a structure in the ventricles of the brain. 50-70% is produced by modified ependymal cells in the choroid plexus. The remainder is formed around blood vessels and along ventricular walls.

CSF is reabsorbed into venous sinus blood via arachnoid granulations.

CSF is produced at a rate of 500ml per day. As the subarachnoid space around the brain and spinal cord can only contain 135 to 150 ml, large amounts are drained into the blood through arachnoid granulations in the superior sagittal sinus. Hence, the CSF turns over about 3.7 times a day.

CSF is very useful as a diagnostic tool. When CSF pressure is elevated, cerebral blood flow may be constricted. It can be used for the diagnosis of various neurological diseases, usually with a procedure called a lumbar puncture. This is performed in an attempt to count the

cells in the fluid and to detect the levels of protein and glucose. CSF can be sent for analysis which can identify microorganisms causing infection ie meningitis. It can be analysed for cytology, looking for cancer cells or for xanthachromia, the presence of blood which may indicate a subarachnoid haemorrhage.

THE SPINE

The spine is an intricate set of bones and muscles, nerves and discs. It is divided into 5 regions. These are cervical (neck), thoracic (chest), lumbar (low back), sacral (attached to pelvis) and coccygeal (tail bone). Each region has vertebral bones. These are 7 cervical, 12 thoracic and 5 lumbar. The sacrum is a single, large fused bone. The coccyx is made up of 1 or 2 small bones.

The spine bones are referred to by letters and numbers ie C7 is cervical, level 7, L2 is lumbar, level 2.

The vertebrae are the bones of the spine and together support the whole body. Each vertebra is separated by a disc. The discs are in the anterior (front part) of the spine. The discs allow for movement and cushioning. Posterior to (behind) each of the discs and between every pair of vertebral bones, is a foramen or hole.

One spinal nerve root exits from each of these holes. These nerves go to the arms, chest and legs. The posterior parts of the vertebral bones are connected by small joints called facet joints. Behind the facet joints and along the midline are spinous processes. These are bumps that can be felt along the back of the neck, thoracic spine and lower back.

Each vertebral bone has an anterior and posterior part. The anterior portion is called the vertebral body which provides the surfaces against which the discs rest. Two pedicles or struts project posteriorly from the body and support an arch called the vertebral lamina. The arch forms a canal through which the spinal cord and nerves pass.

The vertebral bones are separated from one another by intervertebral discs which provide flexibility and absorb impacts and shocks.

The discs consist of 2 parts. The inner area is called the nucleus and the outer area is called the annulus. The disc is like a jelly donut.

The inner core consists of a gelatinous material. The annulus is the strongest part and keeps the jelly like substance from leaking out, supporting the weight of the spine and preventing excessive motion. The annulus is built from layers of fibres.

Normally the disc remains firmly contained but can rupture. Ruptures occur when the annulus is torn.

The back is supported by strong ligaments and more powerful muscles.

THE SPINAL CORD AND NERVES

The spinal cord begins at the base of the brain and runs down the spine to the lower back. It is protected within the spinal canal, a bony arch formed by each of the vertebral bones. Between every 2 vertebral bones, 2 nerves exit the spinal canal, 1 on the left, 1 on the right. The nerves exit right behind the disc and directly in front of the facet joint.

If there is a ruptured disc, it will pinch the nerve. A damaged facet joint can also press on a nerve.

Each nerve goes to a specific area of the body. The nerves from the neck go to the arms. Those from the thoracic go to the chest wall and abdomen. Those from the lumbar go to the legs. Each nerve serves sensation in a specific area and controls specific muscles. Some nerves have reflexes that can be tested, others regulate blood flow to the skin and tissues and functions of internal organs.

If a nerve is badly compressed this can cause muscle weakness, abnormal reflexes and changes in skin colour or temperature.

NEUROMUSCULAR JUNCTION

This can be defined as a synapse the motor neuron and the muscle fibre. The synapse occurs between the synaptic end bulbs of the motor neurone and motor end plate of the muscle fibre. The motor end plate is responsible for initiating action potentials across the muscle surface. This ultimately results in muscle contraction.

The neuromuscular junction is comprised of 3 parts

- Synaptic End Bulbs – As the axon of the motor neuron enters the skeletal muscle, it forms many branches called axon terminals. At the end of each axon terminal there is a bulbous swelling called the synaptic end bulb. Each bulb contains many synaptic vesicles which contain many synaptic vesicles. These vesicles contain the all-important neurotransmitter substances such as acetylcholine. These neurotransmitter substances are responsible for transmission of impulse from axon to muscle fibre through the synapse.
- Motor End Plate – It is the part of the muscle cell in closest proximity to the synaptic end bulb.
- The Synaptic Cleft – the space between the motor end plate and synaptic end bulb (motor neuron part) of the neuromuscular junction. Because of this cleft, the connection between the motor neuron and the muscle fibre in not continuous and there is a break. This break is traversed by the neurotransmitters. This shows the importance of these substances in the activity of muscles and all other nervous control mechanisms.

Synapses and neuromuscular junctions are physiologically the same, however the neuromuscular junction is a specific type of synapse that occurs between the motor neuron and muscle fibre.

Useful information in Neurology

FVC – Forced vital capacity

Forced vital capacity (FVC) is the amount of air that can be forcibly exhaled from your lungs after taking the deepest breath possible, as measured by spirometry.
Place flow transducer in patient's mouth. Patient should breathe in a relaxed/normal rate and frequency through the flow transducer. Start the measurement by selecting FVC button. Patient inspires slowly and long. We monitor and record FVC's for patients who are at risk of their respiratory muscles becoming compromised such as myasthenia gravis and Guillain Barre Syndrome. Results should be greater than 2L. If less than 1.5L or significantly lower than a patients usual contact a doctor. Usually the patient will need an ICU review and ABG bloods performing.

Breath count

Some people have poor technique using an FVC machine in this case we perform breathe counts (BC). Ask the patient to breathe in, and then count as they breathe out. Ideally this number should be greater than 20. Ensure you inform senior nurse/doctor of FVC/BC is low.

EMG/NCS

Electromyography (EMG) measures muscle response or electrical activity in response to a nerve's stimulation of the muscle. The test is used to help detect neuromuscular abnormalities. During the test, one or more small needles (also called electrodes) are inserted through the skin into the muscle. A nerve conduction study (NCS) is a measurement of the amount and speed of conduction of an electrical impulse through a nerve. ... During the test, the nerve is stimulated, usually with surface electrode patches attached to the skin.

Intravenous immunoglobulin – Ivig

IVig is a blood product treatment administered in some autoimmune neurological conditions such as GBS and MG. it works by replacing and resetting patients own antibodies which are attacking the nerves. IVig is usually administered over 5 days. Infusion rates are 0.3mls/KG of body weight/per hour which is gradually increased. Regular vital sign observations are taken during administration. Patints with GBS should have a cardiac monitor on.

I.V Methylprednisolone

IV Mep is a strong steroid that is administered via IV. This is usually 1g per day for 3 days. It is used to improve symptoms of inflammatory conditions such as MS. A urine dip should be carried out prior and regular vital sign monitoring throughout. IV Mep can increase appetite; patients may experience a metallic taste also. Once daily blood glucose

monitoring must be completed whilst on IV mep. If this is raised increase to QDS monitoring and inform diabetic specialist nurse.

Motor Neurone Disease

Motor neurone disease (MND) describes a group of diseases that affect the nerves (motor neurones) in the brain and spinal cord that tell your muscles what to do. With MND, messages from these nerves gradually stop reaching the muscles, leading them to weaken, stiffen and waste. Select from the following to find out more.

MND can affect how you walk, talk, eat, drink and breathe. Some people also experience changes to their thinking and behaviour. However, MND affects everyone differently. Not all symptoms will affect everyone, or in the same order. Symptoms also progress at varying speeds, which makes the course of the disease difficult to predict.
MND is life-shortening and there is no cure. Although the disease will progress, symptoms can be managed to help achieve the best possible quality of life.
MND can affect adults of any age, but usually when they are 50 years old or more. The disease is more common in men than women, but this evens out with age.

Types of Motor Neurone Disease

Amyotrophic lateral sclerosis (ALS): is the most common form of MND, with weakness and wasting in the limbs, muscle stiffness and cramps. Someone may notice they are tripping when walking or dropping things. Life expectancy is usually two to five years from the onset of symptoms.

Bulbar onset MND or **Progressive bulbar palsy (PBP):** affects a smaller number of people than typical ALS, and mainly affects the muscles of the face, throat and tongue. Early symptoms may include slurring of speech or difficulty swallowing. Life expectancy is between six months and three years from onset of symptoms.

Progressive muscular atrophy (PMA): affects only a small proportion of people. Early symptoms may show as weakness or clumsiness of the hands. Life expectancy is usually more than five years.

Primary lateral sclerosis (PLS): is a rare form of MND, causing mainly weakness in the lower limbs, although some people may experience clumsiness in the hands or speech problems. PLS progresses slowly and life expectancy can be 10-20 years.

Kennedy's Disease: is not a type of MND, but has similar symptoms. It is a rare condition affecting the motor neurones, with increasing weakness and wasting of the muscles. Unlike MND, Kennedy's also causes hormonal changes. Due to their similarities, MND and Kennedy's disease are sometimes confused at diagnosis. Most people with Kennedy's disease live an average life span

Symptoms

- **muscle weakness,** with loss of muscle mass (wasting), and movement and mobility problems
- **muscle cramps and spasms,** including rippling sensations (known as fasciculation)
- **stiff joints,** which may limit range of movement
- **pain or discomfort,** as a result of other symptoms (not usually caused by MND directly)
- **speech and communication problems,** affecting how you speak, gesture and show expression
- **swallowing difficulties,** affecting how you eat and drink
- **saliva problems,** where thin saliva pools in the mouth or saliva becomes thick and sticky
- **weakened coughing,** which makes it harder to clear the throat
- **breathing problems,** which can lead to breathlessness and fatigue
- **emotional lability,** with inappropriate emotional responses, such as laughing when feeling sad
- **changes to thinking and behaviour,** for about half of those diagnosed with MND.

Nursing observations

Vital signs are a fundamental part of a patient assessment. They provide a baseline and determine the patients' usual range. They assist in identifying deterioration or improvement in patient's condition and help determine the level of care required. Four hourly observations and FVC's are required for anyone with MND. Spirometry is performed by deeply inhaling and forcefully exhaling into a spirometer (the device that records the various measurements of lung function). There are two measurements that are crucial in the interpretation of spirometry results. The first is called the forced vital capacity (FVC). This is a measurement of lung size and represents the volume of air in the lungs that can be exhaled following a deep inhalation. Where the FVC technique is poor, breath counts are required. Breath counts should ideally be above 20.

An FVC should be greater than 2, however this should be compared to the patient's baseline. If the result is significantly lower than the patients baseline then an arterial blood gas may be performed and he/she may receive an ICU review.

A TOSCA system uses just a single sensor for continuous monitoring of ventilatory status and oxygen saturation in paediatric and adult patients. It's an easy-to-use solution ideal for respiratory care and sleep medicine. The TOSCA system is designed to monitor tcpCO_2, SpO_2 and pulse rate, and can be connected for overnight monitoring of ventilation and oxygen saturation in patients suffering from sleep-related breathing disorders.

Diagnosing Motor Neurone Disease

Clinical examination: helps the neurologist recognise signs and work out which tests are appropriate, depending on your symptoms.

Blood tests: look for a rise in a substance called creatine kinase. This is produced when muscle breaks down. It is sometimes found in the blood of people with MND, but may indicate other conditions.

Electromyography (EMG): is sometimes called the needle test, as fine needles record the natural nerve impulses within certain muscles. When muscles start to lose their nerve supply, this can be detected, even if the muscle activity still seems normal.

Nerve conduction tests: apply an electrical impulse through a small pad on the skin. This measures the speed at which nerves carry electrical signals.

Transcranial Magnetic Stimulation (TMS): measures the activity of the upper motor neurones to help diagnosis.

Magnetic Resonance Imaging (MRI): scans involve being placed in a cylinder-like machine. The machine takes internal images of the body. These help rule out conditions such as stroke, Alzheimer's disease, Parkinson's disease, multiple sclerosis, tumours and trapped nerves, as well as injury to spine and brain.

Multiple Sclerosis

Multiple sclerosis (MS) is a disease of the central nervous system (your brain and your spinal cord).

The central nervous system cells are covered in a protective layer of fatty protein called the myelin sheath (a bit like the insulation on an electrical cable). MS is an auto-immune disease, where the immune system gets confused and instead of attacking an infection or virus, the immune system turns on itself and attacks the nerve cells, damaging this protective sheath. This process is called demyelination. The demyelination disrupts the 'messages' being transmitted from and to the brain, causing them to slow down, become distorted or not get through at all.

The term 'sclerosis' means scarring. Demyelination causes many scars or lesions in different places within the central nervous system. The symptoms that occur depend on the site and severity of the lesions and this is why people with MS experience different symptoms at different times.

Symptoms

MS can cause a wide range of symptoms, and there is no definitive list of early signs. What could be a first symptom for one person may never be experienced by another. People can have different symptoms at different times and, although some are very common, there is no typical pattern that applies to everyone.

Some of the most common symptoms include:

Fatigue, vision problems, numbness and tingling, muscle spasms, tingling and weakness, pain, mobility problems and pain.

Types of MS

Clinically Isolated Syndrome (CIS)

CIS is a first episode of neurologic symptoms caused by inflammation and demyelination in the central nervous system. The episode, which by definition must last for at least 24 hours,

is characteristic of multiple sclerosis but does not yet meet the criteria for a diagnosis of MS because people who experience a CIS may or may not go on to develop MS.

Relapsing-remitting MS (RRMS)

RRMS – the most common disease course – is characterized by clearly defined attacks of new or increasing neurologic symptoms. These attacks – also called relapses or exacerbations – are followed by periods of partial or complete recovery (remissions). During remissions, all symptoms may disappear, or some symptoms may continue and become permanent.

Primary progressive MS (PPMS)

PPMS is characterized by worsening neurologic function (accumulation of disability) from the onset of symptoms, without early relapses or remissions. PPMS can be further characterized at different points in time as either active (with an occasional relapse and/or evidence of new MRI activity) or not active, as well as with progression (evidence of disease worsening on an objective measure of change over time, with or without relapse or new MRI activity) or without progression.

Secondary progressive MS (SPMS)

SPMS follows an initial relapsing-remitting course. Most people who are diagnosed with RRMS will eventually transition to a secondary progressive course in which there is a progressive worsening of neurologic function (accumulation of disability) over time.

Treatments used on the ward

Steroids (also known as corticosteroids) may be used to treat relapses in multiple sclerosis. Methylprednisolone is the steroid most often prescribed. Not all relapses need treatment as, in most cases, the symptoms will gradually improve on their own. If the symptoms of your relapse are causing significant problems, such as affecting your eyesight or making walking difficult, your MS team or GP may suggest that you have a short course of high dose steroids. They should explain the benefits and potential side effects of taking steroids so that you can decide together on the best course of action in your situation.

Methylprednisolone can be taken as tablets or by intravenous infusion (drip). The recommended treatment courses are:

- tablets: methylprednisolone 500mg daily for 5 days
- intravenous infusion (drip): methylprednisolone 1000mg daily for 3–5 days

The side effects of methylprednisolone are usually mild and will go away quickly when you finish the treatment course. The most common side effects include a metallic taste, indigestion, difficulty sleeping, mood swings or altered mood and flushing of the face.

Myasthenia Gravis

Myasthenia gravis (MG) is an acquired autoimmune disease that impairs the transmission of messages at the neuromuscular junction (NMJ), resulting in fluctuating muscle weakness that increases with muscle use (fatigability). Progression varies and can be debilitating for some sufferers, but most patient's symptoms can be improved or remission achieved with medication.

Symptoms

Common symptoms of Myasthenia Gravis include: Droopy eyelids, double vision, difficulty making facial expressions, problems with chewing and difficulty swallowing, slurred speech, weakness and shortness of breath. Patients with Myasthenia Gravis will require a SALT review and dietician review.

Nursing observations

Vital signs are a fundamental part of a patient assessment. They provide a baseline and determine the patients' usual range. They assist in identifying deterioration or improvement in patient's condition and help determine the level of care required. Four hourly observations and FVC's are required for anyone with Myasthenia Gravis. Spirometry is performed by deeply inhaling and forcefully exhaling into a spirometer (the device that records the various measurements of lung function). There are two measurements that are crucial in the interpretation of spirometry results. The first is called the forced vital capacity (FVC). This is a measurement of lung size and represents the volume of air in the lungs that can be exhaled following a deep inhalation. Where the FVC technique is poor, breath counts are required. Breath counts should ideally be above 20.

An FVC should be greater than 2, however this should be compared to the patient's baseline. If the result is significantly lower than the patients baseline then an arterial blood gas may be performed and he/she may receive an ICU review.

Treatment

Pyridostigmine bromide is the first-line treatment. It is a cholinesterase inhibitor that inhibits the breakdown of ACh, increasing its availability. The initial dose is 30–60 mg every 4–6 hours, which is increased and adjusted to maximise benefit and minimise side effects

Immunosuppressants: When pyridostigmine does not control symptoms, corticosteroids are the next line of treatment. Prednisolone is the drug of choice. Like the other immunosuppressants, it acts by reducing the production of antibodies.

For acute exacerbation's there are two treatments that may offer rapid (within a few days) improvement plasma exchange and IVIg. They are of similar efficacy but each present resource issues and the specialist will decide which is most appropriate. The benefits only last a few weeks, but this gives time for other treatments to become effective.

Intravenous immunoglobulin (IVIg) and plasma exchange are used for short-term treatment of myasthenic crisis. They temporarily reduce the number of anti-AChR antibodies and bring about gradual improvement, usually within a week. IVIg is usually given as a course over 5 days.

A thymectomy is necessary for patients with a thymoma and is also considered in patients who have abnormalities of the gland with early-onset AChR-MG.

PRIMEVIEW

MYASTHENIA GRAVIS

nature REVIEWS DISEASE PRIMERS

For the Primer, visit doi:10.1038/s41572-019-0079-y

Myasthenia gravis (MG) is an autoimmune disease that affects neuromuscular junctions, leading to muscle weakness, ptosis (drooping eyelids) and diplopia (double vision). Approximately 80% of patients have pathogenetic antibodies against the acetylcholine receptor (AChR).

EPIDEMIOLOGY

The overall incidence of MG is 8–10 cases per million person–years. Although several studies have demonstrated an increased prevalence of MG over time, whether this increase represents a higher incidence, or if it is due to improved case ascertainment and survival, is unknown.

Several genetic risk factors for MG have been identified, including variation in *HLA* genes and *CHRNA1* (encoding the α-subunit of AChR), among others. Environmental factors likely have a role, but are not well-established

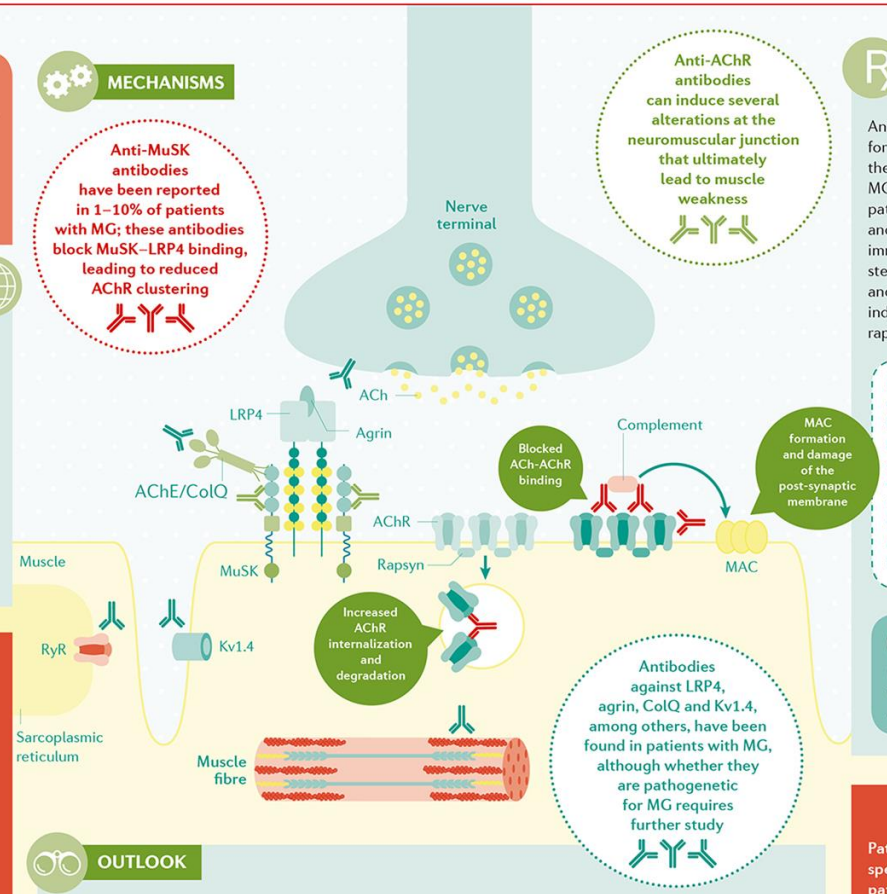
DIAGNOSIS

All individuals with suspected MG should undergo testing for anti-AChR antibodies, followed by testing for anti-MuSK antibodies in those with negative results. The presence of either autoantibody together with muscle weakness is diagnostic for MG. Individuals without either autoantibody should be referred for electromyography.

Several subgroups of MG have been identified based on age of onset and the presence of autoantibodies or thymus pathology

MECHANISMS

Anti-MuSK antibodies have been reported in 1–10% of patients with MG; these antibodies block MuSK–LRP4 binding, leading to reduced AChR clustering



Anti-AChR antibodies can induce several alterations at the neuromuscular junction that ultimately lead to muscle weakness

Antibodies against LRP4, agrin, ColQ and Kv1.4, among others, have been found in patients with MG, although whether they are pathogenetic for MG requires further study

MANAGEMENT

Anticholinesterases are the first-line treatment for MG, and increase the bioavailability of ACh at the synaptic cleft. All subgroups — except MuSK MG — respond to these drugs; however, most patients have some persistent muscle weakness and require immunotherapy. Commonly used immunotherapies include steroids and non-steroidal immunosuppressants. Plasma exchange and intravenous immunoglobulin can be used in individuals with acute, severe disease in whom a rapid response is crucial.

Monitoring patients for drug-related adverse effects is essential. Before commencing immunosuppressants, patients should be screened for viral hepatitis and tuberculosis, among other diseases. Bone mineral density should be evaluated in patients using steroids, and thrombocytopenia, hepatic dysfunction and renal dysfunction should be monitored in patients using immunosuppressive therapies.

Thymectomy is indicated in patients with a thymoma, and in most patients with incapacitating muscle weakness, anti-AChR antibodies and onset age below 60 years.

OUTLOOK

Many new drugs for MG are in development or are being evaluated in clinical trials. Therapies in ongoing trials include drugs that influence IgG metabolism, target the complement pathway and inhibit B cell or T cell activation or survival. If approved, these therapies could be used as monotherapy or in combination with traditional immunosuppressive agents.

QUALITY OF LIFE

Patient-reported outcome measures that are specific for MG have been useful to assess patient experience. Indeed, studies using these tools have demonstrated limitations in social activity and work life in most patients with MG. Moreover, many patients complain of limitations in their ability to enjoy fun activities.

doi:10.1038/s41572-019-0085-0

Written by Louise Adams; designed by Laura Marshall

Parkinson ’s disease

Parkinson’s is caused by the loss of dopaminergic nerve cells in the brain, which is located within the basal ganglia, deep in the lower region of the brain, on either side of the brain stem. Symptoms of the condition become apparent once around 70% of these cells are lost. The reason why these nerve cells die is not known but Parkinson’s UK is committed to funding research into finding a cure and better treatments and supporting those affected by the condition. Dopamine allows messages to be sent to the parts of the brain that coordinate movement. With the loss of the dopaminergic nerve cells, these parts of the brain are unable to work normally, causing the symptoms of Parkinson’s to appear. The level of dopamine then continues to fall slowly over many years, causing symptoms to further develop and new symptoms to appear. Parkinson’s can affect everyday activities such as talking, walking, swallowing and writing, and symptoms can include tremor, slowness of movement and muscle stiffness. Other less visible symptoms may include sleep difficulties, depression, anxiety and memory loss, and these are often the symptoms that are the most debilitating.

Symptoms

The most common symptoms of Parkinson’s are stiff, rigid or frozen muscles, slowness of movement and tremor. Contrary to popular belief, not everyone has a tremor – only around 70% experience this symptom. As well as affecting movement, people with Parkinson’s often find that other issues, such as tiredness, pain and depression, can have an impact on their day-to-day lives. Whereas these symptoms are typical of Parkinson’s, the condition affects each person differently.

Motor symptoms

A tremor is an uncontrollable shaking movement that affects a part of the body, usually the hand. Anxiety or stress can make a tremor worse and drugs for Parkinson’s, such as levodopa, can reduce or stop a tremor while the drugs are working. Rigidity in Parkinson’s means that the stiffness or inflexibility of the muscles can cause pain or cramping. Parkinson’s can also prevent the muscles from stretching or relaxing. Simple movements, such as rolling over in bed or fastening buttons, can become difficult or impossible to manage. Freezing is also common – many people with Parkinson’s describe freezing as feeling as if their feet are stuck to the floor. Regular exercise can help patients maintain freedom of movement, strengthen muscles and, in some cases, increase their mobility so it is good to try to encourage regular movement.

Non-motor symptoms can include: incontinence and constipation; swallowing problems or loss of control of saliva; falls and dizziness; problems with sleeping, including excessive daytime sleepiness

and intense or frightening dreams; depression and anxiety; pain; and hallucinations. These symptoms may be less obvious than motor symptoms at first, but are the symptoms that patients often find the most debilitating.

Medication – getting it on time

Parkinson's can affect different people in different ways, with symptoms and severity varying from person to person. As a result, each individual will have a carefully balanced combination of medication to control and manage their symptoms. The timing of this medication can be crucial, especially in the more advanced stages. It is important for health professionals to be aware of this as patients' medication timings may not fit in with the normal timings of drug rounds in inpatient settings. Additionally, some drugs must be given at the same time in order to be effective, such as Madopar and therefore, medications have to be given exactly as prescribed. If people with Parkinson's don't get their medication on time, their control over their symptoms can suffer and it may be difficult to regain. For example, their mobility can deteriorate rapidly; they can develop pain and cramping and they can be more prone to falling.

Apomorphine pump

Apomorphine is usually saved for more advanced Parkinson's, when a person's symptoms do not respond well to oral drug treatments.

Apomorphine doesn't help everyone. But the Parkinson's nurse may suggest trying it if the patient has sudden and unpredictable changes in symptoms, or if the patient has severe 'off' periods that aren't controlled by other Parkinson's medications.

Infusion- If you have so many 'off' periods that repeated injections are unsuitable, you may use a syringe driver. This is a small, battery-driven pump that delivers a continuous dose of medication from a syringe. If you need more than seven to 10 injections a day, you may be changed to a syringe driver. This change can greatly improve your quality of life.

The syringe has a fine needle that will be inserted under your skin, either in your lower stomach or on the outside of your thighs. You will be taught how to use this on the ward.

Monitoring of patients with Parkinson's disease

Parkinson's disease is a degenerative neurological disease caused due to a lack of the neurotransmitter dopamine being produced in the brain. This can cause bradykinesia (slow movement) and rigidity. When someone feels completely rigid this is called 'OFF'. Parkinson's medications aim to improve the dopamine uptake within the brain reducing 'OFF' periods.

However, these medications can cause patients to experience dyskinesia (abnormal involuntary movements) which can impact on them completing day to day tasks. It can be difficult to get the balance of medication to reduce 'OFF' periods without causing unmanageable dyskinesia.

Patients are often admitted to the ward to titrate and amend Parkinson's medications and require close monitoring. To do this we use an 'ON/OFF' chart (see below) which is to be filled in by the nurse every hour. If the patient is 'ON' (able to move freely) the chart is filled in with green. If they are 'OFF' it is filled in red. If they are able to move slowly but appear rigid this is described as 'IN-BETWEEN' and this is coloured in blue.

The nurse assesses for dyskinesia and 'scores' the patient 0-3 the chart also allows for comments for example 'medications taken'. If used correctly this tool is very useful in providing a clear picture of how Parkinson's medications are affecting patients and in turn supports doctors and nurses decisions when titrating medications.

PARKINSONS ON/OFF CHART

BLEASDALE NEUROLOGY

ALL CHARTS MUST BE COMPLETED USING COLOURED PENS

ON	GREEN
OFF	RED
IN-BETWEEN	BLUE

DYSKINESIA

0 – ABSENT

1 – MILD (NOT INTERFERING WITH ACTIVITIES SUCH AS WALKING AND EATING)

2 – MODERATE (INTERFERING WITH ACTIVITIES SUCH AS WALKING AND EATING)

Guillain-Barre Syndrome

Guillain-Barre syndrome (GBS) is a rare acute post-infective disorder that causes peripheral neuropathy affecting both peripheral and cranial nerves. It can occur in children but is more prevalent among adults. Most people affected by GBS will make a full neurological recovery, but up to 20% of affected individuals die or remain disabled and dependent 2 years following diagnosis. The condition affects the peripheral nervous system and is usually triggered by an acute infection. Guillain-Barre is usually referred to as a syndrome rather than a disease because it is not clear that a specific disease-causing agent is involved. GBS usually presents as a symmetric motor paralysis with or without sensory or autonomic disturbances.

Symptoms

By function, the peripheral nervous system is divided into the somatic nervous system, autonomic nervous system and the enteric nervous system. As has been mentioned, GBS generally manifests as a symmetric motor paralysis with or without sensory and autonomic disturbances. The first symptoms are usually paraesthesia ('pins and needles') together with numbness beginning in the toes and fingers. Many patients complain that their legs feel heavy and 'wooden'. Symptoms can range from mild weakness to total paralysis requiring mechanical ventilation. In the majority of cases weakness occurs in the lower limbs, but rapidly progresses over several hours or days to affect the arms and facial muscles. As the condition progresses, legs will not be able to bear weight and the arms will become very weak.

Nursing observations

Vital signs are a fundamental part of a patient assessment. They provide a baseline and determine the patients' usual range. They assist in identifying deterioration or improvement in patient's condition and help determine the level of care required. Four hourly observations and FVC's are required for anyone with Guillain Barre Syndrome. Spirometry is performed by deeply inhaling and forcefully exhaling into a spirometer (the device that records the various measurements of lung function). There are two measurements that are crucial in the interpretation of spirometry results. The first is called the forced vital capacity (FVC). This is a measurement of lung size and represents the volume of air in the lungs that can be exhaled following a deep inhalation. Where the FVC technique is poor, breath counts are required. Breath counts should ideally be above 20.

An FVC should be greater than 2, however this should be compared to the patient's baseline. If the result is significantly lower than the patients baseline then an arterial blood gas may be performed and he/she may receive an ICU review.

Tests

Lumbar puncture-

A small amount of fluid is withdrawn from the spinal canal in your lower back. The fluid is tested for a type of change that commonly occurs in people who have Guillain-Barre syndrome.

Nerve conduction studies. Electrodes are taped to the skin above your nerves. A small shock is passed through the nerve to measure the speed of nerve signals.

Treatment

For acute exacerbation's there are two treatments that may offer rapid (within a few days) improvement plasma exchange and IVIg. They are of similar efficacy but each present resource issues and the specialist will decide which is most appropriate. The benefits only last a few weeks, but this gives time for other treatments to become effective.

Plasma exchange, or plasmapheresis, is a procedure that removes plasma from the blood and replaces it with new plasma fluid. Blood is removed from the patient (a small amount at a time) and separated, so that the plasma can be discarded. The red and white blood cells and the platelets are returned to the patient, along with the replacement fluid. An anti-coagulant is added to the blood to stop it clotting.

Epilepsy

Epilepsy is a condition that affects the brain. When someone has epilepsy, it means they have a tendency to have epileptic seizures. Anyone can have a one-off seizure, but this doesn't always mean they have epilepsy. Epilepsy is usually only diagnosed if a doctor thinks there's a high chance that the person could have more seizures.

Electrical activity is happening in our brain all the time, as the cells in the brain send messages to each other. A seizure happens when there is a sudden burst of intense electrical activity in the brain. This causes a temporary disruption to the way the brain normally works, so the brain's messages become mixed up. The result is an epileptic seizure.

There are many different types of seizure. What happens to someone during a seizure depends on which part of their brain is affected, and how far the seizure activity spreads. During some types of seizure the person may remain alert and aware of what's going on around them, and with other types they may lose awareness. They may have unusual sensations, feelings or movements. Or they may go stiff, fall to the floor and jerk.

The main way doctors diagnose epilepsy is by taking a detailed description of the seizures. They may also arrange for some tests to help give them more information about the possible type and cause of the epilepsy. This can also help rule out any other conditions that could be causing seizures. These tests can include blood tests, an EEG (recording of the brainwaves) and a brain scan. 10 But there isn't a single test that can prove if someone does or does not have epilepsy.

The main treatment for epilepsy is epilepsy medicines. These are sometimes called antiepileptic drugs or AEDs. The medicine doesn't cure epilepsy, but helps to stop or reduce the number of seizures. Many people find that their seizures stop with the first or second medicine they try. But some people need to try a few medicines before they find one that works well for them. And some people need to take 2 or more epilepsy medicines together. If epilepsy medicine doesn't work well for someone, their doctor might suggest other types of treatment. Other types of treatment include brain surgery, another type of surgery called vagus nerve stimulation, and a special diet called the ketogenic diet which is sometimes used for children.

When someone has a seizure it is important to complete a seizure chart.

SEIZURE RECORDING CHARTS

Name of Patient: **DOB:** **Hospital/NHS Number:**	**Date of seizure:** **Time of start of seizure:** **Length of actual seizure:** **Approx. recovery time after seizure:**
Seizure observed and recorded by:	**Where did the patient have the seizure:**

If seizure has been going on for ≥5minutes call medical doctors and follow Status Guidelines

BEFORE	**Y**	**N**
Aware of imminent seizure?		
Change in behaviour? If so what?		
Change in skin colour (if yes what Colour?)		
Change in vital signs/observations?		
Agitated?		
Unexpected seizure?		
Change in medications?		
Other –		

AFTER	**Y**	**N**
Confused?		
Weepy/emotional?		
Aware of seizure?		
Seizure Medication given?		

DURING	**Y**	**N**
Do they have involuntary jerky movements?		
If so Please describe which body parts were involved (Face? Whole body, one side etc)		
Change in tone? If so what? (rigid/floppy)		
Change in saturations?		
Sweaty?		
Change in skin colour (if yes what colour?)		
Eyes closed?		
If so, can you open them?		
Abnormal Pupils/ reaction to light? If so, what did you observe		

			Glazed/fixed stare?				
GCS: E= /4 V = /5 M= /6 = /15							
Have you seen this person have a seizure before? If so, was it the same or different?			Able to talk to you?				
			Emotional? (crying/weeping)				
Any additional comments regarding this seizure:			Turning head to one side? If so which side?				
			Mouth closed?				
			Unusual sounds?				
			Incontinence? If so:	**Y**	**N**		
			Faeces			Urine	

What are Functional Neurological Disorders (FND's)

Functional Neurological Disorders (FND's) is the name given for symptoms in the body which appear to be caused by problems in the nervous system but which are not caused by a physical neurological disease or disorder. Health professionals sometimes call these disorders 'medically unexplained', psychosomatic or somatisation. We prefer the term 'functional' which just means that the body is not functioning quite as it should.

For most people these symptoms are short-lived, but for others they persist for months or years and are very disabling. Symptoms tend to change with time, and as a result patients may often repeatedly consult their doctors for advice or investigation. Many doctors also find these conditions puzzling, and patients may find that they become frustrated by the shortage of information about why these symptoms occur and what to do about the

Symptoms of Functional Neurological Disorders (FND's)

Symptoms of FND can be continuous, variable or happen from time to time. There are four main types of functional symptoms:

- Sensory
- Concentration, memory and fatigue
- Motor (affecting movement of the body)
- Dissociation/functional seizures

Although often considered inexplicable or mysterious, they can actually be easily understood as interference with normal brain function by the emotional centres of the brain. This causes abnormalities of the way the brain processes sensory information coming to it from the body, and also of the link between planning a movement and carrying it out, 'between wanting to move and actually doing it'.

1. Sensory Symptoms

The process of filtering sensations from the sensory organs of the body via the nervous system is called "gating". Our brains are constantly bombarded by sensory information from millions of sense organs all over the body, including the skin, joints, muscles, internal organs, and other senses such as sights, sounds, smells and tastes. Most of this information is unimportant, and the brain very effectively filters it out so we are usually unaware of it.

When there is a problem with the gating or filtering system people can experience either "negative" symptoms (i.e. loss of sensation or anaesthesia like a dentist's injection) or "positive" symptoms (extra sensations, such as pins and needles or pain) or, indeed, both.

“Negative” symptoms such as loss of sensation can come on quite suddenly. People can wake and find that they cannot feel part of their body properly, and may fear they have had a stroke. The symptoms may change with time, fluctuating sometimes minute-to-minute or hour-to-hour, and may evolve slowly with time so that a different symptom becomes the most prominent.

“Positive” sensory symptoms can be just as difficult for someone to manage as “negative” symptoms. People with FND often find they experience ‘sensory overload’ – lights feel too bright, noises too intrusive, heat and cold very uncomfortable, uncomfortable skin sensations (tingling, crawling, prickling, tenderness or pain). The difficulty with ‘gating’ may also cause problems with concentration.

A common FND sensory symptom is pain. The pain is often but not always difficult to locate and seems to come from muscles, skin or joints at various times. It gets better and worse, and is usually combined with a feeling of intense tiredness or fatigue, and difficulty concentrating. Sometimes it is worse at times of stress.

2. Concentration, Memory and fatigue

When someone is struggling to concentrate, they are not able to filter out unimportant sensory information to focus on what is important. People who are trying hard to overcome their difficulty concentrating or problems filtering sensory information often feel exhausted or fatigued a lot of the time. These symptoms are very common with FND.

A person with FND may often complain of memory problems. This is often a result of finding it difficult to concentrate. As a result you might lose things, such as keys, or find you have put the kettle in the ‘fridge’ instead of back on the worktop. You may forget appointments or things that you have done recently, and often feel that your brain is in a ‘fog’. You might also feel extremely fatigued.

The fatigue usually varies day to day, but characteristically if you overdo it one day you pay for it the next and have to take more rest to compensate. Some people complain that the fatigue is so intense, for example, that they have to spend a day in bed after they have been shopping, yet on other days they feel very bright.

3. Movement symptoms

People with FND often complain of difficulty moving. They may feel slowed down, or may find that they cannot move part of their body or grip with a hand. They often complain that their limbs do not seem to do what they want them to any more. Some people may get extra involuntary movements such as twitches or tremors.

4. Functional Seizures

People may find that they collapse, black out or lose consciousness, with or without shaking. See our section on Functional seizures for more information.

How are Functional Neurological Disorders (FND's) diagnosed?

Often when people with FND are assessed either at a routine appointment or in an emergency, their symptoms may seem to be those of a serious physical disorder, such as a stroke, mini-stroke or multiple sclerosis.

When investigations such as scans are done to check for these diseases, there are no indications that there is any neurological disease or damage in the nervous system. This indicates to the doctors that the symptoms are functional, but sometimes the doctor will not be sure and refer to a specialist.

The diagnosis of FND is not just made by ruling out physical causes. A thorough clinical assessment will usually provide other clues. The nature of the symptoms, the way they fluctuate with time and the way they evolve, can all give strong hints to the diagnosis of FND. Tests are sometimes required, partly to reassure the doctor and their patient that there is not anything else that could possibly cause the symptoms. Often these tests pick up slight abnormalities that are not relevant to the symptoms, and it is not unusual to acquire several other diagnoses along the way before the true diagnosis is clear. It often takes many years for a diagnosis of FND to be made.

What are functional seizures? (NEAD)

Functional seizures are a type of functional neurological symptom. Many different words are used for functional seizures. The more commonly used terms include non-epileptic seizures, non-epileptic attack disorder (NEAD) non-epileptic events, dissociative seizures, pseudo seizures, pseudo-epileptic seizures, psychogenic seizures, or conversion seizures.

Some of these names can be offensive, none are perfect. Having so many different names for the same condition can be very confusing. However, all the names describe the same thing: attacks, which look similar to epileptic seizures, but are not caused by abnormal electrical activity in the brain (epileptic activity).

Functional seizures are experienced by around 2 or 3 people in every 10,000. This means that in a typical town with around 300,000 people (such as Cardiff, Wigan or Doncaster) there will be about 60-90 people who have functional seizures.

Of all the people who come into hospital with attacks, which do not settle quickly, nearly half turn out to have functional seizures.

About 1 in 6 people newly referred to specialist blackout clinics turn out to have functional seizures.

Symptoms of functional seizures

Functional seizures often look like epileptic attacks or fainting spells but there are often clues in the description such as:

- Very frequent, prolonged attacks
- Those in which the body movements come and go
- Attacks where the person is emotionally upset afterwards

Like epileptic seizures, functional seizures can cause blacking out, collapsing, injuries and loss of bladder control. Functional seizures are not consciously produced to achieve something.

Better knowledge of functional seizures means they can now be identified more easily.

How are functional seizures diagnosed?

It is important to realise that the diagnosis of functional seizures and other seizure disorders is often a gradual process rather than a single event. The information available to the doctor about a first blackout is often limited. The diagnosis may become clearer as more events are observed and described. Most people with functional seizures are initially misdiagnosed as having epilepsy.

Specialists in treating functional seizures (such as neurologists) can sometimes tell what type of attacks you have when you or a witness describe the attacks in detail. Although functional seizures resemble epileptic seizures, there are small but important differences in how the person having attacks, or witnesses describe these.

Video recordings (for instance on a mobile phone) or photos of a typical attack can be very helpful to the doctor to make the correct diagnosis. Seizure experts can accurately diagnose nine out of ten seizures if they have access to a video recording of a seizure, or have observed a seizure.

Depending on the nature of your attacks, other tests can be helpful including brain scans, blood tests, and heart recordings. These tests may be carried out to look for other causes of blackouts. However in some cases no further investigations are necessary when a seizure expert has heard a description of your attacks.

Sheffield Teaching Hospital (2020)

COMMON INVESTIGATIONS

INVESTIGATION	WHAT IT IS
EEG	
EMG/NCS	
LP	
CT SCAN	
MRI/MRA	
MYELOGRAM	
DAT SCAN	
PET SCAN	
VEPS	
SSEPS	
VIDEOFLUROSCOPY	
CEREBRAL ANGIOGRAM	
BIOPSIES – NERVE/MUSCLE/BRAIN	
ADDENBROOKES	

COMMONLY USED DRUGS

DRUG	CONDITION USED FOR	WHAT IT DOES	RISKS
PYRIDOSTIGMINE			
MADOPAR			
KEPPRA			
PHENYTOIN			
IMMUNOGLOBULINS			
METHYLPREDNISOLONE			
APOMORPHINE			
GABAPENTIN			
HYDROCORTISONE			
QUETIAPINE			
DALTEPARIN			
CODEINE			
LANZOPRAZOLE			

CYCLIZINE			
ROTIGATINE			
METFORMIN			
HEPARIN			
RILUZOLE			
HYOSCINE			
ASPIRIN			
CLOPIDOGREL			
ACICLOVIR			

COMMON TERMINOLOGY USED IN NEUROLOGY

A or An	Absence of or inability to
Anarthria	Inability to pronounce words
Anosmia	Loss of sense of smell
Aphasia	Inability to speak
Aphonia	Inability to make sounds
Ataxia	Unsteadiness
Aura	Warning symptoms
BIH	Benign intracranial hypertension
Bulbar	Concerning the medulla
Carpel Tunnel	Channel in wrist through which the median nerve passes
CAT scan	Computerised axial tomography
Chiasma	Crossing of the optic nerve
Choroid Plexus	Area in ventricles where CSF produced
CJD	Creuzfeldt Jacob Disease
Cortex	Surface layer of cerebral and cerebellar hemispheres
CSF	Cerebro spinal fluid
CVA	Cerebrovascular Accident
Demyelination	Damage to Myelin sheath
Diplopia	Seeing double
Disc (optic)	Optic nerve leaving the eye – seen by opthalmascope
Dys -	Difficulty in
Dysarthria	Difficulty in pronouncing words
Dysphasia	Difficulty in saying words
Dyspraxic	Coordination disorder affecting fine and/or gross motor
Encephalitis	Inflammation of brain
Idiopathic	Unknown cause
IIH	Idiopathic Intracranial Hypertension
Intracranial	Occurring within the skull
Peripheral	Near surface or outside of
Motor	Movement of muscles in body
Myelin Sheath	Fatty white substance surrounding axon of some nerve cells, forming electrically insulating layer
Myopathy	Any abnormality or disease of muscle tissues

NAD	No Abnormalities Detected
Neuropathy	Diseases of nerves
Radiculopathy	Comes from compression of nerves in spine causing pain and other symptoms
Sensory Level	The point where sensation changes from normal to abnormal
Status epilepticus	Prolonged seizure or seizures following each other in rapid succession
Stenosis	Narrowing
TSE	Transmissable Spongiform Encephalopathy
White matter	Parts of brain and spinal cord containing myelinated fibres

EDUCATIONAL VISITS

Specialist nurses	Date visited
Multiple sclerosis	
Motor neurone disease	
Parkinson nurse	
Epilepsy	
Dystonia	
Neuro muscular	

Multi Disciplinary Team	Date visited
SALT	
Dietitian	
Physio	
OT	