Malaysian Association for the Study of Pain
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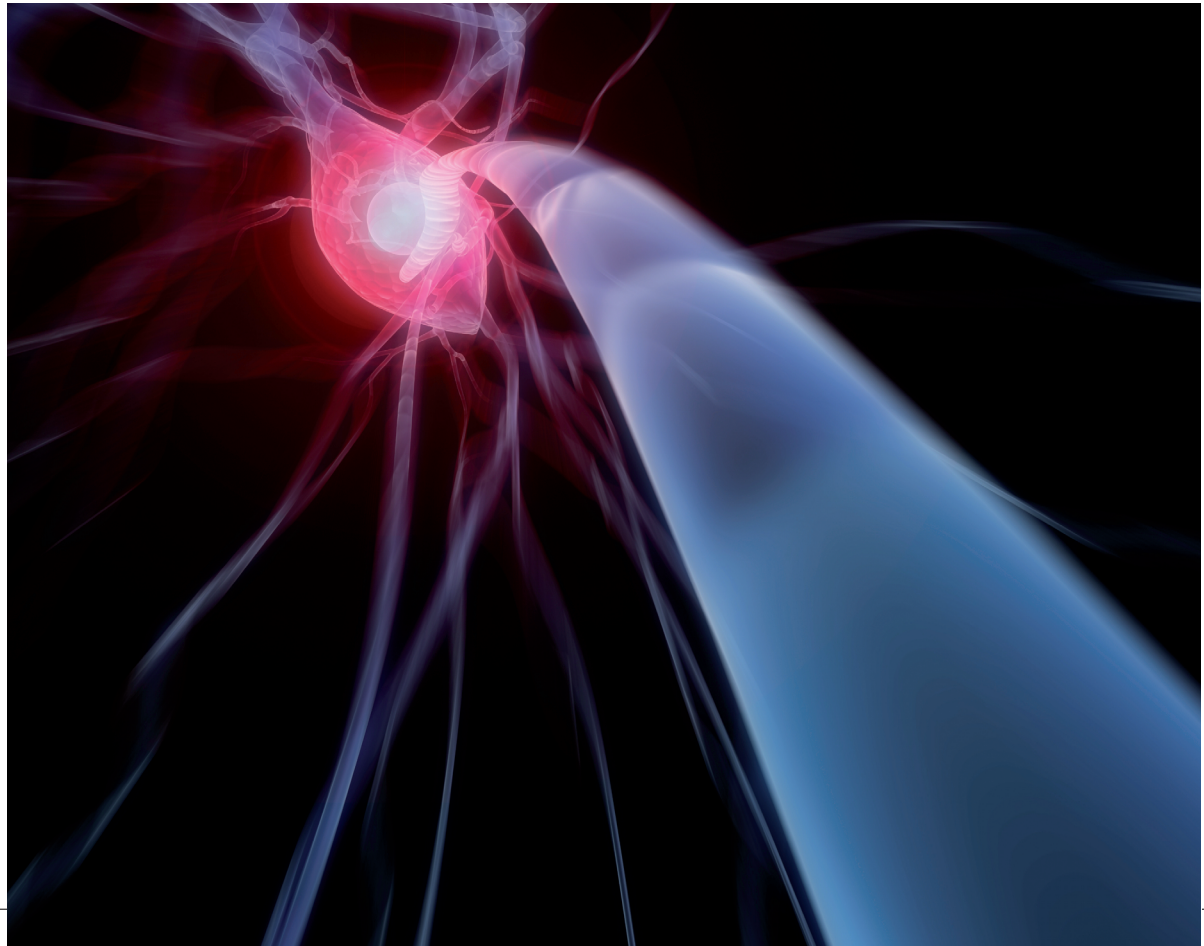
Management of Neuropathic Pain

2nd Edition



Malaysian Guidelines

Management of Neuropathic Pain

Second Edition 2012

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1.0 Objectives

The objectives of these guidelines are to assist medical practitioners from all disciplines to:

- Identify and assess patients with neuropathic pain;
- Improve patient management and drug selection;
- Improve patient's overall quality of life.

2.0 Definition and Prevalence

2.1 Definition

Neuropathic pain has been defined by the International Association for the Study of Pain (IASP) as "pain caused by a lesion or disease of the somatosensory nervous system." Neuropathic pain is a clinical description (and not a diagnosis) which requires a demonstrable lesion or a disease that satisfies established neurological diagnostic criteria.[1]

2.2 Prevalence

The prevalence of neuropathic pain is estimated to range from 1.5% of the general population, to 50% of patients attending pain clinics; about one-third of patients with cancer experience neuropathic pain.[2-4] In Malaysia, the prevalence of chronic persistent pain was found to be 7.1% among 33,733 adults surveyed nationwide,[5] while 54.8% of attendees at a primary care clinic at University Malaya Medical Center were found to have chronic pain.[6] Census data from the Hospital Selayang pain clinic reported that 38.8% of patients had neuropathic pain.[7]

3.0 Pathophysiology

Figure 1 shows the normal pain signalling pathway. A patient suffers from neuropathic pain when there is a disease or lesion anywhere along this pathway, either at the peripheral or central level. The pathophysiology of neuropathic pain is complex and heterogeneous with multiple mechanisms involved. [4,8,9]

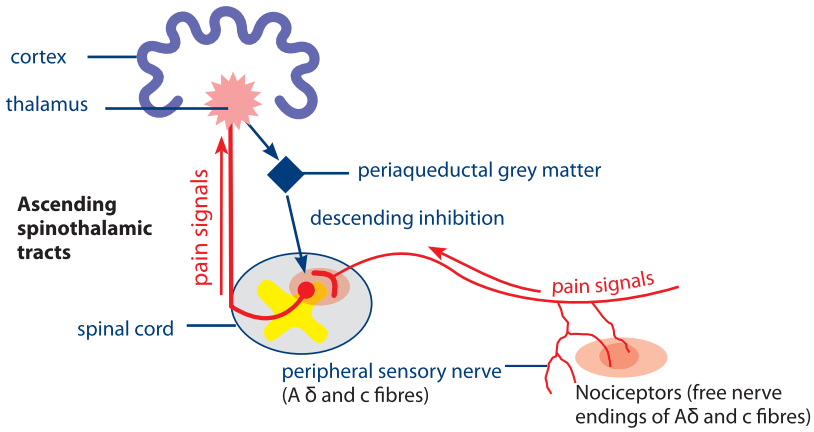


Figure 1. Pain Signalling Pathway– Somatosensory Nervous System

Peripheral mechanisms:

- **Proliferation of sodium channels**
  Occurs at the neuroma site and along the length of the nerve after nerve injury.[10] This can result in foci of ectopic activity leading to spontaneous pain that one sees in patients with neuropathic pain.
- **Sprouting of sympathetic axons**
  Induced around the dorsal root ganglion where the neuropathic pain is sympathetically mediated.[11]

Central mechanisms:

- **Loss of inhibitory control**
  Nerve injury reduces the inhibitory control over dorsal horn neurons through various mechanisms.[12]
- **Central sensitization of the dorsal horn neurons**
  This can manifest as a heightened response to noxious stimuli (hyperalgesia) as well as pain associated with stimuli in the non-noxious range (allodynia). [13]

4.0 Assessment and Diagnosis

4.1 Types of Pain

In assessing patients, it is important to recognize the differences between acute and chronic pain, nociceptive and neuropathic pain, and stimulus-independent and stimulus-evoked pain.

Acute pain results from tissue injury but resolves with healing (e.g. posttraumatic pain from fractures and tissue injury), whereas **chronic pain** persists after the initial injury heals.[1,14] Acute pain is usually nociceptive, but chronic pain may be nociceptive, neuropathic or both.

Nociceptive pain is pain that arises from actual or threatened damage to non-neural tissue and is due to the activation of nociceptors. **Neuropathic pain**, on the other hand, results from a primary lesion or disease of the somatosensory nervous system.[9,15]

Both **stimulus-independent** and **stimulus-evoked pain** (positive sensory symptoms; **Table 1**) may be present in neuropathic pain. Stimulus-independent pain may be intermittent (shooting, lancinating or electric shock-like) or continuous (superficial burning or deep pressure).[14,16,17] Stimulus-evoked pain results from chemical, thermal or mechanical stimuli and is characterized by **allodynia** and **hyperalgesia**.[14,16,18]

In addition, most patients may experience co-existing negative sensory symptoms **(Table 1)**.[14,16]

Table 1. Positive and Negative Sensory Symptoms of Neuropathic Pain[14,16]

Positive sensory symptoms	Negative sensory symptoms
• Dysesthesias	• Loss or impairment of sensory quality
• Paresthesias	• Numbness and reduced sensation
• Stimulus-independent pain – Intermittent lancinating pain – Persistent burning sensation	
• Stimulus-evoked pain – Hyperalgesia – Allodynia	

Table 2. Causes of Neuropathic Pain[19]

Causes	Central	Peripheral
Trauma	• Spinal cord injury	• Brachial plexus injury • Phantom limb pain • Complex regional pain syndromes • Post surgical neuropathic pain syndromes (e.g. post thoracotomy, post mastectomy, post cholecystectomy)
Peripheral nerve compression		• Lumbosacral and cervical radiculopathy • Thoracic outlet syndrome • Carpal tunnel syndrome • Trigeminal neuralgia
Infections	• HIV myelopathy	• Postherpetic neuralgia (PHN) • HIV sensory neuropathy • Lightning pains of tertiary syphilis (tabes dorsalis)
Metabolic diseases		Peripheral neuropathy caused by: • Diabetes mellitus • Nutritional deficiencies (e.g. niacin, pyridoxine, thiamine) • Pernicious anaemia • Amyloidosis
Inflammation	• Multiple sclerosis-related pain e.g. transverse myelitis	Vasculitic neuropathy due to • Systemic lupus erythematosis • Rheumatoid arthritis • Systemic vasculitis e.g. polyarteritis nodosa
Neoplasms	• Direct infiltration of spinal cord	• Direct infiltration of nerves, plexuses and nerve roots
Drugs and toxins		Peripheral neuropathy caused by • alcohol • thallium • arsenic • lead • vincristine • cisplatinum • taxol • amiodarone • isoniazid
Vascular	• Central post-stroke pain	• Vasculitic neuropathy (see above)
Genetic		• Fabry disease • Familial amyloid polyneuropathy
Idiopathic		• Trigeminal neuralgia • Idiopathic small-fibre polyneuropathy

Conditions associated with neuropathic pain along with their underlying causes are listed in **Table 2**.[19]

4.2 Patient Evaluation

Evaluation of a patient for neuropathic pain include[4]:

- Screening
- Pain characteristics assessment
- Clinical history and physical examination, especially neurological assessment
- Ancillary diagnostic tests (if necessary)
- Assess the impact of pain on the patient's function and quality of life.

4.2.1 Screening

These are questionnaires based on verbal description of pain with or without limited clinical examination and serve to identify possible neuropathic pain.[20]

Examples include

- ID Pain **(Table 3)**[21]
- *Douleur neuropathique en 4 questions* (DN4) **[Table 4]**[22]
- PainDETECT (available for download from www.northsomerset.nhs.uk/Services/Medicine_Management/Carehomes/PainDetect.pdf)[23]
- Leeds assessment of neuropathic symptoms and signs (LANSS and S-LANSS)[24, 25]
- Neuropathic pain questionnaire (NPQ).[26]

Table 3. ID Pain[21]

Question	Score	
	Yes	No
1. Did the pain feel like pins and needles?	1	0
2. Did the pain feel hot/burning?	1	0
3. Did the pain feel numb?	1	0
4. Did the pain feel like electrical shocks?	1	0
5. Is the pain made worse with the touch of clothing or bed sheets?	1	0
6. Is the pain limited to your joints?	-1	0

Minimum total score = -1 Maximum total score = 5

-1	Neuropathic pain not likely	2 - 3	Consider neuropathic pain
0 - 1	Neuropathic pain less likely	4 - 5	Strongly consider neuropathic pain

Table 4. DN4 Neuropathic Pain Diagnostic Questionnaire[22]

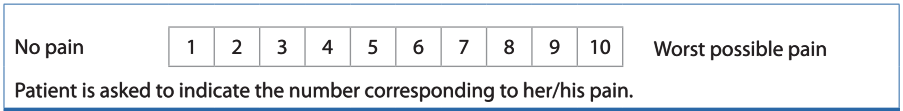
A "YES" score of ≥4 is diagnostic of neuropathic pain.

Interview of the patient					
Question 1	Does the pain have one or more of the following characteristics?				
	1. Burning	☐	Yes	☐	No
	2. Painful cold	☐	Yes	☐	No
	3. Electric shocks	☐	Yes	☐	No
Question 2	Is the pain associated with one or more of the following symptoms in the same area?				
	4. Tingling	☐	Yes	☐	No
	5. Pins and needles	☐	Yes	☐	No
	6. Numbness	☐	Yes	☐	No
	7. Itching	☐	Yes	☐	No
Examination of the patient					
Question 3	Is the pain located in an area where the physical examination may reveal one or more of the following characteristics?				
	8. Hypoesthesia to touch	☐	Yes	☐	No
	9. Hypoesthesia to prick	☐	Yes	☐	No
Question 4	In the painful area, can the pain be caused or increased by:				
	10. Brushing	☐	Yes	☐	No

Patient Score: /10

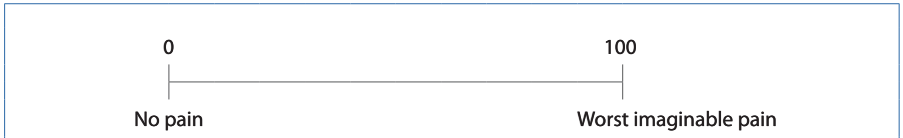
4.2.2 Pain Assessment

Ask the patient direct questions about the characteristics of the pain to differentiate between neuropathic and nociceptive pain. The diagnosis of neuropathic pain relies almost entirely on a clinical diagnosis.



Patient is asked to indicate the number corresponding to her/his pain.

Figure 2: Pain Intensity Numerical Rating Scale (NRS).



Patient is asked to place a mark on the line corresponding to her/his pain intensity.
Please note: The horizontal line should be exactly 100 mm long.

Figure 3: Visual Analogue Scale (VAS).

Pain Severity Scales

Pain severity can be assessed by using the Numerical Rating Scale (NRS) **(Figure 2)**[27] and the Visual Analogue Scale (VAS) **(Figure 3)**.[4] These scales can also be used to gauge response to treatment.

Pain Characteristics

Ask the patient a series of direct questions to identify the following pain characteristics:

Quality

- Is the pain sharp, shooting, burning, throbbing or stabbing?
- Are there abnormal, unpleasant sensations caused by normal stimuli (dysesthesia)?
- Are there abnormal but non-painful sensations, e.g. tingling (paresthesia)?
- Does the quality of the pain change over time?
- Is the pain spontaneous or provoked?
- Is the pain induced by non-noxious stimuli, e.g. light touch (allodynia)?
- Is the pain out of proportion to the stimulus (hyperalgesia)?

Location

- Where is the pain?
- Where does it radiate to?

Duration

- How long have you had the pain (days, weeks, etc)?
- Is the pain episodic or continuous?
- If it is episodic, how often does it occur and how long does each episode last (frequency and duration of attacks)?

Aggravating and relieving factors

- What makes the pain worse?
- What makes the pain better?

4.2.3 Clinical History and Examination

Ask the patient about underlying causes for neuropathic pain e.g. diabetes mellitus, stroke, trauma etc **(Table 2).**[19]

Physical examination includes neurological evaluation of the motor, sensory and autonomic nervous systems. The aim is to localize the neurological lesion in the central or peripheral nervous systems. **Figure 4** provides reference information.[28]

Motor System Examination[6]

This would include inspecting for limb deformities, spontaneous movements e.g. spasms and fasciculations, muscle wasting, assessing the muscle tone and tenderness, tendon reflexes and muscle power.

Somatosensory Assessment

Determine the patient's response to:

Pain	—	prick with the sharp end of a wooden orange stick
Touch	—	stroke with a cotton swab
Position sense	—	test awareness of digit position with eyes closed
Vibration	—	apply 128Hz tuning fork to a bony prominence
Temperature	—	touch with a cold metal object (e.g. tuning fork)

Reflexes	Root values
Ankle jerks	S1
Knee jerks	L2,3,4
Biceps jerks	C5
Supinator jerks	C6
Triceps jerks	C7
Abdominals	T8-11

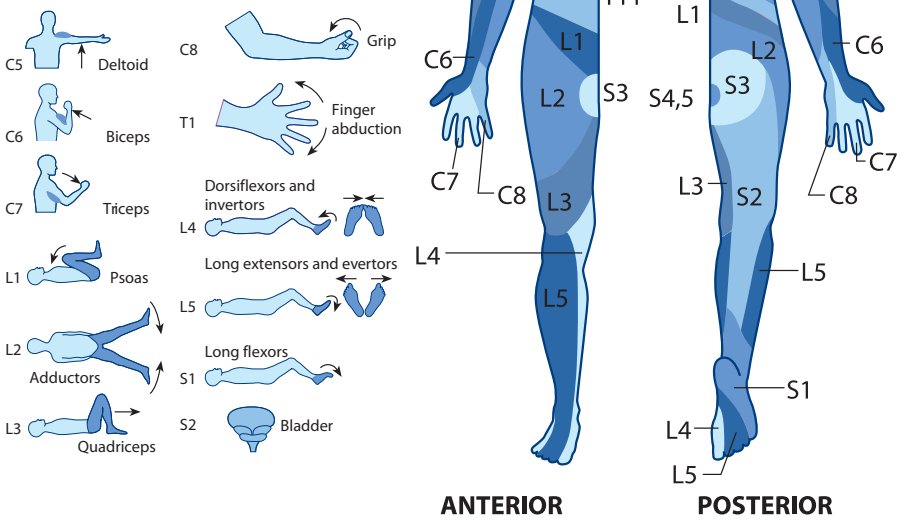


Figure 4. Schematic Diagram Depicting Motor and Sensory Innervation and Root Values of Reflexes.[28]

Autonomic Nervous System Evaluation[16,29]

In patients with suspected complex regional pain syndrome (CRPS), look for changes in skin temperature, colour, if sweating is present, trophic changes in hair, nails or skin, and oedema in the affected limb.

4.2.4 Ancillary Laboratory Diagnostic Tests[16,29]

Laboratory tests are generally not required to confirm the diagnosis of neuropathic pain, although ancillary diagnostic tests (e.g. motor, sensory, autonomic) may help define the pain syndrome in specific patients **(Table 5)**. Some patients may have normal diagnostic test results. Overall, positive test results suggest abnormalities in the nervous system but negative test results **do not rule out** the diagnosis.

Table 5. Ancillary Diagnostic Tests for the Patient with Neuropathic Pain[16,29]

Tests	Neuropathic pain condition
Electromyography and nerve conduction studies	Assesses the peripheral nervous system including the motor and sensory nerves. Nerve conduction studies primarily measure large myelinated fibres.
Quantitative sensory testing	Assesses temperature and vibration thresholds. The former provides an assessment of small unmyelinated/thinly myelinated nerve fibres.
Skin punch biopsy	Assesses intra-epidermal nerve fibre density, an assessment of the small unmyelinated/thinly myelinated nerve fibres
Autonomic function tests	Electrocardiogram (to determine heart rate variability). Sudomotor axon reflex test (sympathetic skin response test) records response of sweat glands to stimulation.
Somatosensory and motor-evoked potentials	Assesses sensory and motor pathways.
Magnetic resonance imaging, computed tomography scanning	Image both the central and peripheral nervous systems.

4.2.5 Assessment of the Impact of Pain on the Patient's Function and Quality of Life

Neuropathic pain impairs physical and psychological functioning. Psychological factors such as anxiety and depression as well as sleep disturbances may exacerbate pain and increase its negative impact.[30,31] Assessments for functional impairment, sleep disturbances, and anxiety or depression are essential to effective management of the neuropathic pain patient.[29]

Examples of questions to ask include:

- What can you **not** do because of the pain?
- How long can you sit/stand/walk before the pain gets worse?
- Does the pain affect your sleep?
- Do you still enjoy the things you used to enjoy?
- Do you feel tensed, frightened and restless?

5.0 Holistic, Multidisciplinary Management

The principal goals of treating neuropathic pain **(Figure 5)** are to[32]:

- Reduce or eliminate pain
- Improve physical functioning
- Reduce psychological distress
- Improve the overall quality of life.

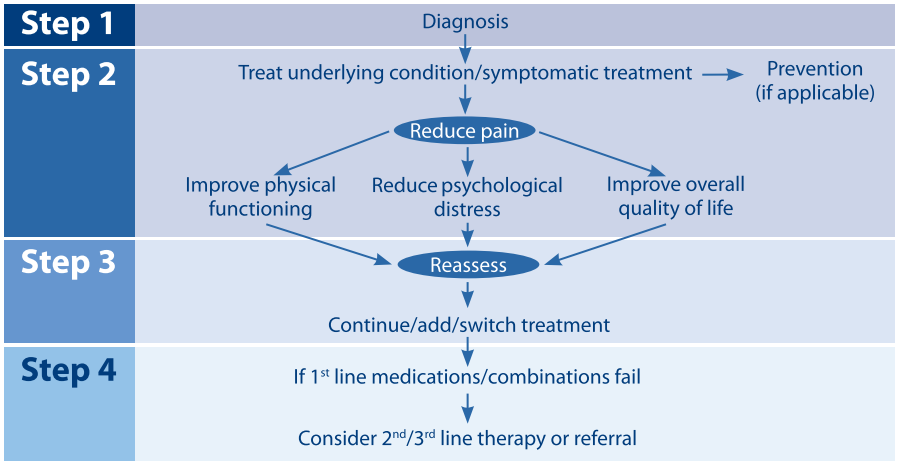


Figure 5. Approach to Treatment for Neuropathic Pain.[32]

Stepwise Pharmacological Management of Neuropathic Pain (NP)[33]

The best outcomes are achieved when a multidisciplinary team is used, which should include psychologists, physical and occupational therapists and social workers, in addition to doctors from different disciplines.

Step 1

- Assess pain and establish the diagnosis of NP; if uncertain about the diagnosis, refer to a pain specialist or neurologist.
- Establish and treat the cause of NP; if uncertain about availability of treatments for cause of NP, refer to appropriate specialist.
- Identify relevant comorbidities that may be affected by NP treatment and manage accordingly.
- Explain the diagnosis and treatment plan to the patient and establish realistic expectations.

Step 2

- Initiate symptom treatment with one or more of the following:
  - A secondary-amine tricyclic antidepressant [TCA] (amitriptyline, nortriptyline, desipramine) or a serotonin–norepinephrine reuptake inhibitor [SNRI] (duloxetine, venlafaxine)
  - A calcium channel α2-δ ligand, either gabapentin or pregabalin
  - For patients with localized peripheral NP, topical lignocaine used alone or in combination with one of the other first-line therapies
  - For patients with acute NP, neuropathic cancer pain, or episodic exacerbations of severe pain and when prompt pain relief during titration of a first-line medication to an efficacious dosage is required, opioid analgesics or tramadol may be used alone or in combination with one of the first-line therapies.
- Evaluate patients for nonpharmacological treatments and initiate if appropriate.

Step 3

- Reassess pain and health-related quality of life frequently.
- If substantial pain relief (eg, average pain reduced to ≤3/10) and tolerable adverse effects, continue treatment.
- If partial pain relief (eg, average pain remains ≥4/10) after an adequate trial, add one of the other four first-line medications.
- If no or inadequate pain relief (eg, <30% reduction) at target dosage after an adequate trial, switch to an alternative first-line medication.

Step 4

- If trials of first-line medications alone and in combination fail, consider second- and third-line medications or referral to a neurologist, pain specialist or multidisciplinary pain center.

A wide variety of treatment modalities are available **(Figure 6)** and are often used in combination.[33-35]

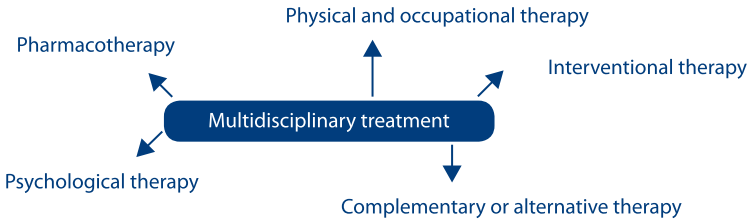


Figure 6. Treatment Modalities for Neuropathic Pain.[33-35]

5.1 Pharmacotherapy

Pharmacotherapy is the most common first-line treatment option for neuropathic pain. The other treatment strategies described below should be used along with drug therapy in a multi-disciplinary treatment program. In some cases, a nonpharmacological treatment approach may be considered as a first-line treatment option (see sections 5.2 to 5.5).

Four drug classes have consistently demonstrated efficacy against various types of neuropathic pain in randomized, controlled clinical trials (**Table 6 and 7**).[33-35] These are:

1. Anticonvulsants
2. Antidepressants
3. Opioids
4. Local anaesthetics.

- NSAIDs have not been found to be effective and should not be used for the treatment of neuropathic pain.
- Tricyclic antidepressants (TCAs) should be used with caution in the elderly and in patients with cardiac disease.[8]

Table 6: Drug Options and Dosages[33-35]

Drug	Recommended for	Starting dosage
Anticonvulsants		
Pregabalin	PHN (1st line) DPN (1st line) TN (2nd line)	150 mg/day as 75 mg bid
Gabapentin	PHN (1st line) DPN (1st line) TN (2nd line)	Day 1, 300 mg at bedtime; Day 2, 300 mg bid; Day 3, 300 mg tid
Carbamazepine	TN (1st line) PHN (2nd line)	100 mg bid
Lamotrigine	TN (2nd line)	25 mg/day for 2 weeks
Antidepressants		
Amitriptyline	PHN (1st line) DPN (1st line) TN (2nd line)	10–25 mg daily at bedtime
Nortriptyline, desipramine	PHN (1st line) DPN (1st line) TN (2nd line)	10–25 mg at bedtime
Duloxetine	DPN (1st line)	30 mg/day
Opioids		
Morphine, oxycodone, methadone	Conditions with mixed nociceptive/neuropathic pain	10–15 mg morphine q4h or as needed (equianalgesic dosages should be used for other opioid analgesics)
Tramadol	PHN (2nd line) DPN (2nd line)	50 mg qd or bid
Local anaesthetics		
IV lignocaine	Used by pain specialists only	5 mg/kg over 30–60 min
Topical agents		
Capsaicin	PHN (1st line)	0.075% applied tds-qds
5% lignocaine patch	PHN (1st line)	Apply patch for a maximum of 12 h per day
EMLA®	PHN (1st line)	tid, under occlusive dressing if possible

Dose titration (if necessary)	Maximum dosage	Duration of adequate trial
Increase to 300 mg daily after 3–7 days, then by 150 mg/d every 3–7 days as tolerated	600 mg daily (300 g bid)	4 wks
Increase by 300 mg tid every 1–7 days as tolerated	3,600 mg daily (1,200 mg tid)	3–8 wks for titration plus 2 wks at maximum tolerated dosage
100 mg every 3–7 days	1,600 mg/day	8-12 wks
Increase to 50 mg/day for 2 wks, then increase by 50–100 mg every wk	200–400 mg/day	12 wks (including titration period)
Increase by 10 to 25 mg weekly	Up to 75 mg daily	3 months at maximum tolerated dosage
Increase by 25 mg daily every 3–7 days as tolerated	150 mg daily	6–8 wks with at least 2 wks at maximum tolerated dosage
Increase to 60 mg/day after 1 week	60 mg twice a day	4 wks
After 1–2 wks, convert total daily dosage to long-acting opioid analgesic and continue short-acting medication as needed	No maximum dosage with careful titration	4–6 wks
Increase by 50–100 mg daily in divided doses every 3–7 days as tolerated	400 mg daily (100 mg qid); 300 mg daily in patients >75 years	4 wks
Titrated based on symptoms of local anesthetic toxicity, eg, perioral numbness, slurring of speech, tinnitus, dizziness, diplopia, convulsions		–
None needed	3 patches daily for no more than 12 h in 24 h	2–4 wks
–	–	–

Table 7: Side Effect Profiles and Management Tips[33-35]

Drug	Potential adverse effects
Anticonvulsants	
Pregabalin	Dizziness, somnolence, weight gain, blurred vision, dry mouth, constipation, peripheral oedema, euphoric mood, disturbed attention, increased appetite, unsteady gait
Gabapentin	
Carbamazepine	Sedation, dizziness, gait abnormalities, nausea & vomiting. Serious AEs: hyponatraemia, agranulocytosis, aplastic anaemia, Stevens-Johnson syndrome
Lamotrigine	Skin rash (potentially severe), irritability, headache, drowsiness, insomnia, dizziness, tremor, nystagmus, ataxia, diplopia, blurred vision, nausea, vomiting, diarrhoea, constipation, tiredness, arthralgia, painful menses, back pain
Antidepressants	
Amitriptyline	Dry mouth, sweating, sedation, disturbed vision, cardiotoxicity, palpitations, postural hypotension, urinary retention, constipation, drowsiness
Nortriptyline, desipramine	
Duloxetine	Nausea/vomiting, dry mouth, constipation, GI distress, decreased appetite, insomnia, dizziness, somnolence, blurred vision, increased sweating, fatigue
Opioids	
Morphine, oxycodone, methadone	Constipation, sedation, nausea, dizziness, vomiting, respiratory depression
Tramadol	Dizziness, dry mouth, nausea, constipation, somnolence; risk of seizures/ epilepsy; risk of serotonergic syndrome if combined with SSRIs
Local anaesthetics	
IV lignocaine	Nausea, hypotension, bradycardia, hypertension, paraesthesia, dizziness, vomiting
Topical agents	
5% lignocaine patch	Mild localized skin reactions around application site
EMLA®	Pale skin, redness or swelling at the application site, burning, change in hot or cold sensation
Capsaicin	Local, transient pain and erythema

Comments
Dose adjustment needed in renal dysfunction
Monitor FBC, liver enzymes and sodium levels for 1 year; contraindicated in porphyria, AV block or with concomitant MAO inhibitors; patients should seek immediate medical assistance if fever, sore throat, rash or mouth ulcers, bruising/bleeding develop
Very slow dose titration minimizes risk of rash; most cases of rash occur within first 8 weeks
Give dose at bedtime to minimize effect of sedation; titrate dose slowly; may be poorly tolerated by the elderly; CI in patients with glaucoma and those taking MAO inhibitors
Nortriptyline causes less sedation and anticholinergic effects than amitriptyline; CI in patients with glaucoma and those taking MAO inhibitors
Start with a dose of 30 mg. Advise patients to take it with food to reduce the incidence of nausea.
Coadminister pre-emptive stool softeners and antiemetics
Initiate therapy at low dose and titrate as tolerated; use with caution in epileptic patients
Decrease the infusion rate or discontinue treatment if signs of toxicity
Only apply to healed intact skin; apply to affected area
–
–

5.2 Physical and Occupational Therapy

5.2.1 Physical Therapy

- Recommend exercises for muscle strengthening, flexibility and endurance.[29,36]
- Transcutaneous Electrical Nerve Stimulation (TENS) is a well-tolerated and useful adjunctive treatment that is relatively free of adverse effects. It has been used in PHN and phantom limb pain.[2,37]

5.2.2 Occupational Therapy

Focus on rehabilitation and improving function.

5.3 Psychological Therapy

This may be done as individual or group therapy. It includes patient education, cognitive behavioural therapy, relaxation and teaching of pain management strategies like distraction, planning and pacing.

5.4 Interventional Therapy

5.4.1 Surgical Procedures

Decompressive laminectomy (e.g. spinal stenosis), microvascular decompression (e.g. TGN), spinal cord stimulation (e.g. CRPS).

5.4.2 Sympathetic Block

Stellate ganglion block, lumbar sympathetic block for CRPS.

5.4.3 Epidural Steroid Injections

May be used for symptomatic relief of lumbar or cervical radiculopathy.

5.4.4 Intrathecal Therapy

May be considered in severe and difficult to control pain from post-spinal cord injury pain and CRPS.

5.4.5 Spinal Cord Stimulation

May be considered in severe pain in CRPS which is not responding to sympathetic blocks or pharmacological therapy.

5.5 Complementary Therapies

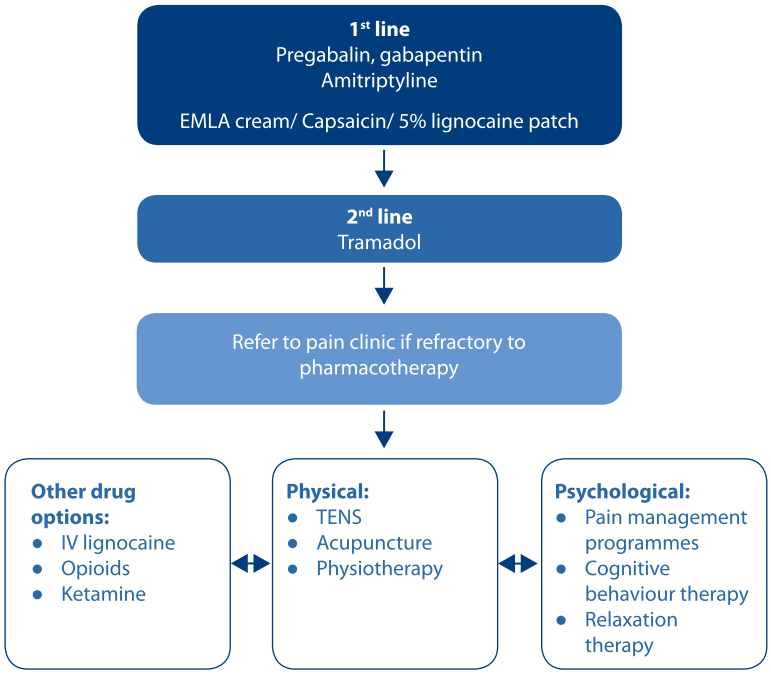
In Malaysia, as in other countries, complementary or alternative therapies, such as massage, hypnosis, acupuncture and herbal medicine are also used to treat neuropathic pain. However, acupuncture or any other complementary therapies have not been shown to provide long-term benefit in neuropathic pain in randomized, controlled trials.[2]

6.0 Algorithms for Management of Specific conditions

Management should follow the principles outlined previously on page 11.

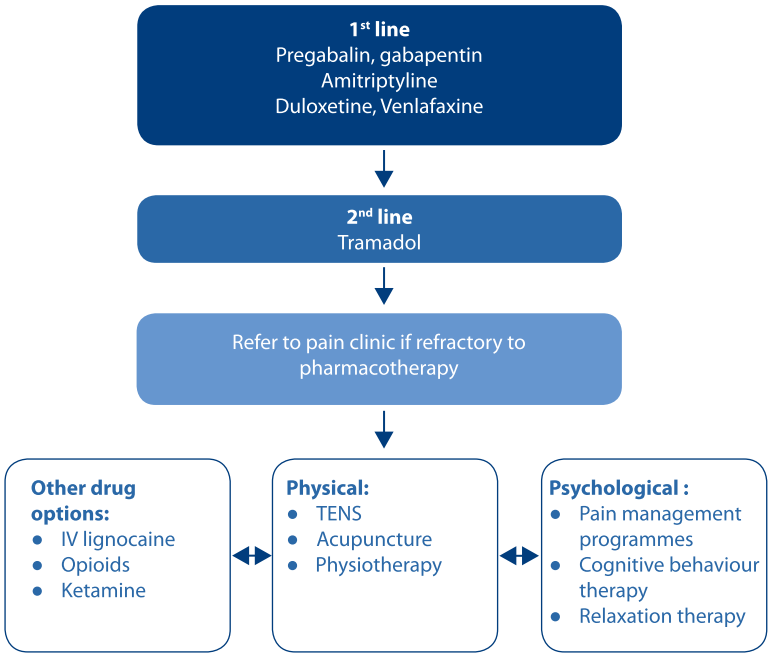
6.1 Postherpetic neuralgia[38]

Postherpetic neuralgia is a neuropathic pain syndrome characterized by severe pain (burning, throbbing, sharp, or shooting) and paraesthesia in dermatome areas involved in the original infection.



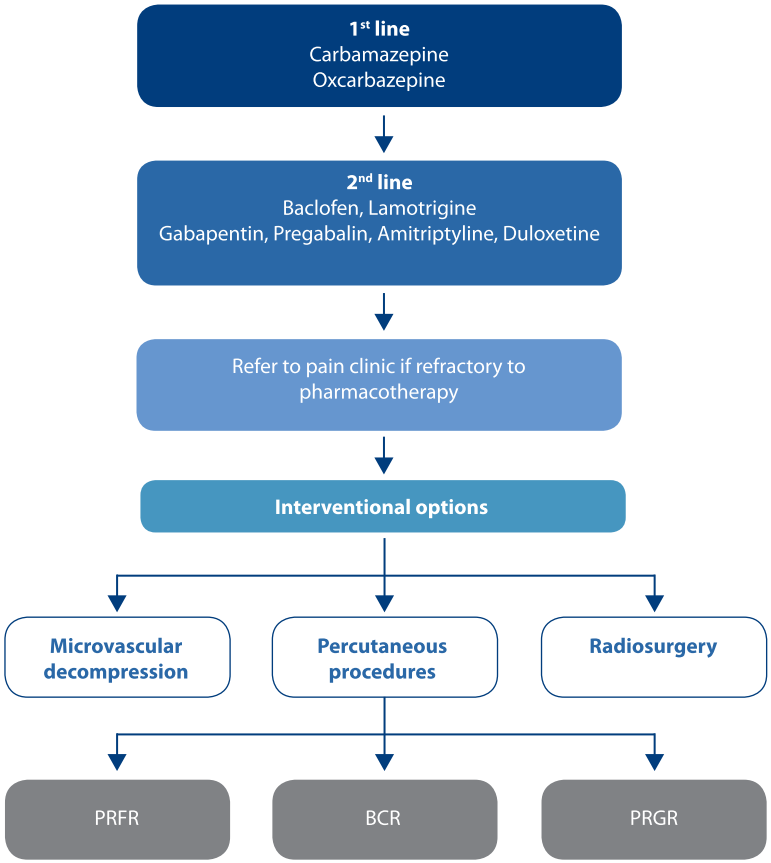
6.2 Diabetic peripheral neuropathy[39]

Diabetic peripheral neuropathy (DPN) refers to a group of progressive, degenerative conditions involving autonomic, motor, or sensory peripheral nerves, thought to result from poor glycaemic control and long-term hyperglycaemia.



6.3 Trigeminal neuralgia[40,41]

Also called tic douloureux, trigeminal neuralgia (TGN) usually occurs in elderly individuals, is generally unilateral, is more common on the right than left side, and is twice as common in women than in men. Typical features consist of paroxysms of electric shock-like pain that last from a few seconds up to 2 minutes. Attacks and spasms of the facial muscles can be caused by common daily activities such as eating, face washing, shaving, and teeth cleaning. Need to exclude symptomatic TGN by MR imaging and treat underlying cause e.g. tumour, multiple sclerosis.



PRFR = Percutaneous radiofrequency rhizotomy
BCR = Balloon compression rhizotomy
PRGR = Percutaneous retro-Gasserian glycerol rhizotomy

6.4 Radiculopathies

	Cervical radiculopathy	Lumbar radiculopathy
Non-pharmacological	Cervical collar Physiotherapy Neck care Postural training	Percutaneous electrical nerve stimulation / TENS Physiotherapy Back care
Pharmacological	*NSAIDs[42,43] Gabapentin/Pregabalin	*NSAIDs[42,43] Gabapentin/Pregabalin Epidural steroid
Surgery	Decompression/discectomy	Decompression/discectomy

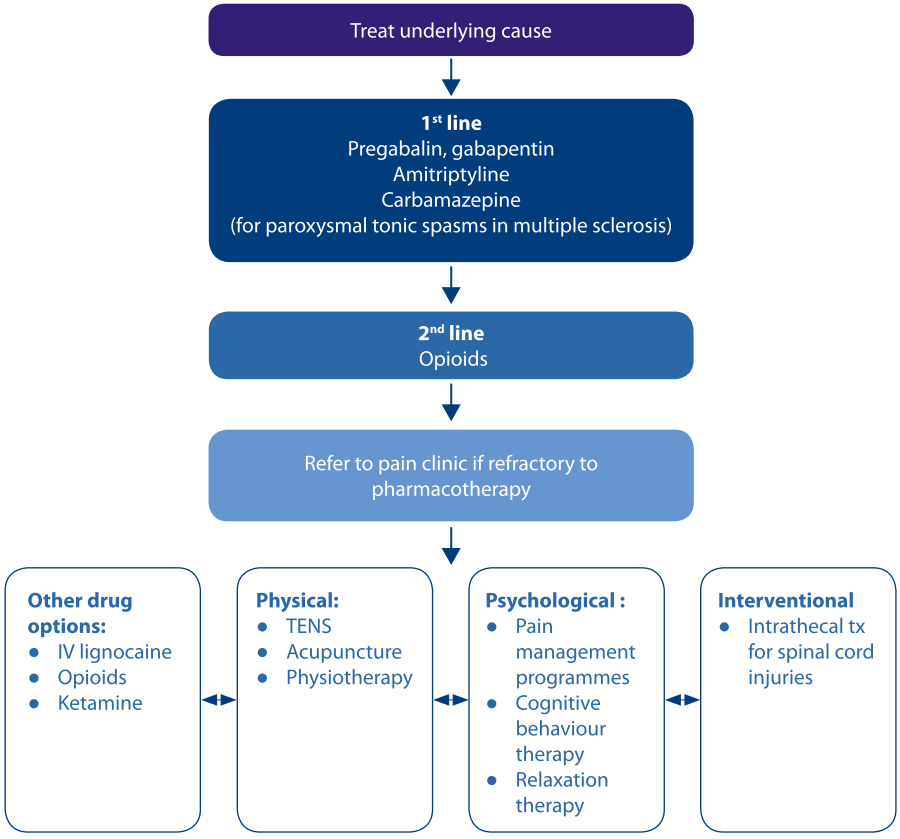
	Carpal tunnel syndrome
Mild	NSAIDs[42,43] Diuretics[42,43] Splinting / hand braces Physiotherapy Acupuncture[43] Ultrasound therapy Yoga[43]
Moderate	Same as for mild above and/or Local steroid injection[44]
Severe	Decompression

* Use of NSAIDs is only appropriate when there is mixed nociceptive/neuropathic pain, and only for short periods of time (not for prolonged use).

6.5 Central pain[45]

The most frequent central neuropathic pain states are caused by stroke, spinal cord injury or multiple sclerosis.

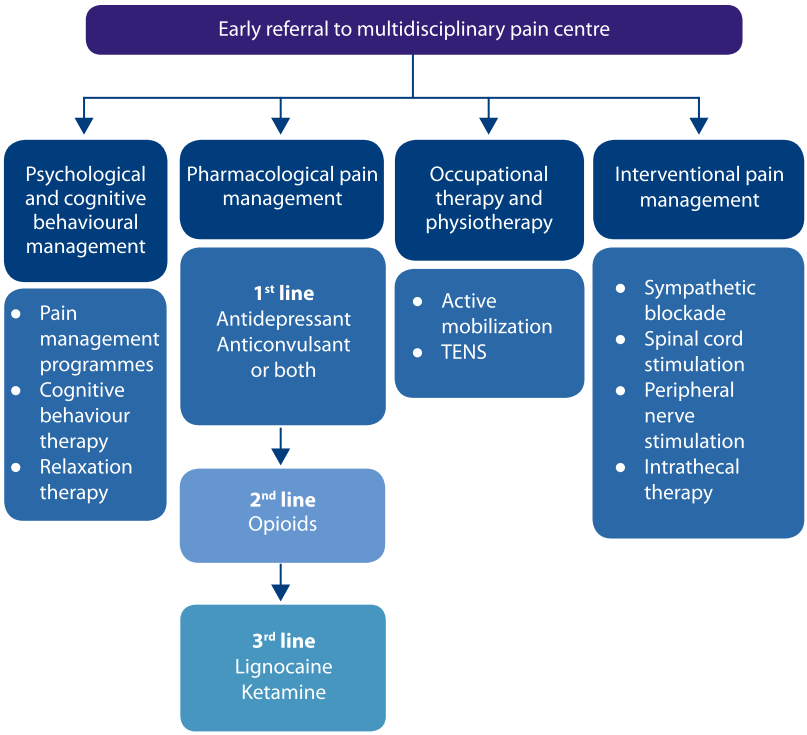
Central post-stroke pain (CPSP) — previously known as 'thalamic syndrome'. This condition is characterized by allodynia, a burning or freezing pain, and a partial or complete lack of sensation to thermal and/or sharp stimuli. Patients with CPSP, who are generally younger stroke patients, may have concurrent nociceptive pain such as frozen shoulder. CPSP may be one-sided and may involve only small areas. The intensity of such pain may vary within the affected area, and symptoms may be intensified by stress or reduced by relaxation.



6.6 Complex regional pain syndrome[46]

Complex regional pain syndrome (CRPS) type I (reflex sympathetic dystrophy syndrome) — a chronic disorder characterized by severe burning pain in an extremity accompanied by sudomotor, vasomotor changes in the skin and trophic changes in bone and nails without an associated specific nerve injury. This condition is most often precipitated by trauma to soft tissue. The skin over the affected region may be erythematous and demonstrates hypersensitivity to tactile stimuli.

Complex regional pain syndrome (CRPS) type II (causalgia) — a neuropathic pain condition caused by nerve injury in which pain may be associated with autonomic alterations (e.g. sweating or vasomotor dysfunction) and/or trophic changes (e.g. hair loss). Characteristic features are burning pain, allodynia, and hyperpathia in the affected limb. Pain is usually experienced within the distribution of the damaged nerve, but often involves adjacent dermatomes.



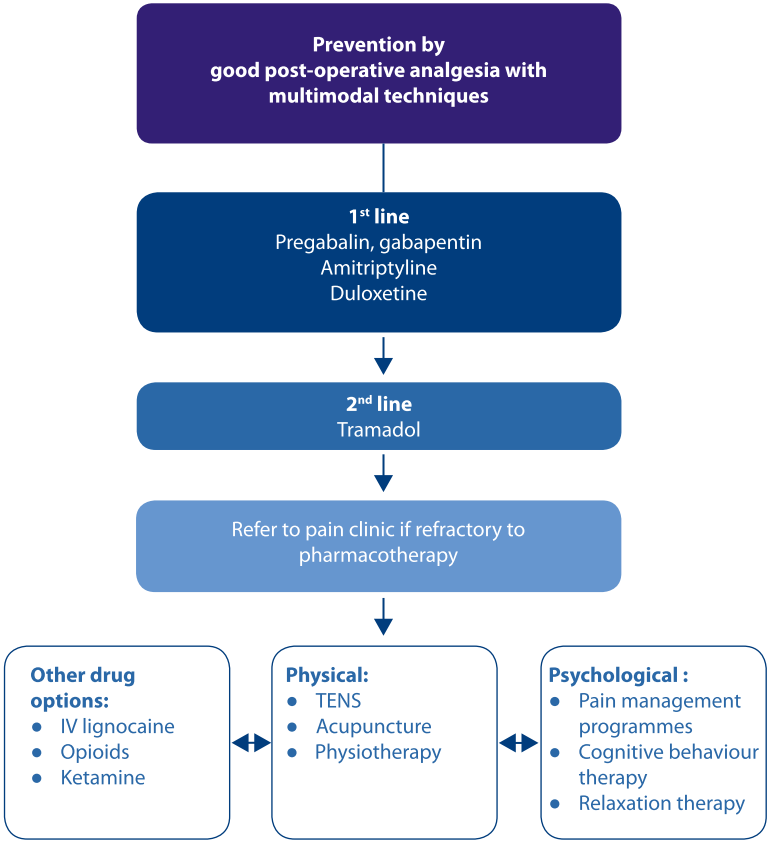
6.7 Persistent post-surgical pain

Persistent post-surgical pain is a common but under-recognized problem. It is chronic pain that persists after surgery beyond the normal period of healing. The incidence varies between 10 – 50%, with 2-10% having disabling pain.[47-49]

Inguinal hernia repair, breast surgery, lower limb amputation, total knee replacement, thoracotomy, coronary artery bypass graft and caesarean section are recognized procedures that can lead to post-surgical pain.[49] Risk factors that predispose to its development include the severity of pre- and post-operative pain and intraoperative nerve injury.[48-50]

Post-surgical pain is the consequence of either **ongoing inflammation** or, more commonly, a **manifestation of neuropathic pain** resulting from surgical injury to peripheral nerves.

Chronic pain, once established, is difficult to treat. There is evidence that the incidence of post-surgical pain can be reduced by changing surgical techniques to include minimally invasive surgery.[48] Aggressive control of acute post-operative pain using multimodal analgesic techniques have also been found to reduce post-surgical pain. They include the concomitant use of opioids, NSAIDs, regional analgesia and gabapentinoids.[51,52]



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Glossary

Acute pain — results from tissue injury but resolves with healing (e.g. posttraumatic pain like fractures and tissue injuries). Acute painis usually nociceptive. See chronic pain.

After sensation — the abnormal persistence of a sensory perception provoked by a stimulus even though the stimulus has stopped.

Allodynia — a painful response to a stimulus that normally does not provoke pain. See hyperalgesia and stimulus-evoked pain.

Apraxia — loss of the ability to carry out familiar, purposeful movements in the absence of paralysis or other motor or sensory impairment.

Chronic pain — persists after the initial injury heals. Chronic pain may be nociceptive (e.g. osteoarthritis), neuropathic, or both. See acute pain.

Dysaesthesia — abnormal, unpleasant, but not necessarily painful, sensation caused by normal stimuli. May be spontaneous or provoked by external stimuli. See paraesthesia.

Hyperalgesia — a magnified response to painful stimuli. See allodynia and stimulus-evoked pain.

Hyperpathia — a painful syndrome characterized by an abnormally painful reaction to a stimulus, especially a repetitive stimulus, as well as an increased threshold. See complex regional pain syndrome type II.

McGill Pain Questionnaire (MPQ) — a widely used means of determining the quality of spontaneous neuropathic pain. It includes a list of words that ser ve as affective, evaluative, and sensor y pain descriptors. It is used to indicate pain location and intensity and to quantify changes in pain quality and pattern (i.e. intermittent or continuous) over time.

Neuropathic Pain Scale (NPS) — an accurate, validated tool for the assessment of neuropathic pain that is based on a series of numerical rating scales. See Appendix.

Nociceptive pain — a normal physiological response resulting from exposure of nociceptors to noxious stimuli. It has a protective function in acute conditions, since it indicates the likelihood of tissue damage and alerts an individual to the need to prevent additional injury.

Numerical rating scale (NRS) — an 11-point pain-intensity scale. The NRS can be used to identify clinically important reduction in an individual's pain. See Figure 1.

Paraesthesia — abnormal but non-painful sensations, which can be spontaneous or evoked, e.g. tingling. See dysaesthesia.

Stimulus-evoked pain — results from chemical, thermal, or mechanical injury and is characterized by allodynia and hyperalgesia. Also called stimulus-dependent pain. See stimulus-independent pain.

Stimulus-independent pain — or spontaneous pain may be intermittent or continuous. Spontaneous continuous pain, often felt as superficial burning or deep pressure, is present all or almost all the time, although it can vary in intensity. Spontaneous intermittent pain is episodic and typically of relatively short duration. Often paroxysmal, it is described by patients as shooting, lancinating, or like an electric shock.

Trophic changes — tissue alterations due to interruption of nerve or blood supply; may include changes in hair growth and texture of skin.

Vasomotor changes — alteration in regulation of dilation or constriction of blood vessels.

Visual analogue scale (VAS) — this pain scale evaluates pain intensity and pain relief with treatment. Lines on the VAS are exactly 100 mm long, and patients are asked to mark on the line their degree of pain (see Figure 3). The scale score is the distance in millimetres from the left end of the scale to a patient's mark.

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