Stroke

Definition

Stroke

- Acute onset of neurological deficit, lasting >24 hours, vascular cause

Types

- Ischemic (85%)
  - Atherothrombosis (30%), Embolism (25%), Small Vessel Disease (20%), Watershed Infarction(10%)
- Haemorrhagic (15%)
  - Subarachnoid (5%), Intracerebral (10%)

More than 80% of strokes can be prevented

Transient Attack (TIA)

- Acute onset of neurological deficit, vascular cause

Impairments

Primary Impairments	Secondary Impairments

<u>Sensori-Motor</u>
- Negative
  o ↓ Strength
  o ↓ Co-ordination
  o ↓ sensation
- Positive
  o Spasticity
<u>Non-Motor</u>
- ↓ vision
- ↓ speech/language
- ↓ perceptual function
- ↓ cognitive function
- Apraxia
- Behaviour
- Emotion
	<u>Motor/Musculo-Skeletal</u>
	- ↓ mm length/joint stiffness
	- ↓ fitness
	- ↓ strength
	- Learned non-use
	- Compensatory movements
	- Swelling
	- Pain
	- Shoulder subluxation
	- Soft tissue damage
	<u>Non-Motor</u>
	- Depression
	- Fatigue

Primary Impairments

Sensori-Motor	- **Dysphagia** – Difficulty Swallowing - **Dysarthria** – Difficulty with articulation	
Non-Motor	Vision Impairment	- **Hemianopia** – Loss of visual field on the side of hemiplegia - **Quadrantanopia**- Loss of a quadrant of the visual field - **Loss of conjugate gaze**
	Speech/Language Impairment	- **Aphasia/Dysphagia** – difficulty with the spoken word - Receptive, Expressive, Global (both)
	Perceptual Impairment	- Difficulty processing and interpreting sensory information - Includes: neglect, agnosia
	Cognitive Impairment	- Inability to process, sort, retrieve and interpret information (cognitive) - Includes problems with: problem solving, motivation, planning, organisation, attention, memory
	Dyspraxia/Apraxia	- Inability to plan/execute movements
	Behaviour/emotional impairments	- Lability - Depression - Anxiety - Impulsivity - Disinhibition - Personality changes→ aggressive or passive behaviour - Decreased insight - Unrealistic goals

Circulation / Blood

- Brain uses 20% of body's O2 requirements
- 800ml/min blood flows through brain
- 4 arterial trunks supply the brain
  - Anterior Circulation: Internal Carotid Artery System
  - Posterior Circulation: Vertebro-Basilar System

Circulation

	General	Sensori-Motor	Non-Motor
Anterior Circulation	- Internal Carotid Artery System - Supplies most of hemispheres and cortical deep white matter - *Common carotid → Internal carotid → middle cerebral → anterior cerebral*	- ↓ strength - ↓ coordination - ↓ sensation - Spasticity	- ↓ vision - ↓ speech/language - ↓ perceptual function - ↓ cognitive function - Apraxia - Behaviour - Emotion
Posterior Circulation	- Vertebra-Basilar System - Supplies the brainstem, cerebellum and occipital lobes		

Hemispheres

- Most people have a dominant hemispheres – left Hemisphere dominance 90% of the population

Left Side	Right Side
- Left hemisphere = language, analytic functions	- Right hemisphere = awareness of body and visuo-spatial skills, attention

	Concentration	Good	Poor/distractible
	Movement Time	Slow	Impulsive
	Performance	Correct	Erratic
	Carryover Effect	Good	Poor
	Attitude	Realistic	Unrealistic
	Mood	Depressed, Anxious, Frustrated, Can be labile	May appear unmotivated, Can be labile

Bamford Classification		- (S) = syndrome: indeterminante pathogenesis, prior to imaging - (I) = infarct - (H) = haemorrhage
	TACS	**Total Anterior Circulation Stroke** - All 3: o Hemiplegia +/- sensory loss o Hemianopia o Cortical signs (e.g. cognitive, perceptual, aphasia) - Most severe → 5% patients alive and independent (I) at 1 year
	PACS	**Partial Anterior Circulation Stroke** - 2 of 3: o Hemiplegia +/- sensory loss o Hemianopia o Cortical signs (e.g. cognitive, perceptual, aphasia) - OR o Isolated cortical dysfunction - OR o Pure motor or sensory signs less severe than lacunar - 55% patients alive (I) at 1year
	LACS	**Lacunar Stroke** - Have: o Hemiplegia +/- sensory loss – affecting at least 2/3 of face/arm/leg o No cortical signs - 60% patients alive (I) at 1 year - Occlusion of deep perforating arteries
	POCS	**Posterior Circulation Stroke** - Multitude of signs, can include: o Cranial nerve palsies o Ipsilateral motor and/or sensory impairments o Bilateral motor +/- sensory deficits o Eye movement disorders o Isolated hemianopia o Cerebellar deficits - If patients survive acute event → 60% patients alive (I) at 1 year
Ischaemic Penumbra		- An area of vulnerable brain tissue surrounding the ischaemic brain tissue - If blood flow can be restored to this area o The extent of the damage causes by secondary and delayed mechanisms may be limited o The ischaemic penumbra may be salvaged
Interdisciplinary Management of Stroke		- Complex care needs, affects individual and carers/families - Better outcomes when treated in 'stroke unit' vs. general medical wards o Brings specialised team together in one place o ↓ death, death or institutionalised care, death or dependency - Person-centred team with multiple roles and responsibilities o Immediate management of consequences of stroke and secondary complications o Physical, information, psychosocial, spiritual and bereavement needs (patient and carer/family) o Coordinated discharge back into community or rehabilitation services o In cases of life threatening stroke – providing end of life care (may involve palliative care experts in hospital)
	Team – Physician	(usually a neurologist) - Oversee medical management (stable observations have better outcomes) - Identify cause of stroke - Attempt to prevent further stroke - Manage other medical conditions
	Team – Nurses	- Neurological observations and monitoring - Hydration monitoring and intravenous treatment if required - Medication administration - Assessment/Management of continence, skin integrity, pain - Assistance with mobility, falls prevention and personal care of patients - Prevention of post stroke complications - Information and support to patients and families - Palliative care for those who are terminally ill - Education about secondary prevention including smoking cessation

		Physiotherapists	
		Occupational Therapists	- Activities of daily living o Self care o Return to work - Perceptual/cognitive/behavioural screening and management
		Speech Pathologists	- Dysphagia - Communication problems
		Dieticians	
		Social Workers	- Financial issues - Family issues - Services - Placement – aged care facilities
		Orthoptists	- Visual Problems
		Referral to psychology, optometry	- Cognitive Assessment
Continuum of Care	**Acute Care**	Neurological Ward, Acute Stroke Unit, Mixed Medical Ward, Neurosurgical unit	
	Rehabilitation	Mixed Rehabilitation Unit, Stroke Unit, Slow Stream Rehabilitation	
	Community Based Rehabilitation	Hospital Out patient/Day Therapy, Community Centre, Private Practice, Home-Based, Residential Care	
Australian Stroke Foundation Guidelines	**Strong Recommendations**	- Where guideline authors are certain that the evidence supports a clear balance towards either desirable or undesirable effects	
	Weak Recommendations	- Where the guideline panel is uncertain about the balance between desirable and undesirable effects	
	Physiotherapy Evidence	- Strong evidence for early rehabilitation - Strong evidence for task-related practice - Strong evidence for increased intensity of practice - Potential for improvement may exist for many years	
	Key Aspects of a Physio Program	- Address primary impairments - Increase strength and train co-ordination in context of everyday activities - Prevent and manage secondary impairments	

Current Principles in Neurological Physiotherapy	
Neuro Physio	**Use of Neuro Physio**
- Works with disorders/damage to brain, spinal cord, neuromuscular system. Or degenerative conditions (affecting brain, nerves or muscles). And resulting movement disorders. - Including: stroke, traumatic brain injury, Parkinson's disease, dizziness and balance disorders, falls management	- Early treatment following acute onset can help to maximise recovery - Ongoing neurological rehabilitation can help achieve best possible long term potential - In degenerative conditions, focus is to minimise disability and promote optimal function and independence

Current Neurological Physiotherapy (10) Practice Principles		
Evidence Based	- Integration of research evidence with clinical expertise and patient values to inform decisions - Emerging scientific evidence of efficacy and knowledge of clinical efficacy, combine with patient values and goals to facilitate optimal EBP	
Applies Knowledge and scientific evidence from a number of areas	- ICF, person-centred practice, functional anatomy, neuroanatomy, neuroplasticity and neuropathophysiology, ageing process, motor control and motor learning, biomechanics, task-oriented training	
Is delivered across the continuum of care	- Work in mixed settings in collaboration with: other allied health professionals; general practitioners; hospitals doctors and specialists; case coordinators; families and carers - Physiotherapy aims will vary at different stages o Restoration of movement and function when the client has potential for improvement o Adaptation involving the use of alternative strategies. This is done only when there is no potential for improvement. o Maintenance of function o Prevention of secondary impairments	
Delivered within an ICF Framework	- Neuropathophysiology of the condition - Impairment of body structure or function	
	Activity Limitation	<u>Primary Impairments</u> - Negative motor impairments → loss of muscle activation (voluntary movement), loss of muscle strength (weakness), loss of dexterity, fatigue - Positive motor impairments → hyperreflexia (spasticity), increased cutaneous reflexes Somato-sensation, vision, vestibular, perceptual, cognitive, motor planning, speech and language, swallowing <u>Secondary impairments</u> - Musculoskeletal changes → loss of joint range; loss of neural length; muscle and connective tissue stiffness; shortening and lengthening of muscles; disuse weakness, muscle atrophy and

		changes in fibre types; decreased bone density; altered joint mechanics leading to problems such as shoulder pain - Pain → hemiplegic shoulder pain (HSP); thalamic pain; complex regional pain syndrome (CRPS) - Decreased cardio-respiratory fitness - Cognitive behavioural effects - Adaptations of motor performance (compensatory movements/behaviours) - Learned Non-use o Unsuccessful attempts to use impaired arm and leg → learn to use unimpaired arm for functional tasks. Weight bear predominantly on unimpaired leg → learned non-use of impaired limbs → reduction in cortical representation occurs → residual capacity in impaired limbs may be lost
	Participation Restrictions	- Difficulties at the community/societal level - "what is it you want to be able to do in the community? - These restrictions they want to improve form long term goals
Based on ongoing use of a clinical reasoning process with measured outcomes		
Is person-centred	- Person centred care: cased on shared control and shared decision making; emphasises the role of the client as a problem solver; client is part of the decision making process at each stage of the rehabilitation process; relevant short and long term goals are established together with the client; informed consent to implement the agree program must be given by the client	
Is Task Oriented	- Assist clients to regain and maintain optimal motor performance of everyday tasks, specific and relevant to the individuals lifestyle and stage of rehabilitation - *Functional analysis → part task practice → practice the whole task → transfer training different contexts* - Analysis of everyday activities: Repetitive practice of relevant essential movement components of the task being trained - Part Task Practice o Set up specific for muscle contraction for specific task o Reduce factors limiting performance of essential movement components (manage primary and secondary impairments) - Whole Task Practice o Done in same session as part task practice o Application of strategies and specific skills in context of function o Set up to encourage muscle activation appropriate for task and environment (selective, appropriate force generation, correct timing and sequencing) o Strengthening muscles and developing control of movement o Retraining affected limbs is stressed during task practice, compensatory behaviour minimised - Transfer training to different contexts o Ensure carry over to contexts/environments relevant to patient o Stages in skill transfer: simple/closed skill performance → task variation → added task variation from external factors → complex/open ended tasks	
Fosters active participation and self-management	- Self management is important → developing skills required to cope with disability and resume lifestyle. Is enhanced by high self-efficacy and adherence to therapy - Practice of relevant tasks → emphasise functional tasks that are of immediate use in the ward and later in the home/work/community environments - Goal setting - Client-driven practice → assist patients to develop problem-solving skills, resourcefulness and creativity; peer support; positive attitude by client, family and therapist, and a therapist who is committed with a genuine interest in clients	
Employs a variety of models of delivery to maximise intensity of practice	- One-one training with physio (practice requiring physical assistance, requires presence for safety concerns) - Semi-supervised practice (anything done in the gym without direct supervision, workstations set up for individuals in a circuit, supervision provided by therapists/therapy assistants/trained family members/friends) - Independent practice (usually in bedroom or home; family member can be trained to assist; patient will have to be able to set up equipment themselves) - Need to identify content and dosage of practice and review performance and progress. Small modifications to environment can enable semi-supervised or independent practice - Feedback and monitoring is essential (wall charts, exercise program with diagrams, workbook/practice sheet/diary)	
Is conducted in an optimal training environment	- Rehabilitation environment should be stimulating and challenging - Include relevant activities that replicate real world tasks and environments - Initial set up needs to enable client success with task (increasing motivation to learn), assist with upright orientation and to provide movement cues. - Later set-up can progress to challenge sensory and motor systems for transfer to learning. E.g. changing start position, foot position, speed, type of object, surface	