Core Curriculum for the Basic Course on the Evaluation and Treatment of Adults with Neurological Conditions - The Bobath Concept

Introduction

The following is an outline of the core curriculum for the Basic Bobath course: The Evaluation and Treatment of Adults with Neurological Conditions - The Bobath Concept. This content reflects those subjects that according to the Education Committee must be included in the Basic Bobath course. The Basic Course core curriculum includes four key aspects: **Theoretical, Practical, Self-Directed Learning** and **Optional components**. The course instructor must integrate all parts of the curriculum into the course to enable the course participant to develop their clinical reasoning with respect to the Bobath concept. A hallmark of the learning experience on a Basic Course is the development of specific handling and facilitation skills via:

- Instructor-led patient demonstrations
- Course participant-led patient workshops
- Instructor supervised patient sessions
- Case Report Assignment

It is up to the individual instructor to select the style of presentation that is most appropriate to the learning style of the course participants, his/her own preferred style of presentation and the needs of the group. Similarly, the order of presentation is variable although certain subjects will logically precede others.

The core material occupies approximately 105 hours of the course minimum of 110 contact hours. The remaining hours, as identified in the 'Optional Components', allow emphasis on specific areas according to the needs of the group and/or the instructor's own specific areas of interest or expertise.

Participants will not receive a course certificate without successful submission of a written case report assignment.

THEORETICAL COMPONENTS

- Introduction
- ICF
- Model of Bobath Clinical Practice (MBCP)
- Applied Neurophysiology
    - Neural Organization
    - Descending systems
    - Ascending systems
    - Integrated motor behaviour
    - Cerebellum/Basal Ganglia/ Thalamus
    - Neuromuscular plasticity
    - Movement Dysfunction
- Motor Control and Motor Learning
- Outcome Measures
- Postural Control
- Locomotion
- Upper Limb Reach, Grasp and Manipulation

PRACTICAL COMPONENTS

Clinical Assessment and Treatment

- Model of Bobath Clinical Practice (MBCP)
- Patient Demonstrations
- Patient Workshops
- Patient Assessment, Treatment and Evaluation (by course participants)

Practical Sessions

- Movement Analysis and Facilitation

SELF-DIRECTED LEARNING

- Case Report Assignment
- Reflective journal
- Self-evaluation tool

OTHER COMPONENTS THAT MAY BE INCLUDED IN THE BASIC COURSE

- Oro-Facial problems
- Perceptual problems: contraversive pushing, apraxia, neglect
- Model of Bobath Clinical Framework (MBCF)

OPTIONAL COMPONENTS (examples)

- Assistive Devices
- Body Weight Support Training
- Mental Imagery
- Constraint Induced Movement Therapy
- Botox
- Splinting

THEORETICAL COMPONENTS		
Subject Heading	**Hrs**	**Content**
Introduction	2	**Introduction and needs of participants** Course procedures - Structure and logistics - Requirements regarding course fulfilment - Learning objectives and use of self-evaluation tool - Information about IBITA and the website www.ibita.org **Introduction to the Bobath concept today** - Revised definition and brief history. Refer to: - Vaughan-Graham, J., Cheryl, C., Holland, A., Michielsen, M., Magri, A., Suzuki, M., & Brooks, D. (2019). Developing a revised definition of the Bobath concept: Phase three. Physiotherapy research international : the journal for researchers and clinicians in physical therapy, e1832. - PUBLIC webpage - https://ibita.org/bobath-concept-definition/
Applied Neurophysiology	7	- **Neural Organization**: Neurons, synaptic mechanisms, excitation/ Inhibition - **Descending systems**: Ventromedial and lateral - **Ascending systems:** Somatosensory receptors, Discriminative touch, Dorsal Column-Medial Lemniscal, Anterolateral, Spino-cerebellar Pathways - **Integrated motor behaviour**: Cerebral cortex, Association areas, Cerebellum, Basal Ganglia, Limbic System, Thalamus, Brain Stem, Spinal cord - **Neuromuscular plasticity:** Muscle physiology, synaptic plasticity (short, long term), dendritic plasticity, Relationship to motor learning, Form : Function - **Motor Control & Motor Learning**: Historical and current models of motor control. Interaction of individual, task and environment. Intention, motivation and goal. Practice/repetition. Feedback. Task flexibility and transference. Cognition, perception, action: including motivation, emotional state, and alertness - **Movement Dysfunction**: Altered tone: neural and non-neural, Upper motor neuron syndrome

Theoretical Session: Postural Control	**1**	**Theoretical Session Learning Objectives** On successful completion of the basic course, the course participant will be able to: - Define the unique aspects of postural control in humans closely related to movement transitions, bipedalism and manipulation - Describe how the organization of multisensory signal flow is involved in postural control, postural orientation and body schema as a basis for motor output for postural stability. - Define the key biomechanical characteristics of postural control (BOS, COM, COP, stability limits, alignment). - Apply feedforward and feedback postural control systems and their integration in postural and movement control. - Describe the importance of bilateral trunk activity as part of postural control. - Describe the more recent classification of Postural Adjustments. - Describe the peripheral, subcortical and cortical components of postural control. Specifically, the role of the cerebellum, the basal ganglia, the sensory and motor cortices. - Describe the perception systems in postural control, including the role of the individual senses, current theories on sensory organization and the way in which sensory organization is adapted to changing environmental tasks and needs. **Suggested Bibliography** - Ivanenko, Y., & Gurfinkel, V. S. (2018). Human postural control. Frontiers in neuroscience, 12, 171. - Lovejoy O. (2005) The natural history of human gait and posture Part 1. Spine and pelvis 2005. Gait Posture Jan;21(1):95-112. - Mackinnon C.D. (2018) Sensorimotor anatomy of gait, balance, and falls. Handb Clin Neurol. 159:3-26. - Piscitelli, D., Falaki, A., Solnik, S., & Latash, M. L. (2017). Anticipatory postural adjustments and anticipatory synergy adjustments: preparing for a postural perturbation with predictable and unpredictable direction. Experimental Brain Research. https://doi.org/10.1007/s00221-016-4835-x - Takakusaki K. (2017) Functional Neuroanatomy for Posture and Gait Control. J Mov Disord Jan;10(1):1-17. - Van Criekinge T, Hallemans A, Herssens N, Lafosse C, Claes D, De Hertogh W, et al. (2020) SWEAT2 Study: Effectiveness of Trunk Training on Gait and Trunk Kinematics After Stroke-A Randomized Controlled Trial. Phys Ther. Aug 31;100(9):1568-1581. - Vaughan Graham J., Patterson K., Zabjek K., Cott C (2019) Important Movement Concepts: Clinical Versus Neuroscience Perspectives. Motor Control Jul 1;23(3):273-293. **Further reading**: MEMBER access only available in the ITC locomotion bibliography and IBITA Library

Theoretical Session: Locomotion	1	**Theoretical Session Learning Objectives** On successful completion of the basic course, the course participant will be able to: - Define the unique aspects of human locomotion - Define key aspects of postural control underpinning human locomotion - Define the key evolutionary and biomechanical characteristics of locomotion (verticality, alignment, stability, stance, initiating first step, propulsion and swing) creating the optimal multi-kinetic chain. - Describe the neural control of locomotion including: cortex, limbic-hypothalamic, basal ganglia, cerebellum, brain stem and spinal cord. - Discuss that human locomotion is more dependent on supraspinal control for initiation and termination. - Explain the importance of the ability to adapt and change to the demands of different environments in locomotion - Describe the cognitive, perceptual, motivational and emotional aspects of locomotion - Describe the aspects of pattern/synergies generation of locomotion phases and control of transition, including Central Pattern Generation (CPG) and role of sensory systems. - Identify the specific role of the foot in locomotion - Analyze the role of the upper limbs in locomotion (Propriospinal pathways, interlimb coordination) **Suggested Bibliography** - Awad L, Lewek M, Kesar T, Franz J and Bowden M (2020) These legs were made for propulsion: advancing the diagnosis and treatment of post-stroke propulsion deficits. Neuroeng Rehabil. Oct 21;17(1):139. doi: 10.1186/s12984-020-00747-6. - Grillner S, El Manira A. (2019) Current Principles of Motor Control, with Special Reference to Vertebrate Locomotion. Physiol Rev. 1;100(1):271-320. doi: 10.1152/physrev.00015.2019. - Klarner T (2018) Sherlock Holmes and the curious case of the human locomotor central pattern generator. Neurophysiol 1;120(1):53-77. - Maguire C, Sieben J, de Bie R (2017) The influence of walking-aids on the plasticity of spinal interneuronal networks, central-pattern-generators and the recovery of gait post-stroke. A literature review and scholarly discussion. Journal of Bodywork and movement therapies 21 422-434 - McKeon P (2014) The foot core system: a new paradigm for understanding intrinsic foot muscle function Neurophysiol Clin 50(1):55-68. - Takakusaki K (2017 Functional Neuroanatomy for Posture and Gait Control J Mov Disord. 2017 Jan; 10(1): 1–17. - Viseux F. (2020) The sensory role of the sole of the foot: Review and update on clinical perspectives. Neurophysiol Clin. 50(1):55-68. doi: 10.1016/j.neucli.2019.12.003. 29. **Further reading**: MEMBER access only available in the ITC locomotion bibliography and IBITA Library

Theoretical Session: Upper Limb Reach, Grasp and Manipulation	1	**Theoretical Session Learning Objectives:** On successful completion of the basic course, the course participant will be able to: - Discuss the role of the upper limb and hand in reach, grasp and manipulation in a variety of patterns and trajectories. - Explain the role of the corticospinal system in sensory and motor control of hand function grasp and manipulation in conjunction with the descending systems supporting postural reach activity. - Demonstrate an understanding of the role of sensory information to facilitate an enhanced body schema for voluntary movement of the hand. (tactile discrimination, stereognosis parietal, cerebellum,) - Define key aspects of postural control underpinning human upper limb function (specific role of the head, trunk, pelvis and scapula. - Recognize and explain the role of shoulder girdle complex for stability and mobility in reaching activity. - Discuss glenohumeral range of motion and limiting factors - Demonstrate an understanding of the importance of distal initiation for straight line path in reach to grasp. - Understand the postural role of the intrinsics in the hand to support individual digit movement in hand function. - Explain the role of vision and object selection in reach to grasp - Identify the role of the task in developing appropriate movement control (Motivational and meaningful) - Summarize and apply the role of motor learning principles in rehabilitation of reach, grasp and manipulation. - Explain the systems control of reach, grasp and manipulation for a given task in a given environment **Suggested Bibliography** - Baker, S., Zaaimi, B., Fisher, K, Edgley, S, & Soteropoulos, D. (2015). Chapter 18 - Pathways mediating functional recovery. In S. N. Numa Dancause & R. Serge (Eds.), Progress in Brain Research (Vol. Volume 218, pp. 389-412): Elsevier. - Cardinali L et al (2016) Proprioception is necessary for body schema plasticity: Evidence from a deafferented patient Frontiers Human Neuroscience 10:272 - Edwards, L., King, E, Buetefisch, C, & Borich, M. (2019). Putting the “sensory” into sensorimotor control: the role of sensorimotor integration in goal directed hand movements after stroke. Frontiers in integrative neuroscience, 13, 16 - Kibler B, Sciascia A, Wilkes T (2012) Scapular Dyskinesis and Its Relation to Shoulder Injury J Am Acad Orthop Surg :364-372 - Piscitelli D (2017). Anticipatory postural adjustments and anticipatory synergy adjustments: preparing to a postural perturbation with predictable and unpredictable direction. Exp Brain Res.;235 (3):713-30. - Sangole A, Levin M (2009) Palmar arch modulation in patients with hemiparesis after a stroke. Exp Brain Res (2009) 199:59–70

		- Silva C, Pereira S, Silva C, Ferreira S, Oliveira N and Santos R (2018) Anticipatory postural adjustments in the shoulder girdle in the reach movement performed in standing by post-stroke subjects. Somatosensory and Motor Research DOI: 10.1080/08990220.2018.1484354 - Stamenkovic A. & Stapley P. (2016) "Trunk muscles contribute as functional groups to directionality of reach during stance" Exp Brain Res 234: 1119-1132 - Webb and Moreta (2020). Current Concepts in Treating Hemiplegic Shoulder Pain UPMCPhysician Resources.com/Rehab | Consults and referrals: 1-866-884-8579 **Further reading:** MEMBER access only available in the ITC locomotion bibliography and IBITA Library
ICF	1	- Concepts of participation, activity, impairment, context - and their inter-relationships - Concepts of capacity and performance - Integration of the ICF in the clinical reasoning process - Recognition of the limitations of the ICF model
Model of Bobath Clinical Practice (MBCP)		- The Model of Bobath Clinical Practice (MBCP) is the clinical parallel to the updated theoretical assumptions published by Vaughan-Graham et al., (2009) and illustrates the unique aspects of the clinical application of the Bobath concept [see Michielsen M, Vaughan-Graham J, Holland A, Magri A, Suzuki M (2017): The Bobath concept – A model to illustrate clinical practice. Disability and Rehabilitation Dec 17:1-13. doi: 10.1080/09638288.2017.1417496. Epub ahead of print] - Use to describe the integration of posture and movement with respect to quality of task performance and the use of facilitation to positively effect postural control and perception. - Relate to current neuroscience and neurorehabilitation evidence. - MBCP PUBLIC webpage: https://ibita.org/model-of-bobath-clinical-practice/ - MBCP resources for instructor access only are located on the MEMBER only webpage: https://ibita.org/bobath-concept-model-and-framework/
Outcome Measures	1	- Importance of evaluating clinically relevant change and the choice of appropriate patient reported outcome measures and/or objective performance measures - Mapping measures to the ICF domains related to Body Function/Structure, Activity, and Participation. Quality of life measures are also included. - Embedding relevant and appropriate outcome measures into patient treatment sessions on the basic course and into the basic course case report assignment. - Outcome measure resources have been compiled by the Research and Education Committees for Ataxia, Multiple Sclerosis, Parkinson's Disease, Spinal Cord Injury, Stroke and Traumatic Brain Injury and are available via this LINK

PRACTICAL COMPONENTS		
Subject Heading	**Hrs**	**Content**
Clinical Assessment & Treatment 36 hours within which there are a minimum of 22 hours for patient sessions.	36	Review of subjective and objective data, analysis of dyssynergic/ inefficient movement, assessment of potential, hypothesis generation, development of a treatment plan, goals and evaluation, clearly articulating the clinical reasoning process and relevance of interventions. Use the MBCP to illustrate the clinical application of the Bobath concept. To facilitate use of the MBCP in clinical practice and educational environments a worksheet and guidelines have been developed. The worksheet provides a practical tool for IBITA instructors to use to highlight the integration of theoretical and professional practice knowledge to explain the individual clinical presentation. - **Patient Demonstration:** An instructor-led learning opportunity demonstrating the clinical application of the Bobath concept. Discussion/practical explanation post demonstration is essential to clarify the clinical reasoning process. - **Patient Workshops:** A guided and supported learning opportunity enabling the course participant/s to make explicit their clinical reasoning process. - **Patient Sessions:** Opportunity for peer-learning, with instructor supervision, enabling the course participant to develop their assessment and treatment progression and clinical reasoning process with respect to the individual patient within his/her environment.

Practical sessions	53	
Practical Content: Relationship between alignment, base of support (BOS), postural control, core control and selective movement with respect to functional activities.		**Analysis of functional tasks** - Introduction to the relationship between activity/participation and body function/structure. - Introduction to postural assessment, alignment of body segments and relationship of body segment/s with Base of Support. - Introduction to the interaction of stability and mobility for coordinated sequences of movement and how this relates to postural transitions and/or task completion in order to highlight differences in the quality of task performance. - Introduction to the concept of balance, stability limits and postural control strategies. - Introduction to therapeutic handling, stereognostic capacity of the therapist, use of the environment and verbal cues. - Introduction to the use of facilitation. - Introduction to hypothesis formation and testing in relationship to critical cues / missing components in relation to a functional task.

Practical Content: Moving between standing and sitting.		**Analysis of stand to sit (SIT)** - Increase understanding of biomechanical demands and neuromuscular activity of the SIT task, highlighting stability-mobility challenges. - Use of the facilitation of SIT as an assessment/treatment tool to gain active sitting. - Facilitation of active standing to active sitting through graded lowering of the body mass using eccentric muscle activity, controlling centre of mass (COM) from a small to a large Base of Support. **Analysis of sit to stand (STS)** - Increase understanding of biomechanical demands and neuro- muscular activity of the STS task, highlighting stability-mobility challenges. - Facilitation to gain concentric activity against gravity whilst controlling from a large to a small Base of Support.
Practical Content: Moving in sitting; moving from sitting to lying; moving in lying; moving from lying to sitting		**Exploration of moving in sitting** - Introduction to the role of the trunk, pelvis and lower limbs in selective weight transfer. - Introduction to anterior, posterior and lateral pelvic tilt in selective weight transfer vs. weight shift, and quality of upper limb movements. **Analysis of sit to lie** - To understand the differing demands on postural control in moving from sit to lie. - To understand the role of weight transfer, changing Base of Support and scapulothoracic stability throughout this transition. - Facilitation to gain eccentric control into lying. **Exploration of moving in lying** - Introduction to the development of core activation/ selective trunk activity and its influence on selective limb/head movement. - Facilitation of selective foot, knee, hip and pelvic control. - Facilitation of selective hand, wrist, elbow, shoulder complex. - Facilitation of selective neck and head movement. - Introduction to the role and use of placing. - Facilitation from lie to side lie through selective UL and/or LL activation. **Analysis of lying to sit** - To understand the neuromuscular and postural demands of this transition in particular core strength and anticipatory postural control. - To understand weight transfer, change in Base of Support, and independence of UL's and LL's. - Facilitation to gain core activation and head placing.

Practical Content: Acquisition of single leg stance and activation of lower limb and foot with respect to stepping, locomotion, stairs, dressing etc.		**Single leg stance** - To understand the neuromuscular and postural requirements of single leg stance and its relationship to selective weight transfer, locomotion, stair walking, dressing and reaching in standing. - To understand the reciprocal activity of the trunk, lower and upper limbs required for single leg stance. - To understand and explore the dynamic transition of centre of mass from bipedal to single leg stance. - Facilitation of the lower limb lateral stability mechanisms and effective weight acceptance through the foot **Locomotion** - Analysis of the components of the gait cycle including the role of the head, arms and trunk (HAT). - To understand and explore unipedal propulsion. - Introduction to the facilitation of gait through different body segments. - Facilitation of a backward step. - Facilitation of cross stepping and its relationship to the development of reactive balance strategies - Coordination of rhythmical stepping and arm swing.
Practical Content: Activation of the shoulder girdle/upper limb and hand in relation to reach and grasp, postural control, locomotion and dexterity.		**Scapulothoracic stability/mobility** - Analysis of the relationship between scapula(e), clavicle, humerus, ribs, sternum and thoracic spine; the biomechanical and neuromuscular requirements of scapulohumeral rhythm; relationship to the painful shoulder. - Assessment of localisation to touch and two-point discrimination in relation to recovery of hand function. - To gain an understanding of the biomechanical and neuromuscular requirements of the reach pattern and the dynamic reciprocal activity of the trunk. - To gain an understanding of the role of the hand in terms of manipulation, grasp, sensorimotor integration and body schema - Facilitation of the reach to grasp pattern, hand shaping and bimanual upper limb activities.
Practical Content: Seating and positioning.		**24-hour concept** - To gain an understanding of the importance of appropriate seating and positioning to facilitate carry over as part of the 24 hour management approach. - To optimize efficiency in sit to stand, transfers, upper limb function. - To minimize compensatory strategies/secondary complications.

Practical Content: Implementation of motor learning principles.		**Motor learning** - To gain an understanding of how motor learning principles sup- ports clinical practice. - Consideration of the effect of practice conditions with respect to optimizing positive neuroplastic change within a treatment session e.g. whole vs. part task training; random vs. blocked practice; constant vs. variable practice. - To gain an understanding of other influences on motor learning e.g., dosage; feedback; sleep; medication.
SELF-DIRECTED LEARNING		
Subject Heading	Course Contact Hrs	**Content**
Case Report Assignment 2 hrs allocated in the curriculum to outline the case report structure / key requirements.	2 Hrs	- The basic course incorporates into the course structure a period of self-directed learning in the form of a written case report to be completed individually by each course participant and evaluated by the course instructor(s). - The aim of the case report is to allow the course participant to consolidate their clinical application of the Bobath concept. - The written case report should have the following structure: a title; an abstract; an introduction to the report including a statement that the patients' consent was obtained; a presentation of the clinical case including the patient narrative, functional movement analysis and the use of skilled facilitation to identify the patients potential, a movement diagnosis [main problems and compensatory strategies utilized]; generation of a working hypothesis; use of relevant outcome measures; treatment; re-evaluation; discussion; key learning points; references. - The written case report should integrate the current evidence base to underpin the course participant's clinical reasoning processes. - Course participants will not receive a course certificate with an IBITA stamp without successful submission of a written case report.
Reflective Journal		The course participant is encouraged to record the events of the day that is subsequently reflected upon to identify individual educational needs. The use of reflection, or thinking about practice by the course participant, helps accelerate the acquisition and integration of knowledge.
Self-evaluation tool		The IBITA self-evaluation tool is used by the course participants as a guide to help evaluate their ongoing development with respect to the Bobath concept. Refer Google Docs- Procedural Manual Files – 3.1.5 Basic Course Self Evaluation Tool (LINK)

OTHER COMPONENTS THAT MAY BE INCLUDED IN THE BASIC COURSE		
Subject Heading	**Hrs**	**Content**
Other components		Oro-Facial problems
Perceptual problems		Contraversive pushing, apraxia, neglect
OPTIONAL COMPONENTS		
Subject Heading	**Hrs**	**Content**
Optional components	5	The inclusion of any optional components allows emphasis on specific areas according to the needs of the group and/or the instructor's own specific areas of interest or expertise. Examples: Assistive Devices, BWST, Mental Imagery, CIMT, Botox and splinting.
Model of Bobath Clinical Framework (MBCF)		The MBCF presents a philosophical outline of the Bobath concept and includes theoretical assumptions, the ICF framework as well as knowledge of the therapist.
Total	**110**	