Get Aligned with NDT as an SLP

Working with Children with Neuromuscular Involvement

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Definition of NDT (2012 NDT Theory Committee)

• Neuro-Developmental Treatment (NDT) is a therapeutic approach used by clinicians who work with people with stroke, traumatic brain injury, cerebral palsy or similar neuropathologies. Examination, evaluation, and intervention are grounded in an on-going process of clinical problem-solving which considers both strengths and limitations of the individual. NDT clinicians analyze each person’s functional activities and limitations by observing the postures and movements that support and limit these functions and hypothesizing their relationships to underlying system integrities and impairments.

Definition of NDT (continued)

• The clinician, in consultation with the individual, family, and health and education team, seeks to determine effective intervention to restore or develop the individual’s meaningful life skills. A hallmark of that intervention is the judicious use of therapeutic handling, adapted to the characteristics of the individual and carried out within meaningful tasks and contexts.
Summary of NDT for our purposes

• A problem solving approach that assesses the posture and movement of a client

• It seeks to determine how the client’s functional abilities, or disabilities, are attributed to their underlying impairments

• Treatment plan is based on improving function by addressing their impairments

Summary of NDT for our purposes (continued)

• It is a “Living Concept”, therefore, it is changeable & continually evolving!

• We work with individuals who have dysfunction in posture & movement; NDT is a problem solving approach as we analyze the posture and movement of a client; correlate the functional abilities/disabilities with the underlying impairments. We then formulate a treatment plan based on addressing the impairments, to result in increased function!

• We need to understand how posture and movement are impacted across the lifespan and incorporate this in our treatment plan. (B. Hodge, 2010)

Evidence Informed Practice

Newest terminology on what we are doing

• Utilizes scientific evidence relating to the various systems involved in functional activities (B. Hodge 2010)

• NDT will continue to be enriched with the new information, theories and models from movement and behavioral sciences

• Evidence Informed Practice takes into account research PLUS your clinical judgment and experience.
Pathophysiology (etiology)

• CNS injury before, during or near the time of birth
• Possible metabolic or Genetic Cause
• Affects Multiple-systems directly and indirectly

What is the ICF Model?

• WHO Model of Health & Disability
• Looks at how an individual functions in the world and the body systems involved in doing so.
• The person’s social participation and social restrictions are the most important element to consider (**Functional Outcomes need to relate to the social component of this model!!)

ICF Framework - definitions

Functioning and Disability
  Body Functions: physiologic functions of body systems
  Body Structures: anatomical parts of the body such as organs, limbs and their components
  Impairments: problems in body function or structure such as a significant deviation or loss (multi or single system) that can be temporary or permanent.
  Functional Activity: execution of a functional task
  Participation: Involvement in a life situation

Contextual Factors (facilitators or barriers)
  Environmental Factors
  Personal Factors

*each component can be expressed in positive or negative terms
Interactions Between Components of ICF

Body Functions and Structures

Activities

Participation

Environmental Factors

Personal Factors

How the ICF Model relates to NDT

- NDT looks at multiple systems of the body in an effort to assess and treat children with neuromuscular involvement because we understand that functional movement activity results from the ongoing interaction of multiple systems, the specific task and the environment in which the client participates.
ICF & NDT Continued

• In NDT, this model helps us to structure our problem solving and describe/classify functional integrity of single system impairments and their relationships to posture and movement. (Barbara Hodge, 2010)

• The ICF model helps NDT focus on a client’s functional activities or limitations as they relate to their participation in society

• Intervention includes therapeutic handling and the active participation on the part of the client

Single Systems

• Neuromuscular
• Musculoskeletal
• Sensory
• Respiratory
• Cardio-pulmonary
• Cognitive
• GI
• Other: Limbic, Regulatory, Integumentary

Neuromuscular system

• CNS functions
  • Cranial nerve integrity
  • Muscle activity and tone

• Measured by:
  • Timing and sequencing of muscle activity
  • Anticipation/preparation of muscle activity
  • Graded control of muscle activity
Musculoskeletal System

Body Alignment and Biomechanics
• Limited Joint ROM
• Decreased muscle length/soft tissue
• Peripheral Weakness (disuse)
• Skeletal Impairments
• Torsional changes

Integrity

Sensory System

Sensory:
   Ability to receive, register and organize sensory input for function
Sensory/Regulatory:
   Ability to maintain and regain a well-modulated subsystem balance
Sensory systems: vestibular; somatosensory; visual; auditory; gustatory; olfactory
Sensory systems contribute to the planning and execution of purposeful or goal-directed movements
Measurements:
• Detection of sensory input
• Interpretation of single or multi-system sensory input
• Modulation difficulties

Respiratory System

• Decreased Respiratory Capacity (may be influenced by multiple systems)
• Poor Coordination of breathing with posture and movement (influenced by multi-systems)

• Measurements:
  Respiratory disease
  Upper respiratory status
  Baseline respiratory status
Cardiopulmonary
Decreased Endurance
Decreased Physical conditioning

• Measurements:
  Baseline cardiac status
  History of cardiac disease

Cognitive
• Primary or Secondary Cognitive Impairments
  • Executive Functions
• Issues with judgment and safety

Gastrointestinal System
• Reflux
• Motility
• Constipation
• Nutritional Deficits

Measurements:
  GI history
  Current GI Function
What is Posture and Movement

In NDT we are always aware of the multi-systems involved in posture and movement.

Good posture provides us with efficient movement; increased oxygen intake; positive interactions with others and appropriate perceptual information as well as freedom from pain.

Efficient movements are timely, isolated, coordinated, reliable, non-stereotypical, safe (balance and equilibrium) and conserve energy.

In order to have efficient movement with good posture you must have antigravity strength, mobility, joint alignment, righting and equilibrium reactions.

Multi-System Impairments Related to Posture and Movement

• Alignment Issues
• Atypical Tone (Hypertonia/Hypotonia)
• Difficulty Bearing Weight
• Atypical Base of Support (BOS)
• Atypical Weight Shifting
• Atypical Postural Control
• Problems with Coordination and Balance
• Motor Planning Issues (spatial or temporal features)

Effects of Multi and Single System Impairments on Function

• Motor Performance of functional skills is slow, inefficient or not possible
• Increased energy expenditure leads to fatigue
• Decreased variety of movements limits functional tasks
• Independence is compromised
• Adaptive equipment often necessary
• Functional skills developed early in life may be past due so there are secondary impairments
Secondary Impairments

• Impairments occurring in any system not present as part of initial pathophysiology (CNS injury before, during or near the time of birth)

• Often but not always caused by original impairments

• This is where many of our issues (as SLPs) fall under (Oral Motor; Swallowing; Sound Production and Communication issues)

Secondary Impairments (continued)

• Often the therapist is treating these impairments as the Primary Impairments and that is why the techniques used do not have positive and/or lasting functional outcomes

• Practice and repetition of oral exercises is fine to do ONCE the systems are aligned and ready to work together! Once they are working together, you will see an improvement in the carryover of these skills to the functional task (e.g., eating; producing sounds/words)!

Let's Think “Systems” for Feeding and Swallowing

• What are the primary single systems that we frequently encounter with the child with neuromuscular challenges?

• How do these systems interact to create the problems we are seeing?

• How does this effect how we evaluate our clients’ needs?
Oral Issues
We need to evaluate:

What are the functional activities and functional limitations the child exhibits during feeding and swallowing activities?

What are the child’s participation/participation limitations during mealtime feeding with his family?

What body systems are creating the oral issues during feeding and swallowing and what specific primary and/or secondary impairments exist?

Oral Issues (continued)
For example, When we look at the musculoskeletal system we evaluate:
Adequacy of Structures of the oral musculature:
• Lips
• Tongue
• Cheeks
• Palate
• Jaw
Integrity of Musculature
• ROM and strength and endurance of oral musculature
• When we look at the neuromuscular system we evaluate:
timing and sequencing of oral movement;
anticipation/preparation of oral muscle activity
graded control of oral muscles

Oral Issues (continued)
• When we look at the sensory system we evaluate:

• The impact of the sensory systems (olfactory, gustatory, visual, auditory, somatosensory, vestibular) on the child’s oral activity/responses during feeding and swallowing.
Pharyngeal Issues

• We need to evaluate:
  • Adequacy of Structures of the Pharynx (Nasopharynx, oropharynx, hypopharynx)
  • Integrity of the musculature
    • ROM and strength/endurance of musculature

Pharyngeal Issues (continued)

• When we look at the neuromuscular system we evaluate:
  timing and sequencing of pharyngeal movement;
  anticipation/preparation of pharyngeal muscle activity;
  graded control of pharyngeal muscles

• When we look at the sensory system we evaluate:
  • The impact of the sensory systems (olfactory, gustatory, visual, auditory, somatosensory, vestibular) on the child’s pharyngeal activity/responses during feeding and swallowing.
  • Remember, the sensory systems allow us to receive, register and organize sensory input for function and contribute to the planning and execution of purposeful or goal directed movements which is what feeding and swallowing is all about!
GI issues

Respiratory Issues

Multi-system Interactions for Feeding and Swallowing

- Interactions among Musculoskeletal, Neuromuscular, GI, Respiratory, Sensory, Cognition, Cardiopulmonary, Regulatory on feeding and swallowing

- The interaction between Postural Control and Movement and these single systems within feeding and swallowing (NDT!)

Plan of Care

- Functional Activity Outcomes Developed

- Multi and Single System Impairments prioritized and linked to functional activity outcomes

- Treatment strategies and procedures are directed towards the specific impairments and integrated into functional activities

- Success in these activities leads to the child's active participation in feeding and swallowing during mealtimes
Let's think “Systems” for Sound and Speech Production

Let's think “Systems” for Communication
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