The Premature Child: From a Fine Motor and Language Perspective

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Objectives

• To describe the Perinatal Follow-up Clinic at the Alberta Children’s Hospital.
• To better understand how prematurely born children may differ in their overall outcomes but especially in their motor and language development.
• What caregivers of prematurely born children can do to promote optimal functioning in fine motor and communication development.
• Where parents can go to get help for their prematurely born children.
Happy Birthday to PNFC

- We have been operating for 30 years
- Begun in 1977 as part of Developmental Clinic, with a doctor, nurse, physiotherapy and ophthalmology.
- 64 patients in the first year, running one morning per week.
- Families seen for visits when children were 4, 8, 12 months and yearly after that until age 8.

Current Clinic Mandate

- To conduct multidisciplinary evaluations of high risk infants.
- Provide interim care and early referral of infants at risk of disabling conditions secondary to specific perinatal problems, emphasizing the group from birth to 3 years of age.

Major Focus

- To monitor the long term outcomes of neonatal intensive care

Our Kids
Which infants do we see?

- Inclusion criteria currently for our clinic
  - Weighing less than 1250 grams, with emphasis and priority to those under 1000 grams.
  OR
  - Gestational age of less than 28 weeks.
- We also provide assessments to infants and children who received complex pediatric therapies, those who are enrolled in perinatal clinical trials and those referred for clinical indications.

What is premature?

- Commonly all children born before spending 37 weeks in the uterus are premature. 38 to 41 weeks is average.
- Commonly a baby who weighs less than 2500 grams (5.5 lbs) at birth is low birthweight.
- Usually premature babies also have low birthweights.
- Babies who have lower than expected birthweight for their gestational age are called “small for gestational age” (SGA) and this may present with different difficulties.

Research definitions

- Extremely low birthweight (ELBW)
  - Less than 1000 grams (2 ¼ lbs)
- Very low birthweight (VLBW)
  - Less than 1500 grams (3 1/3 lbs)

We currently see 5 year old children that have been followed in clinic since birth at 25 weeks gestation and birthweights of approximately 500 grams.
Routine visits to clinic

- Families that meet criteria come for core visits with a standardized assessment at:
  - 4 months
  - 8 months
  - 21 months
  - 3 years
  - 5 years (if born at or below 1000 grams)

The family sees only some of the team at each visit.

Role of SLP on Perinatal Follow-up Clinic

- Assessment of communication skills including; receptive and expressive language, speech, voice quality and fluency.
- Referral to appropriate services for treatment.
- Short term parent support including strategies and treatment when a communication difficulty is diagnosed and/or suggestions on how to encourage normal development of communication abilities.
- Perinatal Feeding Team assessments and feeding interaction support.
Speech pathology test protocols used at each assessment

- 21 month adjusted age assessment-
  - Bayley 3 Scales of Infant and Toddler Development: Language Scale
  - Receptive and Expressive Emergent Language Test (REEL-3)
- 36 month adjusted age assessment-
  - Clinical Evaluation of Language Fundamentals – Preschool (CELF P2) (including the Descriptive Pragmatics Scale)
  - Picture Articulation Test (PAT-3)
- 5 year adjusted age assessment-
  - CELF P2
  - Children’s Communication Checklist (CCC-2)
  - PAT-3

Role of OT on the Perinatal Follow-up Clinic

- Primarily consultative
- Feeding assessment
- Assessment of fine motor skill development
- Education to parents

Standardized Tests
- Peabody
- Beery VMI
- Movement Assessment Battery for Children
- Non-Standardized clinical observation

Outcomes of Prematurity

- Most premature babies have no disabilities or ongoing difficulties.
- The earlier a child is born the more likely it may have a problem.
- For most prems the problem will be a very mild one or a moderate difficulty in coordinating movements, learning disability
- In a small number, the disability may be more severe.
- Risk of significant disability is:
  - 10% if born at 28 weeks
  - 20-30% if born very early 24-25 weeks
More of our kids

Risk Factors for Disability

• Being born before 26 weeks
• Birth asphyxia
• Bleeding into the brain IVH
• Severe jaundice
• Severe Hypoglycemia
• Long term ventilation support
• Long and difficult course in the NICU
• Chronic long term illness BPD
• Severe Infections

Overview: ELBW Developmental Outcomes

• 10% - 20% of ELBW children have major sensory, motor or cognitive impairments resulting in severe disability (Whitefield, M, Grunau, R, 2006)
• 40% - 60% have a combination of vulnerabilities
  - high prevalence of borderline intelligence (Whitefield, 1997)
  - learning disorders with difficulty at school (Grunau & Whitefield, 2000)
  - poor fine and gross motor coordination often leading to a diagnosis of DCD (Habib & Grunau, 2002)
  - difficulties with sustained attention, working memory and executive functioning (Taylor et al, 2000)
  - social and emotional immaturity (Nadeau et al, 2004)
  - vulnerability to bullying (Nadeau et al, 2004)
VLBW Outcomes ≤1500g

Palta, M et al 2000
Functional Assessment of a Multicentre

- Cerebral palsy was present in 12.6%
- IVH grade and severe BPD were independently predictive of CP and functional outcome
- Self-care, mobility and social function range of 11.7%-29.5% of the children scored at least 2 SD below the normative means.

Neurodevelopmental Profile at 5 Years ≤32 Weeks Gestation

1993 Finnish study by Herrgard et al

- Lower scores on neurological examination
- Lower median scores for general IQ –both preterm and non-handicap preterm
- Visual-spatial, sensorimotor and language scores were lower in the preterm group
- Memory and attention functions were equivalent in preterm and control groups

Neurodevelopmental Profile of the handicapped preterm child showed

- Multiple developmental problems simultaneously
- Motor, visual-spatial and visual problems often emerged simultaneously

Neurodevelopmental Profile of the minor neurodevelopmental disabled child

- Monosymptomatic profiles
- Higher IQs

Children with language, visual-spatial and visual-motor problems at age 5 will have a greater risk for learning difficulties irrespective of IQ
**ELBW Teenagers**

- Tend to be smaller than peers
- Good general health
- Struggles with some aspect of schooling
- Achieve high school graduation
- Tentative in seeking for work
- Low levels of physical activity
- Less mature socially and emotionally
- More connected to their families

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**Factors that Affect Improved Outcomes**

- Home Environment
- Impact of Parents and Environment
- Follow-Up Care

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**The fine motor perspective of children born prematurely**

- Effective use of hands relies on the interplay between
  - hand skills
  - postural mechanisms
  - cognition
  - visual perception
**Fine Motor Skills in the ELBW Child**

- ELBW children demonstrate difficulty with the acquisition of fine motor skills necessary to accomplish a variety of preschool/school related and daily living tasks
- In the preschool aged ELBW child, this has been clinically observed as delayed ability to perform skills such as copying of pregraphic forms, scissoring, buttoning etc.

**Fine Motor Development of the Premature Child**

- Lack of physiological flexion at birth
- Weaker muscles and lower muscle tone
- Poor prone skills – lack of essential upper extremity weight bearing
- Small weak hands
- Poor Postural Control

**Clinical Observations**

- In-hand manipulation skills: movement of objects within a person’s hand
  - clumsy
  - slow
  - inefficient in performing fine motor tasks
  - use awkward patterns of grasp
- Delayed in their ability to use pencils/crayons for writing and colouring, scissoring, tying shoe laces, buttoning, engaging in complex constructive and manipulative play
Visual Motor Integration

- The degree to which visual perception and finger-hand movements are well coordinated
- Differences in ability to copy a circle, left oblique line, cross, triangle and model with two intersecting forms
- Clinically, we see inability to copy oblique lines as a marker of difficulty with visual-motor integration

Occupational Therapy Intervention

Infants
- Prone play
- Four point play
- Midline play
- Food play – radial differentiation
- Decreasing fisting

Toddlers
- Puzzles and building blocks
- Exposure to tools: spoons, crayons, scissors, paint brushes
- Development of dressing skills: mastering fasteners
- Play positions: colouring in prone and on vertical surfaces
- Recreational activities: swimming, gymnastics, skating, martial arts
Preschool

- Tool use - scissors, paint brushes, crayons
- Pencil grasp – consistent and efficient
- Simple crafts
- Pregraphic skills - verbal rehearsal
- Strengthening of upper extremities - playground equipment, resistive materials
- Colouring within boundaries
- Continued radial differentiation
- Bilateral skill development
- Differentiation of function
- Using vertical surfaces

Kindergarten and Primary Grades

- Establishing consistent mature pencil grasp
- Graphic skills
- Copying complex forms
- In-hand manipulation skills
- Core strengthening
- Involvement in organized activities

Clinical Observations at 5 years

- Difficulty with kinesthetic regulation
- Difficulty stabilizing the body during movement or at rest
- Inadequate control of movements
- Poor balance between flexion and extension of body parts, poor stability
- Demonstrate difficulty planning, or executing a sequence of movements
- Difficulty imitating postures or understanding where body is in space
- Parents report that they are clumsy and accident prone
- Have difficulty with projected sequences that require timing
- Require more practice to acquire skills
- Have difficulty with slow, controlled movements but also with tasks that require speed and accuracy
Movement Assessment Battery for Children

- Normed test used age 4-5 years
- Used to diagnose Developmental Coordination Disorder (DCD)
- Identified most clinically useful assessment measure

The communication perspective of children born prematurely

- Communication is a social act with allows humans to interact with each other. We use language to share a message.
Infant communication

What we see
- They comprehend familiar sounds and can look for named items.
- They cry, vocalize
- They enjoy vocal and physical imitation routines
- They send their messages through sounds, facial expressions and body movements
- Their messages are clear and say
  - "I am hungry"
  - "I want you to look over here"
  - "I like what you are doing"

Infant communication

How we help
- Imitate, imitate, imitate
- Create a culture and environment of sound & vocal play.
- Observe, Wait, Listen (watch)
- Acknowledge your understanding of the message, verbally.
- Let them cry- it is practice- within reason
- Use simple language- parentese
- Take care of middle ear health

Great ideas for communication support

www.parentlinkalberta.ca
Toddler communication

What we see
- First words develop. Check the rate of word use and look for burst at 1.5 years
- They use language socially to interact, learn and enjoy other children.
- These kids are so cute that we often think they are great communicators, but they are often small and we need to consider their age when judging abilities.
- Grammar (syntax) is often the main area of difficulty. Systematic, rule based behaviour.
- A mild delay by test scores needs to be taken seriously. These kids are at risk for difficulties and they are starting to show delays. Don’t assume they will grow out of it or catch up on their own.
- No reports that the incidence of articulation or phonological difficulties are more common in premature children.

How to help
- Challenge, challenge, challenge
- Don’t be so smart and helpful
- Balance between modeling and commentating
- Offer choices to encourage word use
- Set up regular routines
- Break all the rules
- Have fun with language through songs, books and rhymes.
- Use emphasis on your corrected models to make errors more salient.
- Use natural consequences when there are communication breakdowns

School age communication

What we see
- These children often do well enough on formal tests to score normally.
- Some still having difficulties in syntax
- Higher level language use is often the area of concern.
  • Narrative development appears to be one area that can be difficult
- Pragmatics difficulties are starting to emerge
  • Non-verbal learning disorders?
Video Clip

– the man pushes the stroller …with the baby side, and a car.
– and a guy with a _____ shirt
– and a girl skipping rope
– and a girl with a ball
– and playing ball
– even if it’s?…you have to have a 4 or a blue?
– it can be blue, just not a four?

School age communication

How to help
– Use open ended questions to encourage discussion.
– Read books, discuss story structure, copy stories.
– Play word games that compare, contrast, rhyme, segment words.
– Encourage direction giving activities
– Continue to place natural consequences on poor communication attempts.

Where is help available for children that are born prematurely?

Sometimes parents can self refer for services

- Some communities have early intervention programs that parents can access for assistance with general child development support
  - Speech and Language pathology assessments are available in each health region. Some health regions have OT services available for the preschool child available through community speech services.
  - Private services are also available, for both OT and SLP with less wait time.
- You may have some coverage under your medical insurance.
- These assessments will allow referrals to programs/treatment and may include funding.
  - Program Unit Funding (PUF)
    - Need to qualify with severe communication delay or moderate delay in both SLP and OT
    - Funding can be used to attend a special needs preschool program or qualified community preschool programs, or provide home programs with staff.
Where is help available for children that are born prematurely?

Sometimes a doctor or pediatrician needs to refer.
- When a physician sees an overall delay referrals can be made for
  - Further assessment
    - Child Development Clinic
  - Treatment and support programs
    - Early Intervention programs
    - Infant Team
    - Child Development

Other community programs
- Any time a child spends time with peers they are seeing good models of development.
- Your doctor can help you with concerns about exposure to infections.
- Spend time with your child enjoying what the family likes to do.
  - Alberta’s parent link centres have people available to assist you with finding programs to fit your families needs.

Parents as advocates
- You are the most knowledgeable person regarding your child.
  - You know their strengths and weaknesses
- You must inform the people that are caring for your preterm child that any suspected delays need to be dealt with immediately.
- Taking a “wait and see” approach with a child who is at high risk for difficulties does not make sense.
Web site resources

- www.aboutkidshealth.ca/PrematureBabies
  - Toronto Sick Kids information on premature children
- www.parentlinkalberta.ca
  - Highlights the needs and issues of premature children in Alberta
- www.agmp.ca
  - Alberta regional language pathologists in Alberta that provide services on a private practice basis
- www.acspla.ca
  - Speech and Language Pathology Foundation of Canada
- www.caspca.ca
  - Canadian Speech-Language Pathology Association
- www.talkbox.ca
  - Excellent information on communication development, with activities and suggestions for parents and caregivers
- www.asapp.ca
  - Lists the speech language pathologists in Alberta that provide services on a private practice basis
- www.acspla.ca
  - Provided by the College of SLP’s in Alberta. Has information on speech and language development.
- www.caslpa.ca
  - Canadian SLP website
- www.calgaryhealthregion.ca
  - Follow services - speech language pathology and then preschool program links to get information for self referral for services in Calgary
- www.saot.ca
  - Lists the occupational therapists in Alberta that provide services on a private practice basis

References

- Bradford, N. Your premature baby, the first five years. Firefly Books, Toronto 2003