NATIONAL GUIDELINE FOR FOLLOW-UP CARE OF "AT-RISK" NEONATES AFTER DISCHARGE FROM HOSPITAL

Ministry of Health

Male', Republic of Maldives

National guideline for follow-up care of “at-risk” neonates after discharge from hospital

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1. Introduction

With improvements in survival of extreme preterm neonates, and those neonates who had a stormy neonatal period, there are more babies at risk of developmental disabilities. These complications include neuro-developmental delays, cognitive and learning issues, cerebral palsy, blindness, and deafness.

For the care of high-risk children, we need to have a multidisciplinary approach. Timely intervention to modify the risk and disease condition is important. Knowledge and understanding among health workers and parents are crucial to seek and offer the medical and surgical interventions and therapies that can prevent and improve child’s condition. The aim is to bring the child’s full potential later in life.

It is also important to study the long-term outcome of risk babies to understand, assess and improve the program. Survival and morbidity data are also important when counselling parents and planning interventions for each specific gestation age and birth weight.

2. Scope

This guideline is intended to be used by health professionals who are managing at risk neonates during the initial and follow up care. There will be some services that might not be available in some peripheral centres. However, this guideline gives easier and feasible methods to categorise the neonate into risk categories. The guideline can be used in all levels of health care including the health centres and tertiary hospitals.

Developmental assessment here covers up to corrected age of 3 years.

3. Aims

The aims of regular follow-ups for high-risk neonates are:

1. Ensure appropriate ongoing care for the neonate following discharge from the hospital.
2. Identify neurodevelopmental and neurosensory difficulties and facilitate appropriate interventions that will optimize the child’s development.
3. Coordinate the care with practitioners and social support groups who are responsible for the care of these infants with acute and chronic needs.
4. Study the outcomes of high-risk neonates as an ongoing audit of overall care of neonates and infants at risk.

4. Definition

A neonate/infant at risk is not well defined. However, it is understood that maternal, placental and infant conditions can pose immediate and long-term risks for growth and neurodevelopment. These conditions include following.

1. Prematurity
2. Small or large for gestational age
3. Syndromic and dysmorphic babies
4. Significant birth defects that impair child’s health especially brain anomalies
5. Significant medical conditions that may lead to long term complications (e.g., those received mechanical ventilation, very high bilirubin level near exchange level, meningitis, intracranial haemorrhage, encephalopathy, recurrent hypoglycaemia, hypothyroidism, TORCH infection, neural tube defects, clubfoot, cleft lip and palate, chromosomal anomalies, multiple congenital defects etc)
6. Social detrimental conditions
7. Maternal substance abuse

5. Personnel

Managing high-risk neonate and family needs a multidisciplinary team. It consists of and not limited to the following.

1. Neonatologist and Paediatrician
2. Developmental paediatrician
3. Neurologists
4. Therapists (Speech, occupational and physical)
5. Educational specialists (school and behavioural therapists/psychologists)
6. Social workers
7. Nutritionists

6. Risk categorization before discharge from hospital

Many newborns are discharged from hospital after routine care. These are well babies and will be followed monthly in well baby clinic for growth, development, and vaccination.

Before discharge of all sick newborns that required admission for treatment in hospital (other than routine care) should be assessed for risks of neurodevelopment. Use Table1 (see annex) to categorize the newborn into mild, moderate and high risk. Growth can also be affected with surgical conditions such as diaphragmatic hernia, gastrointestinal anomalies etc. These children will also be required to monitor growth parameters (weight, height and occipitofrontal circumference (OFC)).

It is very important to inform parents and care takers the risk factors detected and empower them to engage them for monitoring and consult regularly in follow ups of the child.

7. Discharge plan

During hospital stay parents should be included in the care of the baby. This include both medical and non-medical care. It is to ensure parents are aware and equipped for the treatments and manage day to day tasks of the baby at home.

All the babies should be assessed for the following. If a certain service is not available, it should be arranged with other centres.

Assessment before discharge

1. Medical and neurological examination. Look for signs of dysmorphism. Examine the hip for developmental dysplasia (DDH).
2. Screen for critical congenital heart disease
3. Radiological assessments such as ultrasound cranium and other scans that was found to be abnormal from antenatal scan
4. Retinopathy of prematurity (ROP) screening for those born before 32 weeks of gestation and who are at risk for developing ROP (Refer to ROP guideline from Ministry of Health)
5. Hearing screening (BERA)
6. Screening for congenital hypothyroidism (if metabolic screening is available do metabolic screening)
7. Screening for metabolic disorders
8. Assessment of parent coping and family support (If required, involve family protection unit and state care)

Discharge summary

Discharge summary must include risk factors for the growth and developmental abnormalities. Details of hospital stay and treatment provided are critical information. The following should be included in discharge summary.

1. Diagnosis including risk factors (Factors mentioned in table 1), all medical issues, treatment and opinions from referred specialities.
2. Maternal risk factors
3. Neonatal findings and risk factors that may risk next pregnancy outcome (e.g.; Group B streptococci sepsis in neonate and genetic disorders etc.)
4. Gestational age and weight at birth, discharge weight and discharge head circumference
5. Respiratory therapy received including days on ventilation, CPAP, oxygen and when baby was off oxygen.
6. All investigations done in hospital (haematological, metabolic screen, thyroid screen and G6PD status, culture results of Blood, urine, exudates) need to be attached.

7. Details of transfusions, exchange transfusions and procedures (umbilical catheters and long lines)
8. Results of ROP screen, hearing screen, radiological investigations (ultrasound cranium, echocardiography, and other scans),
9. Immunization status
10. Feeding method, supplements, fortifiers, and plan for feed increments.
11. Early intervention techniques to simulate five senses (to be taught before discharge).

8. Managing follow up program.

Every hospital should have a written protocol for high-risk clinic and a way to coordinate with higher centres.

Every baby at risk for growth and developmental abnormalities should be followed at least for 3 years until it is sure that child has achieved milestones at appropriate age. It should be emphasized to the parents that improving compliance of follow up is necessary for early intervention. Baby can be followed with a paediatrician in any health institution and referred to higher centre if necessary.

To make follow-ups easy for the family, it is important to coordinate with different specialists who are involved in the care of the child. Quite often different therapies are required which include speech therapy, occupation therapy and physiotherapy. This should also be done even for babies who are residing in islands. The local doctor should communicate with specialist in the referral centres to minimize the burden on family on arranging the required service.

Growth, development, and immunization status should be checked in every visit. Information on vaccination and developmental assessment for corrected.

Continuation of care must be facilitated.

In each visit, a plan for next visit and purpose should be documented and explained to parents.

First follow up should be arranged within 10 days of discharge and it is responsibility of the person writing the discharge summary to arrange it.

9. Follow up clinics (OPD).

A neonate may look normal in the initial evaluation or in early stage of disabilities. A proactive approach should be used to detect early sign and symptoms of developmental disabilities and growth abnormalities and nutritional deficiencies. Ideally high-risk babies should be offered expert

evaluation by paediatrician, therapist, radiologist, ophthalmologist, audiologist, physiotherapist, social worker, and dietician.

All moderate to high-risk babies should be given appointment to paediatrician. Atoll and regional hospitals should run a high-risk clinic.

In follow up clinics, information should be provided to parents regarding effective early communication and interactions with their preterm and sick infants which will improve early attachment and bonding and maximising speech, language, and communication outcomes post discharge and beyond into early childhood.

Paediatric assessments focus on growth, nutrition, hearing, vision, development, medical issues (e.g. lungs, cardiac) and family wellbeing.

Early detection of cerebral palsy (CP) in infants with risks and younger than 6 months (corrected age in case of prematurity) need to use a combination of history, standardised motor assessment and, neuroimaging.

Evaluation in follow up clinics

Timing of assessment

The first 1000 days are the most important days of brain development. At early infancy below 6 months neurological evaluation should be done monthly and later 6 monthly and then yearly till at least 32 years of corrected age.

A usual visit times can be as follows:

- 3-6 weeks of corrected age
- 4 months of corrected age
- 8 months of corrected age
- 12 months of corrected age
- 18 months/24 months of corrected age
- 36 months of corrected age

Screening procedures and tools

In every visit to clinic the following must be checked, measured, documented, and assessed.

Corrected age

Corrected age is used for preterm babies only. Those who are born less than 37 weeks of gestation until 3 years of corrected age.

Corrected age in weeks = Chronological age in weeks – (40 – gestational age in weeks at birth)

For e.g. A preterm born 32 weeks. Currently after birth is 3 months (12 weeks).

Corrected age in weeks = 12 – (40-32) = 4 weeks, which is 1 month now in terms of corrected age.

Assessment in risk clinic

Gross motor, fine motor, language, and social skills need to be evaluated separately. The screening tests that are used in OPD are designed in a way that even general paediatrician or medical officers can use it to pick the children at risk of delays.

1. Head circumference (OFC)
    a. Marked increase in head circumference compared to other parameters need to evaluate especially for signs of hydrocephalus.
2. Weight (compared to corrected age and centile).
    a. A poor weight gain could be associated with inability to feed due to neurological or structural abnormalities.
3. Height (compared to age and centile).
    a. A poor growth in length and height shows significant nutritional impairment.
4. Evaluation of feeding and nutritional supplements
    a. Term formula is advised once the baby is more than 32 weeks of corrected gestational age.
    b. Human milk fortifier is stopped once the baby reaches 1.8 kg and is ready to go home.
    c. Calcium and multivitamins are supplemented until at least 3 months of chronological age.
    d. Vitamin D, (400 units daily) in all at risk patients and iron supplements at 2-3mg/kg/day is advised until baby is 1 year of chronological age.
5. Birth dose of hepatitis B is administered within 24 hrs of life, irrespective of weight and gestation. BCG is administered once baby is 1.8kg. Other vaccines are administered according to chronological age after 4 weeks from BCG vaccination.
6. Neurodevelopmental assessment. It can be done using Hammer Smith or Amiel-Tisen charts (see annex).
    a. Assessment of tone is very important. Compare the tone in upper limb and lower limb.

   b. Assess the primitive reflexes and its persistence.
7. Evaluation for chronic lung disease and gastro oesophageal reflux disease.
8. Radiological examination of cranium. All scans need to be reviewed and do follow up scans if previous ones are abnormal.
9. Parental concerns in foetus should be addressed and evaluated.

10. Children with special devices and procedures

Some babies might be on devices in situ, such as tracheostomy, gastrostomy, ileostomy etc. Parents should be empowered to take care of the devices. Some of these devices may not be available in Maldives and will need to be arranged when a reinsertion or revision is required.

11. Revision of diagnosis

During the initial admission and workup, there might be diagnosis that were not obvious or missed. It is important to look for causes such as genetic, metabolic, and neuromuscular disorders etc, that may lead to neurological abnormality. Work up should be done including investigations that might require sending blood abroad or refer to other subspecialities (local and abroad).

At each visit the clinician should check for signs and symptoms of neuro-developmental problems. Red flags mentioned in annex should be checked.

1. Cerebral Palsy (CP), Motor problems and Global developmental delay and learning disability (intellectual disability); Early signs of CP include hand preference, stiffness or tightness in the legs, inability to sit by 9 months, persistent fisting of hands beyond 4 months, and delayed or asymmetrical movements of limbs.

2. Speech, language, and communication problems
3. Visual and hearing impairment
4. Feeding problems
5. Sleep problems, including sleep apnoea.
6. problems with communication, autism spectrum disorders, inattention), impulsivity or hyperactivity, emotional and behavioural problems, executive function problems, and potential special educational needs.

12. Early intervention.

Early intervention is necessary for improving neurodevelopmental outcome. It should be started while in hospital depending on the baby’s condition and what is required. For those who are found a delay within 1 to 3 months period early intervention at home is necessary and a follow up is mandatory in 1to 3 months. If no improvement, therapy should be started accordingly. Special arrangements for babies living in islands with no such facilities need to be made.

13. Red flags of infant toddler development

The following are red flags of development that needs further evaluation and management under paediatrician.

Age	**Developmental assessment**
4 months	Is not gazing at objects; Does not tune out repetitive sounds; Does not move eyes to follow sound, Does not respond to loud sounds, Does not coo or make sounds, When lying on back: keeps hands fisted and lacks arm movements; is not bringing hands to mouth; lacks symmetrical arm movements; Does not turn head to follow a toy or face When lying on tummy: has difficulty lifting head; stiff legs with little or no movement; When lying on back: head is not in midline, Does not cry when upset; Does not smile at people
6 months	Does not look at self in mirror; Does not try to reach for objects; Does not bang objects; Does not respond to sounds; Does not make vowel sounds; Does not laugh or squeal, When lying on back: does not reach for a toy; has unsymmetrical arm or leg movements; when seated is not reaching to grasp toys; not yet able to eat from a spoon When seated: poor head control and rounded back; When lying on back: does not brings arm forward; arches back and stiffens legs; is not rolling; When held in a standing position: stiff legs; arms held back behind body. No joyful expressions; does not cry when upset; does not show affection toward caregivers; parent ignores or misreads child’s cues
9 months	Does not explore toys with eyes, hands, or mouth Does not look where you point; does not respond to own name or does not appear to know name Does not use repetitive consonant vowel combinations (dadada) Is not using both arms or predominately using one hand; does not pass toys from one hand to the other; is not voluntarily releasing objects Uses only one side of the body to move; has difficulty crawling; when held in a standing

	position cannot support weight on legs or does not have a straight back Failure to thrive with no medical reason; lack of smiling with primary caregiver; child is not comforted by physical contact; child does not show wariness of a stranger; child does not seek proximity to a parent when distressed
12 months	Does not search for things s/he sees you hide Is not pointing or waving byebye No babbling When seated: stiffly extended arms; is not pointing; is not holding a cup or feeding self with finger foods Difficulty getting to a standing position because of stiff legs; when seated sits with weight to one side or uses hands to maintain a seated position. Poor balance when standing; is not crawling Child does not seek out parent when distressed; child is not wary of a stranger; child does not explore a new environment in the caregiver’s presence; parent punishes child’s distress; no babbling
18 months	Does not know what familiar things are for (e.g.: spoon, cup, comb) Does not point to show you things; is not copying others Does have at least 6 words; is not using multiple syllables when babbling (b aba ba); does not produce more consonants than vowels Is not able to stack two blocks; does not help with dressing; is not scribbling with crayons; not using a pincer grasp (thumb and pointer finger) No signs of walking; walks on toes Overly friendly with strangers; child avoids parent when distressed; parent ignores or punishes emotions
2 years	Does not understand simple instructions Is not using spontaneous 2-word phrases; is not copying words Is not able to eat with a spoon; does not take off own shoes and socks Not walking steadily; walks on toes; very clumsy
3 years	Attention difficulties; does not know shapes or colours; trouble learning numbers and alphabet Has unclear speech; does not speak in sentences; difficulty rhyming words Is unable to dress and undress self; cannot unscrew a jar lid Has a lot of trouble with stairs and balance (note: serious motor delays are typically seen before 18 months)

14. What to do for those who found to be abnormal in development?

All screened children with developmental delays need to be referred to specialties that can take care of the condition. Changes including home environment and special care for the child need to be assessed and discussed. Speech, occupational, physio and other relevant therapies should be initiated according to delays in development.

Specific interventions include medications and physiotherapy for motor impairment and hypertonia, speech delays, orthopaedic management for developmental dysplasia of hip join, ophthalmology intervention for squint correction, behaviour therapy and pharmacotherapy for behavioural disorders and learning disabilities.

15. Social and financial support

All the medical cost are covered by government insurance policy Aasandha. Arrangements such as providing documents to national social protection agency (NSPA) should be provided to parents. These documents might be annually refreshed according to NSPA protocols. Family protection unit (FPU) of the hospital also will guide parents in these proceedings.

16. Tools for neurodevelopmental assessment

Child’s milestones should be assessed using any of the following.

1. The Communication and Symbolic Behaviour Scales Developmental Profile Infant Toddler Checklist
    a. It can be downloaded from https://brookespublishing.com/wp-content/uploads/2012/06/csbs-dp-itc.pdf
    b. It enables to take an early look at a collection of 7 key predictors of later language delays.
    c. It is used with infants and toddlers whose functional communication age is between 6 months and 24 months (chronological age from about 6 months to 6 years)
    d. It can be completed by caregivers and professionals trained to assess young children (e.g., speech-language pathologists, early interventionists, or psychologists);
    e. Professionals scoring takes 5–10 minutes to complete
2. Bayley Scales of Infant Toddler Development IV
    a. Its test is designed to be used with children ages 1 to 42 months. It consists of five scales: Cognitive, Language (Receptive and Expressive), Motor (Fine and Gross), Social-Emotional, and Adaptive Behaviour (Conceptual, Social, and Practical)
    b. It can be assessed from https://www.pearsonassessments.com/store/usassessments/en/Store/Professional-Assessments/Cognition-%26-Neuro/Bayley-Scales-of-Infant-and-Toddler-Development-%7C-Fourth-Edition/p/100001996.html
3. Denver II
    a. It is used to check for the four domains of development.

17. References

Agrawal, S., Rao S. C., Bulsara, M. K., & Patole, S. K. (2018). Prevalence of autism spectrum disorder in preterm infants: A meta-analysis. *Pediatrics,142(3)*: e20180134.

American Academy of paediatrics, Joint Committee on Infant Hearing. Year 2007 position statement: Principles and guidelines for early hearing detection and intervention programs. *paediatrics, 120(4):*898– 921.

Barrington, K. J., Saigal, S. (2006). Long-term caring for neonates. *Paediatric Child Health, 11(5):*265–66.

Bayley, N., and Bayley, A. G. (2006). Scales of Infant Toddler Development Fourth Edition (Bayley-4) 2019 Retrieved from: https://www.pearsonassessments.com/store/usassessments/en/Store/ProfessionalAssessments/Cognition-%26-Neuro/Bayley-Scales-of-Infant-and-Toddler-Development-%7C-FourthEdition/p/100001996.html.

Bélanger, S.A., Caron, J. (2018). Evaluation of the child with global developmental delay and intellectual disability. *Paediatric Child Health, 23(6):*403-10.

Doyle, L. (2014). Long term follows up of high-risk children: who, why and how? *Paediatrics.*1-15.

Doyle, L. W., and Anderson, P. J. (2016). Do we need to correct age for prematurity when assessing children? *Journal of Paediatrics, 173*:11–12.

Jefferies, A. L. (2016). Retinopathy of prematurity: An update on screening and management Canadian Paediatric Society, Fetus and Newborn Committee. *Paediatric Child Health, 21(2):*101–04

Lee, S. K., Beltempo, M., and McMillan, D.D. (2020). Outcomes and care practices for preterm infants born at less than 33 weeks’ gestation: A quality-improvement study. *Canadian Medical Association Journal, 192(4),* E81–E91.

Novak, I., Morgan, C., Adde, L, Blackman, J., Boyd, R. N., Brunstrom-Hernandez, J. (2017). Early, accurate diagnosis and early intervention in cerebral palsy: Advances in diagnosis and treatment. *Journal of American Medical Association, 171(9*), 897-907

Prizant. B., Wetherby, A. Communication and Symbolic Behaviour Scales Developmental Profile Infant Toddler Checklist (CSBS DPTM ITC): Paul H Brookes Publishing; retrieved from: https://brookespublishing.com/products/csbs-dp-itc/.

Sharp, M., Coenen, A., and Amery, N. (2018). General movement assessment and motor optimality score in extremely preterm infants, *Early Human Development, 124,* 38-41, ISSN 0378-3782,https://doi.org/10.1016/j.earlhumdev.2018.08.006.

Stacks. A. (nd). Infant Toddler Developmental Red Flags; Ann Stacks PhD, WSU, Merrill Palmer Skillman Institute, 71 East Ferry Detroit, MI 48202. Retrieved from https://www.courts.michigan.gov/4a2bc8/siteassets/educational-materials/cws/supplemental-handouts/developmental-red-flags-birth-to-age-5.pdf

Unger, S. L., Fenton, T. R., Jetty, R., Critch, J. N., and O’Connor, D. L. (2019. Iron requirements in the first 2 years of life. *Paediatric Child Health, 24(8),* 555–56.

Annex

Table 1; Risk Categories for Neurodevelopmental Outcomes

	Mild risk	**Moderate risk**	**High risk**
Gestation	33-34weeks	30-32 weeks	<30 weeks
Birth weight	>1500 gm	1250-1499 gm	<1250 gm
Fetal Growth Restriction	None	Fetal growth 3^{rd} -10^{th} centile	Fetal growth <3^{rd} centile
Intra-uterine insults	None	Abnormal NST BPP<5 Maternal fever pPROM Dichorionic twins	Severe maternal pre-eclampsia (seizures) Monochorionic twins/triplets or higher order Clinical chorioamnionitis Cord prolapses Abruption placenta AEDF, reversal EDF
Antenatal steroids (ANS)	Completed	Incomplete course or 24 hours not elapsed from last dose	No ANS
Antenatal MgSO4 (<35wk)			Not received
Need for resuscitation at birth		PPV	Chest compressions, Epinephrine
APGAR		4 to 5 at any minute	<3 at any minute
Need for ventilation		Ventilation with normal blood gases and no air leaks	Ventilation abnormal blood gases and air leaks
Days on ventilator / CPAP		/	/
Number of Days with in situ Feeding Tube;		2 -3weeks	>3weeks
Seizures			seizure requiring > 1 antiseizure medication
Shock	Saline bolus	Inotropes	Steroids
Hypoglycaemia		Hypoglycaemia (asymptomatic)	Symptomatic hypoglycaemia
Blood sugars mg/dl, duration		32-46, less than 4 days	<32, 5 or more days
Neurosonogram/MRI		IVH < grade III	Grade III IVH or IPE in NICU or ventriculomegaly, PVL at 36-40 weeks

Infection		Sepsis	Sepsis with hypotension/Meningitis
NNJ	PT	ET	BIND (MRI/BERA/Clinical)
Hypothyroidism		Hypothyroidism	Treatment delayed or not normalized by one month)

Flow chart 1; Algorithm for follow up of at-risk neonates

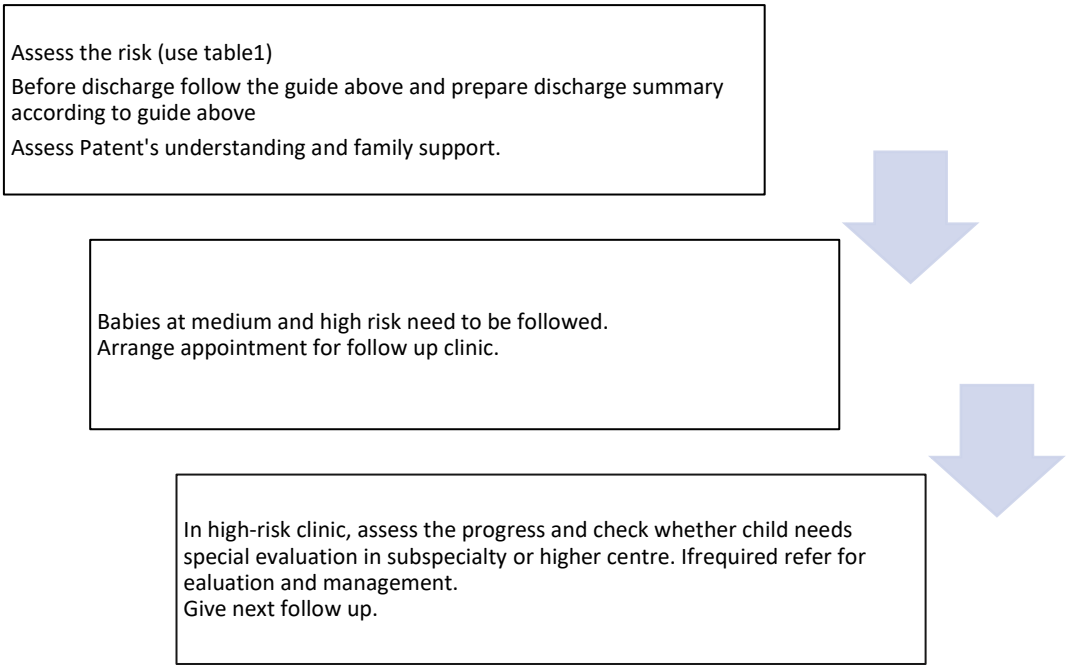
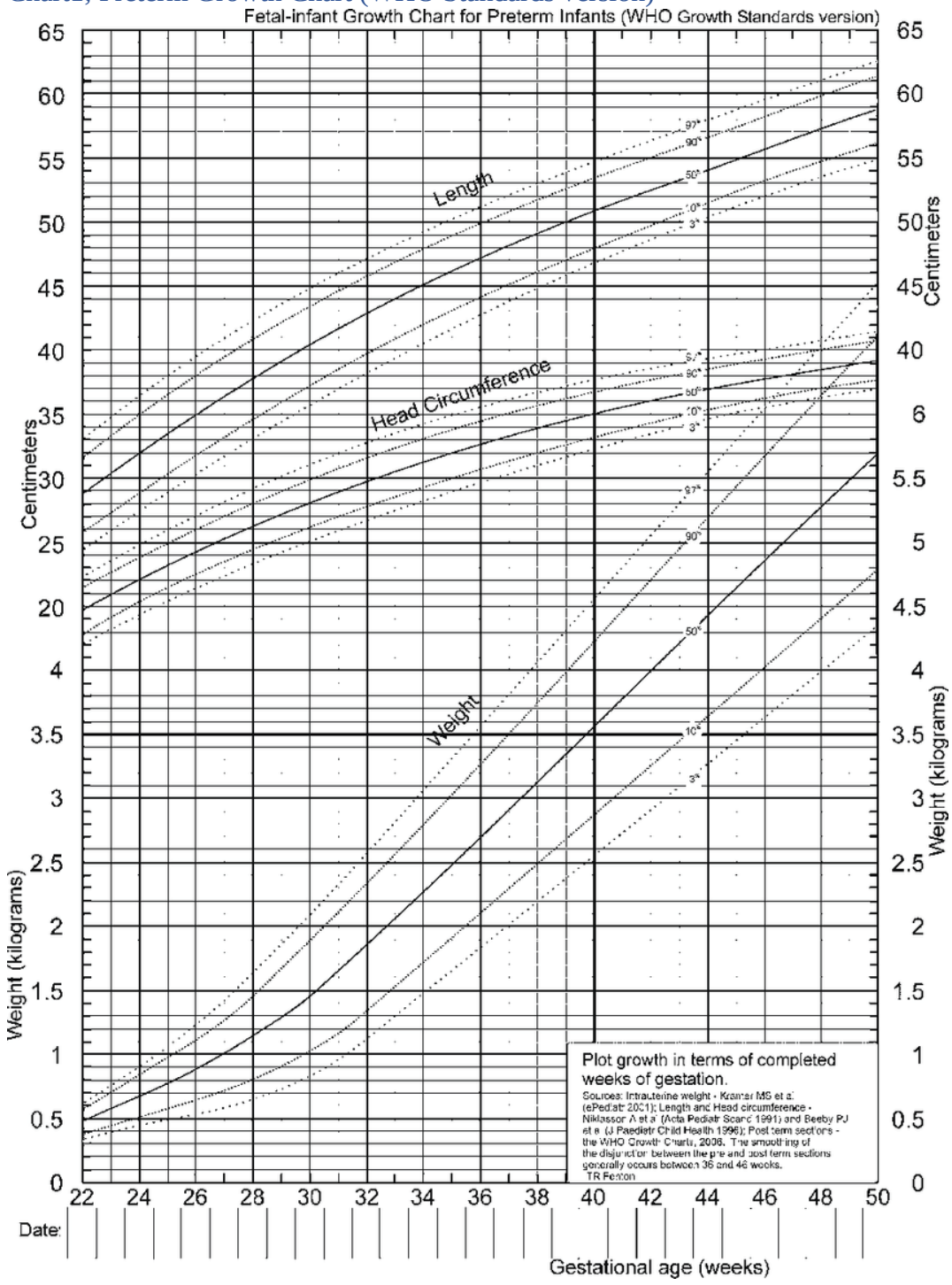
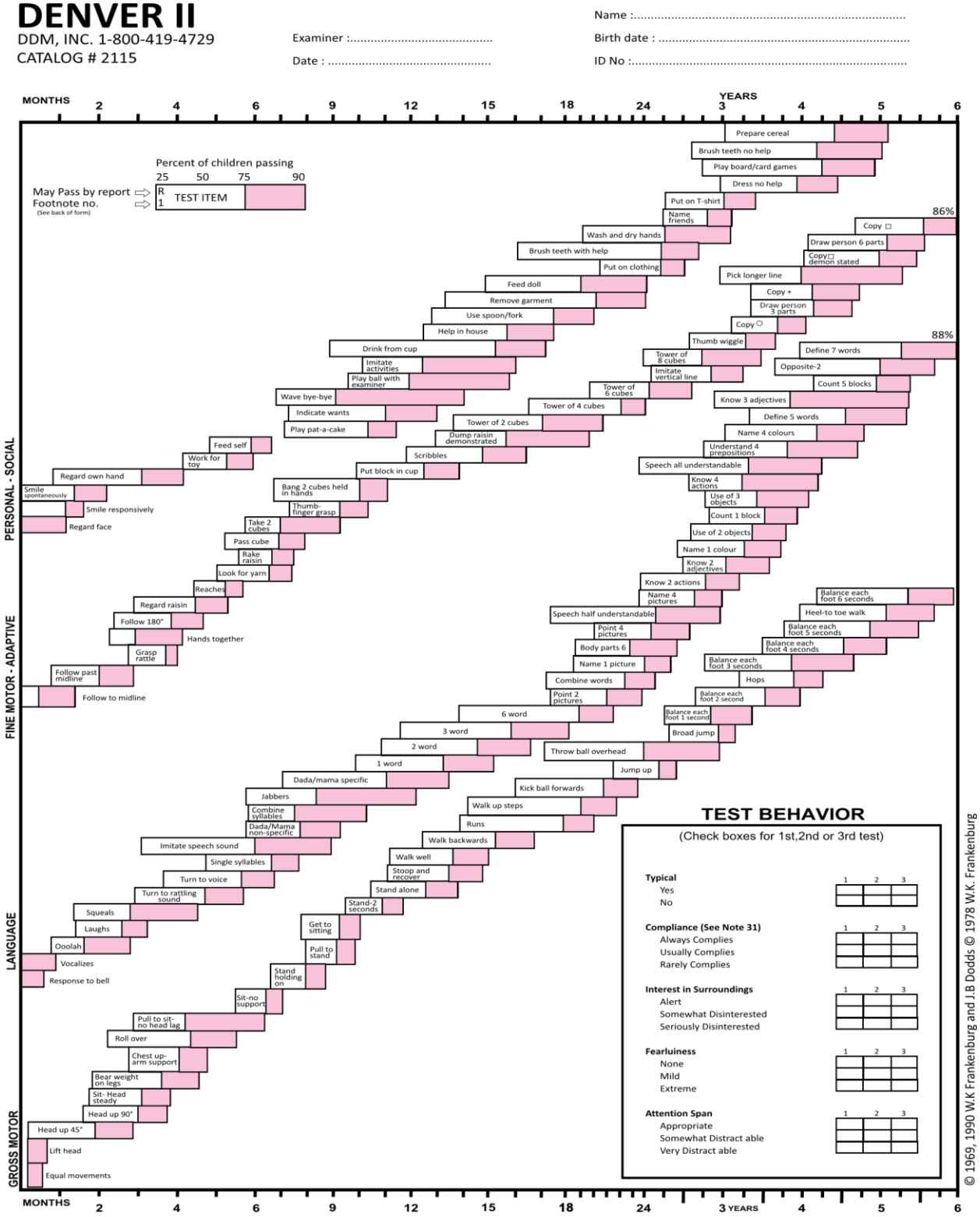


Chart1; Preterm Growth Chart (WHO Standards version)



Denver II


DENVER II
DDM, INC. 1-800-419-4729
CATALOG # 2115
Examiner :.....
Date : .....
Name :.....
Birth date : .....
ID No :.....
MONTHS 2 4 6 9 12 15 18 24
YEARS 3 4 5 6
Percent of children passing
25 50 75 90
May Pass by report
Footnote no.
(See back of form)
R
1
TEST ITEM
PERSONAL - SOCIAL
FINE MOTOR - ADAPTIVE
LANGUAGE
GROSS MOTOR
Prepare cereal
Brush teeth no help
Play board/card games
Dress no help
Put on T-shirt
Name friends
Wash and dry hands
Brush teeth with help
Put on clothing
Feed doll
Remove garment
Use spoon/fork
Help in house
Drink from cup
Imitate activities
Play ball with examiner
Wave bye-bye
Indicate wants
Play pat-a-cake
Feed self
Work for toy
Regard own hand
Smile spontaneously
Smile responsively
Regard face
Bang 2 cubes held in hands
Thumb-finger grasp
Take 2 cubes
Pass cube
Rake raisin
Look for yarn
Reaches
Regard raisin
Follow 180°
Hands together
Grasp rattle
Follow past midline
Follow to midline
Put block in cup
Scribbles
Dump raisin demonstrated
Tower of 2 cubes
Tower of 4 cubes
Tower of 6 cubes
Tower of 8 cubes
Imitate vertical line
Thumb wiggle
Copy ○
Draw person 3 parts
Copy +
Pick longer line
Copy□ demon stated
Draw person 6 parts
Copy □
86%
Define 7 words
Opposite-2
Count 5 blocks
Know 3 adjectives
Define 5 words
Name 4 colours
Understand 4 prepositions
Speech all understandable
Know 4 actions
Use of 3 objects
Count 1 block
Use of 2 objects
Name 1 colour
Know 2 adjectives
Know 2 actions
Name 4 pictures
Speech half understandable
Point 4 pictures
Body parts 6
Name 1 picture
Combine words
Point 2 pictures
6 word
3 word
2 word
1 word
Dada/mama specific
Jabbers
Combine syllables
Dada/Mama non-specific
Imitate speech sound
Single syllables
Turn to voice
Turn to rattling sound
Squeals
Laughs
Ooolah
Vocalizes
Response to bell
Get to sitting
Pull to stand
Stand holding on
Sit-no support
Pull to sit-no head lag
Roll over
Chest up-arm support
Bear weight on legs
Sit- Head steady
Head up 90°
Head up 45°
Lift head
Equal movements
Balance each foot 6 seconds
Heel-to toe walk
Balance each foot 5 seconds
Balance each foot 4 seconds
Balance each foot 3 seconds
Hops
Balance each foot 2 second
Balance each foot 1 second
Broad jump
Throw ball overhead
Jump up
Kick ball forwards
Walk up steps
Runs
Walk backwards
Walk well
Stoop and recover
Stand alone
Stand-2 seconds
TEST BEHAVIOR
(Check boxes for 1st,2nd or 3rd test)
Typical
Yes
No
Compliance (See Note 31)
Always Complies
Usually Complies
Rarely Complies
Interest in Surroundings
Alert
Somewhat Disinterested
Seriously Disinterested
Fearluiness
None
Mild
Extreme
Attention Span
Appropriate
Somewhat Distract able
Very Distract able
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NEUROLOGICAL EXAMINATION

ASSESSMENT OF CRANIAL NERVE FUNCTION

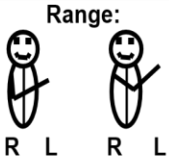
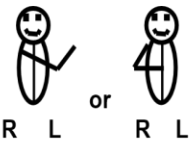
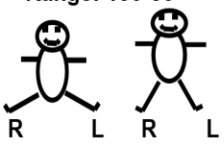
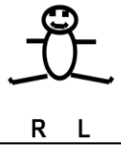
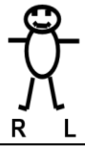
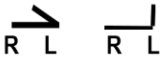
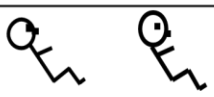
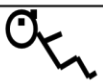
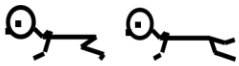
	score 3	**2**	**score 1**	**score 0**	**score**	**Asymmetry / Comments**
Facial appearance (at rest and when crying or stimulated)	Smiles or reacts to stimuli by closing eyes and grimacing		Closes eyes but not tightly, poor facial expression	Expressionless, does not react to stimuli		
Eye movements	Normal conjugate eye movements		**Intermittent** Deviation of eyes or abnormal movements	**Continuous** Deviation of eyes or abnormal movements		
Visual response Test ability to follow a black/white target	Follows the target in a complete arc		Follows target in an incomplete or asymmetrical arc	Does not follow the target		
Auditory response Test the response to a rattle	Reacts to stimuli from both sides		Doubtful reaction to stimuli or asymmetry of response	No response		
Sucking/swallowing Watch infant suck on breast or bottle. If older, ask about feeding, assoc. cough, excessive dribbling	Good suck and swallowing		Poor suck and/or swallow	No sucking reflex, no swallowing		

ASSESSMENT OF POSTURE (note any asymmetries)

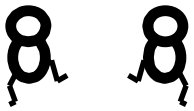
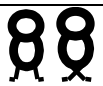
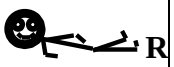
ASSESSMENT OF MOVEMENTS

	Score 3	**Score 2**	**Score 1**	**Score 0**	score	Asymmetry / comments
Quantity Watch infant lying in supine	Normal		Excessive or sluggish	Minimal or none		
Quality Observe infant’s spontaneous voluntary motor activity during the course of the assessment	Free, alternating, and smooth		Jerky Slight tremor	• Cramped & synchronous • Extensor spasms • Athetoid • Ataxic • Very tremulous • Myoclonic spasm Dystonic movement		

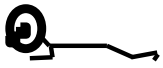
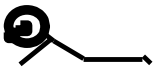
Assessment of Tone

	Score 3	Score 2	Score 1	Score 0	sc	Asym/Co
Scarf sign Take the infant's hand and pull the arm across the chest until there is resistance. Note the position of the elbow in relation to the midline.	**Range:** 					
Passive shoulder elevation Lift arm up alongside infant's head. Note resistance at shoulder and elbow.	Resistance overcomeable 	Resistance difficult to overcome R L	No resistance 	Resistance, not overcomeable 		
Pronation/supination Steady the upper arm while pronating and supinating forearm, note resistance	Full pronation and supination, no resistance		Resistance to full pronation / supination overcomeable	Full pronation and supination not possible, marked resistance		
Hip adductors With both the infant's legs extended, abduct them as far as possible. The angle formed by the legs is noted.	**Range: 150-80°** 	**150-160°** 	**>170°** 	**<80°** 		
Popliteal angle Keeping the infant's bottom on the bed, flex both hips onto the abdomen, then extend the knees until there is resistance. Note the angle between upper and lower leg.	**Range: 150°-100°** 	**150-160°** 	**~90° or > 170°** 	**<80°** 		
Ankle dorsiflexion With knee extended, dorsiflex the ankle. Note the angle between foot and leg.	**Range: 30°-85°** 	**20-30°** 	**<20°or 90°** 	**> 90°** 		
Pull to sit Pull infant to sit by the wrists. (support head if necessary)						
Ventral suspension Hold infant horizontally around trunk in ventral suspension; note position of back, limbs and head.						

REFLEXES AND REACTIONS

	Score 3	Score 2	Score 1	Score 0	sc	Asym / Co
Arm protection Pull the infant by one arm from the supine position (steady the contralateral hip) and note the reaction of arm on opposite side.	 Arm & hand extend **R** **L**		 Arm semi-flexed **R** **L**	 Arm fully flexed **R** **L**		
Vertical suspension hold infant under axilla making sure legs do not touch any surface – you may “tickle” feet to stimulate kicking.	 Kicks symmetrically		 Kicks one leg more or poor kicking	 No kicking even if stimulated or scissoring		
Lateral tilting (describe side up)**.** Hold infant up vertically near to hips and tilt sideways towards the horizontal. Note response of trunk, spine, limbs and head.	 **R** **L**	 **R** **L**	 **R** **L**	 **R** **L**		
Forward parachute Hold infant up vertically and quickly tilt forwards. Note reaction /Symmetry of arm responses,	 (after 6 months)		 (after 6 months)			
Tendon Reflexes Have child relaxed, sitting or lying – use small hammer	Easily elicitable biceps knee ankle	Mildly brisk **bicep** knee ankle	Brisk biceps knee ankle	Clonus or absent biceps knee ankle		

SECTION 2 MOTOR MILESTONES (not scored; note asymmetries)

Head control	Unable to maintain head upright normal to 3m	Wobbles normal up to 4m	Maintained upright all the time normal from 5m			**Please note age at which maximum skill is achieved**
Sitting	Cannot sit	With support at hips  normal at 4m	Props  normal at 6m	Stable sit  normal at 7-8m	Pivots (rotates)  normal at 9m	Observed: Reported (age):
Voluntary grasp – note side	No grasp	Uses whole hand	Index finger and thumb but immature grasp	Pincer grasp		Observed: Reported (age):
Ability to kick in supine	No kicking	Kicks horizontally but legs do not lift	Upward (vertically)  normal at 3m	Touches leg  normal at 4-5m	Touches toes  normal at 5-6m	Observed: Reported (age):
Rolling - note through which side(s)	No rolling	Rolling to side normal at 4m	Prone to supine normal at 6 m	Supine to prone normal at 6 m		Observed: Reported (age):
Crawling - note if bottom shuffling	Does not lift head	On elbows  normal at 3m	On outstretched hands  normal at 4m	Crawling flat on abdomen  normal at 8m	Crawling on hands and knees  normal at 10m	Observed: Reported (age):
Standing	Does not support weight	Supports weight normal at 4m	Stands with support normal at 7m	Stands unaided normal at 12m		Observed: Reported (age):
Walking		Bouncing normal at 6m	Cruising (walks holding on) normal at 12m	Walking independently normal by 15m		Observed: Reported (age):

SECTION 3 BEHAVIOUR (not scored)

	1	2	3	4	5	6	Comment
Conscious state	Unrousable	Drowsy	Sleep but wakes easily	Awake but no interest	Loses interest	Maintains interest	
Emotional state	Irritable, not consolable	Irritable, carer can console	Irritable when approached	Neither happy or unhappy	Happy and smiling		
Social orientation	Avoiding, withdrawn	Hesitant	Accepts approach	Friendly			