การติดตามทารกแรกเกิดที่มีปัจจัยเสี่ยง

High Risk Newborn Follow Up

รศ.พญ.จันท์ฑิตา พฤกษานานนท์

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20 กรกฎาคม 2554-DBP short course

at Pramongkut Hospital

Who needs to be followed
-Risk for adverse neurodevelopmental outcome

BIOLOGICAL RISK

PREMIES-

Micropremies (post conceptional age 22-24 wks)

ELBW (<=1000g and / or<=28 wk gestation)

VLBW (<=1500g)

SGA

neurologic problems

NEC, CLD, recurrent apnea+ bradycardia,

hyperbilirubinemia + Ex Tx

sepsis, meningitis

BIOLOGICAL RISK

***Term*-encephalopathy persisting at discharge**

- **neurologic problems**
- **SGA**
- **complex congenital anormalies**
- **sepsis, meningitis**
- **hyperbilirubinemia + Ex Tx**

INTERVENTIONS

resuscitation
postnatal steroids
high frequency ventilation
prolong ventilation > 7 days
total parenteral nutrition
surgical intervention for NEC, shunt

SOCIAL / ENVIRONMENTAL RISK

Low maternal education / teen mother

Low SES, low incomes

Single marital status

Drugs / alcohol abuse / cigarettes

Environmental stress

No prenatal care

Low parenting skills

(poor mother-child interaction)

OPTIMAL AGES OF ASSESSMENT

- 6-8 month corrected age
- 12 month corrected age
- 18-24 month corrected age
- 3- 4 years
- 6 years
- 8 years

MAJOR GOAL

- To provide an ongoing assessment of growth
- To evaluate adequacy of nutrition
- To deliver preventive care
- To assess sensory function, behavior, neurodevelopment
- To counseling & support for families
- To improve functional outcomes

ASSESSMENT OF GROWTH

Weight, length, HC

Accurate gestational age at birth

Corrected for gestational age until age 2 years

90% of VLBW

97% of ELBW are<=10th percentile for corrected age at discharge

growth in NICU influenced subsequence growth and neurodevelopmental outcomes

CORRECTING FOR PREMATURITY

HC	until 18 month postterm
Weight	24 months
Length	3.5 years

GROWTH IN NORMAL INFANT

	Weight	Length	HC
Last trimester	**208 gm/wk**	**1.1 cm /wk**	**0.75cm/wk**
Birth-3mo	**208 gm/wk**	**0.75cm/wk**	**0.5 cm/wk**
3-6mo	**208 gm/wk** 15-40 g/d →5-15 g/d by 12-18 mo	**0.5 cm/wk**	**0.25 cm/wk**

PREMATURE INFANT

→catch- up growth is not complete
until 2.5-3 years of age

Increase in HC, length, weight

Any infant
who is not approaching the lower percentiles
of the curve
or whose growth curve flatten
or decelerates,
the causes should be assessed.

POSTHEMORRHAGIC HYDROCEPHALUS

usually develops within the first weeks following birth
may be delayed as long as 17 months

Length : HC =1.42-1.48 : 1 catch-up

=1.12-1.32 : 1 pathologic nature

Rate of head growth:

Vary—gestational age, medical condition

If>1.25 cm / week →hydrocephalus

Ultrsonography-ventricular size is stable or declining

IUGR

PRIMARY GROWTH DEFICIENCY OF PRENATAL ONSET

Intrauterine infection, chromosome abnormality, congenital malformation

Growth- consistently low

SECONDARY GROWTH DEFICIENCY OF PRENATAL ONSET

Poor placental blood flow -placenta previa,
-maternal disorder--HT,DM

Catch-up growth by 9 month

Poor catch-up-→
poor neurodevelopmental outcome

PREMATURE INFANT→

developing brain is extremely vulnerable to injury

Long-term consequences - motor deficits—CP
developmental delay
cognitive, behavioral problem
subnormal academic achievement
hearing& vision impairment

Basal ganglia, hippocampus, periventricular white matter

CNS DISORDERS

Posthemorrhagic hydrocephalus

Postmeningitis hydrocephalus

Periventricular leukomalacia

Seizures

Risk—inversely proportional to gestational age

26% of infant with BW 501-750 g
12% 751-1000 g
→ more severe form of CNS hemorrhage

May need ventriculoperitonial shunt
infection, malfunctions
poor feeding, vomiting, irritability, lethargy, sleepiness, apnea, seizure

NEONATAL SEIZURE→

long-term psychomotor handicaps

Tx - phenobarbital

duration of Tx?

concerns that drug may hinder brain development

no signs & symptoms

EEG normal-off Tx

HIE-

Neonatal seizure

Placental abruption, uterine rupture,
prolonged cord compression
most often affects term neonate

Recurrence of seizure many months
after anticonvulsant are discontinued

NEUROLOGIC EXAMINATION

Gross motor function

Tone ,reflexes, cerebellar function, cranial nerve ,language

Observe- posture, movement, quality of movement

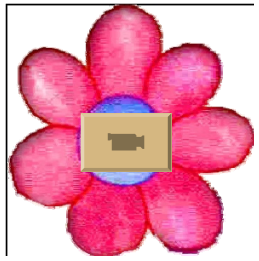
The Gross Motor Functional Classification System (GMFCS) 5 level

Dev Med Child Neurol 2000;42:292-296

Dystonia in preterm infant peak at 7 months corrected age

prevalence of 21-36%

risk for later cognitive & motor problem



Muscle tone

ปัจจัยที่มีผลกระทบต่อพัฒนาการของเด็ก

- อายุครรภ์
- ระยะเวลา/ความรุนแรงของการขาดออกซิเจน
- การดูแลรักษา
- การติดตาม
- การกระตุ้นพัฒนาการอย่างเหมาะสม/ต่อเนื่อง

MAJOR DISABILITIES

- mod-to severe MR
- hearing loss, blindness
- CP, epilepsy

Incidence:

Fullterm	5%
LBW (<2500 g)	6-8%
VLBW (<1500g)	14-17%
ELBW (<1000g)	20-25%

COGNITIVE
& DEVELOPMENTAL SKILLS

High-prevalence / low-severity dysfunction

borderline-low average IQ,

LD, ADHD

specific neuropsychologic deficits

(visual motor integration, executive function**)**

behavior problems

50-70%of VLBW

Cognitive function of infants with severe CNS injury tend to deteriorate over time

IQ of LBW 5-7 point deficit
VLBW 8-11 point lower than full-term

learning problem in reading, spelling, math

conduct disorder,
shyness, unassertiveness,
withdrawn behavior,
anxiety,
depression ,
social skill deficit
occur more frequency

VISUAL-MOTOR PROBLEM

Copying
Perceptual matching
Spatial processing
Finger tapping
Pegboard performance
Visual memory
Visual-sequencing memory

NEUROPSYCHOLOGICAL FUNCTIONS

Executive-function **problem in**
planning, organization,
problem solving,
working memory,
inhibition, attention

EYE PROBLEMS

ROP

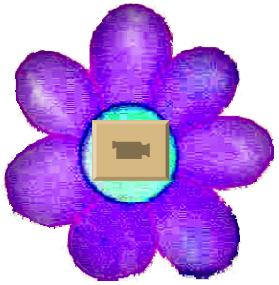
Blindness

Retinal detachment

Refractive disorder, amblyopia

Myopia

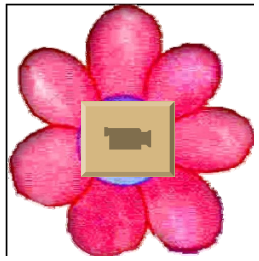
Srabismus



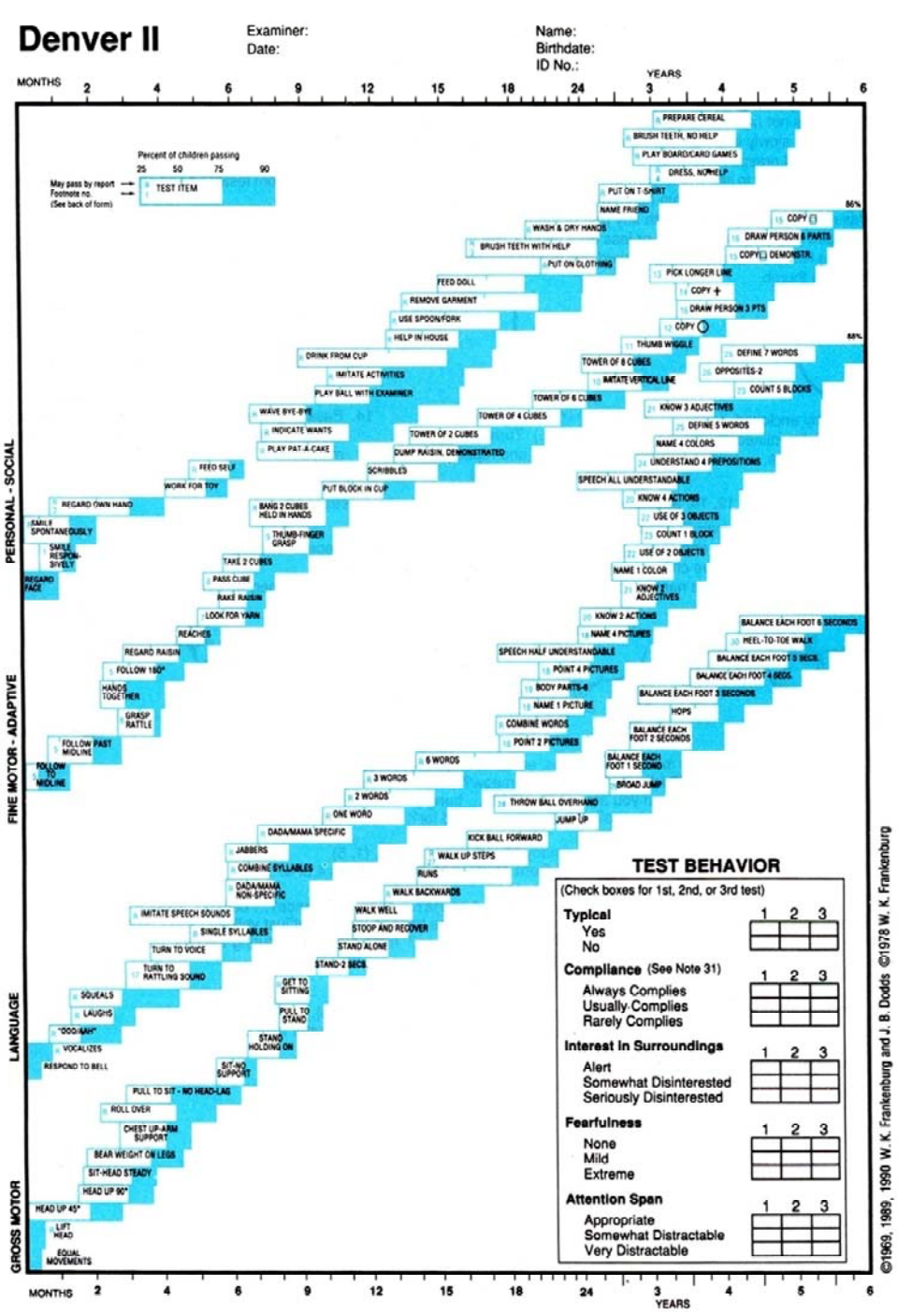
vision

HEARING PROBLEMS

- Hearing loss-hypoxia, drugs, infections
- Silent congenital, symtomatic congenital, postnatally acquired CMV infection
- May progress over time
- Hearing evaluation before leaving the hospital



hearing


Denver II
Examiner:
Date:
Name:
Birthdate:
ID No.:
MONTHS
YEARS
Percent of children passing
25 50 75 90
May pass by report
Footnote no.
(See back of form)
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 FRIEND
WASH & 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
TOWER OF 2 CUBES
DUMP RAISIN, DEMONSTRATED
SCRIBBLES
PUT BLOCK IN CUP
TOWER OF 4 CUBES
6 WORDS
3 WORDS
2 WORDS
ONE WORD
DADA/MAMA SPECIFIC
JABBERS
COMBINE SYLLABLES
DADA/MAMA NON-SPECIFIC
IMITATE SPEECH SOUNDS
SINGLE SYLLABLES
TURN TO VOICE
TURN TO RATTLING SOUND
SQUEALS
LAUGHS
"OOO/AAH"
VOCALIZES
RESPOND TO BELL
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
PREPARE CEREAL
BRUSH TEETH, NO HELP
PLAY BOARD/CARD GAMES
DRESS, NO HELP
PUT ON T-SHIRT
NAME FRIEND
WASH & DRY HANDS
BRUSH TEETH WITH HELP
PUT ON CLOTHING
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3 WORDS
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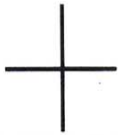
PULL TO SIT - NO HEAD-LAG
ROLL OVER
CHEST UP-ARM SUPPORT
BEAR WEIGHT ON LEGS
SIT-HEAD STEADY
HEAD UP 90°
HEAD UP 45°
LIFT HEAD
EQUAL MOVEMENTS
SIT-NO SUPPORT
STAND HOLDING ON
PULL TO STAND
GET TO SITTING
STAND ALONE
STAND-2 SECS.
STOOP AND RECOVER
WALK WELL
WALK BACKWARDS
RUNS
WALK UP STEPS
KICK BALL FORWARD
JUMP UP
THROW BALL OVERHAND
BROAD JUMP
BALANCE EACH FOOT 1 SECOND
BALANCE EACH FOOT 2 SECONDS
HOPS
BALANCE EACH FOOT 3 SECONDS
BALANCE EACH FOOT 4 SECS.
BALANCE EACH FOOT 5 SECS.
HEEL-TO-TOE WALK
BALANCE EACH FOOT 6 SECONDS
COMBINE WORDS
POINT 2 PICTURES
NAME 1 PICTURE
BODY PARTS-6
POINT 4 PICTURES
SPEECH HALF UNDERSTANDABLE
NAME 4 PICTURES
KNOW 2 ACTIONS
KNOW 2 ADJECTIVES
NAME 1 COLOR
USE OF 2 OBJECTS
COUNT 1 BLOCK
USE OF 3 OBJECTS
KNOW 4 ACTIONS
SPEECH ALL UNDERSTANDABLE
UNDERSTAND 4 PREPOSITIONS
NAME 4 COLORS
DEFINE 5 WORDS
KNOW 3 ADJECTIVES
TOWER OF 6 CUBES
IMITATE VERTICAL LINE
TOWER OF 8 CUBES
THUMB WIGGLE
COPY ○
DRAW PERSON 3 PTS.
COPY +
PICK LONGER LINE
COPY□ DEMONSTR.
DRAW PERSON 6 PARTS
COPY □
86%
88%
DEFINE 7 WORDS
OPPOSITES-2
COUNT 5 BLOCKS
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
Fearfulness
None
Mild
Extreme
Attention Span
Appropriate
Somewhat Distractable
Very Distractable
1 2 3
©1969, 1989, 1990 W. K. Frankenburg and J. B. Dodds ©1978 W. K. Frankenburg

DIRECTIONS FOR ADMINISTRATION

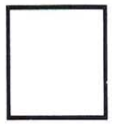
1. Try to get child to smile by smiling, talking or waving. Do not touch him/her.
2. Child must stare at hand several seconds.
3. Parent may help guide toothbrush and put toothpaste on brush.
4. Child does not have to be able to tie shoes or button/zip in the back.
5. Move yarn slowly in an arc from one side to the other, about 8" above child's face.
6. Pass if child grasps rattle when it is touched to the backs or tips of fingers.
7. Pass if child tries to see where yarn went. Yarn should be dropped quickly from sight from tester's hand without arm movement.
8. Child must transfer cube from hand to hand without help of body, mouth, or table.
9. Pass if child picks up raisin with any part of thumb and finger.
10. Line can vary only 30 degrees or less from tester's line.
11. Make a fist with thumb pointing upward and wiggle only the thumb. Pass if child imitates and does not move any fingers other than the thumb.

12. Pass any enclosed form. Fail continuous round motions.

13. Which line is longer? (Not bigger.) Turn paper upside down and repeat. (pass 3 of 3 or 5 of 6)



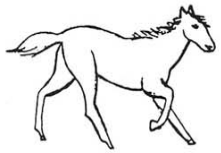
14. Pass any lines crossing near midpoint.

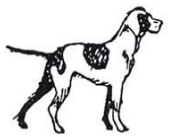


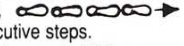
15. Have child copy first. If failed, demonstrate.

When giving items 12, 14, and 15, do not name the forms. Do not demonstrate 12 and 14.

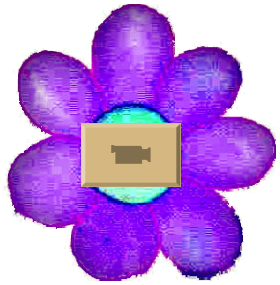
16. When scoring, each pair (2 arms, 2 legs, etc.) counts as one part.
17. Place one cube in cup and shake gently near child's ear, but out of sight. Repeat for other ear.
18. Point to picture and have child name it. (No credit is given for sounds only.)
    If less than 4 pictures are named correctly, have child point to picture as each is named by tester.




19. Using doll, tell child: Show me the nose, eyes, ears, mouth, hands, feet, tummy, hair. Pass 6 of 8.
20. Using pictures, ask child: Which one flies?... says meow?... talks?... barks?... gallops? Pass 2 of 5, 4 of 5.
21. Ask child: What do you do when you are cold?... tired?... hungry? Pass 2 of 3, 3 of 3.
22. Ask child: What do you do with a cup? What is a chair used for? What is a pencil used for? Action words must be included in answers.
23. Pass if child correctly places and says how many blocks are on paper. (1, 5).
24. Tell child: Put block **on** table; **under** table; **in front of** me, **behind** me. Pass 4 of 4. (Do not help child by pointing, moving head or eyes.)
25. Ask child: What is a ball?... lake?... desk?... house?... banana?... curtain?... fence?... ceiling? Pass if defined in terms of use, shape, what it is made of, or general category (such as banana is fruit, not just yellow). Pass 5 of 8, 7 of 8.
26. Ask child: If a horse is big, a mouse is __? If fire is hot, ice is __? If the sun shines during the day, the moon shines during the __? Pass 2 of 3.
27. Child may use wall or rail only, not person. May not crawl.
28. Child must throw ball overhand 3 feet to within arm's reach of tester.
29. Child must perform standing broad jump over width of test sheet (8 1/2 inches).
30. Tell child to walk forward,  heel within 1 inch of toe. Tester may demonstrate. Child must walk 4 consecutive steps.
31. In the second year, half of normal children are non-compliant.

OBSERVATIONS:



Denver II

Longterm Outcome in High Risk Newborn

รศ.พญ.ทิพวรรณ หรรษคุณาชัย

หน่วยพัฒนาการเด็ก ภาควิชากุมารเวชศาสตร์

คณะแพทยศาสตร์ มหาวิทยาลัยธรรมศาสตร์

Neurosensory impairment (NSIs)

Risk factors

- Bronchopulmonary dysplasia (BPD)
- Severe retinopathy of prematurity (ROP)
- Intraventricular hemorrhage grade 3-4 (IVH)
- Periventricular leukomalacia (PVL)

In Extremely Preterm (EPT)

Schmidt B, 2003. Vohr BR, 2005. Luu TM, 2009.

Neurosensory impairment (NSIs)

Does not predict

- Functional disability- Learning disabilities
- Behavioral problems
- Quality of life

In later childhood

Butler C, 1999. Msall ME, 2004.

The EPT Children without Major Disabilities

At later school age: approximate 50 % have

- Learning disabilities
- Visual-perceptual impairments
- Language disorders
- School problems
- Attention deficits
- Executive dysfunctions
- Others behavioral difficulties

Saigal S, 2000. Hoekstra RE, 2004. Vohr BR, 2005.

Impact at Age 11 Years of Major Neonatal Morbidities in Children Born Extremely Preterm

- 247 infants GA < 26 wks
- 97 survived (40%) postmenstrual age of 36 wks
- 88 survivors at 11 Yrs
- brain injury, severe ROP, BPD
  - Poor outcome: death after 36 wks, major disability at 11 Yrs (99%)
  - Consequence of chronic conditions at 11 Yrs (97%)

Aijaz Farooqi, et al. Pediatrics 2011.

Impact at Age 11 Years of Major Neonatal Morbidities in Children Born Extremely Preterm

- Major disability: mod CP, mod HL, severe MR, severe visual impairment, need special school
- Consequence of chronic conditions: QUICCC
  - Chronic health
  - Physical, psychological, cognitive, social development
- Multivariate logistic regression analysis
- Results: brain injury, severe ROP – poor outcome

Aijaz Farooqi, et al. Pediatrics 2011.

Docosahexaenoic Acid (DHA)

- Long chain polyunsaturated fatty acid (LUPUFA)
- Accumulates in neural tissues during fetal and early postnatal development
- Systematic review of RCTs: feeding preterm infants formula fortified with 0.2-0.4% DHA improved mental development (Bayley II)

Smithers LG, et al. Am J Clin Nutr 2008.

High Dose Docosahexaenoic Acid (DHA) Improve Neurodevelopmental Outcome?

Neurodevelopmental outcomes of Preterm Infants Fed High-dose DHA

- Randomized, double-blind controlled trial
- 657 infants GA< 33 wks
- 93.5% complete at 18 months' corrected age
- High-DHA (1% FA), standard-DHA (0.3% FA)
- Results: High-DHA in early life did not increase Bayley MDI scores at 18 months

Makrides M, et al. JAMA 2009

Neurodevelopmental outcomes of Preterm Infants Fed High-dose DHA

- RCTs; High-DHA no influence vocabulary comprehension and production in 6, 9, and 14 months

  O'Connor DL, 2001. Henriksen C, 2008.

- RCT; High-DHA no influence language and behavior in early childhood (3-5 Yrs)

  Smithers LG, et al. Am J Clin Nutr 2010.

- ประเมินครอบครัว
- ส่งกระตุ้นพัฒนาการ
- ติดตามเป็นระยะๆ

Early intervention

Early stimulation program is a program of educational, therapeutic and support services for children between the ages of birth to 3 years, who have or might be at risk for problem in their development.

Not to accelerate development

but to maintain and facilitate development.

a meta-analysis : 6 RCT of EIP

↑ cognitive outcomes in infancy & preschool

But not significant impact on school age

Spittle A, Cochrane Database Syst Rev18:CD005495,2007

Adolescent

-slight ↑ math. vocab. Behavior

Mc Cormick, Pediatrics 2006;117(3):771-80

Follow - up of NICU patient

eMedicine

AAP. Follow-up care of high-risk infants

pediatrics.2004;114(Suppl) :1337-97

Continuing care or the high- risk infant

clinic in perinatology.1984

THANK YOU
FOR
YOUR ATTENTION