

Appendix 1: Neonatal Intensive Care Unit Network Neurobehavioral Scale Scoring Form

The numbering and notation on this form are used throughout the rest of the appendices in the computation of summary scores.

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emy of Pediatrics.

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ID

□□
Visit

Part 1: Examination

A. Preexamination Observation

1. Initial-state observation

B. Habituation (States 1 and 2)

2. Response decrement to light NNHALIT
 3. Response decrement to rattle NNHARAT
 4. Response decrement to bell NNHABEL

C. Unwrap and Supine

5. Posture (states 1–5) NNUSPOS
 6. Skin color (states 1–5) NNUSSKN
 7. Skin texture

Yes No
 NNUSTXS

Is infant in state 1, 2, 3, 4, or 5?
 If yes,

Yes No
 NNUSTXD
 NNUSTXE
 NNUSTXL
 NNUSTXC
 NNUSMOV
 NNUSTAC

a. Desquamation
 b. Excoriations/abrasions
 c. Loose skin
 d. Deep creases around the eyes and nose
 8. Movement (states 1–4)
 9. Response decrement to tactile stimulation of the foot (states 1–3)

D. Lower Extremity Reflexes (States 3–5)

If asymmetrical, describe the less-optimal side

| | | | | | | | |
|-----------------------------------|--------------------------|---------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|---------|
| 10. Plantar grasp | <input type="checkbox"/> | NNLERPG | ↓L <input type="checkbox"/> | ↑L <input type="checkbox"/> | ↓R <input type="checkbox"/> | ↑R <input type="checkbox"/> | NNLEAPG |
| 11. Babinski | <input type="checkbox"/> | NNLERBA | ↓L <input type="checkbox"/> | ↑L <input type="checkbox"/> | ↓R <input type="checkbox"/> | ↑R <input type="checkbox"/> | NNLEABA |
| 12. Ankle clonus | <input type="checkbox"/> | NNLERAC | ↓L <input type="checkbox"/> | ↑L <input type="checkbox"/> | ↓R <input type="checkbox"/> | ↑R <input type="checkbox"/> | NNLEAAC |
| 13. Leg resistance | <input type="checkbox"/> | NNLERLR | ↓L <input type="checkbox"/> | ↑L <input type="checkbox"/> | ↓R <input type="checkbox"/> | ↑R <input type="checkbox"/> | NNLEALR |
| 14. Leg recoil | <input type="checkbox"/> | NNLERLC | ↓L <input type="checkbox"/> | ↑L <input type="checkbox"/> | ↓R <input type="checkbox"/> | ↑R <input type="checkbox"/> | NNLEALC |
| 15. Power of active leg movements | <input type="checkbox"/> | NNLERAL | ↓L <input type="checkbox"/> | ↑L <input type="checkbox"/> | ↓R <input type="checkbox"/> | ↑R <input type="checkbox"/> | NNLEAAL |
| 16. Popliteal angle | <input type="checkbox"/> | NNLERPA | ↓L <input type="checkbox"/> | ↑L <input type="checkbox"/> | ↓R <input type="checkbox"/> | ↑R <input type="checkbox"/> | NNLEAPA |

E. Upper Extremities and Face (States 3–5)

If asymmetrical, describe the less-optimal side

| | | | | | | | |
|-----------------------------------|--------------------------|---------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|---------|
| 17. Scarf sign | <input type="checkbox"/> | NNUEFSS | ↓L <input type="checkbox"/> | ↑L <input type="checkbox"/> | ↓R <input type="checkbox"/> | ↑R <input type="checkbox"/> | NNUEASS |
| 18. Forearm resistance | <input type="checkbox"/> | NNUEFFR | ↓L <input type="checkbox"/> | ↑L <input type="checkbox"/> | ↓R <input type="checkbox"/> | ↑R <input type="checkbox"/> | NNUEAFR |
| 19. Forearm recoil | <input type="checkbox"/> | NNUEFFC | ↓L <input type="checkbox"/> | ↑L <input type="checkbox"/> | ↓R <input type="checkbox"/> | ↑R <input type="checkbox"/> | NNUEAFC |
| 20. Power of active arm movements | <input type="checkbox"/> | NNUEFAA | ↓L <input type="checkbox"/> | ↑L <input type="checkbox"/> | ↓R <input type="checkbox"/> | ↑R <input type="checkbox"/> | NNUEAAA |
| 21. Rooting | <input type="checkbox"/> | NNUEFRT | ↓L <input type="checkbox"/> | ↑L <input type="checkbox"/> | ↓R <input type="checkbox"/> | ↑R <input type="checkbox"/> | NNUEART |
| 22. Sucking | <input type="checkbox"/> | NNUEFSU | | | | | |
| 23. Grasp of hands | <input type="checkbox"/> | NNUEFGH | ↓L <input type="checkbox"/> | ↑L <input type="checkbox"/> | ↓R <input type="checkbox"/> | ↑R <input type="checkbox"/> | NNUEAGH |
| 24. Truncal tone | <input type="checkbox"/> | NNUEFTT | | | | | |
| 25. Pull to sit (states 4 and 5) | <input type="checkbox"/> | NNUEFPS | | | | | |

F. Upright Responses (States 3–5)

If asymmetrical, describe the less-optimal side

| | | | | | | | | |
|------------------------|--------------------------|--------------------------|---------|---------|---------|---------|---------|---------|
| 26. Placing | <input type="checkbox"/> | <input type="checkbox"/> | NNUPRPL | ↓L 1 | ↑L 2 | ↓R 3 | ↑R 4 | NNUPAPL |
| 27. Stepping | <input type="checkbox"/> | <input type="checkbox"/> | NNUPRST | ↓L 1 | ↑L 2 | ↓R 3 | ↑R 4 | NNUPAST |
| 28. Ventral Suspension | <input type="checkbox"/> | <input type="checkbox"/> | NNUPRVS | | | | | |
| 29. Incurvation | <input type="checkbox"/> | <input type="checkbox"/> | NNUPRIN | ↓L 1 | ↑L 2 | ↓R 3 | ↑R 4 | NNUPAIN |

G. Infant Prone (States 3–5)

| | | | |
|-------------------------|--------------------------|--------------------------|---------|
| 30. Crawling | <input type="checkbox"/> | <input type="checkbox"/> | NNINPCR |
| 31. Stimulation needed | <input type="checkbox"/> | <input type="checkbox"/> | NNINPSN |
| 32. Head raise in prone | <input type="checkbox"/> | <input type="checkbox"/> | NNINPHR |

H. Pick up Infant (States 4 and 5)

| | | | |
|------------------------|--------------------------|--------------------------|---------|
| 33. Cuddle in arm | <input type="checkbox"/> | <input type="checkbox"/> | NNPUICA |
| 34. Cuddle on shoulder | <input type="checkbox"/> | <input type="checkbox"/> | NNPUICS |

I. Infant Supine on Examiner's Lap (States 4 and 5)

| | | | |
|--|--------------------------|--------------------------|---------|
| 35. Orientation: inanimate visual | <input type="checkbox"/> | <input type="checkbox"/> | NNISLIV |
| 36. Orientation: inanimate auditory | <input type="checkbox"/> | <input type="checkbox"/> | NNISLIA |
| 37. Orientation: inanimate visual and auditory | <input type="checkbox"/> | <input type="checkbox"/> | NNISLIB |
| 38. Orientation: animate visual | <input type="checkbox"/> | <input type="checkbox"/> | NNISLAV |
| 39. Orientation: animate auditory | <input type="checkbox"/> | <input type="checkbox"/> | NNISLAA |
| 40. Orientation: animate visual and auditory | <input type="checkbox"/> | <input type="checkbox"/> | NNISLAB |

J. Infant Spin (States 3–5)

If asymmetrical, describe the less-optimal side

| | | | | | | | | |
|--------------------------------------|--------------------------|--------------------------|---------|---------|---------|---------|---------|---------|
| 41. Tonic deviation of head and eyes | <input type="checkbox"/> | <input type="checkbox"/> | NNSPNTD | ↓L 1 | ↑L 2 | ↓R 3 | ↑R 4 | NNSPATD |
| 42. Nystagmus | <input type="checkbox"/> | <input type="checkbox"/> | NNSPNNY | | | | | |

K. Infant Supine in Crib (States 3–5)

If asymmetrical, describe the less-optimal side

| | | | | | | | | |
|------------------------------------|--------------------------|--------------------------|----------|---------|---------|---------|---------|---------|
| 43. Defensive movements | <input type="checkbox"/> | <input type="checkbox"/> | NNSCRDR | | | | | |
| 44. Asymmetrical tonic neck reflex | <input type="checkbox"/> | <input type="checkbox"/> | NNSCRTN | ↓L 1 | ↑L 2 | ↓R 3 | ↑R 4 | NNSCATN |
| 45. More reflex | <input type="checkbox"/> | <input type="checkbox"/> | NNSCRM R | ↓L 1 | ↑L 2 | ↓R 3 | ↑R 4 | NNSCAMR |

L. Summary Items

| | | | | | | | | |
|--|--------------------------|--------------------------|---------|--|--|--------------------------|--------------------------|---------|
| 46. Orientation: handling procedures | Yes | No | NNSIOST | | | | | |
| Was infant in State 4 or 5? | <input type="checkbox"/> | <input type="checkbox"/> | | | | | | |
| If yes, | Yes | No | | | | | | |
| a. Repeated time out | <input type="checkbox"/> | <input type="checkbox"/> | NNSIOTO | | | | | |
| b. Hand-holding/ventral pressure | <input type="checkbox"/> | <input type="checkbox"/> | NNSIOHV | | | | | |
| c. Auditory stimulation (voice or rattle) | <input type="checkbox"/> | <input type="checkbox"/> | NNSIOAS | | | | | |
| d. Jiggling/vertical rocking | <input type="checkbox"/> | <input type="checkbox"/> | NNSIOJR | | | | | |
| e. Covering/wrapping | <input type="checkbox"/> | <input type="checkbox"/> | NNSIOCW | | | | | |
| f. Swaddling | <input type="checkbox"/> | <input type="checkbox"/> | NNSIOSW | | | | | |
| g. Rocking/walking | <input type="checkbox"/> | <input type="checkbox"/> | NNSIORW | | | | | |
| h. Sucking/pacifier | <input type="checkbox"/> | <input type="checkbox"/> | NNSIOSP | | | | | |
| i. Other | <input type="checkbox"/> | <input type="checkbox"/> | NNSIOOT | | | | | |
| 47. Alertness (states 4 and 5) | | | | | | <input type="checkbox"/> | <input type="checkbox"/> | NNSIALR |
| 48. General tone/predominant tone (states 4 and 5) | | | | | | <input type="checkbox"/> | <input type="checkbox"/> | NNSITON |
| 49. Motor maturity (states 4 and 5) | | | | | | <input type="checkbox"/> | <input type="checkbox"/> | NNSIMOT |
| 50. Consolability with intervention (states 6 to 4–1) | | | | | | <input type="checkbox"/> | <input type="checkbox"/> | NNSICON |
| 51. Peak of excitement (all states) | | | | | | <input type="checkbox"/> | <input type="checkbox"/> | NNSIEXC |
| 52. Rapidity of build-up (all states with state 6 at least 15 seconds) | | | | | | <input type="checkbox"/> | <input type="checkbox"/> | NNSIRAP |
| 53. Irritability (all states) | | | | | | <input type="checkbox"/> | <input type="checkbox"/> | NNSIRRT |
| 54. Spontaneous activity (states 3–5) | | | | | | <input type="checkbox"/> | <input type="checkbox"/> | NNSISPO |
| 55. Elicited activity (states 3–5) | | | | | | <input type="checkbox"/> | <input type="checkbox"/> | NNSIACT |
| 56. Tremulousness (all states) | | | | | | <input type="checkbox"/> | <input type="checkbox"/> | NNSITRE |
| 57. Amount of startle during exam (states 3–6) | | | | | | <input type="checkbox"/> | <input type="checkbox"/> | NNSISTA |
| 58. Lability of skin color (as infant moves from states 1 to 6) | | | | | | <input type="checkbox"/> | <input type="checkbox"/> | NNSISKN |
| 59. Lability of states (all states) | | | | | | <input type="checkbox"/> | <input type="checkbox"/> | NNSILAB |
| 60. Self-quieting activity (states 6 and 5–1) | | | | | | <input type="checkbox"/> | <input type="checkbox"/> | NNSIQUI |
| 61. Hand-to-mouth facility (all states) | | | | | | <input type="checkbox"/> | <input type="checkbox"/> | NNSIHMD |
| 62. First predominant state | | | | | | <input type="checkbox"/> | <input type="checkbox"/> | NNSIFPR |
| 63. Second predominant state | | | | | | <input type="checkbox"/> | <input type="checkbox"/> | NNSISPR |
| 64. Postexamination-state observation | | | | | | <input type="checkbox"/> | <input type="checkbox"/> | NNSIPEX |
| 65. Order of administration | | | | | | <input type="checkbox"/> | <input type="checkbox"/> | NNSIORD |

Part II: Stress/abstinence scale

M. Physiological

| | Yes | No | |
|-----------------------|--------------------------|--------------------------|---------|
| 66. Labored breathing | <input type="checkbox"/> | <input type="checkbox"/> | NNPHLAB |
| 67. Nasal flaring | <input type="checkbox"/> | <input type="checkbox"/> | NNPHNAS |

N. Autonomic

| | Yes | No | |
|----------------------|--------------------------|--------------------------|---------|
| 68. Sweating | <input type="checkbox"/> | <input type="checkbox"/> | NNAUSWE |
| 69. Spit-up | <input type="checkbox"/> | <input type="checkbox"/> | NNAUSPT |
| 70. Hiccoughing | <input type="checkbox"/> | <input type="checkbox"/> | NNAUHIC |
| 71. Sneezing | <input type="checkbox"/> | <input type="checkbox"/> | NNAUSNZ |
| 72. Nasal stuffiness | <input type="checkbox"/> | <input type="checkbox"/> | NNAUSTF |
| 73. Yawning | <input type="checkbox"/> | <input type="checkbox"/> | NNAUYAW |

O. Central Nervous System

| | Yes | No | |
|-------------------------------------|--------------------------|--------------------------|---------|
| 74. Abnormal sucking | <input type="checkbox"/> | <input type="checkbox"/> | NNCNASU |
| 75. Choreiform movements | <input type="checkbox"/> | <input type="checkbox"/> | NNCNCHO |
| 76. Athetoid postures and movements | <input type="checkbox"/> | <input type="checkbox"/> | NNCNATH |
| 77. Tremors | | | |
| a. Low frequency/ high amplitude | <input type="checkbox"/> | <input type="checkbox"/> | NNCNTRL |
| b. High frequency/ low amplitude | <input type="checkbox"/> | <input type="checkbox"/> | NNCNTRH |
| 78. Cogwheel movements | <input type="checkbox"/> | <input type="checkbox"/> | NNCNCOG |
| 79. Startles | <input type="checkbox"/> | <input type="checkbox"/> | NNCNSTA |
| 80. Hypertonia | <input type="checkbox"/> | <input type="checkbox"/> | NNCNHYP |
| 81. Back arching | <input type="checkbox"/> | <input type="checkbox"/> | NNCNBAR |
| 82. Fisting | <input type="checkbox"/> | <input type="checkbox"/> | NNCNFST |
| 83. Cortical thumb | <input type="checkbox"/> | <input type="checkbox"/> | NNCNCTH |
| 84. Myoclonic jerks | <input type="checkbox"/> | <input type="checkbox"/> | NNCNJRK |
| 85. Generalized seizures | <input type="checkbox"/> | <input type="checkbox"/> | NNCNSEZ |
| 86. Abnormal posture | <input type="checkbox"/> | <input type="checkbox"/> | NNCNAPO |

P. Skin

| | Yes | No | |
|-------------------------|--------------------------|--------------------------|---------|
| 87. Pallor | <input type="checkbox"/> | <input type="checkbox"/> | NNSKPAL |
| 88. Mottling | <input type="checkbox"/> | <input type="checkbox"/> | NNSKMOT |
| 89. Paroxysmal cyanosis | <input type="checkbox"/> | <input type="checkbox"/> | NNSKPCY |
| 90. Overall cyanosis | <input type="checkbox"/> | <input type="checkbox"/> | NNSKOCY |
| 91. Circumoral cyanosis | <input type="checkbox"/> | <input type="checkbox"/> | NNSKCCY |
| 92. Periocular cyanosis | <input type="checkbox"/> | <input type="checkbox"/> | NNSKRKY |

Q. Visual

| | Yes | No | |
|---|--------------------------|--------------------------|---------|
| 93. Gaze aversion during orientation | <input type="checkbox"/> | <input type="checkbox"/> | NNVIAVR |
| 94. Pull down during orientation | <input type="checkbox"/> | <input type="checkbox"/> | NNVIPUL |
| 95. Fuss/cry during orientation | <input type="checkbox"/> | <input type="checkbox"/> | NNVICRY |
| 96. Obligatory following during orientation | <input type="checkbox"/> | <input type="checkbox"/> | NNVIFOL |
| 97. Endpoint nystagmus during orientation | <input type="checkbox"/> | <input type="checkbox"/> | NNVIENY |
| 98. Sustained spontaneous nystagmus | <input type="checkbox"/> | <input type="checkbox"/> | NNVISNY |
| 99. Visual locking | <input type="checkbox"/> | <input type="checkbox"/> | NNVILOC |
| 100. Hyperalertness | <input type="checkbox"/> | <input type="checkbox"/> | NNVIHYP |
| 101. Setting-sun sign | <input type="checkbox"/> | <input type="checkbox"/> | NNVISUN |
| 102. Roving eye movements | <input type="checkbox"/> | <input type="checkbox"/> | NNVIEYE |
| 103. Strabismus | <input type="checkbox"/> | <input type="checkbox"/> | NNVISTR |
| 104. Tight blinking | <input type="checkbox"/> | <input type="checkbox"/> | NNVIBLN |
| 105. Other abnormal eye signs | <input type="checkbox"/> | <input type="checkbox"/> | NNVIOTH |

R. Gastrointestinal

| | Yes | No | |
|------------------------------------|--------------------------|--------------------------|---------|
| 106. Gagging/choking | <input type="checkbox"/> | <input type="checkbox"/> | NNGACHK |
| 107. Loose or watery stools | <input type="checkbox"/> | <input type="checkbox"/> | NNGASTL |
| 108. Excessive gas or bowel sounds | <input type="checkbox"/> | <input type="checkbox"/> | NNGAGAS |

S. State

| | Yes | No | |
|--|--------------------------|--------------------------|---------|
| 109. High-pitched cry | <input type="checkbox"/> | <input type="checkbox"/> | NNSTHCR |
| 110. Monotone-pitch cry | <input type="checkbox"/> | <input type="checkbox"/> | NNSTMCR |
| 111. Weak cry | <input type="checkbox"/> | <input type="checkbox"/> | NNSTWCR |
| 112. No cry | <input type="checkbox"/> | <input type="checkbox"/> | NNSTNCR |
| 113. Extreme irritability | <input type="checkbox"/> | <input type="checkbox"/> | NNSTIRR |
| 114. Abrupt state changes | <input type="checkbox"/> | <input type="checkbox"/> | NNSTCHN |
| 115. Inability to achieve quiet, awake state (4) | <input type="checkbox"/> | <input type="checkbox"/> | NNSTQUA |

NNXAMIN

Examiner:
First Last

NNXAMDT

Date of exam:
Month Day Year