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Manual for the Naturalistic Observation of Newborn Behavior

Newborn Individualized Developmental Care and Assessment Program (NIDCAP)

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Behavioral Definitions published in Als H: Reading the premature infant, in Goldson E (ed): *Developmental Interventions in the Neonatal Intensive Care Nursery*, New York, Oxford University Press, 1999, pp 18-85.

Much can be learned from systematic, naturalistic observation of an infant in the nursery. A behavioral observation methodology has been developed on the basis of the conceptualizations underlying the APIB (Assessment of Preterm Infants' Behavior).¹ The Behavior Observation Sheet, developed for the recording of information, is designed to be used by an observer who watches the infant in the course of a caregiving interaction. In order to arrive at a sufficient database for the judgment of current thresholds of stability of the autonomic, the motoric, the state organizational, and the self-regulatory systems as discussed in the APIB, it is recommended to observe an infant for up to 20 minutes before the infant is interacted with by a caregiver, then during the course of the caregiving interaction, be it vital signs taking, diaper change, feeding, bathing, blood test, etc., and then for at least 20 minutes after such a caregiving interaction. On average, between 60 and 80 minutes of observation are collected. Such observations, particularly if repeated over time, yield much information regarding the infant's degree of robustness and competence in interacting with the environmental and caregiving inputs provided. They form the basis for caregiving suggestions and modifications in environmental structuring, as outlined and studied elsewhere.²⁻⁶ The approach to caregiving is referred to as Newborn Individualized Developmental Care and Assessment Program (NIDCAP) and the Behavior Observation Sheet is known variously as NIDCAP Observation Sheet, or Naturalistic Observation of Newborn Behavior (NONB) Sheet.

I. Recording of Observation

The materials necessary for a NIDCAP observation, aside from the trained eye of the observer, consist of: 1) the front sheets of the observation package, 2) the observation sheets themselves (1 per 10 minutes, rarely more than 10 sheets for one observation), and 3) the clinical write-up sheets. Also needed are a quiet pen or pencil, a clipboard, and a silent timing device with an easily visible second hand.

Front Sheet

The front sheets are designed for the recording of medical background information usually readily obtained from the infant's medical chart; data on the current status of the infant, again, usually readily obtained from the infant's chart; and a description of the physical environment and circumstances of the observation. Depending on the purpose of the observation, it is helpful to obtain the background information only after an observation in order not to bias the observation. One might react differently to the same behavior, depending on one's knowledge of the history of the infant. After an observation, the observer is encouraged to formulate an estimate of the infant's current age, gestational age at birth, and medical history, and only then check the record. This procedure typically leads more quickly to improved astuteness in the recognition of behavioral patterns associated with specific medical conditions and courses, than does *a priori* available information.

Observation Sheets

Each observation sheet is segmented into 2-minute time intervals and set up in a frequency checklist format for continuous recording of behavior. This method does not permit the accurate documentation of duration of a behavior, only its frequency. If an infant shows an arm extension for 5 seconds, this will be marked with a check in the respective 2-minute time block. The infant who extends an arm for the entire 2-minute epoch will receive the same check mark. Individual observers may adapt their own methods of indicating incidental vs. prevalent occurrences within a 2-minute epoch. For statistical data analysis, only the occurrence of the event itself would be available.

It is recommended that observers walk the path from the hospital entrance to the infant's bedside, orient themselves to the infant and the infant's bedspace in relationship to the larger nursery space and the hospital itself, and then record the environmental parameters on the respective form. They then mark in the top left row of the first observation sheet the starting time of the direct behavioral observation, and then mark the five 2-minute intervals across the top of the sheet, indicated in the two sets of 5 columns.

Time:	10:06	:08	:10	:12	:14		10:06	:08	:10	:12	:14

In contrast to the behavioral data, which are recorded in continuous fashion, the parametric autonomic data collected are recorded in a time sampling fashion. The sheet is set up for the 2-minute time sampling of heart rate (HR), respiratory rate (RR), and transcutaneous oxygen pressure (TcPO₂) or pulse oxymetry reading (SaO₂). Heart rate and SaO₂ (TcPO₂) are recorded if the child is monitored for these parameters, in which case the reading, typically displayed digitally, is recorded every 2 minutes. Respiration rate is not recorded off the monitor. Instead, at the onset of a 2-minute interval the observer observes and counts respirations for 30 seconds using the watch or clock at hand and multiplies by 2. It is at this point, 30 seconds into the 2-minute observation period, that HR and SaO₂ are read off the respective monitors. The observer continues to watch the child for the remainder of the 1-1/2 minutes until the next 2-minute block starts. In the box preceding the parametric autonomic monitor data, HR, RR, and SaO₂ (TcPO₂), the current caregiving interactions (manipulation), e.g., feeding, diaper change) is recorded, again for every 2-minute interval.

Recording of occurrence of behavior using this methodology shows good interobserver reliability after training and practice. Some behaviors and positions do not change frequently, while others are highly variable in their occurrence. Of course, some infants are much more active and variable than others.

II. Definition of Behaviors

The behaviors observed are organized into Autonomic/Visceral, State, Motor, and Attention-Related behavior groups.

A. Autonomic Behaviors

These are subgrouped into respiration patterns, color, autonomic instability-related motor patterns, and visceral and respiratory behaviors.

1. Respiration

- Regular: The breath-to-breath interval is steady.
- Irregular: The breath-to-breath interval is variable, at times short, at times longer.
- Slow: Less than at a comparable rate of 40 respirations/minute.
- Fast: More than at a comparable rate of 60 respirations/minute.
- Pause: Any cessation of respiration for equal to or longer than 2 seconds. A pause longer than 8 seconds is also marked in the state related behavior group as AA.

More than one category may be checked, e.g., regular and slow, or irregular and slow and fast and/or pause.

2. Color

- Jaundice: Yellowish appearance; yellowness of skin and whites of eyes.
- Pink: Good perfusion with pink color throughout the face, including mouth and temple area; if trunk and extremities are observable the same criteria apply.
- Pale: Whitish, sallow appearance in parts of face, e.g., forehead, nose or mouth area, temples or overall skin color appearance. Gray, although one hopes it is not observed, would be noted with a special comment under pale.
- Webbed: Pattern of surface blood vessels visible in the form of a net or web, often in face, neck, at times total body surface including extremities.
- Red: Overly perfused, plethoric appearing color.
- Dusky: Purple, dark hue of face parts of the face, or body surface.
- Blue: Cyanotic in mouth area or other areas of the face, trunk, or extremities.

More than one color category may be appropriate to mark either because of temporal fluctuations or because patches of various colors are observed (e.g., pale and blue or dusky and webbed, etc.). Notes as to special circumstances such as harlequin pattern should be made.

3. Autonomic Instability-Related Motor Patterns

- Tremor: Trembling or quivering of any part of or of the whole body, e.g., leg tremor, chin tremor.
- Startle: Sudden large amplitude jumping movement of arms or trunk or legs or whole body.
- Twitch: (face, body, extremities) Small amplitude, brief contractile response of a skeletal muscle, elicited presumably by a single maximal volley of impulses in the neurons supplying it; marked as to the location of its occurrence.

4. Visceral and Respiratory Behaviors

- Spit up: Any bringing up of feeding or saliva; more than a drool is required.
- Gag: The infant appears to choke momentarily or gulp; the respiratory pattern is disrupted during a gag. Gags are often but not necessarily accompanied by mild mouth opening.
- Burp: The infant brings up air in an expiratory burst.
- Hiccough: The infant hiccoughs, i.e., makes one or several repetitive sharp inspiratory sounds with spasm of the glottis and diaphragm.
- BM Grunt: Bowel movement grunting or straining. The infant's face and body display the straining often associated with bowel movements and/or the infant emits the grunting sounds often associated with bowel movements and/or actually passes gas or defecates.
- Sounds: The infants emits undifferentiated whimperlike sounds that resemble diffusely disinhibited vocal discharges.
- Sigh: The infant in- and exhales, perhaps audibly, in a breath longer and deeper than the current respiratory pattern observed.
- Gasp: The infant draws in a respiration sharply or laboriously, often after a respiratory pause; the infant may not apparently complete the inspiration and does not move smoothly to the next expiration.

B. Motor System Behaviors

These are subgrouped into general extremity and trunk behaviors, behaviors of the face, and specific extremity behaviors.

1. General Extremity and Trunk Behaviors

- Flaccid arm(s): The tone of one or both arms is very low and the arm(s) lie, are held, or move flaccidly or limply. Flexor or extensor postural adjustment or movement is marked respectively.
- Flaccid leg(s): The tone of one or both legs is very low and the leg(s) lie, are held, or move flaccidly or limply. Again, flexor or extensor postural adjustment is marked respectively.

Note: It is important to differentiate flaccidity from relaxation. The easiest way to learn to distinguish the two qualities of muscle tone is to test the relative degree of tone by lifting the limb in question. If tone is flaccid a droopy, limp reaction will be felt; if tone is present, a self-maintained tonic response will be felt.

- Flexed or Tucked Arm(s):

Act:	Activity
Post:	Posture
Activity:	Refers to the current flexor movement or act of tucking in of the arm(s). This may be repetitive activity or one adjustment.
Posture:	Refers to the maintenance of arm(s) in a flexor or tucked position.
- Flexed or Tucked Leg(s):

Act:	Activity
Post:	Posture
Activity:	Refers to the active flexor movement or act of tucking in of the leg(s), whether it is then maintained or not. It may be repetitive activity or one flexor adjustment.
Posture:	Refers to the maintenance of the leg(s) in a flexor or tucked position.
- Extend Arm(s):

Act:	Activity
Post:	Posture
Activity:	Refers to the active extension movement of one or both arms This may be a single or several consecutive actions, often alternating with some flexor movement, in which case both <i>extend act</i> and <i>flex act</i> are marked.
Posture:	Refers to the maintenance of arm(s) in extension either in mid air or on a surface.

- Extend Leg(s):
 - Act: Activity
 - Post: Posture
 - Activity: Refers to the active extension movement of one or both legs. This may be a single or several consecutive actions, often alternating with some flexor movement, in which case both *extend act* and *flex act* are marked.
 - Posture: Refers to the maintenance of leg(s) in extension either in mid air or on a surface.
- Sm Mvmt Arms: Smooth movement of arms
- Sm Mvmt Legs: Smooth movement of legs
- Sm Mvmt Trunk:
 - Smooth movement of trunk
 - Refers to smooth movement of arms, legs, or trunk, balanced in terms of extensor and flexor component, indicating modulated movement control.
- Stretch/Drown:
 - This is a configuration of labored trunkal extension, often also accompanied by arm extension and at times leg extension, which is then followed by an apparent effort to move the trunk back into flexion. This pattern of stretching and tucking may be repeated several times. At times the stretching component is quite prolonged. It frequently follows a pattern of decreasing respiratory rate at times ending in a respiratory pause. Often in the course of this motor pattern, inspiration or expiration has halted, leading to increasing color change to dusky. The pattern gives the impression of the struggling action of drowning, while attempting to regain breathing. It is also referred to as “motor drown.” Attention needs to be paid to the successful reactivation of respiration. In successful efforts after a burst of drowning-like behavior, respiration restarts, albeit now often tachypneically. In other cases the drowning may be followed by limpness and a prolonged respiratory pause, requiring containment into trunkal and extremity flexion, at times, additional stimulation in order to reactivate breathing.
- Diffuse squirm:
 - Refers to small writhing, wriggling motions of the trunk, often with accompanying movements of the extremities, yet not showing the labored stretching, struggling patterns of stretch/drown. At times, however, diffuse squirm may lead to stretch/drown.
- Arch:
 - Refers to trunkal arching or trunkal extension into an arch and/or head extension, in prone, supine, sidelying or upright position. The upper extremities may or may not extend; the legs often extend.
- Tuck Trunk:
 - Refers to trunkal tucking or flexion activity, or trunkally maintained flexor posture. The infant curls or tucks trunk

and/or shoulders into flexion; often the infant pulls the legs up into flexion or pull the arms in simultaneously. Active trunkal flexion movement in prone, supine, sidelying, or sitting position as well as the maintenance of trunkally flexed posture are marked.

- **Leg Brace:** The infant extends leg(s) and/or feet towards the edge or wall of the incubator, crib, etc., or the caregiver's hand or body, as if in an effort to stabilize, brace, and gain boundary and inhibition to extensor movement or posture. Once touching, the infant may flex the legs and relax while maintaining the bracing, or may restart the active bracing efforts. Even if no surface is available against which the bracing is successful, efforts at apparently seeking such a surface are also marked in this category. The infant may be actively pressing one or both feet against the mattress or a blanket roll, etc.

2. Face Behaviors

- **Tongue Extension:** The infant's tongue protrudes in extension beyond the lips or extends encased in the lower lip. The behavior is marked whether the infant maintains this tongue posture or engages in repeated extension and flexion or relaxation movements of the tongue. A limply drooping tongue is marked specially. Soft modulated speech-like tongue movements or mouthing are not included in this category.
- **Hand on Face:** The infant places hand or both hands onto the face or head, or over the ears and maintains this for at least a brief, or for a prolonged period. Hand on Face movement or posture is different from active grasping. It is more protective, appears occluding, and usually involves a soft movement or posture that creates a barrier between the face and the outside world. The hand(s) may be placed palm down or palm up against the face.
- **Gape Face:** This refers to a drooping open mouth configuration that is the result of decreased lower facial tone. It gives the appearance of exhaustion and facial limpness. It may be paired, however, with eyes open and even environment inspection. It is also seen in active sleep.
- **Grimace:** This is a facial extension configuration often accompanied by lip retraction and facial retraction and distortion. Eyebrow knitting or frowning is not a part of this configuration, since these represent facial flexion rather than facial extension.
- **Smile:** Smiling requires facial relaxation without flaccidity and is formed by an at least slightly upward curving of the

corner(s) of the mouth, often accompanied by a momentary or prolonged softening of the cheeks.

- **Mouthing:** The infant makes one or several repetitive lip and/or jaw opening and closing movements. These are distinguished from suck-searching. In mouthing, the lips stay usually soft and relaxed and are not directed forward.
- **Suck Search:** The infant actively extends the lips forward or sideways and/or opens the mouth in a searching, rooting fashion; the infant often moves the head while doing so, as if seeking something to suck on.
- **Sucking:** The infant sucks on hand or fingers, on clothing, bedding, the caregiver's finger or mother's breast, a pacifier or other object that the infant has either obtained or that the caregiver has inserted into the infant's mouth.

3. Specific Extremity Movements

- **Finger Splay:** The infant's hand(s) open and the fingers are extended and separated from each other.
- **Airplane:** The infant's arm(s) are either fully extended out to the side at approximately shoulder level or upper and lower arm are at an angle and are extended out at the shoulder.
- **Salute:** The infant's arm(s) are fully extended into mid air in front of the infant, either singly or simultaneously. This is often but not necessarily accompanied by finger splaying.
- **Sitting on Air:** The infant's legs are extended into mid air either singly or simultaneously. This may occur in supine, side-lying, prone or in upright position.
- **Hand Clasp:** The infant grasps one hand with the other or clutches the hands in midline to the body. Each hand may be closed, yet they hold onto each other or actively press against each other. Interdigitation of fingers of one hand with those of the other hand is a subcategory of hand clasp and is marked here.
- **Foot Clasp:** The infant positions one foot against the other, either foot sole to foot sole or one foot sole against the other ankle or leg, or the infant folds the legs in a crossed position with feet grasping the legs or resting against them.
- **Hand to Mouth:** The infant attempts to bring one or both hands or fingers to the mouth in an apparent effort to suck on them. The effort does not have to be successful to be marked.

- Grasping: The infant makes grasping movements with the hands, either directed at the face or body, or in midair, or to the caregiver's hands or fingers or body, the infant's own bottle, tubing or bedding, the side of the incubator or bassinet, etc.
- Holding On: The infant is holding on to the examiner's hands or finger or arm, etc.; the infant may have initiated the holding on, or the caregiver may have positioned the infant's hands and the infant then actively holds on.
- Fisting: The infant appears to hold on to the own hand by flexing the fingers and forming a fist. Occasionally fisting is observed with an object in the hand (e.g., the edge of a blanket, etc.). The degree of relative tightness of the flexion differentiates the softer holding on from fisting.

C. State-Related Behaviors

These are subgrouped into the states themselves and specific, typically attention-related behaviors. Various configurations of behaviors encompassing eye movements, eye opening and facial expressions, gross body movements, respirations, and tone aspects are used in specific temporal relationships to one another to determine at what level of consciousness an infant is at a particular time. It is possible to make meaningful, systematic distinctions between dynamic transformations of various behavioral configurations which appear to correspond to varying states of availability and conscious responsiveness. The following six levels of observable states are used based on the Brazelton Neonatal Behavioral Assessment Scale (BNBAS).⁷ States labeled as A states are the disorganized and diffuse analogues of the states labeled as B states, which are robust, well modulated states.

1. Sleep States

- State 1 Deep sleep
 - State 1A: Diffuse deep sleep with obligatory regular breathing or breathing in synchrony with only the respirator, eyes closed, no eye movements under closed lids; quiet facial expression; no spontaneous activity; typically poor color.
 - State 1B: Robust deep sleep with predominantly modulated regular breathing; eyes closed, no eye movements under closed lids, relaxed facial expression; no spontaneous activity except isolated startles.

- State 2 Light sleep

State 2A: Diffuse light sleep with eyes closed, rapid eye movements may be observed under closed lids; low amplitude activity level with diffuse and disorganized movements; respirations are irregular and there are many sucking and mouthing movements, whimpers; facial, body, and extremity twitchings, much grimacing; the impression of a diffuse state is given. Color is typically poor.

State 2B: Robust light sleep with eyes closed; rapid eye movements may be observed under closed lids; low activity level with movements and dampened startles; movements are likely to be of lower amplitude and more monitored than in State 1; the infant responds to various internal stimuli with dampened startle. Respirations are more regular, mild sucking and mouthing movements may occur off and on; one or two whimpers may be observed, as well as infrequent sighs or smiles.

2. Transitional States

- State 3 Drowsy

State 3A: Diffusely drowsy, semi-awake or semi-asleep; eyes may be open or closed, eyelids fluttering or blinking very exaggeratedly; if eyes are open, they may have a glassy veiled look; activity level is variable, with or without interspersed, startles from time to time; diffuse movement; fussing and/or much discharge of vocalization, whimpers, facial grimacing, etc.

State 3B: Robustly drowsy, as above yet with little discharge of vocalization, whimpers, facial grimacing, etc.

3. Awake States

- State 4 Quietly awake and/or alert

State 4A: Diffusely awake. Two types of diffuse alertness are distinguished, 4AL and 4AH. L or H is marked instead of a check mark

4AL: Low keyed, lidded, diffuse awakeness; quiet, minimal motor activity, eyes half open or open with glazed, dull, or pained look, giving the impression of little energy; or focused yet strained alertness, appearing to look through, rather than at, an object or the caregiver.

4AH: Hyperalert; eyes wide open, giving the impression of panic, fear, or overwhelmedness; appearing to be hooked by the stimulus; the infant seems to have difficulty in modulating or breaking the intensity of the fixation to an object or the caregiver, and appears not in a position to turn the gaze away.

State 4B: Robustly alert with bright shiny eyes, animated facial expression; the infant appears to focus attention on a source of stimulation or a person and appears to process information actively and with modulation; motor activity is at a minimum.

- State 5 Actively awake and aroused

State 5A: Diffusely actively aroused; eyes may or may not be open; the infant is clearly awake and aroused, as indicated by motor arousal, tonus, and distressed facial expression, grimacing, or other signs of discomfort. Vocal fussing, if present, may be diffuse or strained.

State 5B: Robustly actively aroused; eyes may or may not be open; infant is clearly awake and aroused, with considerable, yet well defined, motor activity. The infant may also be clearly fussing without crying robustly.

- State 6 Highly aroused, agitated, upset, and/or crying

State 6A: Diffusely highly aroused with intense upset, as indicated by intense grimace and cry face, yet cry sound may be very strained, weak, or absent; intensity of upset is very high.

State 6B: Robustly highly aroused with rhythmic, intense, lusty crying which is robust and vigorous in sound.

- AA State Removal from the state continuum

AA: Should the infant move into a prolonged respiratory pause, e.g., beyond 8 seconds, AA should be marked, indicating that the infant has removed him or herself from the state continuum.

More than one state per 2-minute time block may be marked, depending on the fluctuation of states the infant shows. Operationally, typically a 2- to 3-second duration of a behavioral configuration is necessary to be recognized as a distinct state; however, even briefer excursions, especially into states 4 and 6, are recorded reliably.

D. Attention-Related Behaviors

These behaviors appear to be related to attentional states and seem to be signs of poor modulation, such as fussing, sneezing, and yawning, or they appear to be the expression of various levels of attentional availability, such as eye floating, ooh face, etc.

- **Fuss:** While fussing is often a component of State 5 behavior, this is not necessarily so. At times fussing occurs in State 3 or even in State 2. Fussing is an audible vocal expression of discomfort, uneasiness, unhappiness, upset, and/or disorganization.
- **Yawn:** The infant opens the mouth widely, usually with a deep inspiration.
- **Sneeze:** The infant expels air forcibly from the mouth and nose in an explosive, spasmodic action.
- **Face open:** The infant, either with eyes open or eyes closed, lifts eyebrows up and extends the forehead upwards. This may occur in sleep state or in awake state.
- **Eye Floating:** The infant's eyes move in floating, apparently disinhibited fashion, often disjugately. This may be in semi-open eye position or with fully open eyes.
- **Avert:** The infant actively averts the eyes from a social or inanimate target. The infant may momentarily close them.
- **Frown:** The infant knits the eyebrows or darkens the eyes by contracting the periocular musculature, engaging in a flexion of the upper face.
- **Ooh Face:** The infant rounds the mouth and purses the lips or extends them forward in an ooh configuration. This may be with eyes open or closed.
- **Locking:** The infant locks onto an object or point in the environment or on the caregiver, or may be maintaining a steady gaze fastened in one direction. The sound component of an environmental event may appear to contribute to the locking. It is not clear whether the infant processes what is looked at. The action appears almost obligatory and difficult to modify.
- **Cooing:** The infant emits a soft, pleasurable, modulated cooing sound.
- **Speech Movements:** The infant's tongue and lips move in soft, rhythmical, speech-like fashion, while the face is typically relaxed and animated, or the gaze is animatedly engaged with the environment or caregiver.

III. Further Specification of Circumstances

The infant's position in the course of an observation is marked as either prone, supine, or side (side lying). Head position is marked as right, left, or middle, defined by the direction of the face. If side lying is marked, the side the infant is lying on is indicated.

IV. Clinical Write-Up

In summarizing an observation, the outline provided on the clinical write-up sheets is followed. The introduction specifies the reason for the observation, the location and time of the observation, as well as the number of observers and caregivers present. Next, the environment around the infant's care area is described, followed by a description of the infant's bedspace and bedding. This is followed by a description of the infant's behavior during the initial observation period before the caregiving interaction begins. Following is the description of the infant's behavior in the course of the caregiving interaction, and then after the caregiving interaction is completed. All observations are seen in the context of biphasic functioning of approach and self-regulation efforts, and avoidance, defense, and stress behaviors, and in an ongoing process of infant, caregiver, and environment co-regulation. The formulation underlying the approach maintains that an infant has strategies available to actively seek well-modulated and well-regulated balance and internal synchronization of subsystems of functioning, and to approach stimuli, if the environmental configuration and opportunities offered are currently appropriate in their complexity, intensity, and timing for the infant's thresholds of functioning. The infant, in turn, is seen as having strategies available to move away from, protect him or herself from, and avoid environmental demands which are inappropriate in complexity, intensity, and/or timing for the infant's current level of organization. Such behaviors are thought of as stress behaviors. Approach and self-regulation behaviors may shift into stress behaviors, and some stress behaviors successfully reduce stress and therewith become self-regulatory behaviors. As a general rule, extension behaviors are thought to reflect stress, and flexion behaviors are thought to reflect self-regulatory competence; diffuse behaviors are reflective of stress and well defined behaviors are reflective of self-regulatory balance.

Self-regulatory balance, thus, might be reflected in:

1. regular modulated respiration, which is neither too fast nor slow and is free of pauses
2. pink color
3. visceral stability
4. well maintained and modulated tone
5. smooth movements of arms, legs, and trunk
6. efforts and success at tucking the trunk into modulated flexion and bracing the legs
7. in the very young infant, hand on face behavior
8. mouthing, yet if overly frequent, it may indicate stress if not seizure activity
9. suck-searching and sucking
10. hand clasp and foot clasp
11. hand-to-mouth efforts, grasping and holding on
12. all modulated (B) states, except for prolonged, intense crying
13. face opening
14. frowning, ooh face, cooing, and speech movements
15. HR between 120 and 160 RR between 40 and 60 SaO₂ between 94 and 98 and TcPO₂ between 55 and 80

Stress and a low threshold to disorganization, reflecting great sensitivity, might be reflected in:

1. irregular respirations, slow or fast respirations, and respiratory pauses
2. color other than pink, i.e., pale, webbed, red, dusky, or blue
3. tremors, startles, and twitches
4. visceral signs such as spit up, gags, hiccoughs, BM grunts, sounds, gasps
5. sighs, depending on the frequency
6. flaccidity of arms, legs, and trunk
7. frequent extensor movement of arms and legs
8. stretch/drown behavior, frequent squirming, arching
9. frequent tongue extensions, gape face, frequent grimacing
10. finger splaying, airplaning, saluting, sitting on air, frequent fisting
11. fussing frequent yawning, sneezing, eye floating and frequent averting
12. HR less than 120 and greater than 160 RR less than 40 and greater than 60 SaO₂ less than 94 or 100 TcPO₂ less than 55 and greater than 80

The picture that emerges from the description of the infant's behavior observed indicates at what level of support or relative challenge the infant moves from self-regulatory balance to stress. From this picture, the infant's history and current status is estimated and then verified by reading the infant's chart and filling out the Front Sheet. A brief medical summary of the infant's course is formulated, followed by a behavioral summary based on the observation. The next step is the formulation of the infant's own apparent current goals. This is followed by recommendations, for which inferences are drawn from the observation as to what strategies and caregiving modifications might be helpful in supporting and enhancing the infant's goal strivings and in reducing stress for the infant.

Recommendations pertain to:

1. The physical environment of the nursery in terms of location of the infant's crib or incubator, lighting, sound level, activity level, temperature, etc.
2. The bedspace and bedding of the infant
3. The direct caregiving interaction in terms of specific aids to self regulation, such as opportunity to suck, to hold on during manipulations; titering of social input modalities, in terms of appropriateness of looking, speaking, softening of voice, and simultaneity of modality; timing and sequencing of manipulations; transition facilitation, e.g., staying with the infant after bedding in prone and letting the infant hold on and suck, trunk and back encased in caregiver's hand and foot soles supported until stabilization is securely established, then gradually removing one aid at a time, assuring secure maintenance of stabilization, etc.

The focus of the recommendations is consistently on the coregulatory expectation of the infant as a partner in the infant-parent and infant-family coregulation system; coregulatory opportunities are identified and the parents are seen as the infant's most important and consistent nurturers and caregivers.

The report is written in universal language, i.e., it is written to be readily understandable by parents as well as by professionals of various disciplines, in the hospital setting as well as in the community.

Example reports are available as are the forms referred to. Information about formal training opportunities currently offered by ten NIDCAP centers nationwide is available from the author.

Literature Cited

1. Als H, Lester BM, Tronick EZ, Brazelton TB. Manual for the assessment of preterm infants' behavior (APIB). In: Fitzgerald HE, Lester BM, Yogman MW, eds. *Theory and Research in Behavioral Pediatrics*. New York: Plenum Press; 1982:65-132.
2. Als H, Lawhon G, Brown E, et al. Individualized behavioral and environmental care for the very low birth weight preterm infant at high risk for bronchopulmonary dysplasia: Neonatal Intensive Care Unit and developmental outcome. *Pediatrics*. 1986;78:1123-1132.
3. Als H. Individualized, family-focused developmental care for the very low birthweight preterm infant in the NICU. In: Friedman SL, Sigman MD, eds. *Advances in Applied Developmental Psychology*. Norwood, NJ: Ablex Publishing; 1992:341-388.
4. Als H, Lawhon G, Duffy FH, McAnulty GB, Gibes-Grossman R, Blickman JG. Individualized developmental care for the very low birthweight preterm infant: Medical and neurofunctional effects. *JAMA*. 1994;272:853-858.
5. Fleisher BF, VandenBerg KA, Constantinou J, et al. Individualized developmental care for very-low-birth-weight premature infants. *Clin Pediatr*. 1995;34:523-529.
6. Buehler DM, Als H, Duffy FH, McAnulty GB, Liederman J. Effectiveness of individualized developmental care for low-risk preterm infants: Behavioral and electrophysiological evidence. *Pediatrics*. 1995;96:923-932.
7. Brazelton TB. Neonatal Behavioral Assessment Scale. 2nd ed. Philadelphia: Spastics International Medical Publications. Lippincott; 1984.