EFFECTS OF SIGNALING INVASIVE PROCEDURES ON A HOSPITALIZED INFANT'S AFFECTIVE BEHAVIORS

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We report the effects of using a visual and auditory stimulus signaling impending painful medical procedures versus "safe" periods on the affective behavior of a hospitalized infant. The results of a reversal design suggested that the signaling procedures increased positive behaviors and decreased negative behaviors during both noninvasive and invasive caregiver events.

DESCRIPTORS: behavioral medicine, discriminative stimulus, prediction, signaling, infants

Necessary medical procedures and routines during hospitalization can have a variety of negative behavioral sequelae in children. Gorski, Hole, Leonard, and Martin (1983), for example, reported that medically unstable infants exhibited signs of distress during both painful and nonpainful caregiving interventions. Cataldo, Jacobs, and Rogers (1982) suggested that the ability to predict the occurrence of aversive hospital procedures may lessen the negative behavioral effects of the events. Specifically, the behavioral sequelae of necessary medical regimens during hospitalization may be attenuated if their occurrence and "safe" periods are made discriminable. We therefore investigated the effects of signaling these events on a hospitalized infant's affective behavior.

METHOD: The subject, a 9-month-old male (mental age 3 months), had been hospitalized since birth. He had been admitted to the neonatal intensive care unit with a diagnosis of bronchopulmonary dysplasia and had a tracheostomy.

Measurement. Five-minute observations were conducted one to three times per day, across all caregiver work shifts, 7 days per week. A 10-s partial-interval procedure was used to record invasive and noninvasive caregiver events. *Invasive* events were any noxious procedures that invaded the normal barrier of body tissue, including nasal, oral, and tracheal suctioning; injections; and administration of medication. Three categories of *noninvasive* events were scored: (a) delivery of routine procedures involving nonpainful physical contact (e.g., bathing, dressing), (b) a caregiver in proximity and oriented to the infant without physical contact, and (c) the absence of a caregiver (no caregiver within 2 ft of the infant). Infant behavior was scored as *positive* (smiles, orients gaze toward caregiver's face or toy in the crib), *negative* (cries, whines, exhibits self-stimulatory behavior), or *neutral* (no overt response to stimuli, or gaze aversion), using a 10-s time sample procedure. Point-by-point interobserver agreement, assessed on 14% of the observations across all experimental conditions, was calculated by dividing the number of agreements (i.e., intervals coded identically by both observers) by agreements plus disagreements and multiplying by 100%. Agreement scores ranged from 78% to 100% ($M = 89.3\%$).

Procedures and experimental design. Two conditions, signal present (signal) and signal absent (no signal) were alternated in the context of an ABAB reversal design. During the signal condition, a plywood box, containing a battery-operated visual (red light) and auditory (low buzz) signal activated by a push-button switch, was attached to the cross-bar of the crib 24 hours per day. The primary care staff member (nurse, physician, or respiratory therapist) turned the signal on immediately before he or she performed an invasive procedure and turned the signal off immediately after the procedure was completed. (An exception occurred during the first observation for the signal condition; the signal was presented once in the absence of caregiver procedures to determine whether the signal alone differentially affected responding before being paired with invasive procedures.) The signal remained off during all noninvasive periods. During the no-signal condition, the signal box was absent from the crib.

RESULTS AND DISCUSSION: Although the data were variable, positive behavior was observed more often (and negative behavior less often) during noninvasive than invasive events and, for both types of events, when the signaling device was present rather than absent. The figure shows the percentage of positive and negative behaviors during noninvasive periods, across conditions in which invasive events were or were not signaled. The mean percentages of positive behavior across successive no-signal and signal conditions were 20% (range, 0% to 75%), 32% (range, 0% to 82%), 29% (range, 0% to 100%), and 42% (range, 10% to 100%), respectively. Mean percentages for negative behavior were 34%, 15%, 26%, and 6%.

An analysis of infant behavior across the three types of noninvasive caregiver events (proximity, routine, and absence), showed consistent differences when comparing the initial no-signal to the final signal condition: Positive behavior increased from a mean of 6% to 29% during caregiver proximity, from 20% to 42% during routine procedures, and from 12% to 26% during caregiver absence. The mean percentage of negative behavior during the initial no-signal and final signal conditions, respectively, declined from 31% to 6% during caregiver proximity and from 34% to 6% during routine procedures. Little change occurred in the low percentage of negative behavior during caregiver absence (from 1% to 2%). With this exception, then, negative behavior decreased and positive behavior increased across all types of caregiving events as experience with the signaling procedure increased.

The data suggest that providing a means for conditional discriminations between invasive (and presumed aversive stimulation) versus "safe" periods resulted in infant behavior that was more positive and less negative, which may, therefore, have a beneficial effect on infant-caregiver interactions. The use of the signaling device represents a low-cost, efficient, and

minimally disruptive procedure, and offers an alternative to the provision of preparatory information, which, albeit shown to be helpful (e.g., Johnson & Levanthal, 1974), is not feasible with prelingual children. Alternative signaling mechanisms (e.g., colored aprons worn differentially by caregivers) might also be investigated (Shorkey & Taylor, 1973).

In addition to the obvious need for direct and systematic replication, future research could analyze operant versus respondent (emotional) aspects of child behavior or, through descriptive methods, quantify the natural course of behavior change during hospitalization. If the behavior observed on intensive medical or surgical wards is best likened to the phenomenon of conditioned suppression (Cataldo et al., 1982), a descriptive study should show a decrease in both positive and negative behavior and an increase in neutral behavior with continued exposure to the stimulus conditions and contingencies of hospital procedures. The considerable basic behavioral research on punishment demonstrates conditions that can mitigate the effects of aversive stimulation (e.g., increased prediction and control of aversive events, counterconditioning techniques). As such, this literature has considerable applied value to clinical situations in which aversive stimulation produces unwanted effects and cannot be avoided, as in the case of necessary medical care.

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