INTRODUCTION
Throughout the first weeks to months of life, premature infants often need round-the-clock medical care associated with recurrent pain, emotional distress, chaotic ambient environment, and relative deprivation of language, paralinguistic, social, and affective communication via auditory sensory modality compared to readiness in their home environment.

Working hypotheses:
1. Pain and emotional distress can be assessed in premature infants over time via variations of motor responses to acute noxious stimuli using neurophysiological responses to auditory stimulation in approximating diagnostic and therapeutic medical procedures.
2. Neurophysiological and behavioral responses to painful stimuli can be assessed by auditory stimulation with vocal music.

METHODS

INFANT SOLETS

- HR acquired and parent informed consent was obtained, and premature infants without neurological disease who did not require respiratory support were enrolled using a randomized, open-label, randomized clinical study design. All patients were admitted to the MGH Neonatal Special Care Unit from the Delivery Room and underwent both tests for medical indications.
- Premature infants (gestational age >30 wks, >2.2 lb) were participated in this test.
- Participants were randomized to the control condition (auditory stimulation, AS) or test condition (auditory stimulation + vocal music, +AS) in accordance with the allocated audio stimuli performed by experienced SVO nurses using a standard "heel stick" procedure. This procedure enabled patching the skin on the plantar surface of foot, and exposing the "pain area" that was turned into a test. Seven neonates received auditory stimulation within 115 seconds after birth (median = 9.09 ± standard deviation = 10.15 minutes; six neonates were not stimulated.
- In the test condition, auditory stimulation started within 2 minutes after skin puncture and continued for a total duration of 10 minutes. Intensity = 60-80 db at mother head.
- Heart rate (HR), respiratory rate (RR), skin and trunk movements, and vocalizations were recorded continuously by HR, respiratory monitoring, and video. The experimental apparatus for both the control and test conditions consisted of the infant's Safety Nest, associated cardiorespiratory BIB monitoring methods, a digital videocamera, a CD amplifier/speaker system, and a sound level meter.

SINGLE-NEONATE DATA: NEUROPHYSIOLOGICAL AND BEHAVIORAL RESPONSES TO PAIN (+AS Condition)

Data from a single premature infant showing neurophysiological responses (HR) and behavioral responses (RR) in typical of What observed in the population during the day, immediately after delivery of a painful stimulus (heel stick puncture) and test manipulation and auditory stimulation (+AS Condition) with visual music (International Tachyarrhythmia Kinetics by a woman in the infant's native language singed with guile accompaniment).

NEONATE POPULATION DATA: NEUROPHYSIOLOGICAL RESPONSES TO PAIN

- This protocol evoked a sudden increase in heart from each of the 15 premature infants and, consequently, the Mean Heart Rate of the entire population.
- Mean Population Heart Rate increased 15% above the Post-Unswaddling, Pre-Pain, Pre-Music Baseline.
- After a blood test, HR increases were sustained for several minutes - throughout the 180-second observation window in some minutes.
- Skins puncture site related sudden and sustained increased in Respiratory Rate in each of the 12 neonates that were above normal limits (S1 = Tachypnea and, Resp, Respiratory Afflaxis.)

NEONATE POPULATION DATA: MODULATION OF PAIN-EVOKED CHANGES IN HEART RATE BY AUDITORY STIMULATION

In the minutes following acute pain and no pain in the test condition (+AS) observed average decrease of 12% in VI: Mean Heart Rate, but patients in the control condition (+AS) showed no change in Mean Heart Rate.

CONCLUSIONS

1. A routine diagnostic procedure required for neonatal assessment – skin puncture, performed dose of times, once days- to-months in some critically ill premature infants – caused sudden, sustained increase in heart rate, respiratory rate, and vocalizations.
2. When compared to the control condition, the performance of auditory stimulation + vocal music intervention in critically-ill premature infants decreased the heart rate effect of 12% of infants profoundly and relatively to the MGH Neonatal Special Care Unit.
3. During the 10 min period following skin puncture and handling, auditory augmentation with vocal music attenuated an autonomic pathophysiology in heart rate, respiratory rate, and vocalizations maintained a large distance by pre-intervention control and large distance by post- intervention condition.
4. Larger populations which have been the authors of Valsalva, respiratory, tachycardia, and response parameters are needed.

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