

RESPIRATORY THERAPISTS CAN IMPACT THE INTENSIVE CARE NURSERY BY PRACTICING DEVELOPMENTAL CARE THROUGH SOUND REDUCTION

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Background: Noise generated by respiratory equipment and related procedures in the Neonatal Intensive Care Unit (NICU) often exceed the recommended 45 dB limit. Noise is an environmental stressor that has been shown to negatively impact the vulnerable preterm infant. These negative effects include apnea, bradycardia, tachycardia, tachypnea, and increased caloric requirements needed for growth and healing. The preterm infant is also unable to produce sufficient amounts of cortisol when under stress (physical as well as environmental). This can lead to insufficient suppression of pulmonary inflammation and free radical oxidative damage predisposing to chronic lung disease. The objective of this study was to better quantify sound levels of various equipment/procedures in the NICU.

Methods: Seven respiratory care patient encounter types were monitored continuously over a 5 minute period, both with and without a sound reducing intervention. The following devices/procedures were studied: 1) Airlife CPAP System, 2) Bunnell Jet Ventilator, 3) Drager 8000 Ventilator, 4) Drager isolette, and 5) Neosucker/suction tubing. Sound data were collected using a SL-814 digital sound monitor. We compared data points using the non-parametric Wilcoxon Rank Sum Test (STATA 12). We considered $p < 0.05$ statistically significant.

Results: 10-24 observations were collected for each encounter type. Data are displayed in the table as median (5th, 95th %ile).

Conclusions: Sound levels using all types of types of equipment were above 45 dB, with or without intervention. Noise reduction interventions, however, were statistically significant for each equipment type. Based on previous research, a 3 dB change equates to a sound pressure level variation of about 50%. Respiratory therapists can greatly impact their patients' exposure to noise which may promote improved clinical outcomes.

EQUIPMENT	SOUND LEVEL WITHOUT INTERVENTION (dB)	SOUND LEVEL WITH INTERVENTION (dB)	P
Airlife CPAP System	76.9 dB (76.8,77.1) (exhalation tubing in isolette)	72.3 dB (72.1,72.4) (exhalation tubing outside isolette)	<0.001
Bunnell Jet (HFJV)	69.1 dB (68.6,69.7) (jet box uncovered in isolette)	66.7 dB (66.2,67.1) (jet box covered with 2 cloth diapers)	<0.001
Drager Isolette (removing top)	73.5 dB (68.8,77.2) (one person removing top)	67.5 dB (66.6,69.1) (two people removing top)	0.010
Drager Isolette (moving bed tray)	81.8 dB (78,85)	67.2 dB (66.7,71.2) (pulling gently, supporting tray)	<0.001

Drager Ventilator (vent on pt's right)	71.9 dB (71.5,72.5) (alarm with isolette doors open)	68.8 dB (68.4,69.2) (alarm with isolette doors closed)	<0.001
Drager Ventilator (vent on pt's left)	70.5 dB (69.7,70.7) (alarm with isolette doors open)	67.6 dB (66.7,68.2) (alarms with isolette doors closed)	<0.001
Suction Tubing / Neosucker	81.7 dB (80.1,88.5) (secretions remain in tubing)	66.3 dB (66.1,67.1) (tubing rinsed with saline)	0.009