Hennepin County
Medical Center

The Effect of the eXtended Range Electronic Projectile (XREP) on Breathing

Donald Dawes, MD • Jeffrey Ho, MD • Jeremy Olsen, MD • James Miner, MD

Introduction

The TASER X26, a handheld device, has an effective range of 7-14 feet and a subject must remain electrically tethered to the device in order for it to incapacitate him. The XREP is a new electronic control device that has a range of over 60 feet and is a self-contained unit that can incapacitate a subject without the electrical tether. This allows the operator to deploy multiple devices to multiple subjects.

Because the XREP is deployed from a longer distance requiring more time for law enforcement officers to close on the subject, the programmed exposure time is longer than the X26. The law enforcement model is programmed for 20 seconds. Because of this long deployment time, the authors felt it was important to study its effects on breathing.

Methods

A breath-by-breath gas analyzer measured tidal volume, respiratory rate, end-tidal CO2, and end-tidal O2. The XREP circuit was connected to the skin by electrical contacts. Placement was thoraco-abdominal in all subjects. The minimum exposure time was 15 seconds.

In 27 subjects, the device was programmed for 45 seconds and they could terminate the device voluntarily after 15 seconds. In the remaining subjects, the device was programmed for 20 seconds.

Data were analyzed using the mean of the measured respiratory parameter for the before, during, and after time intervals. Data are described with descriptive statistics and compared between time points using Wilcoxen sign rank tests.

	Before	During	After
RR(median, IQR, range)	15, 13 - 17, 7 - 23	34, 21 - 42, 4 - 113	16, 13 - 20, 7 - 24
TV(median, IQR, range)	0.9, 0.6 - 1.1, 0.5 - 1.9	0.6, 0.5 - 1.0, 0.3 - 2.7	1.1, 0.7 - 1.3, 0.6 - 2.6
PETCO2(median, IQR, range)	36, 35 - 39, 22 - 43	28, 26 - 33, 19 - 44	37, 36 - 39, 28 - 45
PETCO2(median, IQR, range)	103, 97 - 109, 85 - 118	113, 105 - 117, 84 - 128	104, 100 - 108, 90 - 117
Minute Ventilation (median, IQR, range)	12.9, 10.5 - 15.3, 4.9 - 23.9	19.9, 14.9 - 26.4, 3.6 - 57.9	17.3, 15.6 - 20.0, 9.6 - 31.1

Table 1

Results

A total of 78 subjects completed the study. The variable exposure subjects had a mean exposure of 16.7 seconds, with one subject completing 45 seconds. The results are presented in table 1.

The subject who completed the 45 seconds had a mean respiratory rate of 39, tidal volume of 1.08, a PETCO2 of 28, PETO2 of 115, and a minute ventilation of 42 during the 45 seconds.

Conclusion

There was an increase in the respiratory rate, end-tidal oxygen, and minute ventilation, and a decrease in tidal volume and end-tidal carbon dioxide during the XREP exposure.

This study demonstrates that the XREP does not significantly impair respiratory function.