

SUPPLEMENTARY DIGITAL MATERIAL 1

Instructions of inspiratory plus expiratory neuromuscular electrical stimulation

In inspiratory plus expiratory neuromuscular electrical stimulation group, the procedure was conducted by a doctor. Before treatment, the doctor or nurse measured the subject's respiratory rate and inspiratory time, and then set the respiratory rate and inspiratory time on the stimulator to be consistent with that of the subject. After starting the treatment, the stimulator sent out "inhale" and "exhale" instructions according to the setting parameters; there was a diagram to indicate inhale and exhale, so as to prompt the subjects to inhale and exhale synchronously. In the inspiratory phase, the phrenic nerve was stimulated synchronously by transcutaneous electric stimulation, and the electric signal was transmitted from the phrenic nerve to the diaphragm, causing the diaphragm to contract and promoting the subject to inhale; in the expiratory phase, the abdominal muscle was stimulated synchronously, causing the abdominal muscle to contract and promoting the subject to exhale. The duration of electrical stimulation at each stage was 1 second. Whether there was electrical stimulation of the abdominal muscle or not, the stimulation was synchronized with the subject through an acousto-optic prompt. The synchronization of electrical stimulation therapy with the subject's breath was essential for the treatment.