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COPD Conference 2018: Effect of neuromuscular electrical nerve stimulation in moderate to severe Chronic Obstructive Pulmonary Disease patients-A pilot study-Randall Debattista, University of Malta

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Neuromuscular electrical nerve stimulation (NMES) is a new modality being investigated for its effect related to quadriceps strength and walking distance in chronic obstructive pulmonary disease (COPD) patients. COPD patients also experience weakness in the skeletal muscles. Neuromuscular electric stimulation (NMES) can provide an alternative form of rehabilitation for those who are unable or unwilling to undergo physical training. This metaanalysis was aimed at investigating the controversial issue of whether this therapy is effective in patients with moderate to severe COPD.COPD is a major cause of morbidity and mortality worldwide, and is a major economic and social burden. It is expected that in 2020 they will become the third leading cause of death. It is now recognized that COPD is characteristic of inspiratory muscle fatigue and deconditioning of the skeletal muscle associated with reduced quality of life and premature mortality.

It has been well founded that physical and respiratory muscle exercise is helpful for patient recovery in COPD, and in particular physical training is considered one of the best therapies available to enhance the function of the limb muscle.A recent study has shown that physical training in male patients with COPD can prevent cognitive decline and associated comorbidities. In fact, patients with advanced stage COPD can be too frail to tolerate physical training due to intense breathlessness at rest or minimal exertion.Neuromuscular electrical stimulation (NMES) is emerging as a new method of rehabilitation that does not evoke dyspnea to benefit patients who can not take part in a traditional rehabilitation program. It has also been intensively used in healthy people and athletes to rehabilitate curative care and prevent deconditioning.The inclusive selection criteria were RCTs investigating the role of NMES in patients with moderate to extreme COPD, predefined NMES system applied to the lower limbs, unstimulated or other therapy (i.e., placebo stimulation) defined as control group, and primary outcome quadricep strength and exercise ability defined as moving distance and endurance time.

The secondary result was the score of St George's Respiratory Questionnaire (SGRQ).The criteria met the principles of PICO (patient / problem / population, intervention, comparison / control / comparator, results). Only the full version was used for meta-analysis for the articles reported in more than two publications. It excluded abstracts published solely in academic conferences or website materials.Two investigators (XL and LG) evaluated the eligibility title, or abstract. In discordance cases, a third investigator (BG) took part in the debate in order to reach a final consensus. Full papers were obtained for further analysis of studies which met the inclusion criteria.Details related to the nature of the experiment, patient characteristics, and specific outcomes were recorded in a revised form. We recorded first author, year, patient numbers, age , sex, index of body mass, expiratory forced volume in 1 second, COPD stage, experimental and control interventions .Meta-analyzes were carried out with the program RevMan 5.3 (Cochrane Collaboration, London, UK). For summary statistics, weighted mean difference (WMD) or standardized mean difference (SMD) with a confidence interval of 95 per cent (CI) was considered and derived for comparison of NMES with other methods of rehab.SMD was used when different units or scales were reported for the results from the studies. Because of the expected variability in the NMES approach, including multiple stimulating parameters, specific therapy durations , and diverse research designs and study populations, we used mixedeffect modeling with random effect for parameters of interest to compensate for inter-trial discrepancies.The methodological quality of the trials identified was independently scored using the GRADE system (Grades of Recommendation, Assessment , Development , and Evaluation). The GRADE system classifies four levels in terms of evidence quality

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high , moderate, low, and very low.This approach to th e validity of the data for book reviews is focused on fiv e items: limitations of the research, inconsistency of th e findings, indirectness of data, imprecision, and report ing bias. In order to assess the reliability of the grade, t wo investigators independently assessed the quality cla ssification of the selected articles, with divergences res olved by a third investigator. The purpose of this small pilot study was to observe and absorb as much information possible on the methodology and learning outcomes. Information from this small pilot study would present recommendations for the possibility of a larger national study regarding this new modality. For this aim, a mixed method approach was deemed appropriate. A total of seven moderate to severe COPD patients were included in this feasibility study, four in the experimental group and three in the control group. Following patient consent, the quadriceps strength as well as a 6-minute walk test (6MWT) was completed. The objective measures were taken at the baseline of this study, i.e. week four and week eight. Positive outcomes were reported in all subjects with the experimental group benefitting the most. However, the results are insignificant in view of the small population sampling. A self-designed questionnaire was distributed to the experimental group at the end of the study, with the aim to get a better view on how patients felt during the duration of NMES. Constant feedback was kept during the study duration between the researcher, intermediary physiotherapist and the subjects. Constant feedback and the results from the questionnaire were important for the researcher to present recommendations based on the strength, limitations and learning outcomes. This feasibility study provided guidance for larger more randomized national studies to maximize the benefits of NMES in COPD patients.

Recent Publications 1.Madocks M, Nolan C, Man W, Polkey M, Hart N, et al. (2016) Neuromuscular electrical stimulation to improve exercise capacity in patients with severe COPD: a randomised double-blind, placebo-controlled trial. The Lancet Respiratory Medicine 4(1):27???36. 2. Kharbanda, Krishnan S and Ramakrishna A (2015) Prevalence of quadriceps muscle weakness in patients with COPD and its association with disease severity. International Journal of Chronic Obstructive Pulmonary Disease 1727. 3. Giavedoni S, Deans A, Mccaughtey P, Drost E, Macnee W, et al. (2012) Neuromuscular electrical stimulation prevents muscle function deterioration in exacerbated COPD: A pilot study. Respiratory Medicine 106(10):1429???1434. 4. Abdellaoui A, Prefaut C, Gouzi F, Couillard A, Coisy-Quivy M, et al. (2011) Skeletal muscle effects of electrostimulation after COPD exacerbation: a pilot study. European Respiratory Journal 38(4):781???788. 5. Maffiuletti N (2010) Physiological and methodological considerations for the use of neuromuscular electrical stimulation.