Supplemental digital content

Protocol of mechanical ventilation weaning

Patients were considered ready to be wean if they met the following criteria: a resolution of the cause of acute respiratory failure, a need for less than 50% FiO_2 and less than 8 cmH_2O positive end-expiratory pressure to reach 92% of pulse saturation and an hemodynamic stability with none or very low support with catecholamines.

If the patient met these criteria, a sixty minutes T-piece trial was performed. Failure of the spontaneaous breathing trial (SBT) was defined according to guidelines and encompassed agitation, depressed mental status, cyanosis, dyspnoea, tachypnoea >30 bpm or increased by >50%, tachycardia>140 bpm or increased by >20%, cardiac arrhythmias, systolic blood pressure below 90 mmHg or above 180 mmHg or increased >20%, PaO_2 <60 mmHg with FiO_2>50%, $PaCO_2$>50 mmHg or a more than 8 mmHg increase in $PaCO_2$.

Patients who successfully passed the SBT were immediately extubated. In both investigating centres, prophylactic non-invasive ventilation (NIV) was applied immediately after extubation high risk weaning failure patients (i.e. known chronic obstructive pulmonary disease (COPD) or chronic left heart failure). Prophylactic use of NIV was left to the discretion of the attending physician, and was not classified as a weaning failure. Reintubation or unplanned use of NIV within 48 hours after extubation defined failure of extubation.

According to guidelines, simple weaning was defined by success at the first SBT, difficult weaning was defined by the need for up to three SBT or seven days to achieve successful weaning and prolonged weaning by the need for more than three SBT or more than seven days to achieve successful weaning.

Association between handgrip strength at the first spontaneous breathing trial and the administration of drugs

		first HG strength (kg)	p
steroids	yes n=18	15.6±10.7	0.82
	no n=66	16.3±12.1	
NMBA	yes n=19	16.9±11.5	0.45
	no n=65	14.6±12.6	
catecholamines	yes n=62	15.7±12.0	0.39
	no n=22	18.2±10.9	

NMBA: neuromuscular blocking agents, HG: handgrip

Daily physiotherapy care

In both centres, daily physiotherapy care of the patients followed international guidelines [1]. First, safety issues were evaluated by physicians, nurses and physiotherapists together. As soon as estimated possible, positioning and passive mobilizations of the four limbs in physiological directions were provided to the patients. Active mobilization with increasing load began as soon as patients were able to move spontaneously.

Sedation and neuromuscular blocking agent policy

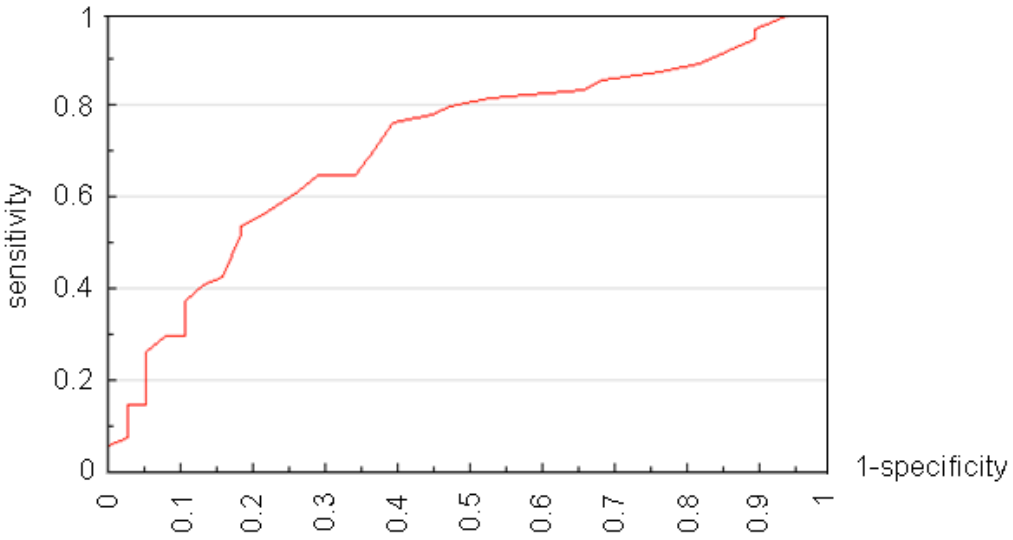
In both ICUs, patients were sedated using continuous infusion of midazolam or propofol and fentanyl. In one centre, a nurse implemented sedation protocol using midazolam and, when needed fentanyl was applied whenever possible to reach the estimated adequate level of sedation, assessed by the Ramsay Score. Daily interruption of sedation was not performed among included patients. Neuromuscular Blocking Agents (NMBAs) were used in specific circumstances and their indications were decided on an individual basis. NMBAs were

administered whether in bolus or through a continuous infusion when estimated appropriate. Atracurium was the only NMBA used in both centres.

Feeding policy

In both investigating centres, feeding policy followed the international guidelines [2]. In brief, enteral nutrition was started as soon as possible through a nasogastric tube with a peristaltic pump. The feeding goals were 25 to 30 kcal/kg/day. The gastric residual volume was not monitored. The decision to stop the enteral feeding or to decrease its output was based on the occurrence of regurgitations, vomiting or abdominal distension at clinical examination. Parenteral nutrition was used if the enteral access was contra indicated, or in combination with enteral nutrition if the caloric goals could not be achieved by the enteral way only.

Receiver operating curve of handgrip strength in SBT success



The area under curve was 0.66. The HG had 0.76 sensitivity and 0.69 specificity for identifying difficult or prolonged weaning at a cut-off of 11 Kg.

References

1. Gosselink R, Bott J, Johnson M, et al. Physiotherapy for adult patients with critical illness: recommendations of the European Respiratory Society and European Society

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2. McClave SA, Martindale RG, Vanek VW, et al. Guidelines for the Provision and Assessment of Nutrition Support Therapy in the Adult Critically Ill Patient: Society of Critical Care Medicine (SCCM) and American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.). J Parenter Enteral Nutr 2009;33:277-316