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Dangerous Effect of Unnecessary Oxygen and Hyperoxemia

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High fractions of inspired oxygen (FiO_2) have been associated with several effects on lung tissue and gas exchange including diminished lung volumes and hypoxemia due to absorptive atelectasis, accentuation or production of hypercapnia, and damage to airways and pulmonary parenchyma.

Oxygen is prescribed in many Medical Emergencies in which tissue oxygenation is threatened because of respiratory failure, and/or reduced tissue perfusion. Depending on the mode of delivery, the fraction of inspired oxygen (FiO_2) associated with oxygen therapy can range from 25 % to 100 %, compared with normal FiO_2 of 0.21 when breathing ambient air at sea level. Since FiO_2 determines PaO_2 , high-dose oxygen therapy ($FiO_2 > 50$ %) can cause PaO_2 to rise well more than the upper limit of the reference range, a condition called hyperoxemia that potentially results in hyperoxia (high O_2 in tissues).

Pulse oximetry (SpO_2) provides continuous visibility to arterial blood oxygenation in hypoxia and normoxia but cannot assess hyperoxia. During supplemental oxygen administration, clinicians often use the partial pressure of oxygen (PaO_2) to assess hyperoxia but this requires ABG that is intermittent and delayed. Between invasive sampling, changes in PaO_2 cannot be assessed and therefore unexpected hypoxia or unintended hyperoxia can occur.

Biography:

Santiago Herrero is Clinical Director of Postoperative Cardiac Surgical ICU at The Jilin Heart Hospital, Changchun, Jilin Province, China. Dr. Santiago Herrero is board certified critical care physician of the Spanish Society of Critical Care Medicine since 1989. Dr. Santiago Herrero received his Research Proficiency in 2008 by the University of Oviedo (2008). He is Fellow of the American College of Chest Physicians since 2004. Associate editor of Current Respiratory Medicine Reviews and of the Journal Critical Care and Shock. Recently he was awarded with The Mountain Changbai Friendship Award in September 2017 by the Changchun and Jilin Government, China.