Oxygen delivery is probably one of the most frequently administered medication by nurses around the world. Oxygen was discovered by Joseph Priestly in the late 18th century and was used as a treatment for patients with acute and chronic respiratory failure until nowadays. Its use should be carefully considered. As any other medications, it may cause harm to patients, if used inappropriately. In clinical practice, a common debate between two currents of thought has been going on till current days: “you can’t administer too much oxygen” versus “oxygen won’t hurt”. Recently healthcare professionals had a tendency to titrate of oxygen administration to avoid the side-effects of both hypoxaemia and hyperoxaemia in emergency and intensive care settings. Indeed, the risks related to hypoxaemia are widely known. On the contrary, complications related to excessive oxygenation seem to have a low priority for the healthcare professionals.

Oxygen can be administered through low flow...
Venturi face-mask receives oxygen at a specific rate, flowing into the mask through a narrow tube. The oxygen flow rate increases by passing through the narrow tube called Venturi valve, and consequently the downstream pressure decreases. The Venturi valve includes a side orifice that aspirates room air because of the decreased pressure within the lumen of the valve. In this fashion, the oxygen flow is mixed with the room air before it reaches the patient at a constant and predictable rate.

Recently, Miller and colleagues have proposed a standardization of High-Flow Oxygen Therapy Concepts. The authors organized the mess of the several terminology changes introduced with the large employment of oxygen therapy through high flow nasal therapy during the last years. There are many trade terms referring to those oxygen delivery modes. They include high-velocity nasal insufflation (Hi-VNI—Vapotherm, Exeter, New Hampshire), high-flow nasal insufflation (HFNI), high-flow nasal oxygenation, Optiflow (Fisher and Paykel, Irvine, California), transnasal humidified rapid-insufflation ventilatory exchange, heated high-flow nasal cannula, heated humidified high-flow nasal cannula, and high-flow nasal cannula. HFNI therapy provides optimal humidification and other benefits affecting physiologic mechanisms: physiological dead space washout with improvement of carbon dioxide (CO2) levels, decreased respiratory rate, positive end-expiratory pressure, increased tidal volume and end-expiratory volume. The authors suggest High Flow Nasal Insufflation (HFNI) as a more appropriate terminology to better describe this mode of “noninvasive high-flow respiratory support”.

Unlike the conventional oxygen therapy modalities, HFNI are capable of delivering heated and humidified gas with very high-flow rates that can approximate the patients’ inspiratory demand while maintaining an adjustable oxygen inspiratory fraction (FiO2). If gas flow rate exceeds their inspiratory peak flow (PIF), patients can inhale a stable mix of air-oxygen flow. Under normal conditions, PIF is about 20-30 L/min, and during increase effort or acute distress spontaneous inspiratory until 45 liters per minute or greater.

However, some doubts emerge when Miller and colleagues’ classification includes Venturi mask among low-flow oxygen supports that do not meet inspiratory demand. Venturi Mask is a conventional oxygen therapy device developed about 1960 by Earl James Moran Campbell. He applied to the medical field the Venturi effect – knew since late 18th century – creating an oxygen delivery face mask capable to administer an air/oxygen mix through high flow rates, and, at the same time, preventing CO2 retention. The Venturi face-mask receives oxygen at a specific rate, delivering “pure” oxygen until 30 L/min – or mixed with ambient or compressed air delivering high flows from 30 up to 80 L/min and over, using many different interfaces.

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References


