EMS STREET SENSE

AN INFORMATIONAL RESOURCE FOR PROVIDERS OF AND SUPPLIERS TO EMS

"The Problem of Inadvertent Hyperventilation" *-Resolving With Technology Part III (ATVs)*

The August issue of Street Sense presented the use of automatic ventilators as one resolution to inadvertent hyperventilation and gastric insufflation during CPR. In this issue we will review the various types of automatic ventilators but limit the discussion to those suitable for pre-hospital use (automatic transport ventilators or ATVs).

The adoption of ATVs has been slower in North America than most other markets worldwide. This seems quite odd when a lead in technology is taken in other areas to improve patient outcomes and/or assist rescuers. We look to automate defibrillation, pulse checking and recently compressions but when it comes to the most essential chain of survival link (breathing) many EMS departments tender for the cheapest "bag".

It is also not uncommon for services that have invested in automatic ventilators/resuscitators to leave the choice of their use up to the scene personnel (automatic ventilator or bag-valve-mask) despite the documented difficulties of delivering proper ventilation with a bag-valve-mask. Can you imagine giving EMS personnel the option of chest pounding versus an AED?

Perhaps it is a misunderstanding on what ATVs are, how they function or memories of the dangers from the original manually triggered devices from 30 years ago. A true, safer "automatic" ventilator should perform the following without manual intervention:

- ☐ deliver the proper breath frequencies
- ☐ deliver appropriate tidal volumes
- ☐ limit peak airway pressures
- ☐ provide proper inspiratory/expiratory ratios

ATVs do what trained EMS personnel try to do with a BVM but which is next to impossible to achieve in the field. If artificial ventilation were being provided to a 100 kilogram (200 lb.) adult, the patient should receive 12 breaths in a minute, 6-700 ml of tidal volume in 2 seconds per breath and be provided with an expiratory time of 4 seconds. The peak airway pressure should be less than 19 cmH2O to avoid gastric insufflation. How many EMS Providers would honestly be able to achieve and sustain these parameters over the period it takes to manage and transport a patient to the

hospital? ATVs can.

There are two primary types of ATVs for pre-hospital resuscitation. Those that operate with micro-pneumatics (or compressed gas) and those powered electronically by batteries. There are many features/options available on both types which will be the focus of our October newsletter. In this issue we will deal with what is NOT an ATV for resuscitation.

Manually triggered oxygen-powered devices.
In the USA, these devices are sometimes referred to as demand valves (see true description below) and while they provide some advantages to both rescuers and patients over BVMs, they do not "automatically" deliver set tidal volumes, frequencies or I:E ratios. A manual button delivers positive pressure gas when pressed and stops the flow when released. They should deliver no more than 40 LPM in this mode and have a pressure relief valve to prevent over inflating the lungs (unlike early models).

Demand valves.
A proper definition of a demand valve is a device that will provide gas flow when negative pressure (inhalation) is applied at the rate "demanded". SCBAs and SCUBA valves are examples but are of no use to a patient who cannot breath (inhale) on their own.

CPAP Devices.
CPAP is an acronym for continuous positive airway pressure. They are therapy devices for patients with difficulty breathing (COPD as an example) versus those in respiratory arrest. While an ATV may have CPAP as an option, a “CPAP-only” device should not be used for resuscitation during CPR.

Pressure cycled devices.
These devices fall into a "gray" area in terms of defining them as ATVs or not. They are sometimes positioned for use during CPR but manufacturers of such go to great lengths to point out that they are neither “vents” nor demand valves. They work by cycling oxygen (or turning on and off) based on changes in a patient's airway pressure. Positive pressure oxygen is initiated at one preset limit and delivered until the airway pressure reaches a higher level where it shuts off.

Pressure cycled devices can create varied respiratory rates as they try to provide ventilation. When being used during CPR, they cannot "time" breaths, making it difficult to achieve a 15:2 compressions to breaths rate. A second issue is in dealing with an airway obstruction or poor compliance. They can turn on and off quickly, which can lead to either inadvertently hyperventilating or hypo ventilating a patient (the problem we are trying to resolve through the use of an ATV).

The latest CPR Guidelines state that "pressure cycled devices are obsolete and should not be used during CPR".

Stay tuned for October's issue where we will look at the various features available on ATVs.

Street Sense is published by O-Two Medical Technologies Inc., innovators in resuscitation since 1971 (mouth-to-mouth barriers, BVMs to a full line of automatic ventilators/resuscitators).

Contact O-Two at:

7575 Kimbel St.
Mississauga ON Canada L5S 1C8
Email: mboadway@otwo.com
Phone: 1-800-387-3405
Fax: 905-677-2035
Web : www.otwo.com