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## Articles

### Busko's Ventilation Algorithm – a step by step approach to airway management.

There are two major schools of thought about how one should approach the management of a patient's airway. In the first, as long as the patient continues to remain oxygenated, you should not limit yourself in the number of attempts or techniques that you perform to establish an airway. The second is the algorithmic approach; that is, that you always have a plan as to what you will do next if what you're doing now fails AND you have guidelines about when you move on to your next option. Although I agree philosophically with the first school of thought, I don't think it's practical in the context of emergency airway management.

By definition, an emergency airway is difficult, the patient is not stable, and things will not go right. An algorithm makes all the difficult decisions beforehand, leaving you to rely on skill and training during the actual event. In addition, it tells you when it's time to give up and move on, a decision that can be very hard to make in the "heat of the battle." Below I will discuss an algorithm I prefer to use; I've thought long and hard about it and believe it maximizes patient care. Nonetheless, I'd be the last to tell you how you should manage your patients (unless I'm your medical director—if that's the case, PAY ATTENTION!). Therefore, if you don't like my algorithm, or you don't want to have something formal written down, then feel free to come up with your own and/or just carry it around in your head. All I suggest is that you have PLAN for what you will do when what you do first doesn't work.

There are a few underlying principles I'd like to mention before I discuss the algorithm I use in managing an airway. Keeping these principles in mind will give your patient his or her best shot. First, if you are getting oxygen in, you are doing EVERYTHING the patient needs. What do I mean by this? Well performed non-intubated bag-valve-mask ventilation gives your patient a much better shot than struggling to intubate a patient and allowing him to become hypoxic. Secondly, *hypoxia kills, hypercarbia happens*. What this means is that as long as you are oxygenating the patient, if you are not doing the best job at ventilating him (removing carbon dioxide), you won't kill the patient. In fact, when the carbon dioxide level gets too low, the cerebral arteries constrict, decreasing oxygen supply to the brain and, probably, causing cerebral hypoxia. No good clinical evidence on what this really means, but remember to focus on oxygen, not carbon dioxide. Finally, you are the best airway manager. Therefore, you should be managing the airway, including non-intubated ventilation. Someone else can set up your equipment, put the patient on the monitor, etc. You need to focus on managing the airway and oxygenating the patient.

With these principles in mind, my algorithmic approach to airway management (this, by the way, is oriented to the provider who can intubate):

- 1) **Determine that the patient needs airway support:** Does the patient have a patent airway, does she maintain her airway, is she hypoxic, or will she get sicker and need support in the near future.
- 2) **Preoxygenate, support ventilation as needed, prepare for your best intubation attempt:** If you replace all the nitrogen in the lungs with oxygen, you give yourself up to 5 minutes of apnea without hypoxia. You can use a BVM to support a still breathing patient. Finally, your first intubation attempt should be your best attempt (we'll discuss this later)
- 3) **Attempt oro-tracheal intubation:** If the patient is breathing, consider nasal intubation.

- 4) **If you are successful now (or at any time), confirm tube placement with at least 3 methods:** One should be end-tidal carbon dioxide measurement, secure the tube, and continue to ventilate the patient.
- 5) **If you were not successful:** oro-tracheal intubation may be attempted up to **3 times TOTAL**. There is no science to this. My theory is that the first time, you probably didn't actually make your first attempt your best attempt and that's why you missed. You hopefully made your second attempt your best attempt and, if you couldn't get the tube, you identified why. If you corrected that problem and still couldn't get the tube the third time, you're likely to just do more damage by continuing to try to intubate. It's time to move on.
- 6) **Attempt to place a blind insertion airway device (BIAD):** There're lots of them on the market. We'll talk more about them later, but they are better than non-intubated facemask ventilation which tends to cause gastric inflation.
- 7) **If the BIAD placement was unsuccessful:** attempt non-intubated facemask ventilation. Refer to Principle 1.
- 8) **If unable to ventilate:** consider an obstructed airway and attempt to clear or perform surgical / pseudo surgical airway. At this point, your patient is getting NO oxygen and it's time to move to drastic measures. We'll talk about surgical and pseudo-surgical airway management at a later point.
- 9) **If this fails, transport emergently:** I don't like transporting patient's emergency traffic (I have more respect for pre-hospital providers' skills than that) but in this case, the patient is in deep trouble and needs to be someone else's problem quickly.

Anyway, this is the algorithm I use; take it or leave it as you see fit. Remember that an algorithm is tool like any other; it can be used well or poorly. It is not the law; it's a guideline that depends on your judgment and "Street Sense" to use wisely.

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