NON-INVASIVE VENTILATION EVALUATION IN EXPLORATION MISSIONS

Aaliya Burza MD FCCP - Pulmonary and Critical Care - SMC – NY
Christopher T. Haas – NASA Flight Surgeon – JSC - TX
David J. Alexander – NASA Flight Surgeon – JSC – TX

DISCLOSURE INFORMATION
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AALIYA BURZA

- I have no financial relationships to disclose.
- I will not discuss off-label and /or investigational use in my presentation.


J.M.

POTENTIAL NIV DEVICES

- Travel CPAP(continuous positive airway pressure device) used for Obstructive Sleep Apnea (OSA).
- Some transport Ventilators used by Emergency Medical Services.

CPAP AS NIV DEVICE

PROS:

- Provides continuous reliable positive pressure 4-20 cm H_20.
- Small weight and size.
- Ability to fit any tube/mask.
- Waterless humidification.
- Hands free operability.

CONS:

- Requires extra connection for supplemental 0_2.
- Flow rate and minute ventilation not reliable.
- Battery separate, Lithium (increase fire risk).

TRANSPORT VENTS AS NIV DEVICES

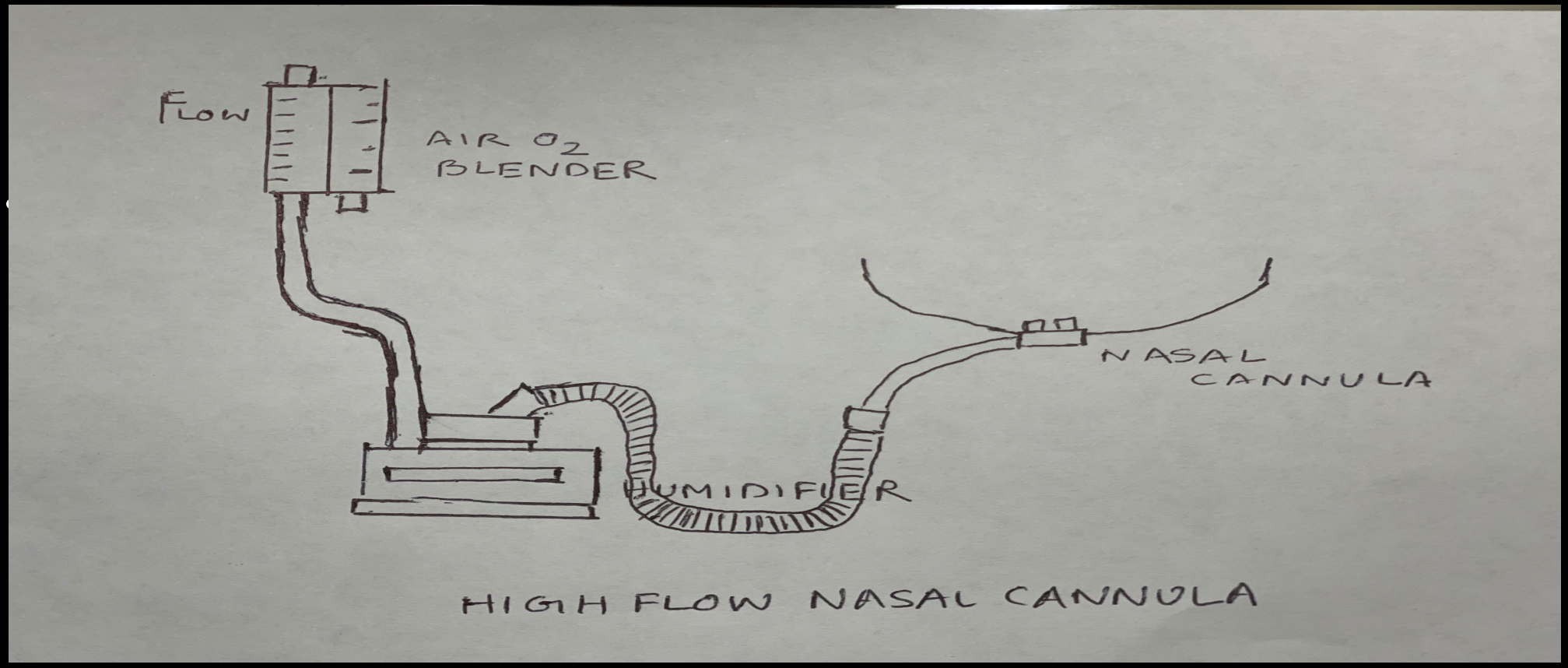
PROS:

- Addition of PEEP 5 - 15 cm H_20 reduces the $Fi0_2$ requirements.
- Able to accommodate high flow rate.
- Works with inlet pressure of 50 psi
- High pressure alert – great safety feature especially in volume cycled ventilation
- No battery/power supply required, breathing gas powered.
- Prior deployment in spaceflight.
- Dual useability as NIV as well as mechanical ventilation.

CONS:

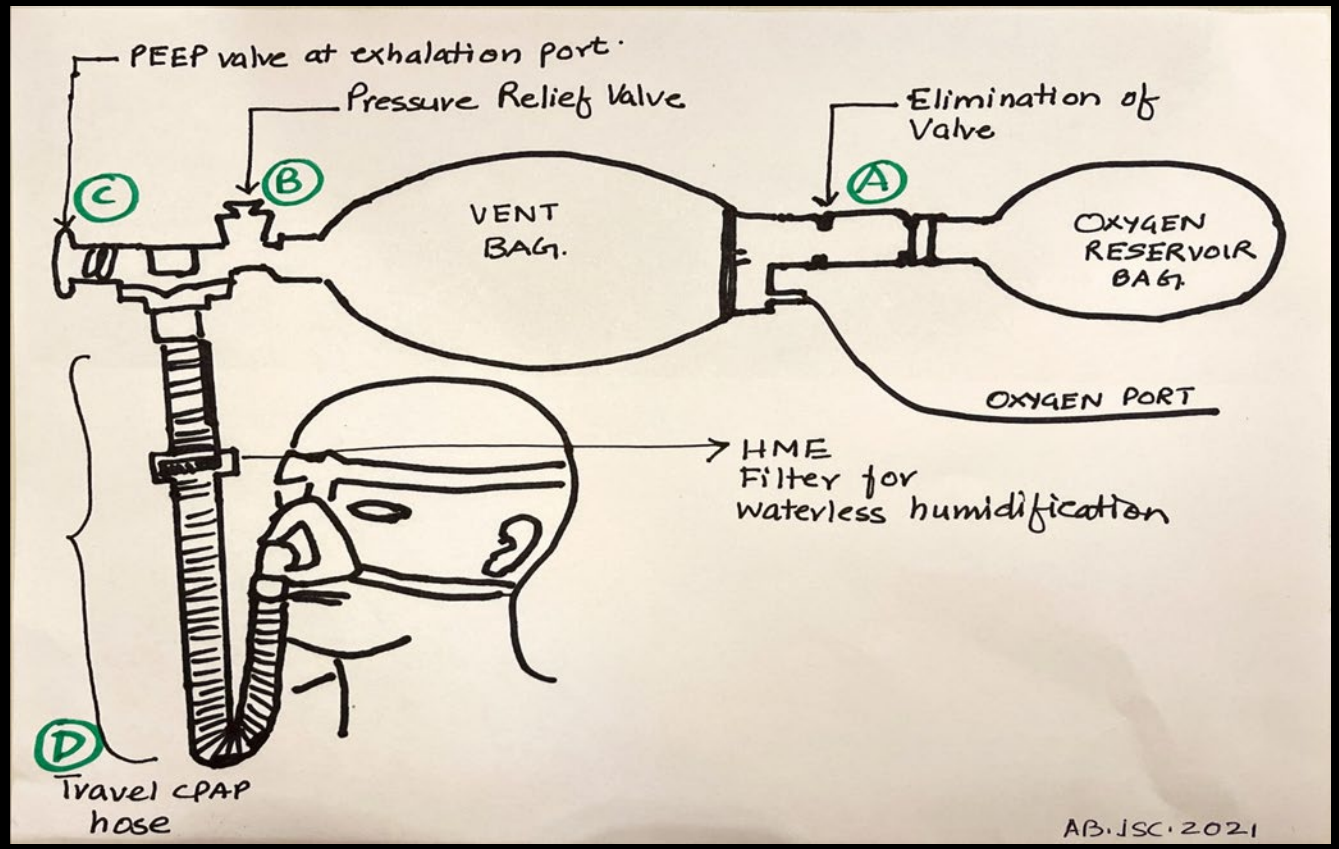
- TV delivery not reliable.
- Pressure cycled mode not available.
- Heavier than the travel CPAP.(esp device 5)
- No humidification.

NEW FRONTIERS



REDESIGN

Reengineering available modalities can also be considered for example modified bag valve mask with CPAP travel hose.



NIV DEVICE SELECTION HIERARCHY

- ***High Flow Nasal Cannula***
  (High flow, PEEP, heated humidification, regulated $Fi0_2$, nasal mask)

- ***Transport Vents***
  (Volume, RR, inspiratory time, PEEP, pressure safety)

- **TRAVEL CPAP**
  (Positive pressure and humidification)

LAST WORD

Both the CPAP model as well the transport vent meet most of the requirements of an ideal NIV device but will need modifications to be ready for use in Exploration Missions.

Regardless, it is important to understand how the latest evidence supports the use of NIV early for acute respiratory failure and can also lead to more rapid improvement of physiological variables and a reduction in the need for invasive mechanical ventilation.

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