**Materials:**

* Arduino
* Wires or bluetooth??
* LED Display
* HEPA filter
* 1-way valves
* Balloon (to mimic lung)
* Compressed air
* Buzzer?
* Pressure gauge
* Spirometer ? or Co2 sensor
* O2 bleed ins - if we want to account for hypoxia

**Design:**

Pretty much just an add-on and more convenient set up for doctors so they don’t have to assemble the splitting of the ventilator and look through guidelines etc. Can have a display on Arduino that shows the normal outputs the actual machine would but for each individual patient. I’m still trying to figure out what sensors we could use to measure efficiency of ventilation (i.e. whether we want to incorporate pressure gauge/spirometer?) bc if we are able to predict purely based on CO2 expired that might be a better option.

driving pressure ~ [ (peak pressure) – peep ]

These were some ideas from the link we might be able to incorporate:

* increase FiO2 levels on individual lines with a variable valve based on inputs from an oximeter or CO2 sensor?
* Individual differences in hypoxia could be addressed by separate O2 bleed ins. This way, ventilation and oxygenation could be easily adjusted to individual patients without the possibility of cross contamination.
* line consisting of a manual pinch valve and a differential pressure sensor (before and after valve) which enables specific pressure support adjustment and also an estimate of tidal volume (thru calibration of pinch valve characteristic vs delta P). More complex than just an arrangement of splitter connectors – but much more functional I think.

<https://www.sciencedirect.com/science/article/pii/S0007091217344471>

<https://www.ncbi.nlm.nih.gov/pubmed/29351442>

<https://www3.gehealthcare.com/~/media/downloads/us/product/product-categories/anesthesia-delivery/gehc_technical-report_pressure-control-ventilation-volume-guaranteed.pdf>

How to maintain unchanged tidal volumes from Yale experiment- As is clear from Figure 12, decreased compliance in Patient #1 could be largely offset, in terms of resulting tidal volume, by titrating the pressure on for Patient #1 on the inspiratory limb. In this study, the tidal volume for Patient #1 was maintained at approximately 330 mL, by means of decreasing the pressure-gated valve set point on the inspiratory limb from

17 to 5 cmH2O as the lung compliance fell. But despite the fact that the setting on the pressure-gated inspiratory valve for Patient #1 was being decreased, the inspiratory pressure and tidal volumes for Patient #2 remained unchanged. This experiment illustrates the potential feasibility of maintaining tidal volumes in one patient with changing lung mechanics, while not affecting the ventilation of the other patient treated with the PReVentS circuit.

<https://www.medrxiv.org/content/10.1101/2020.04.03.20052217v1.full.pdf> - These people p much did what we’re trying to do :-)