ASSIGNMENT-6

"Two page write-up on 5 Solutions to Covid-19 provided by Biomedical Engineers"

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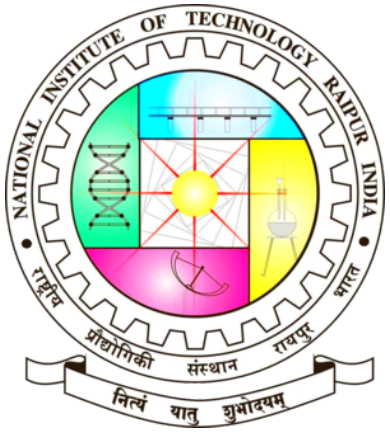

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1 Solving Oxygen shortage

The delivery of additional oxygen using a nasal cannula or a more intrusive face mask is usually the primary form of treatment for mild respiratory insufficiency. The oxygen is usually delivered in cylinders, which are either tiny for transportation or big for fixed patients and longer-term supplies.

Although oxygen concentrators are an appealing option to tanks, they are rarely used in hospital settings for caring for COVID-19 patients. Oxygen concentrators take oxygen from the air and deliver it to the patient on demand. Concentrators are available in a variety of sizes, ranging from a small portable shoulder bag to larger fixed units for patients who require oxygen 24 hours a day.

2 dealing with vantilator challenge in UK

In March 2020, pandemic modelling indicated that the UK would run out of ventilators due to an increase in the number of patients in critical care units (ICUs) who needed them. The government established the Ventilator Challenge, a call to industry and academia across the country to help alleviate the potential gap.

Many consortia were formed to develop new CPAPs that mostly featured new ventilator designs or to find ways to scale up production capacity of existing ventilator types that were already manufactured and certified in the UK.

Finally, the demand was lower than expected, the manufacturing scale-up efforts were adequate, and none of the new designs were subjected to the emergency approval process. This is still a fantastic example of what the country's engineering community can do when faced with a difficult task.

3 Patient monitoring

The monitoring equipment, which keeps track of some of the patient's vitals, especially when they are ventilated and sedated, but also during their recovery phase to ensure the ventilation regime is optimised for their condition, is an

important part of the ICU equipment. Ventilators already have their own set of patient parameters, but patient monitors are usually distinct devices because they are still relevant when the patient can breathe on their own.

The amount of oxygen in a patient's bloodstream (SpO2), which is evaluated by pulse oximetry, which uses optics within a finger clamp, is one of the most important metrics for COVID-19 patients. Pulse oximetry is often used for the duration of a patient's stay in the intensive care unit.

Modern patient monitors provide a plethora of additional patient parameters, all the way down to breathing waveforms, allowing doctors to fine-tune their patient treatment.

4 Continuous Positive Airway Pressure (CPAP)

Continuous Positive Airway Pressure (CPAP) is the next step in treating COVID-19 patients. CPAP was originally designed to avoid airways collapse in sleep apnoea patients, but it has been demonstrated to be beneficial to COVID patients if used early enough in the disease's course.

A well-fitting face mask is an important part of a CPAP machine, but it may be rather bothersome. Because CPAP effectively resists some resistance to expiration, it is only suited for patients who are capable of some breathing strength. There are variants that adapt the level of pressure automatically to the patient's breathing characteristics (APAP) or have distinct levels of pressure for inspiration and expiration (BiPAP). CPAP normally provides the patient with (filtered) air, but most masks feature a port for adding oxygen to the mix.

5 COVID Nudge test kit

Aside from the Ventilator Challenge, the pandemic sparked a slew of new ideas from engineers across the country. This section only mentions a few of the advances that the authors are aware of, and it is not intended to pick them out from the rest of the excellent work that is being done.

During the pandemic, DNA Nudge bioengineers created the COVID Nudge test from the ground up.

In response to the COVID-19 outbreak, a team at Imperial College in London created JAMVENT, a low-cost emergency ventilator. Its design is simple, yet it is capable of performing all of the activities required of an ICU ventilator for COVID-19 patients.