

General comments

There are several things missing. Full body suits are essential, goggles or an alternative to cover the eyes, boots. Face shields are good, but useless when a risk of aerosolization is present.

We're starting to have shortages of simple things like protection overalls, goggles, masks (saw it in the project, looks good), boots, etc.

Regarding ventilators, if you could copy the parts of already existing models and recreate it would be better. Keep in mind that producing new equipment from new designs is problematic - we need to know how it works first, clinical trials must be performed and so on. You can't put a patient with respiratory failure in a ventilation mechanism that we don't know how it works (also consider the learning curve for medical staff). The O2 devices look good for people with mild respiratory difficulties, maximize the user-friendly factor and put an O2 sensor in it.

Also consider cooperating with the textile industry to reconvert clothing and shoe factories in ventilator factories or other medical equipment.

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Oxygen Concentrator

General comments

Do you foresee not using an industrial air compressor? i.e. using a home suitable air compressor?

A curious paper: Preparation of Zeolite Type 13X from Locally Available Raw Materials, <https://www.iasj.net/iasj?func=fulltext&ald=4689>

How important is to have designs that the population can build and run themselves as opposed to medical devices built by dedicated companies that have to go through health approvals?

Is important that dedicated companies help

It depends on how catastrophic the scenario is. Having companies help would be the best (if they are medical device manufacturers even better, otherwise have suitable quality control procedures). If targeting the “general population” we should have suitable instructions and videos available

- Keep in mind that those who will need this the most are the elderly; if to be used at home, I would say the most user friendly possible.
- If you need oxygen at home for acute illness you need surveillance in case you get worse, it is different if you had stable chronic needs.

What O2 concentration do we need to target? Is 70-80% enough or we need more um?

90% if possible → correction: up to 40 and if you require more you should to be in the hospital.

- It needs to be adjustable; some people will require just a bit above the normal 21% and some will require much more; it should go up to 100% I believe
- Actually 40% should do fine for house treatment, if you need more than that you should be in the hospital going to intermediate/Intensive care unit. If you need more than 60% of O2 in inspired air (FiO2) you are near intubation and mechanical ventilation requirement (Intensive care medic)

Can we assume that we can use air from an external (industrial) compressor?

Yes

What other safety features do we need in the concentrator?

None

Not in the concentrator per se: if using an external (industrial) compressor instruct/alert users in how to confirm that there are no oil contaminants (oil leakage) in the compressed air device

Consider humidifiers! It is not feasible to have intense O2 therapy with dry air up you mucosae.

Should we include (optional) sensor for O2 concentration?

No

Well I guess you need to check if the device is working properly and inform the user of what the O2 concentration/pressure is. That being said the priority is being able to concentrate oxygen and delivering it to the patient

- If this is to be used by the person away from a medical facility, a sensor is a good idea, so the patient can adjust the need of oxygen - target around 90-95% peripheral saturation; I believe that the sensor is needed even at the hospitals.. There will be a shortage of peripheral sensors too.

Do we need to include humidifier or can be supplied separately?

No

Need to guarantee the patient is hydrated

- I am not an expert in these systems; but at the hospitals normally there is some kind of water along the system... Humidification is important I think
- Confirm, it is important!
- It can be supplied separately. With low flow (1 to 5 L/min) humidification is not needed.

Closed-loop O₂ flow control with oximeter

Would it make sense to have closed-loop flow control? (motorized valve integrated with SpO₂ sensor)?

Yes

Yes!

How useful/urgent would be this feature?

It would be useful to some light/moderate state patients that might be treated in home care, releasing hospital beds for more severe ones. Such mild state patients would have an extra protection against rapid worsenings, giving them time to call emergency teams.

Cuirass Ventilator

General opinions?

I believe the first ventilators were using this mechanism, so some data must be out there on this... it might work

Not really suitable for this acute pandemic (Would be a fantastic Idea for Fontan Patients!)

It is an equivalent for the iron lung. In most of the patients with severe respiratory failure, the support given is not enough.

Potential risks?

Cleaning? Potential source of spread of microorganisms between patients?

Needs to be easy and fast to uncouple from the patient, otherwise in the acute setting, might preclude basic/advanced life support in case of rapid clinical condition deterioration.

Spontaneous breathing with higher negative pressure can induce PILI (patient induced lung injury)

Potential use for non-invasive ventilation?

Less potential risk of aerosols generation, safer for health care professionals and other patients. Potential advantage for the pediatric population, (poor compliance to face masks)

Opinions on use outside of a healthcare setting?

I think patient who need this kind of external help to breathe will need to be in the hospital

Could be an option in neuromuscular patients, at least in the beginning of the disease.

Pneumatic Ventilator

Pneumatic ventilators do not have the automatic monitoring and adjustment that electronic models have. Could you see using a device such as this in a true triage crisis?

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Are you familiar with the go2vent and similar devices? Do they provide the PEEP you require?

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What do you see as the greatest ventilation crisis of this pandemic? Are we focused on the right thing?

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Mask-Filter Interface

General comments

Attention to the use of this mask at hospital level. My biggest doubt is in the question of not discarding the mask entirely.

Facial screens are not discarded, goggles are not discarded. Bleach or alcohol "bath" will sanitize the equipment.

General opinions?

The most important thing will be to make disposable masks. I notice that in the situation of this mask part of it is not disposable but clean. In my opinion, they either make the mask from a material whose virus does not remain (I know it is difficult) or make the entire mask to be used only once and discard.

This is very important for healthcare professionals who are always in contact with infected patients.

Bleach or alcohol "bath" will disinfect material appropriately.

Is this something that is needed?

In this mask I think that different sizes of filters must be adapted in order to adapt to different facial anatomies. It meets the sizes already mentioned.

Yes

What are some readily available but low temperature (below 70°C) methods for sanitization that we can use in order to clean the plastic components?

Temperatures above 70°C are correct. In this case, use the mask once, discard the filter, o-ring, strings, etc. And everything else goes to decontaminate at temperatures not less than 70°C. We must have enough autoclaves or the like for that purpose.

There are chemical and radiation based methods for low-temp. sterilization that could allow plastic masks to be reusable (not the filter). However, they would need to go through some cumbersome safety and microbiological testing, I assume.

Bleach or alcohol cleaning.

Steam or hydrogen peroxide

While certainly better than nothing for civilians going to the market, would something like this fill the needs of medical professionals? If not, why?

Yes, for civilians it brings a big improvement and I think doctors like it. However, civilians will need to be sensitized and concerned with cleaning / decontaminating the non-disposable part of the mask. A good option may be to put this part of the mask in the dishwasher, at a temperature of not less than 70°C. Is this last idea possible for the material of which the mask will be made?

It can fill the needs for the professionals in case of a pandemic or shortage.

The risk of infection is not negligible.

Could something like this be used in a hospital setting? If not, why?

No, in the hospital, care is doubled. Either the entire mask is discarded or they will have to have autoclaves or similar for decontamination of part of the mask that is not disposable.

The cost of a disposable mask is very low. The processing costs of cleaning this masks will be too high.

Face Shields

General opinions?

For an immediate response to civilians it may be a solution, but not the most effective, as the mask is still not disposable.

Civilians must take care of decontamination / disinfection. Bleach or alcohol bath is good.

This is a great idea, if integrated with other full-body PPE and also with strict protocols to put on and take off.

Do you think this is urgent currently?

Yes

Yes

Do you think it is usable in 4 hour shifts ?

Yes

Yes

Fog up the glass is a major issue!!

Do you think it is reusable/disinfectable ?

Yes, but not 100% efficient

Strict protocol needed, and safety microbiological testing.

Bleach or alcohol bath is good.

The disinfectants will ruin the silicone/plastics of this mask.

Temperature Detection

General comments

It is a nice solution for general hospital care, also (COVID and non-COVID patients). Could detect complications early and safely monitor patients without contact.

How often does fever have to be checked for?

Every 8 hours

How accurate does a fever detector need to be? as in within .5 or 1 degree C

Accuracy of 0.5, not more

Would a forehead LCT sticker on your arm tell you of a change in your temperature with accuracy to warn you you had developed a fever?

Yes, for a first approach, but it is not as effective as the thermometer
In the hospital setting the best temperature to measure is the central temperature (esophagus, bladder, pharynx). The forehead will be ok for infants or screening at the hospital entrance.

Would a change in an individual's heartbeat pattern indicate they may have a fever? As in if someone usually has a heartbeat of 70 on waking and it goes up to 80.

Is not specific.

Are plans for rolling out fever checks like Singapore has already in progress? If so our project can focus on just hardware designs

All strategies for anticipating the diagnosis of the disease are important. Frequent temperature measurement seems to be a good strategy for early diagnosis and early treatment of the disease.

Global Pandemic Alert System

General opinions on if this system is necessary and could add value

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What are the important metrics to track, we would like to start with body temp

Body temp is a good start

A LOT of false negative results (paracetamol, etc... not with fever at the time of measure)

Any inputs / suggestions / improvements would be welcome as well

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Patient Order Decision Support System

General comments

Priorities: Detect the virus early in the individual by doing the diagnostic test earlier (even if he has no symptoms but has been in infected communities), regularly measuring people's temperature; Isolate immunosuppressed individuals (cases of leukopenia / lymphopenia) and avoid social contact as much as possible. If infected give priority to these individuals for treatment.

Is this something useful for medical professionals when deciding which patients to treat first, which patients to be tested first, which patients to provide with crucial equipment first?

Yes, priority should be given to patients with leukopenia and lymphopenia. Applying injections of specific drugs to increase immunity (for example, injections given to patients undergoing chemotherapy) can be a solution at this stage. Are there enough injections?

Do you think this will raise concerns when it comes to obtaining the data? (Ethical concerns and Data Protection concerns). Large amounts of data, both from patients who tested positive to 2019-nCoV and patients that tested negative, is necessary before providing a reliable system.

Yes, it can generate ethical controversies, but at the moment we cannot take this into account. The priority is to treat the most serious cases and reduce the number of deaths

Hotline Decision Support

General opinions?

This is a good idea, as it improves health lines, such as those in Portugal that are currently saturated.

Do you think this is urgent currently?

It is not as urgent as providing masks, gloves, etc. to all citizens, especially those who are at risk.

But it is also an important plan as it decongests health lines and allows people at risk and with real symptoms to have an earlier support.

Comentários

Here in the Azores, they created a separate telephone line for citizens who want clarification on other matters that are not directly related to the disease.

Other issues: workers' rights, government measures, how to proceed legally in the face of this pandemic, etc

Volunteer App

Is immunity guaranteed after cure from COVID?

A cured individual actually develops immunity against Covid-19. However, there have been cases of reinfection, not many.

Does the virus develop different strains that cause reinfection? Studies are following this line of thought.

I think that immunity is not a 100% guarantee

Will hospitals use volunteers for some work?

Yes, it may be necessary. I think that in the most critical countries they already do that. The big issue remains the scarcity of hospital supplies for the protection of health professionals and in this case volunteers as well.

Will this kind of work reduce your work loads somehow?

Yes, if I am assigned to volunteer I will have to leave my job. How is my source of income? Can the state support it? Here we come to social and political support

What information about skills would be helpful to know about so we can ask about it directly to the people registering?

-If they are health professionals in the private sector, they may be called upon to collaborate in the hospital

-How's your health?

-If you have an infected family member

-If you have notions of geriatrics / health care