## **COVID-19 PANDEMIC**



## A review of current evidence/guidelines on:

- PPE: use & re-use
- Risk to HCW on the ward and OR

environments

- Transmission & Incubation

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MARCH 31 2020

## THE NUMBERS...



https://gisanddata.maps.arcgis.com/apps/opsdashboard/index.html#/bda7594740fd40299423467b48e9ecf6

## FLATTEN THE CURVE!





#### JAPAN/SINGAPORE HCW:

- Wearing basic surgical masks & gloves for every patient interaction + proper hand hygiene
- For suspected or confirmed covid cases: N95, face shield, goggles, gowns
  - Anyone who has CLOSE contact with a +ve person is quarantined (fifteen minutes at a distance of less than six feet and without the use of a surgical mask)
  - Separate wards for suspected/+ve covid pts with separate teams



## 1. PPE – DR. BUNTING

### Nurses Die, Doctors Fall Sick and Panic Rises on Virus Front Lines

The pandemic has begun to sweep through New York City's medical ranks, and anxiety is growing among normally dispassionate medical professionals.



Nurses at Jacobi Medical Center in the Bronx gathered early Saturday to protest a shortage of protective equipment, including N95 masks. Gregg Vigliotti for The New York Times

## Doctors scramble for best practices on reusing medical masks during shortage

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By Rafi Letzter - Staff Writer 2 days ago

These masks aren't healthy to reuse, period. But some medical professionals have to right now.

#### Editorial

ONLINE FIRST

March 20, 2020

#### **Conserving Supply of Personal Protective Equip**ment—A Call for Ideas

Howard Bauchner, MD<sup>1</sup>; Phil B. Fontanarosa, MD, MBA<sup>1</sup>; Edward H. Livingston, MD<sup>1</sup> > Author Affiliations | Article Information

JAMA. Published online March 20, 2020. doi:10.1001/jama.2020.4770

Extended use is favored over reuse because it is involves less touching and therefore less risk of contact transmission to the HCW

## TERMINOLOGY

### Extended use

- same mask/N95 for repeated patient encounters without removing in between
- implemented when multiple patients are infected with the same respiratory pathogen
- recommended as an option for conserving masks/respirators during previous respiratory pathogen outbreaks and pandemics

### Reuse

- same mask/N95 for multiple encounters with patients but removing it after each encounter
- Stored/cleaned in between patient encounters
- Limited reuse = recommended and widely used during previous respiratory pathogen outbreaks and pandemics

Source: CDC Website <u>https://www.cdc.gov/niosh/topics/hcwcontrols/recommendedguidanceextuse.html</u>

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## SURGICAL MASKS

\*Can be used beyond shelf life – check if straps intact and no visible signs

of damage

\*Should attempt **extended use** (keep it on for the day, or for multiple

encounters)

#### **Extended use & Re-Use guidelines (OMA):**

Surgical MasksDuring Use• Don't touch mask. If you do perform hand hygiene.<br/>• Leave the patient care area if you need to remove the mask.Masks for Re-Use• Facemasks with elastic ear hooks are most suitable for re-use.Donning/Doffing/Storage<br/>for Re-Use• fold masks so that the surface is held inward against itself to<br/>reduce contact with surfaces when storing.<br/>• Store folded masks in a clean sealable paper bag or breathable<br/>container. Clean or dispose of the storage container regularly.When to discard• The facemask should be removed and discarded if soiled,<br/>damaged, aerosolizing procedure, or hard to breathe through.

https://content.oma.org/wp-content/uploads/private/OMA-Summary-of-CDC-Guidance-on-Reuse-an-Extended-use-of-PPE.pdf

https://www.uottawaortho.ca/









- Wear a surgical mask on top so you can reuse the N95
- Wear a face shield to eliminate droplets on the mask
- Can be used past expiry date
- Respirators can function for 8 hours of continuous use.
- Re-use = removing it, sterilization & re-wearing it  $\rightarrow$

"Although this process is used according to CDC when there are PPE shortages it is not safe and there is no high-level evidence to indicate this is safe. We could find no reassuring statistics released by the CDV or others during other pandemics to show this is practice is safe and the barrier protection is shown to deteriorate with use and time." - STANFORD DEPT ANESTHESIA

## **RE-USE / CLEANING N95**



#### **Can Facial Masks be Disinfected for Re-use?**

https://m.box.com/shared\_item/https%3A%2F%2Fsta nfordmedicine.box.com%2Fv%2Fcovid19-PPE-1-1

(Measurement results by 4C Air Inc.)

Samples	Meltblown fiber filtration media		Static-charged cotton		E. Coli. Disinfection
	Filtration efficiency (%)	Pressure drop (Pa)	Filtration efficiency (%)	Pressure drop (Pa)	Efficiency
70°C hot air in oven, 30min	96.60	8.00	70.16	4.67	>99%
UV light, 30min	95.50	7.00	77.72	6.00	>99%
75% alcohol, soaking and drying	56.33	7.67	29.24	5.33	>99%
Chlorine-based disinfection, 5min	73.11	9.00	57.33	7.00	>99%
Hot water vapor from boiling water, 10min	94.74	8.00	77.65	7.00	>99%
Initial samples before treatment	96.76	8.33	78.01	5.33	

Conclusions: DO NOT use alcohol and chlorine-based disinfection methods. These will remove the static charge in the microfibers in N95 facial masks, reducing filtration efficiency. In addition, chlorine also retains gas after de-contamination and these fumes may be harmful.

- bleach gases (skin and respiratory irritants) remained = X
- microwave melted the masks and soaking them first led to reduced filtration - X

https://www.safety.duke.edu/si tes/default/files/N-95\_VHP-Decon-Re-Use.pdf?fbclid=IwAR0LkyK74Gsx P93MRHo21rGpvIgSHqqDtpIIYD WVYyvNnLXYFAtVA\_n-Pbg

 Table 2: Data supplied courtesy of Professor Yi Cui | Materials Science and Engineering, Stanford University and Posterior Steven Chu | Physics and Molecular & Cellular Physiology, Stanford University on behalf of 4C Air Incorporated.

 https://www.newsobserver.com/news/coronavirus/article241520921.html

https://consteril.com/covid-19-pandemic-disinfection-and-sterilization-of-face-masks-for-viruses/

## **CLOTH HOMEMADE MASKS**



## Use of cloth face masks for protection against COVID-19 in clinical settings

There is limited guidance and clinical research to inform on the use of reusable cloth face masks for protection against respiratory viruses. Available evidence shows that they are less protective than surgical masks and may even increase the risk of infection due to moisture, liquid diffusion and retention of the virus. Penetration of particles through cloth is reported to be high. In one study, 40–90% of particles penetrated the mask. In a cluster randomised controlled trial, cases of influenza-like illness and laboratory-confirmed viral illness were significantly higher among healthcare workers using cloth masks compared to the ones using surgical masks [1,2].

Altogether, common fabric cloth masks are not considered protective against respiratory viruses and their use should not be encouraged. In the context of severe personal protective equipment (PPE) shortages, and only if surgical masks or respirators are not available, home-made cloth masks (e.g. scarves) are proposed as a last-resort interim solution by the US CDC until availability of standard PPE is restored (<u>https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/face-masks.html</u>).

**Bottom Line:** Last resort if there are absolutely NO MASKS in hospital. Wear with full face shield (CDC).

\*Can have a pocket made so you can slip in a filter which may make it slightly better – the filter in surgical masks is **3 layers of polypropylene non-woven fabric or HEPA** <u>filter</u>. Also available to slip in would be the P100 filters which filter ~same as N95. These are **sold out** in many places.

### CLEANING THE SHIELDS/ INDUSTRIAL RESPIRATORS

- Disassemble and wash with soap and water (?optional) followed by:
- Disinfectant Options:
  - 1:9 part bleach solution
  - isopropyl alcohol (FDA APPROVED)
  - virox
- Rinse with water
- Hang to dry

3M https://multimedia.3m.com/mws/media/4739370/3mtm-cleaning-reusable-respirators.pdf

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## COVID-19 RELATED RISKS TO HEALTH CARE OF UOLIDARIES IN THE INPATIENT WARD ENVIRONMENT

What are the risks for health care workers (HCWs)?

- Nosocomial infection
- Physical workload
- Psychological stress
- Others

## COVID-19 RELATED RISKS TO HEALTH CARE OF UOLITAWA CONTROL AND UOLITAWA CONTROL AND UOLITAWA CONTROL AND UOLITAWA CONTROL AND UNDER CONTROL

### **Risk 1: Nosocomial infection**

Reasons for healthcare workers becoming infected with novel coronavirus disease 2019 (COVID-19) in China

Journal of Hospital Infection

FIRST = inadequate personal protective equipment (PPE) of healthcare workers at the beginning of the epidemic was a central issue (they did not understand the pathogen well; and their awareness of personal protection was not strong enough)

SECOND = long-time exposure to large numbers of infected patients directly increased the risk of infection for healthcare workers. ALSO pressure of treatment, work intensity, and lack of rest indirectly increased the probability of infection for healthcare workers.

THIRD = shortage of PPE was also a serious problem

FOURTH = the front-line healthcare workers (except infectious disease physicians) received inadequate training for infection prevention and control (IPC), leaving them with a lack of knowledge of IPC for respiratory borne infectious diseases.

## COVID-19 RELATED RISKS TO HEALTH CARE u Ottawa

### **Risk 2: Physical overload**

How to train health personnel to protect themselves from SARS-CoV-2 (novel coronavirus) infection when caring for a patient or suspected case

Sun Huh\*

Department of Parasitology and Institute of Medical Education, College of Medicine, Hallym University, Chuncheon, Korea

#### J Educ Eval Health Prof 2020;17:10

- Difficult to alleviate due to the shortage of health care personnel able to participate in the urgent response to the epidemic

- Stress and extreme fatigue could further challenge the immune system and increase the susceptibility to 2019-nCoV among HCWs

- Only solutions may be regular exercise, stretching, and balanced meals

## COVID-19 RELATED RISKS TO HEALTH CARE OF U Ottawa Ottawa WORKERS IN THE INPATIENT WARD ENVIRONMENT

### **Risk 3: Psychological Stress**

How to train health personnel to protect themselves from SARS-CoV-2 (novel coronavirus) infection when caring for a patient or suspected case

#### Sun Huh\*

Department of Parasitology and Institute of Medical Education, College of Medicine, Hallym University, Chuncheon, Korea

- J Educ Eval Health Prof 2020;17:10
- HCWs are anxious about passing the infection to their families
- Torment of difficult triage decisions
- The pain of losing patients and colleagues
- HCWs who care for elderly parents or young children will be drastically affected by school closures, social distancing policies, and disruption in the availability of food and other essentials

#### Supporting the Health Care Workforce During the COVID-19 Global Epidemic

- Transparent and thoughtful communication could contribute to trust and a sense of control

- Ensuring that workers feel they get adequate rest, are able to tend to critical personal needs (such as care of an older family member), and are supported both as health care professionals and as individuals will help maintain individual and team performance over the long run

- Liberating clinicians and administrative team members from other tasks and commitments allows them to focus on the immediate needs

## COVID-19 RELATED RISKS TO HEALTH CARE OF UCTION OF UCTIO

### Others

How to train health personnel to protect themselves from SARS-CoV-2 (novel coronavirus) infection when caring for a patient or suspected case

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#### J Educ Eval Health Prof 2020;17:10

**Eczema on the face** is another frequent complication of long-term use of personal protective equipment, including goggles and a respirator

- Medicated creams or ointments may be used.
- Placing an adhesive bandage on the skin is a preventive method

## COVID-19 RELATED RISKS TO HEALTH CARE OF UCTION OF UCTIO

### **FINAL REMARKS**

- Healthcare systems globally could be operating at more than maximum capacity for many months. But healthcare workers, unlike ventilators or wards, cannot be urgently manufactured or run at 100% occupancy for long periods. It is vital that governments see workers not simply as pawns to be deployed, but as human individuals

- In the global response, the safety of health-care workers must be ensured

- Adequate provision of PPE is just the first step; other practical measures must be considered, including cancelling non-essential events to prioritize resources; provision of food, rest, and family support; and psychological support

- Presently, health-care workers are every country's most valuable resource



## MINIMIZING RISK FOR OR STAFF

Ann Surg. 2020 Mar 23. doi: 10.1097/SLA.000000000003923. [Epub ahead of print]



### Managing COVID-19 in Surgical Systems.

Brindle M<sup>1</sup>, Gawande A<sup>2</sup>.

- 1. Specific operating theater for all COVID-19 cases
  - Out of high traffic areas
  - Negative pressure
  - With anterooms
- 2. No unnecessary items should be in OR
  - No pagers, no cell phones, no pens
  - Disposable caps and shoe covers for everyone
  - All disposables should be discarded at end of case



Ann Surg. 2020 Mar 23. doi: 10.1097/SLA.000000000003923. [Epub ahead of print]



#### Managing COVID-19 in Surgical Systems.

Brindle M<sup>1</sup>, Gawande A<sup>2</sup>.

- 3. Minimize in and out OR traffic
  - Use runners
- 4. When possible, patients should be recovered in OR with dedicated staff until they can be transferred to an isolation room on the ward/ICU
- 5. Path to and from OR should be kept clear
  - Maybe don't let there be 9 chairs and 3 computers in the middle of the hallway in ICU
- 6. Consider surgical approaches that could decrease OR staff exposure and shorten case duration

#### CORRESPONDENCE





## What we do when a COVID-19 patient needs an operation: operating room preparation and guidance

Lian Kah Ti, MBBS, MMed, FAMS · Lin Stella Ang, MBBS, MMed, FANZCA, EDIC · Theng Wai Foong, MBBS, MMed · Bryan Su Wei Ng, MBBS, FRCA

- A minimum of one hour is planned between cases to allow OR staff to send the patient back to the ward, conduct through decontamination of all surfaces, screens, keyboard, cables, monitors, and anesthesia machine.
- All unused items on the drug tray and airway trolley should be assumed to be contaminated and discarded.
- All staff have to shower before resuming their regular duties.

# SUMMARY OF RECOMMENDATION

- 1. Minimize elective or nonemergency surgical procedures and clinic visits - keeping in mind that it may be another 6 to 8 weeks (or more) until we see some resolution.
- 2. Shift urgent inpatient diagnostics and surgical procedures to outpatient settings, when possible.
- 3. Minimize the use of essential items (e.g., beds, personal protective equipment, cleaning supplies, ventilators).
- 4. Plan for the potential surge of critical care patients and have additional space and supplies readily

# SUMMARY OF RECOMMENDATIONS<sup>10</sup>

- 5. Create multiple teams that are completely insulated from each another.
- 6. Limit or cancel nonessential travel, not only to prevent the spread of the disease, but also to ensure that you are available to help your local health-care system to manage a possible increase in patient admissions or to reorganize the workforce if a colleague becomes infected.
- 7. If they cannot be cancelled altogether, complete conferences, educational courses, panels, meetings, and even follow-up patient examinations virtually or remotely

## SUMMARY OF RECOMMENDATIONS<sup>10</sup> JBJS

- 8. If a surgical procedure is necessary for a patient with suspected or confirmed COVID-19, use an operating room with:
  - A negative-pressure environment
  - Frequent air exchange
  - A separate access.
  - Use disposable surgical items and protective equipment.
  - Use double caps
  - N95 masks
  - Medical goggles
  - Boots
  - Minimize entry into and exit from the operating room during surgical procedures
  - Allocate time between procedures to allow staff and the operating room to go through proper decontamination procedures.



## **VIRUS CHARACTERISTICS**

## **INCUBATION PERIOD**





- Onset of infection till the onset of symptoms
- Spread via inhalational or contact with infected droplets<sup>1</sup>

nghal et al. A Review of Coronavirus Disease-2019 (COVID-19), Indian journal of pediatrics, 13 March 2020 ola R, Waarsing JH, Thomas GE, Carr AJ, Reijman M, Bierma-Zeinstra SM, et al. Cam impingement: defining the presence of a cam deformity by

## **INCUBATION PERIOD**

#### **Annals of Internal Medicine**



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### The Incubation Period of Coronavirus Disease 2019 (COVID-19) From Publicly Reported Confirmed Cases: Estimation and Application

Stephen A. Lauer, MS, PhD\*; Kyra H. Grantz, BA\*; Qifang Bi, MHS; Forrest K. Jones, MPH; Qulu Zheng, MHS; Hannah R. Meredith, PhD; Andrew S. Azman, PhD; Nicholas G. Reich, PhD; and Justin Lessler, PhD

- **Conclusion:** Median incubation period for COVID-19 of approximately 5 days, similar to SARS
  - Results support current proposals for the length of quarantine or active monitoring of persons potentially exposed to SARS-CoV-2
  - Longer monitoring periods might be justified in extreme cases