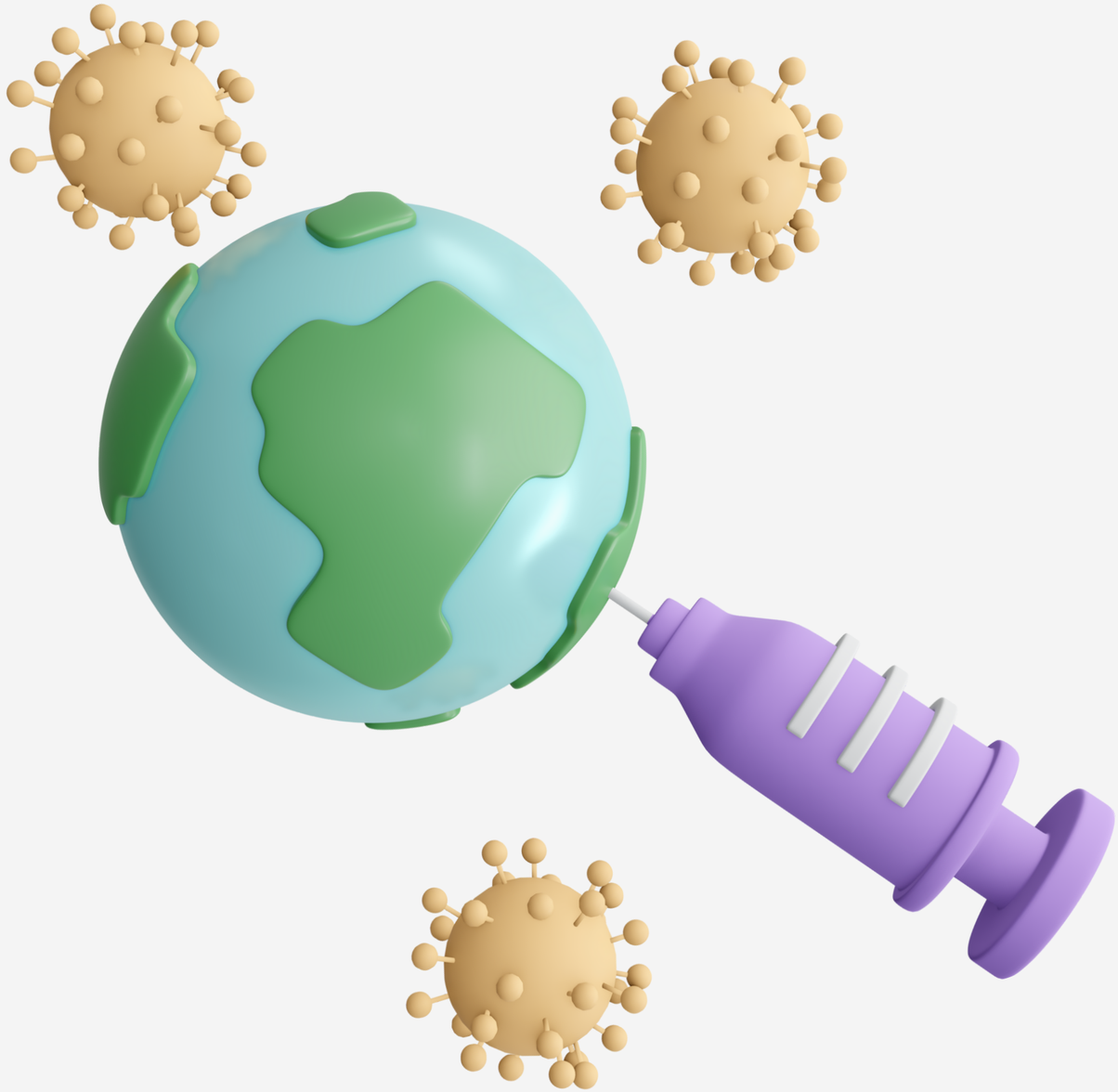


# Pandemic to Endemic: Living with Covid-19

Dr. Ummu Afeera Zainulabid

# .....What is the differences between .....

## ENDEMIC

Transmission occur, but the number of cases remains constant

## EPIDEMIC

The number of cases increases

## PANDEMIC

When epidemics occur at several continents -global epidemic-

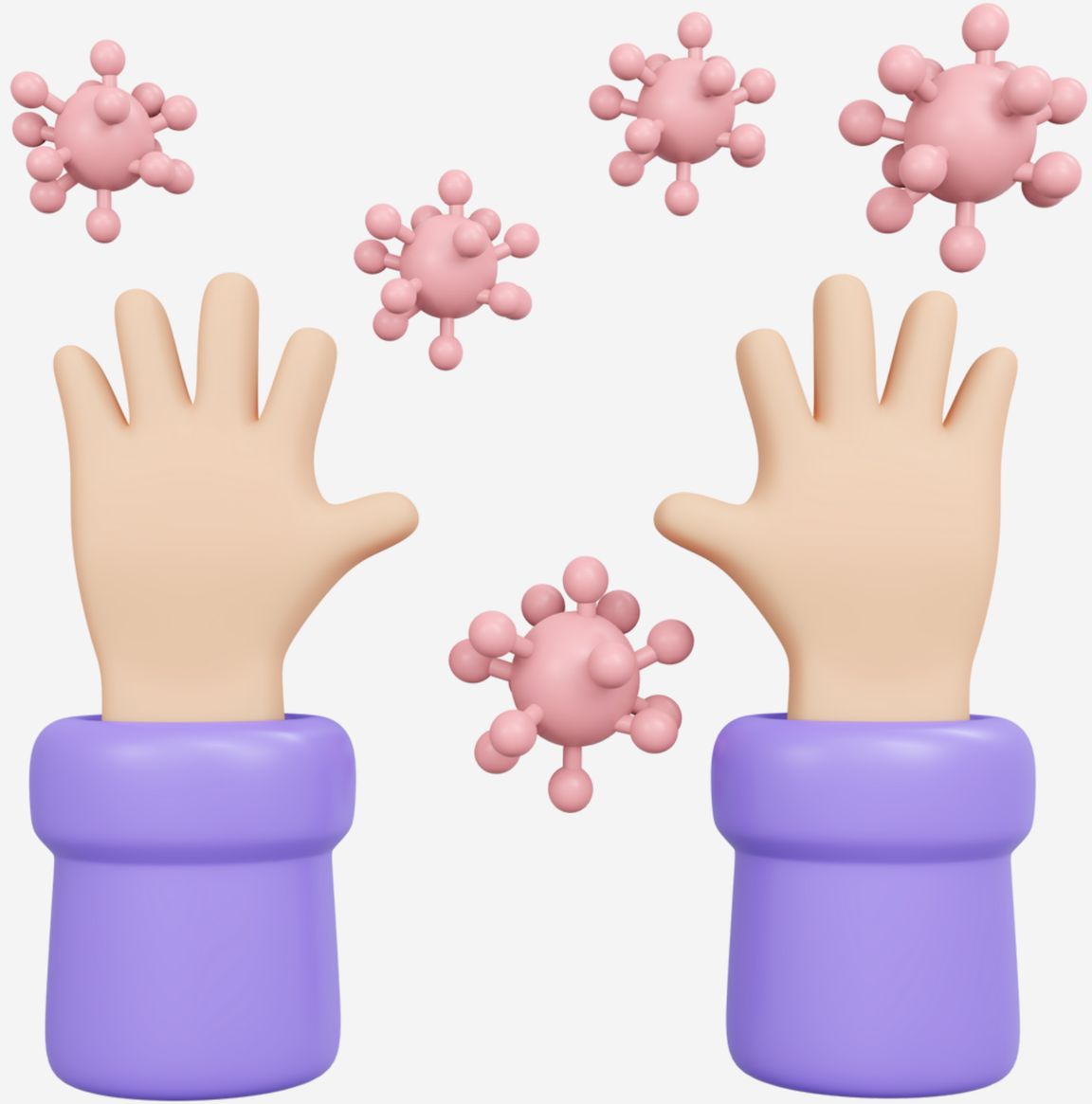
# Road Map

**01** Coronavirus in context

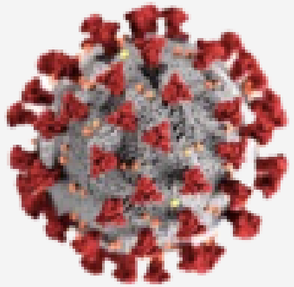
**02** SARS-CoV-2
Chain of transmission
Hierarchy of Controls

**03** Effectiveness of IPC

**04** Fall-out from the pandemic
Looking ahead



# Coronavirus



**CoV are found globally in humans and many different animal species. They are now 7 types of coronaviruses that have been identified by the CDC, which includes:**

| Common Human Coronaviruses | Other Human Coronavirus |
|---|---|
| 1. 229E (alpha coronavirus)<br>2. NL63 (alpha coronavirus)<br>3. OC43 (beta coronavirus)<br>4. HKU1 (beta coronavirus) | 5. SARS<br>6. MERS<br>7. COVID-19 (SARS-CoV-2) |

# (Epidemic/Pandemic) Coronaviruses

- **Severe Acute Respiratory Syndrome (SARS): 2002 – 2003**
- **Middle East Respiratory Syndrome (MERS): 2012 – current**
- **Severe Acute Respiratory Syndrome-2 (SARS-CoV-2, COVID-19): 2019 – current**

# Very different scales

**SARS**

**2002 – 2003**

8,098 cases

**MERS-CoV**

**2012 – present**

2,585 laboratory-confirmed cases through 2/2022


**SARS-CoV-2**

**2019- present**

> 500 million cases


da Costa VG, Moreli ML, Saivish MV. The emergence of SARS, MERS and novel SARS-2 coronaviruses in the 21st century. Arch Virol. 2020 Jul;165(7):1517-1526. doi: 10.1007/s00705-020-04628-0. Epub 2020 Apr 22. PMID: 32322993; PMCID: PMC7176030.

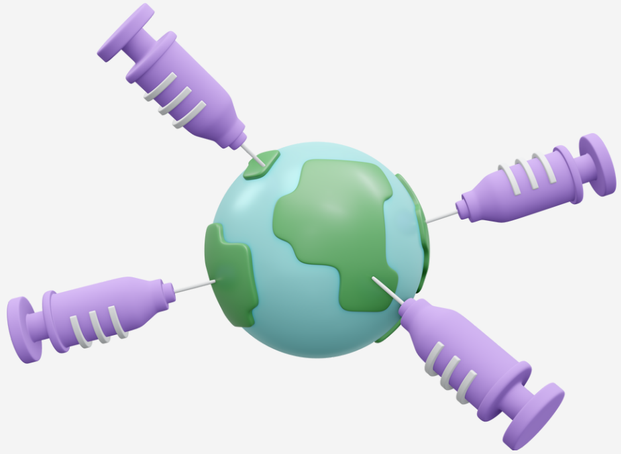
WHO http://www.emro.who.int/health-topics/mers-cov/mers-outbreaks.html accessed 4/18/2022

Nytimes https://www.nytimes.com/interactive/2021/world/covid-cases.html accessed 4/18/2022

# The Chain of Transmission: SARS-CoV-2

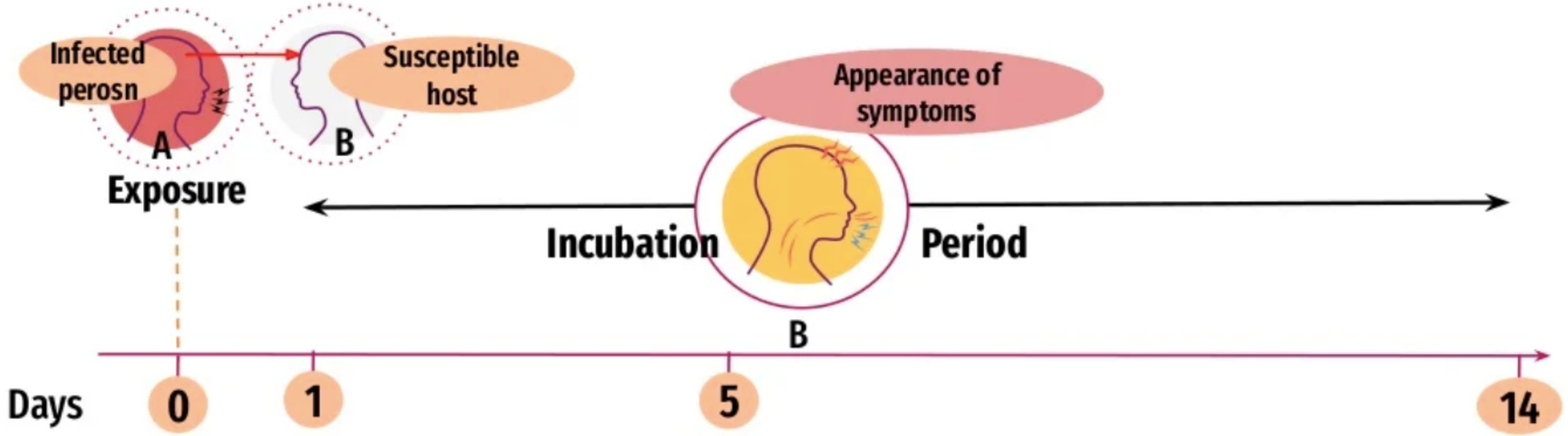
**3 requirements for transmission**

**1. A source (or reservoir) of infectious agents with a portal of exit**
**2. Mode of transmission for the agent**
**3. A susceptible host with a portal of entry receptive to the agent**



# COVID-19 Incubation Period and Infectivity

Incubation period: **between exposure to the virus and symptom onset.**
5-6 days, but can be as long as 14 days.



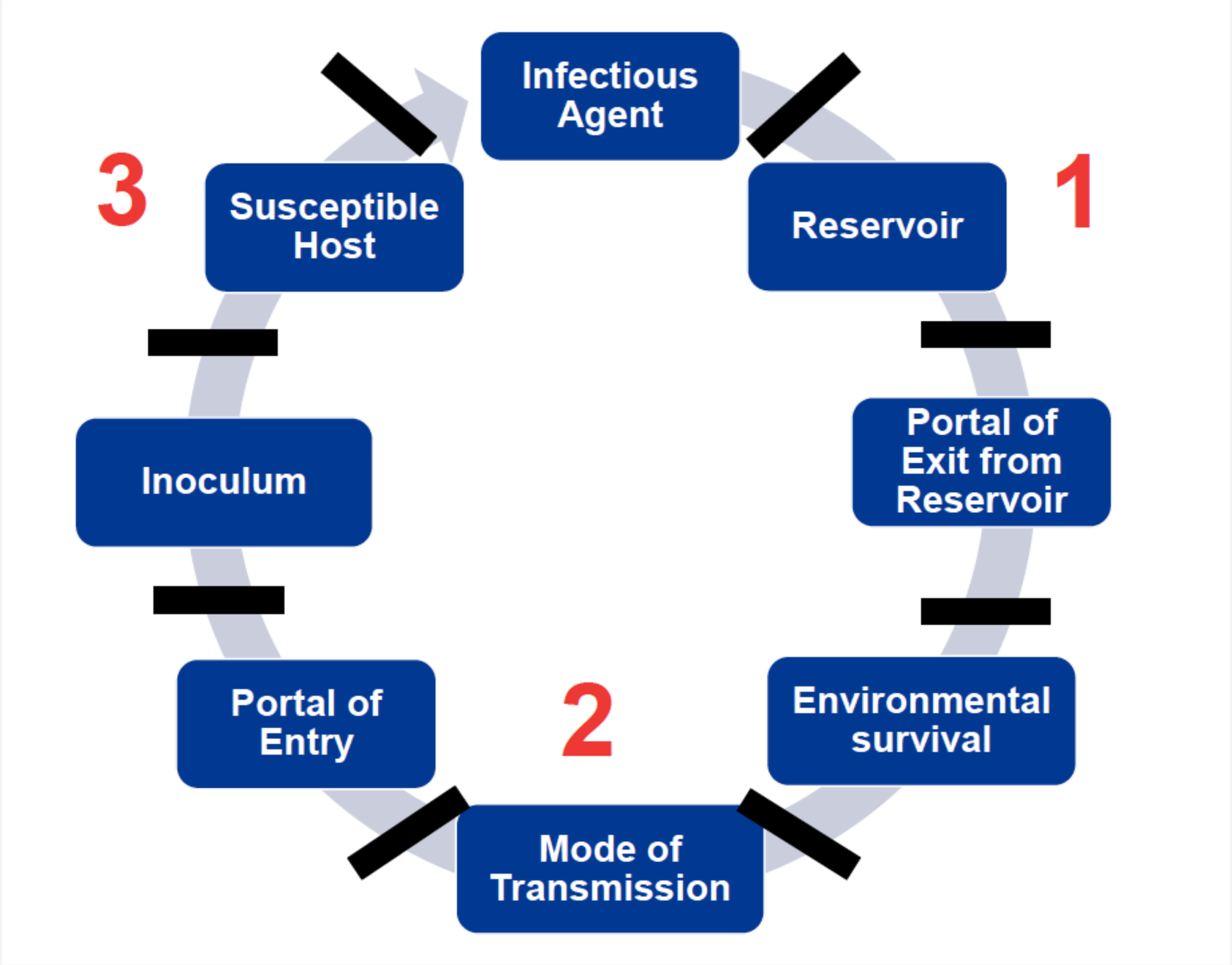

**Onset of infectiousness :**

symptomatic : 48 hr symptom onset of symptoms

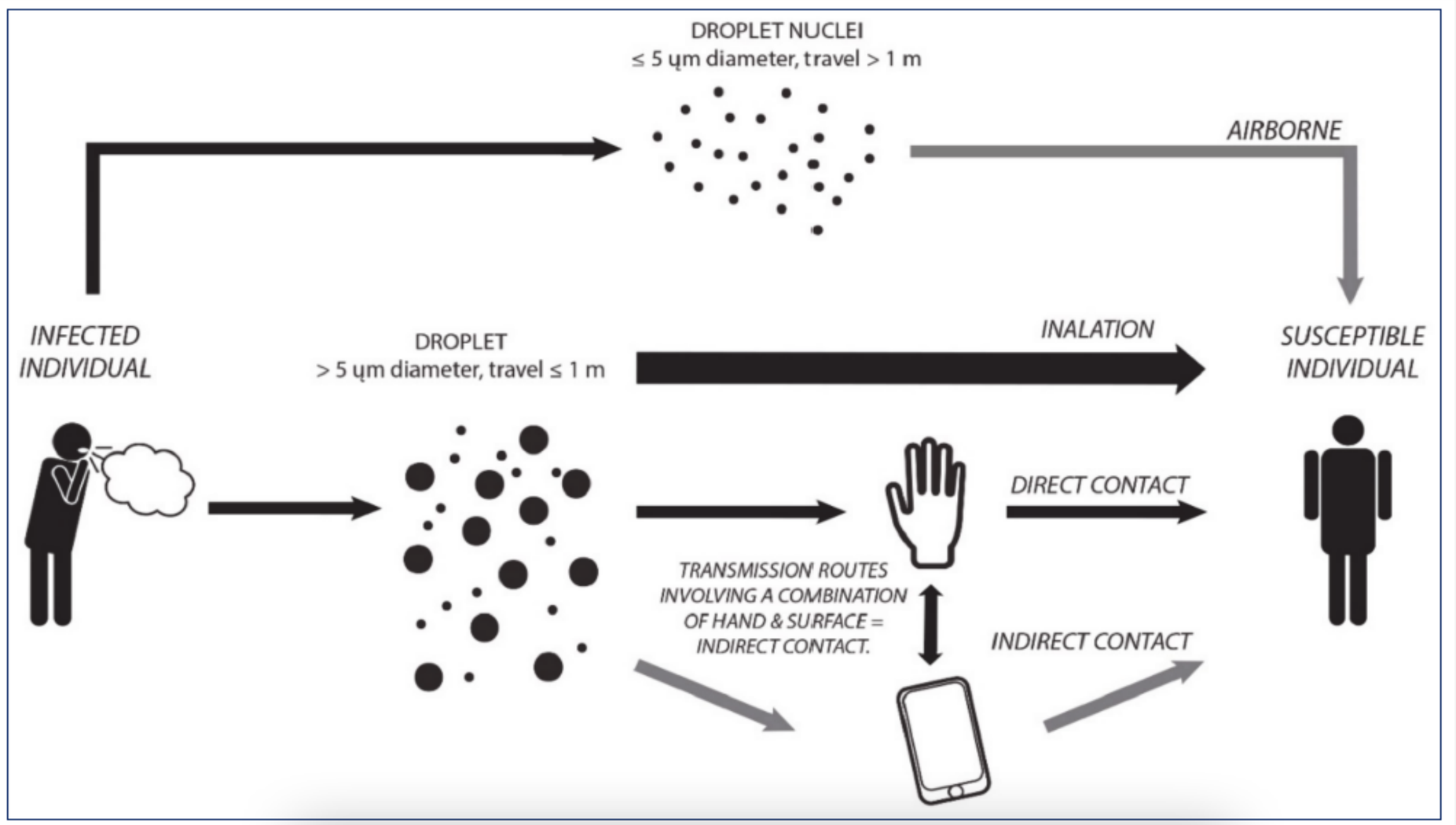
asymptomatic disease: -potentially begins 2 days after their exposure .

-If date of exposure unknown, 48 hr before the date of specimen collection

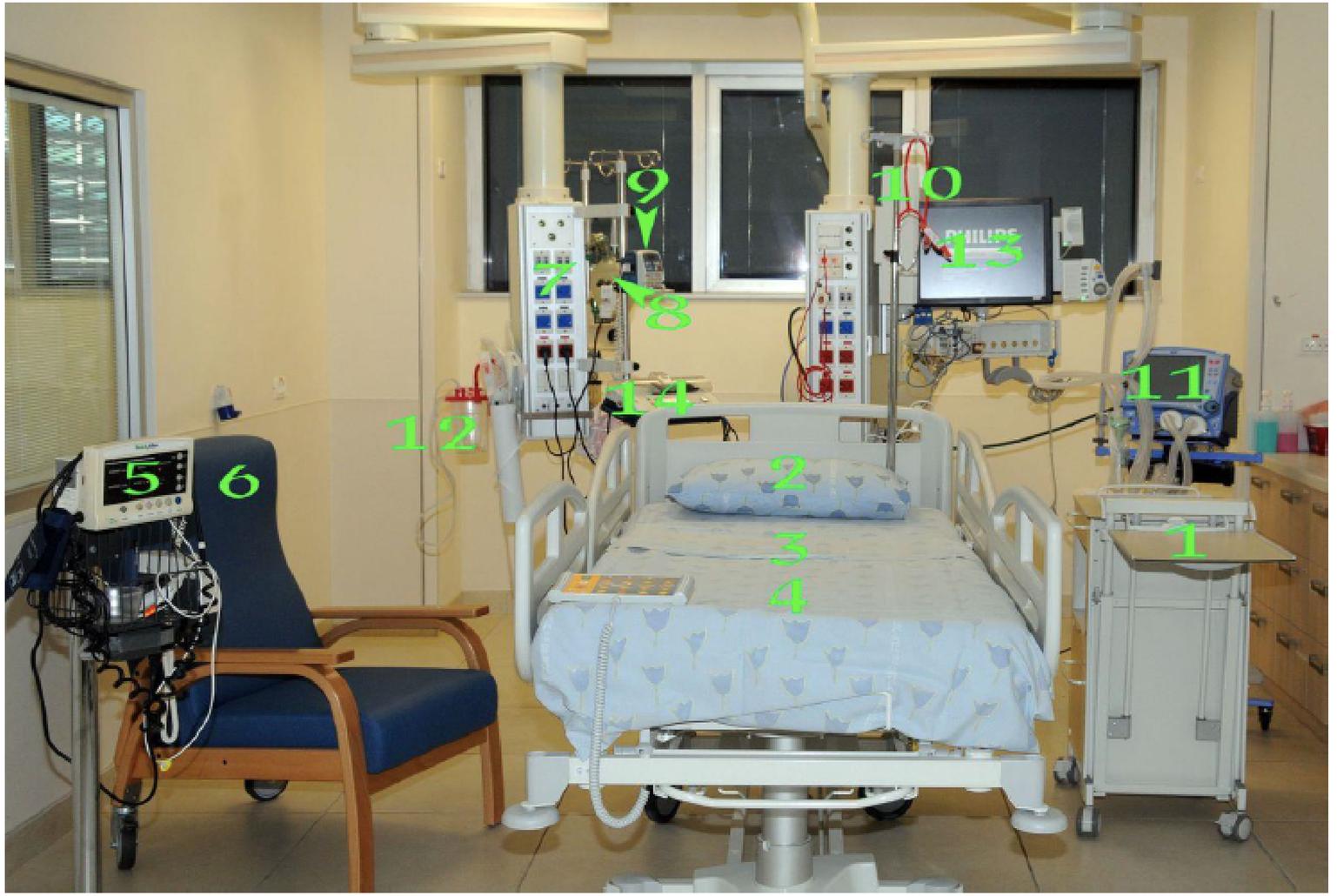
https://www.cdc.gov/coronavirus/2019-ncov/hcp/guidance-risk-assesment-hcp.html


Infectious Agent
Reservoir
1
Portal of Exit from Reservoir
Environmental survival
2
Mode of Transmission
Portal of Entry
Inoculum
3
Susceptible Host

# Routes of SARS-CoV-2 Transmission



# The environment as a reservoir

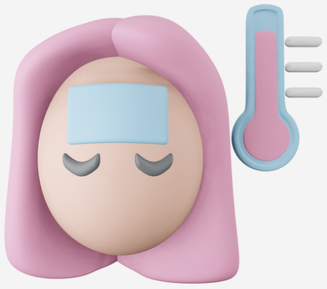



Lerner A, et al. J Clin Microbiol. 2013 Jan;51(1):177-81. doi: 10.1128/JCM.01992-12.

# PREPARING TO GO IN:

## CHECK BEFORE GOING INTO RED ZONE

- Temperature chart
- Day of illness
- Vitals signs
- Plan blood and swabs before entering (label tubes and swabs VTM)
- To clerk patient over the phone/get information over the phone before going in to see the patient - this is to cut down the amount of time spent in the room



## INSIDE RED ZONE

- Input/Output
- Look for GCS, Hydration
- Check for hypoxia
- Ask for exertional dyspnoea
- Respiratory rate – count for 1 minute SPO2
- Blood taking, swab
- ECG needed

# RULES FOR GOING INTO PATIENT CARE AREAS

GO IN PAIRS OR WITH AN OBSERVER

KNOW YOUR ZONES

REGULAR HAND HYGIENE

DON’T TOUCH THE FACE AND EYES

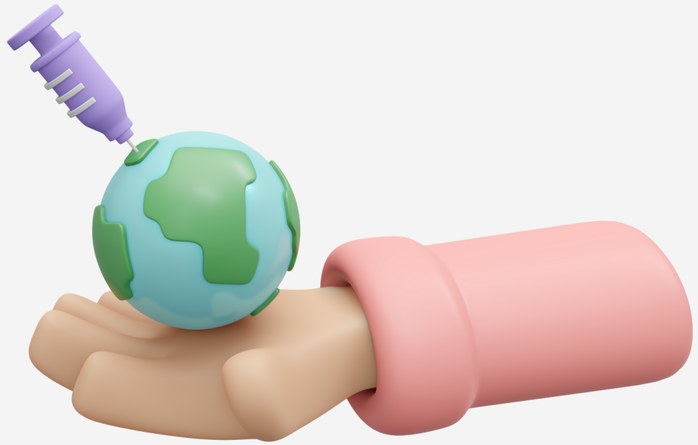
OBSERVER TO WATCH THE HCW DON AND DOFF

REMIND THE PATIENT TO WEAR A MASK WHEN THE HCW IS ENTERING THE ROOM

# Standard Precaution

**The minimum infection prevention practices that should be used in the care of ALL patients, ALL the time.**

**Standard precautions are a set of infection control practices used to prevent transmission of diseases that can be acquired by contact with blood, body fluids, non-intact skin and mucous membranes.**



# Element of Standard Precaution

Hand hygiene

Personal Protective Equipment (PPE)

Disinfectant & Sterilisation

Environmental Hygiene

Linen Management

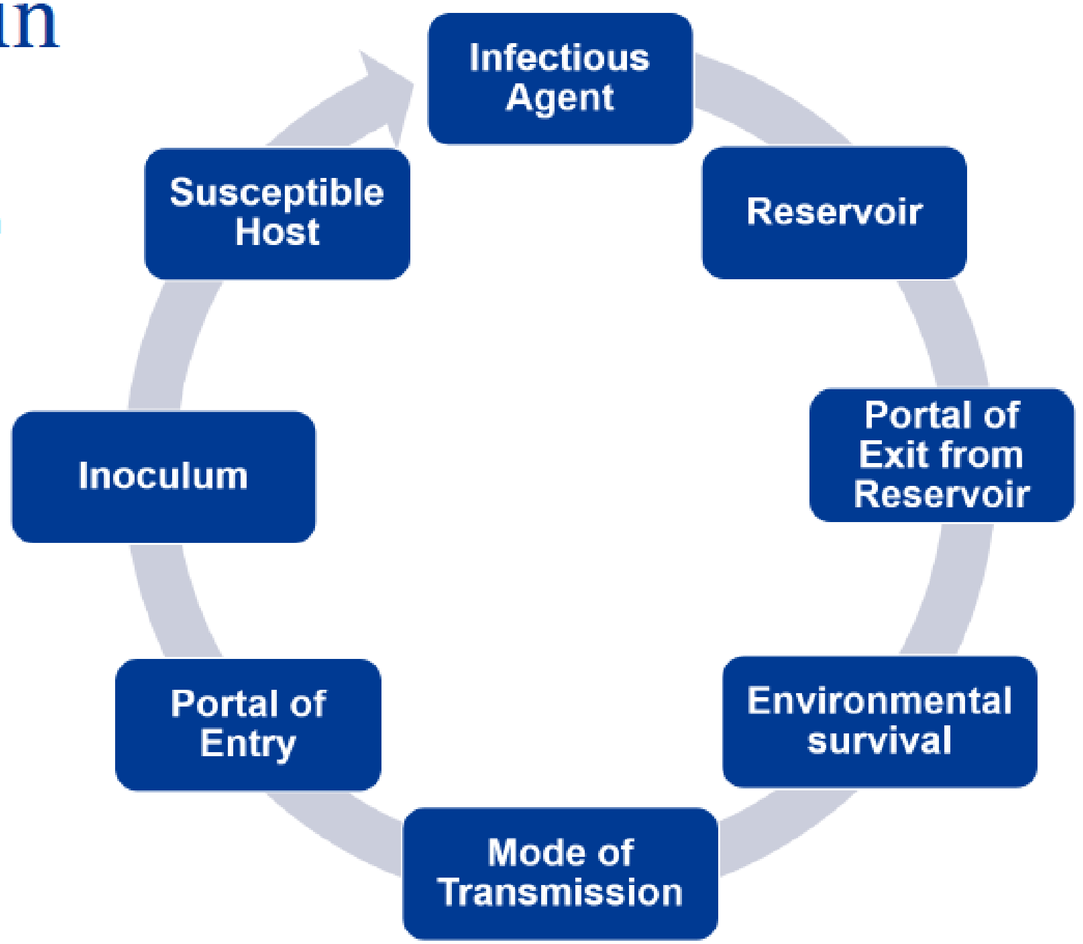
Waste Management

Spillage Management

Injection safety & Sharps management


Respiratory Hygiene & Cough Etiquette

# Breaking the chain




- Immunization

- **HH**
- Disinfection and Sterilization

- **HH**
- Gloves
- Masks
- Respirators

- **HH**
- Transmission based precautions
- Needle and sharps disposal
- Sterilization, disposable supplies

- **HH**
- Dressings covering wounds
- Gloves when contact with body fluids
- Covering mouth and nose when sneezing

# Transmission Based Precautions

- When treating patients who are known or suspected of being infected or colonized with infectious agents.
- These precautions are to be implemented in conjunction with **STANDARD PRECAUTION.**
- Applied according to the clinical syndrome and the likely etiologic agents, and then modified based on test results.

# Transmission Based Precautions

## Three types :
## Contact
## Droplet
## Airborne

**May be combined for diseases that have multiple routes of transmission.**



# APPROPRIATE USE OF PPE

http://covid-19.moh.gov.my/garis-panduan/garis-panduan-kkm/Annex_8_IPC_MEASURES_IN_MANAGING_SUSPECTED_OR_PROBABLE_OR_CONFIRMED_COVID19_23.11.2020.pdf

- used according to the **setting, target personnel, risk of exposure (e.g. type of activity)** and the **mode of transmission** of the **pathogen (e.g. contact, droplet or aerosol).**

SP2

# Personal Protective Equipment (PPE)

PPE are specialised clothing or equipment that are used to protect healthcare personnel from exposure with the infectious agent, or body fluid that may contain the infectious agent.

Used to create barriers that protect skin, clothing, mucous membranes and the respiratory tract of HCW from infectious agents.

## Gloves

(sterile/non sterile)

Protect hands

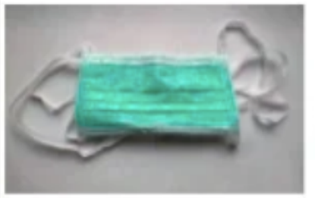
## Protective clothing

isolation gown, coverall suit

protect skin and/or clothing

## Face mask& Respirators

3 ply surgical mask, N95 mask, Purified Air Powered Respirator (PAPR)



Protect mouth/nose

## Goggles

protect eyes

## Face shield

protect face, mouth, nose & eye

# Principle of PPE use:


Selection of PPE is based on the :

I. Anticipated contamination of the HCW clothing and skin by the patient's blood, bodily fluids, non intact skin , secretions or excretions

II. Based on the mode of transmission of the confirmed /suspected pathogen

- **Prevent contamination** of clothing and skin during the process of **removing PPE**
- **Before leaving** the patient's area, **remove and discard PPE**. (except in circumstances where extended use is warranted for some PPE )

- Glove use does not replace any hand hygiene action

- **Perform hand hygiene**

# **COVID-19 :** Respiratory and Contact transmission


STANDARD + CONTACT + DROPLET precautions, including EYE PROTECTION. AIRBORNE precaution if AGP

Patient placement
Choosing the right PPE for the the choosen activity

Rational use of personal protective equipment for coronavirus disease 2019 (COVID-19)

Interim guidance
27 February 2020

World Health Organization

For healthcare professionals use only.

# COVID-19 related (Confirmed/Suspected COVID-19/PUS/ARI)


* Boot cover / shoe cover (ONLY when anticipating contamination )

Low risk:
-Patient is not actively coughing
-Asymptomatic
-Patient is able to wear a mask

**Examples of activities:**

- Direct routine care of low-risk patient
- Blood taking
- Clerking and vital signs monitoring
- Cleaning of patient's room
- Escorting patient (within 1m distance of patient)

**[4]For extended use**
Mask and face shield
To use gown together with plastic apron on the top. Change plastic apron & gloves between patient

# COVID-19 related (Confirmed/Suspected COVID-19/PUS/ARI

High risk:
-Patient is coughing
-Patient requires oxygen support
-Patient is unable to wear a surgical mask
-Ventilated patient

Activity:
Providing direct routine care for high risk patients
Performing & assisting NP swab

**TYPE OF PPE**

1) N95 mask
2) Isolation Gown (fluid-repellent long-sleeved gown)
3) Gloves
4) Eye Protection (face shield/goggles)
5) Head cover

# Self-contamination during PPE removal

Part 1: simulation to document baseline contamination

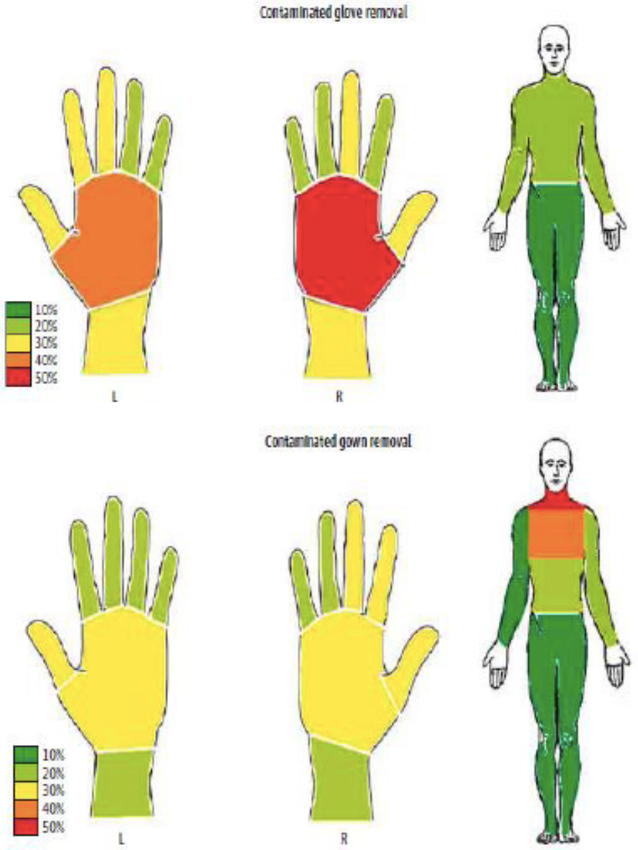
- HCP at 4 hospitals; fluorescent lotion on PPE
- 435 glove and gown removal simulations
- Contamination of skin or clothing with fluorescent lotion occurred in 200 (46.0%)

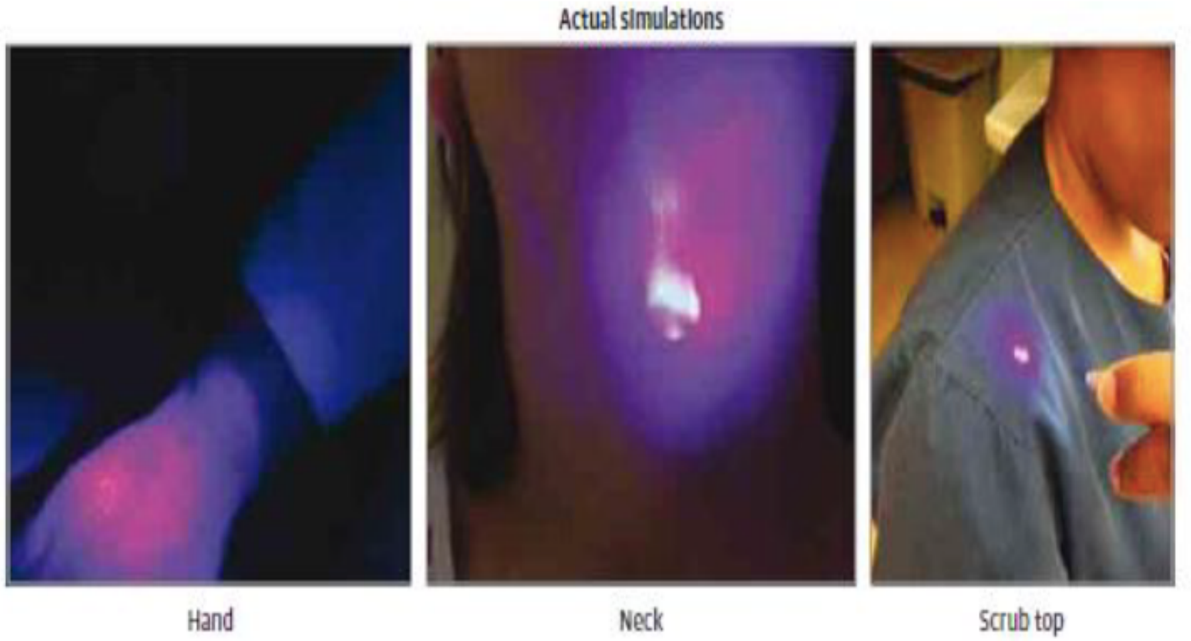
Part 2: intervention

- Reduction in skin and clothing contamination during glove and gown removal (60.0% before the intervention vs. 18.9% after, $P < .001$)
- Sustained after 1 and 3 months (12.0% at both time points, $P < .001$ compared with before the intervention)

Tomas et al. JAMA Intern Med. 2015 Dec;175(12):1904-10. doi: 10.1001/jamainternmed.2015.4535.

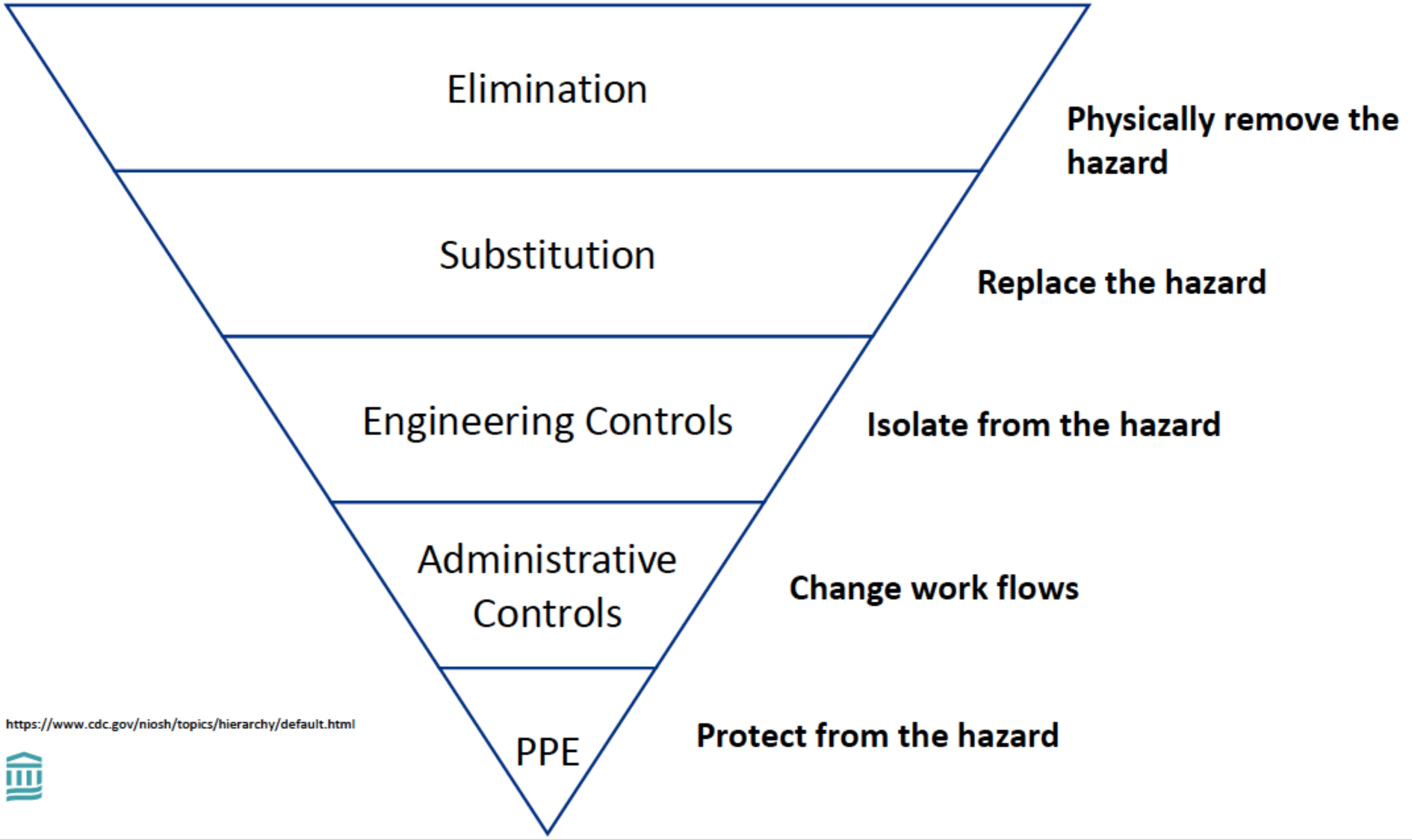
# Results: sites of contamination



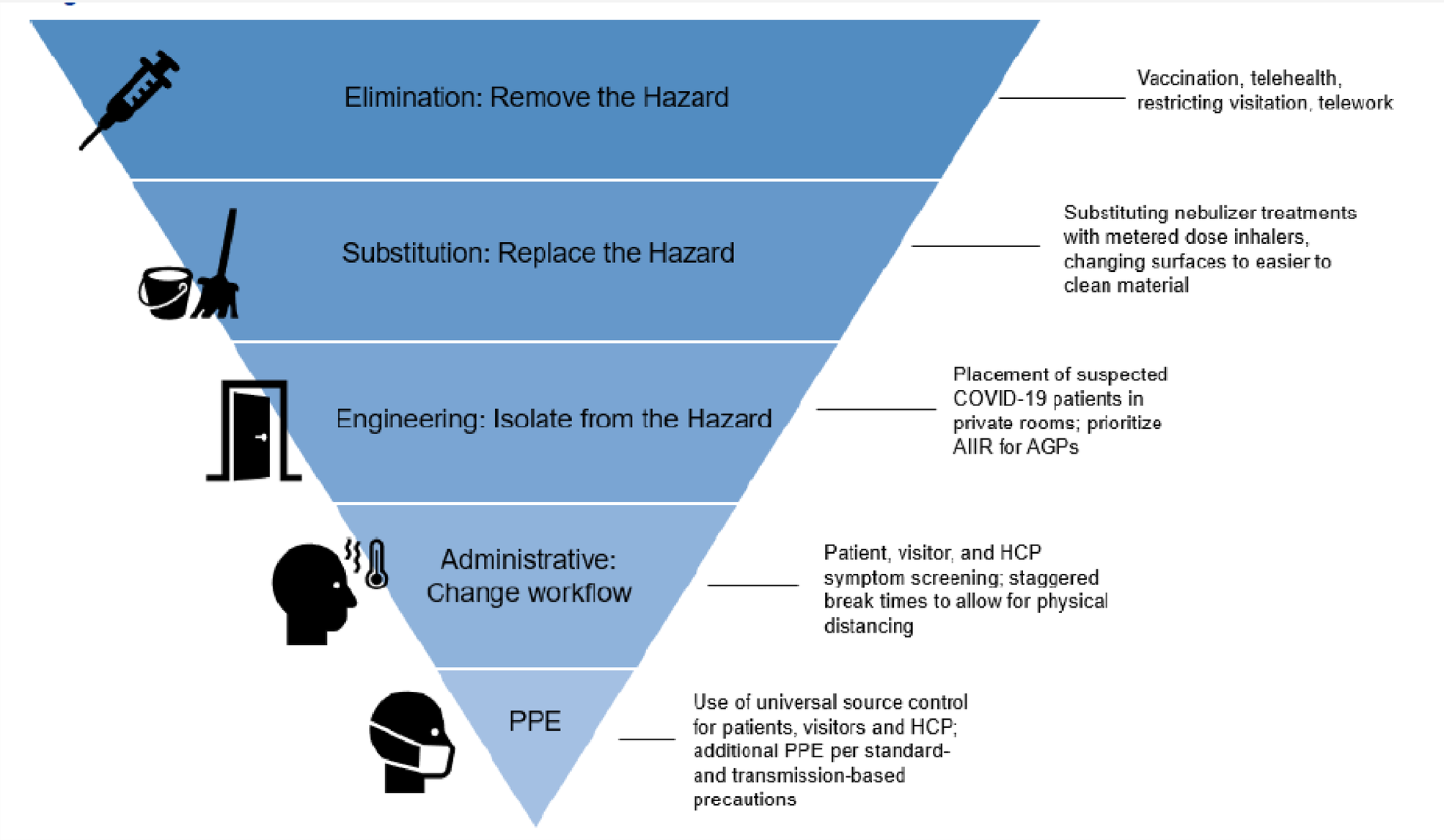

Tomas et al. JAMA Intern Med. 2015 Dec;175(12):1904-10. doi: 10.1001/jamainternmed.2015.4535.

# Prevention of Transmission: The Hierarchy of Controls




https://www.cdc.gov/niosh/topics/hierarchy/default.html

# Hierarchy of Controls: SARS-CoV-2



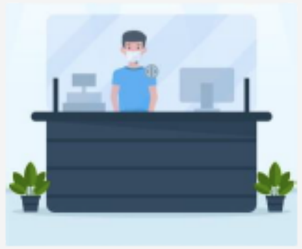

Winkler ML, Hooper DC, and Shenoy ES. Infection Prevention and Control of SARS-CoV-2 In Healthcare Settings. Infect Dis Clin North Am. 2022. In Press.

# INFECTION PREVENTION AND CONTROL (IPC) MEASURES

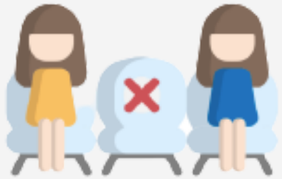
- Point of entry
- Patient placement on admission
- Aerosol-generating procedures (AGP)
- Patient transfer and Transport
- Specimen collection and transport
- Disinfection and sterilization
- Terminal cleaning of an isolation room
- Dishes and eating utensils
- Linen management
- Healthcare worker (HCW)
- Visitors
- Patient record / bed head ticket

# INFECTION PREVENTION AND CONTROL (IPC) MEASURES IN MANAGING SUSPECTED, PROBABLE OR CONFIRMED COVID-19

## Point of Entry



- Use physical barriers such as glass or plastic windows
- Rapid case identification of patients at risk
- Rapid triage of patients

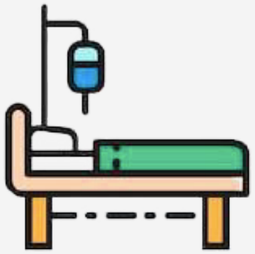


- Separate Suspected COVID-19 to a dedicated waiting area (well ventilated with spatial separation of 1 - 2m between patients)
- Provide tissues/ surgical mask and no-touch bins or biohazard bag

- Provide resources for performing hand hygiene

# Patient placement at point of entry & on admission (in descending order of preference):

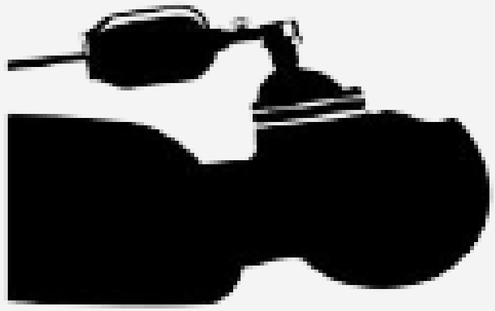
- **Single room (nursed with door closed) and attached bathroom  OR**
- **Single room**



**Cohorting Confirmed COVID-19 patients is allowed**
**Probable COVID-19 case should not be placed in the same area as Confirmed case**
**Suspected COVID-19 cases with pending result should be placed in single isolation room**
**Dedicated equipments if possible (or clean & disinfect before reuse)**

## Patient placement for patient requiring AGP (in descending order of preference):

- **Airborne Infection Isolation Room (AIIR)**
- **Adequately ventilated single room with at least natural ventilation**

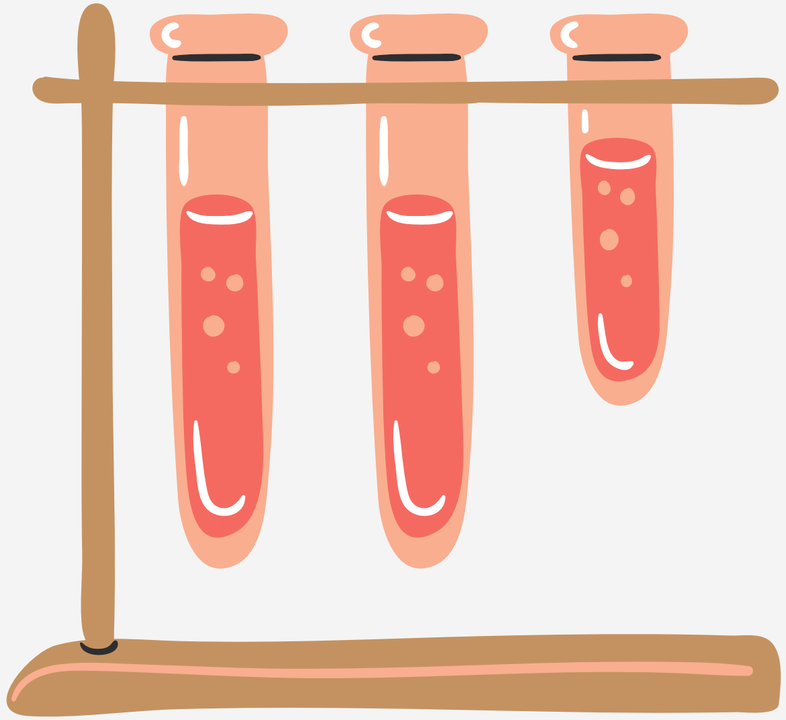


## Transporting patient:

- Minimize patient movement
- If necessary use pre-planned route
- Notify receiving areas or facilities before transferring patient
- Clean and disinfect patient-contact surfaces after use (e.g. bed, wheelchair, incubators)
- HCWs must wear appropriate PPE
- Patient should wear a surgical mask (if tolerable)

## Specimen collection & transport:

- State clearly on the request form and notify the laboratory
- Place in leak-proof specimen bags  and deliver by hand
- Do not use pneumatic-tube systems



## Disinfection & Sterilization:

- Environmental cleaning and disinfection followed hospital recommendation
- Increase frequency of cleaning highly touched area

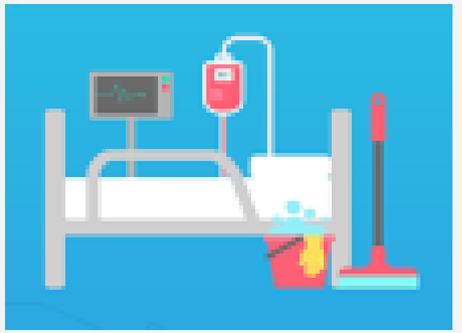
# RECOMMENDED FREQUENCY OF CLEANING OF ENVIRONMENTAL SURFACES, ACCORDING TO THE PATIENT AREAS WITH SUSPECTED OR CONFIRMED COVID-19 IN HOSPITAL SETTING

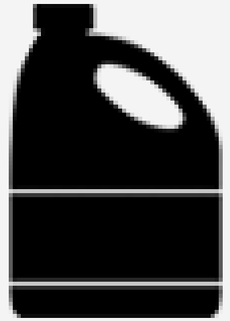
| Patient area | Frequency [a] | Additional guidance |
|---|---|---|
| Screening/triage area | At least twice daily | • Focus on high-touch surfaces, then floors (last) |
| Inpatient rooms / cohort – occupied | At least twice daily, preferably three times daily, in particular for high-touch surfaces | • Focus on high-touch surfaces, starting with shared/common surfaces, then move to each patient bed; use new cloth for each bed if possible; then floors (last) |
| Inpatient rooms – unoccupied (terminal cleaning) | Upon discharge/transfer | • Low-touch surfaces, high-touch surfaces, floors (in that order); waste and linens removed, bed thoroughly cleaned and disinfected |
| Outpatient / ambulatory care rooms | After each patient visit (in particular for high-touch surfaces) and at least once daily terminal clean | • High-touch surfaces to be disinfected after each patient visit<br>• Once daily low-touch surfaces, high-touch surfaces, floors (in that order); waste and linens removed, examination bed thoroughly cleaned and disinfected |
| Hallways / corridors | At least twice daily [b] | • High-touch surfaces including railings and equipment in hallways, then floors (last) |
| Patient bathrooms/ toilets | Private patient room toilet: at least twice daily<br>Shared toilets: at least three times daily | • High-touch surfaces, including door handles, light switches, counters, faucets, then sink bowls, then toilets and finally floor (in that order)<br>• Avoid sharing toilets between staff and patients |

[a] Environmental surfaces should also be cleaned and disinfected whenever visibly soiled or if contaminated by a body fluid (e.g., blood); [b] Frequency can be once a day if hallways are not frequently used.

## Terminal Cleaning of Isolation Room:

- Decontamination is perform from highest to lowest point and from least contaminated to the most contaminated
- Remove curtains and place in red linen bag with alginate plastic
- Use disinfectants such as sodium hypochlorite [suggested concentration: 0.1% (1000ppm)]
- Wait for sufficient air changes





## Dishes & Eating Utensils:

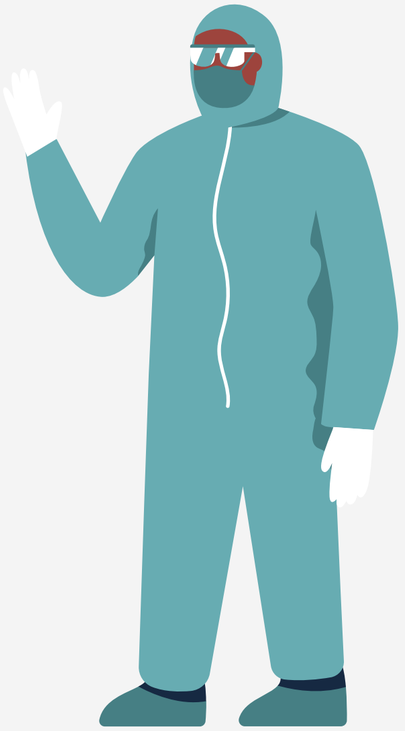
- **Use disposable**

## Linen Management:

- Washing/disinfecting linen should be handled according to hospital protocol
- Place linen into red alginate plastic and then into red linen bag

## HCWs management:

- HCWs with high risk condition / immuno- compromised not allowed to manage and provide care
- Keep a register & monitor for symptoms
- Form a dedicated team

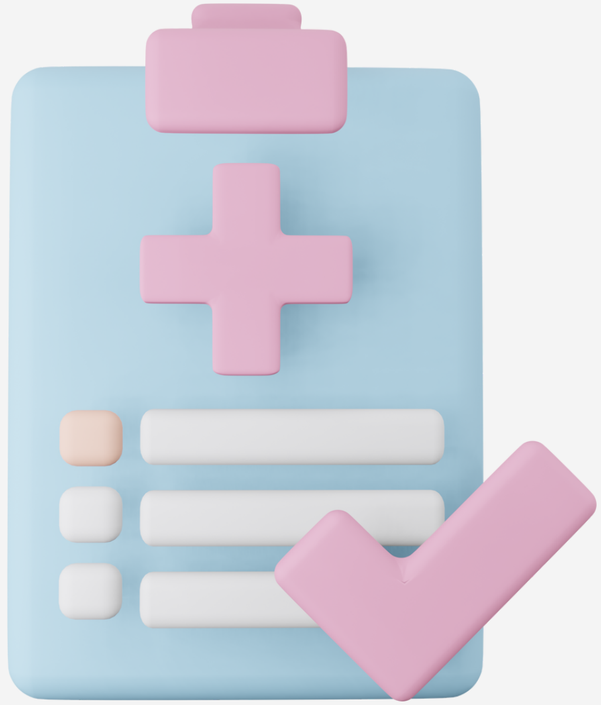


## Visitors:

- NO visitor should be allowed. If necessary, screen for symptoms
- Document and limit the number, scheduled time
- Appropriate instruction on use of PPE and other precautions (e.g., Hand hygiene)

## Patient record / bed head ticket (BHT):

- patient record/bed head ticket should be tagged
- should be kept outside the patient room



# Summary

- SARS-CoV-2 is spread primarily through close, sustained contact; transmission occurs due exposure to larger droplets, smaller droplets, and particles when a person is close to an infected person-relative contribution of deposition versus inhalation not known
- Droplet vs Airborne paradigm/vocabulary may shift, however, practical implications for healthcare are not clear at this time
- Mitigating the risk of transmission requires a layered approach anchored in the breaking the links in the Chain of Transmission through implementation of the Hierarchy of Controls
- Vigilance is required but so is evolution
- SARS-CoV-2 becomes endemic, and maybe/hopefully seasonal, can we apply endemic-level hierarchy of controls?
- Time will tell!

# Reference

MOH Guideline