Covid 19- A Surgical Perspective

Zach Koto MBChB; FCS(SA); FACS; FCS(ECSA) ; PhD

Introduction

- Corona virus disease 2019(COVID-19) Is primarily a respiratory disease
- First described in the city of Wuhan. Province of Hubei in China
- **WHO was alerted to this pneumonia like symptoms caused by the novel Corona virus**
- Majority of these patient presents with mild disease and 14% presents with severe disease.- require hospitalization
- 5% will require intensive care support – which will include ventilatory support

Features of Covid-19 infection

Characteristics of COVID-19 infection

Risk factors
- Male gender
- Comorbidities, e.g.: Hypertension, diabetes, cerebral vascular disease, cardiovascular disease

Symptoms and signs
- Asymptomatic*
- Fever
- Fatigue
- Dry cough
- Myalgia
- Dyspnoea
- Others: diarrhoea and nausea

Investigation

Blood tests:
- Lymphopenia
- Leucocytosis
- Neutrophilia
- Elevated lactate dehydrogenase
- Prolonged INR

Imaging:
- Chest X-ray: consolidation
- CT thorax: bilateral distribution of patchy shadows and ground glass opacity

Complications
- Shock
- Acute respiratory distress syndrome (ARDS)
- Arrhythmia
- Acute renal injury

Where did the Corona virus originate from?

CLINICAL MICROBIOLOGY REVIEWS Oct. 2007, p. 60–694
0893-8512/07/$08.00+0 doi:10.11 /CMR.00023 07

Severe Acute Respiratory Syndrome Coronavirus as an Emerging and Reemerging Infection

Vincent C. C. Cheng, Susanna K. P. Lau, Patrick C. Y. Woo, and Kwok Yu

State Key Laboratory of Emerging Infectious Diseases, Department of Microbiology, Research Centre Immunology, The University of Hong Kong, Hong Kong Special Administrative Region, C

or immunization (Table 10). The Koch's pos-
S-CoV as a causative agent of SARS were
primate model using cynomolgus macaques
mis), which demonstrated clinical and patho-
with some similarities to those found in hu-
the contrary, African green monkeys (*Cerco-*
) did not develop significant lung pathology
with the SARS-CoV. The lack of consistency
l models of rhesus, cynomolgus, and African
or experimental SARS was noted in another
over, these large mammals are expensive and
. BALB/c mice demonstrated asymptomatic
s in lungs and nasal turbinates by intranasal
h was not significantly different from the find-
tion of immunological Th1-biased C57BL/6
B/c mice that were 12 to 14 months old de-
natic pneumonia, which correlated with the
ptibility to acute SARS in humans (287). As
-1 knockout-immunodeficient mice had fatal
l disease (143). Transgenic mice expressing
eptors also developed fatal disease, with ex-
ssemination to many organs including the
It is interesting that mouse-adapted SARS-

SHOULD WE BE READY FOR THE REEMERGENCE OF SARS?

The medical and scientific community demonstrated marvelous efforts in the understanding and control of SARS within a short time, as evident by over 4,000 publications available online. Despite these achievements, gaps still exist in terms of the molecular basis of the physical stability and transmissibility of this virus, the molecular and immunological basis of disease pathogenesis in humans, screening tests for early or cryptic SARS cases, foolproof infection control procedures for patient care, effective antivirals or antiviral combinations, the usefulness of immunomodulatory agents for late presenters, an effective vaccine with no immune enhancement, and the immediate animal host that transmitted the virus to caged civets in the market at the beginning of the epidemic. Coronaviruses are well known to undergo genetic recombination (375), which may lead to new genotypes and outbreaks. The presence of a large reservoir of SARS-CoV-like viruses in horseshoe bats, together with the culture of eating exotic mammals in southern China, is a time bomb. The possibility of the reemergence of SARS and other novel viruses from animals or laboratories and therefore the need for preparedness should not be ignored.

diagnosis

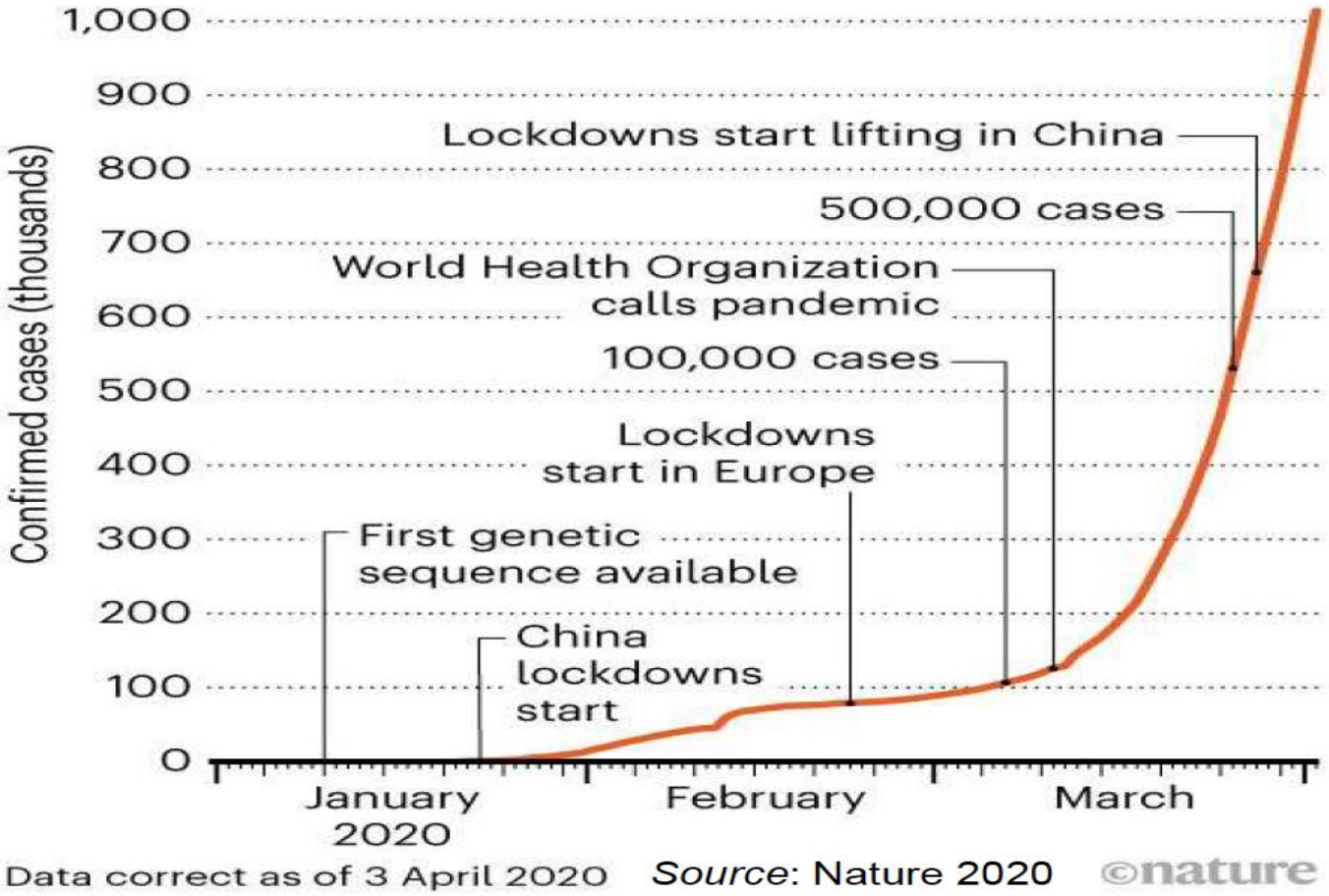
- Two methods
  - real Time Reverse Transcriptase Polymerase Chain Reaction (rRT-PCR) of the of the Oropharyngeal and Nasopharyngeal swab or sputum- takes 2-4 hours turn over - if its positive it indicates active infection
  - Immunologic response could be delayed
  - second method is based on
    - Contact history
    - Clinical symptoms
    - Characteristic X-ray and CT scan findings

Comparison between SARS, MERS and COVID-19

	Severe acute respiratory syndrome (SARS)	Middle East Respiratory Syndrome (MERS)	COVID-19
Virus subgroup	β-coronavirus	β-coronavirus	β-coronavirus
Secondary infection	In hospital	In hospital	Close clusters
Pattern of transmission	Sustained human to human transmission, occasional superspreading events*	Cannot sustain human to human transmission beyond a few generations	Sustained human to human transmission, especially in close contacts, family clusters.
Infectious period	Upon onset of symptoms	Upon onset of symptoms	Able to transmit despite being asymptomatic or with mild symptoms. Higher viral load after symptoms onset.
Reproductive number (R_0)	3	<1	2-3
Total number of cases worldwide	8096	2494	>200,000**
Incubation period	1-4 days	2-14 days	3-7 up to 14 days
Case fatality rate	9.6%	34.4%	2.3%

The first million cases of Covid-19

Wuhan seafood market



Data correct as of 3 April 2020 *Source*: Nature 2020 ©nature

health
Department:
Health
REPUBLIC OF SOUTH AFRICA

CAPRISA

Article

Virological assessment of hospitalized patients with COVID-2019

https://doi.org/10.1038/s41586-020-2196-x

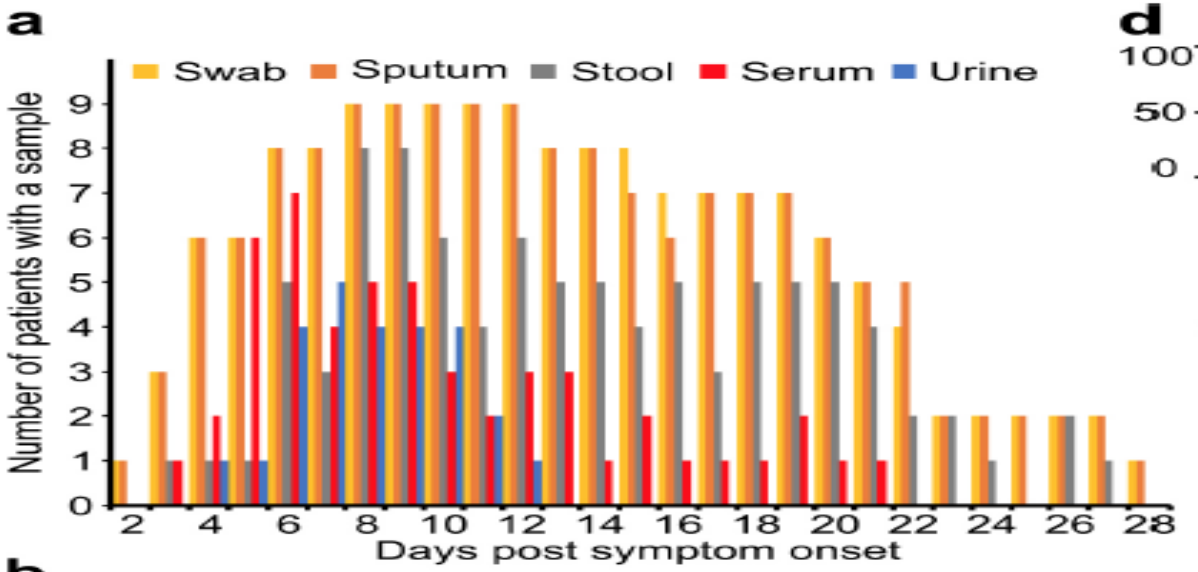
https://doi.org/10.1038/s41586-020-2196-x

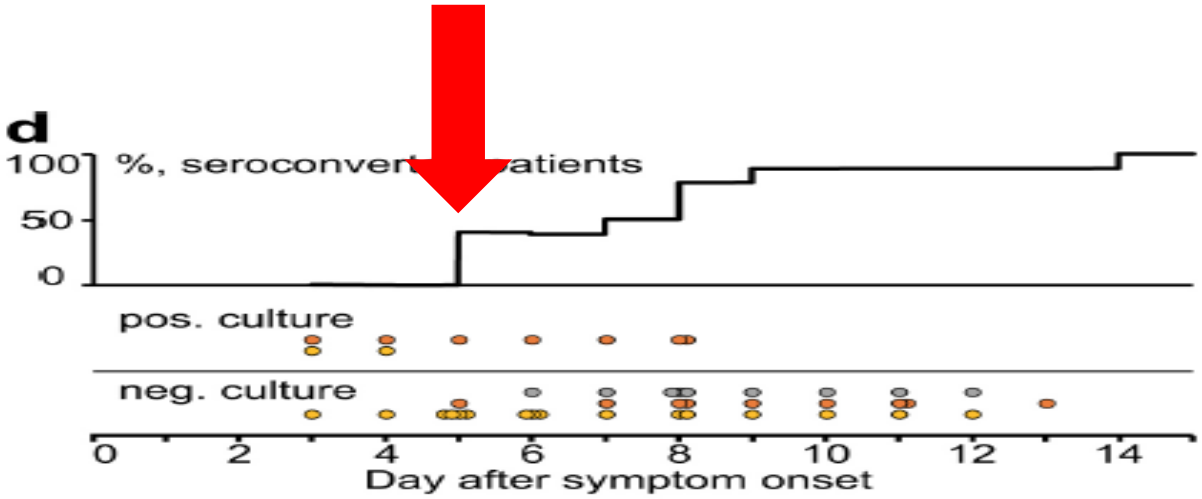
Received: 1 March 2020

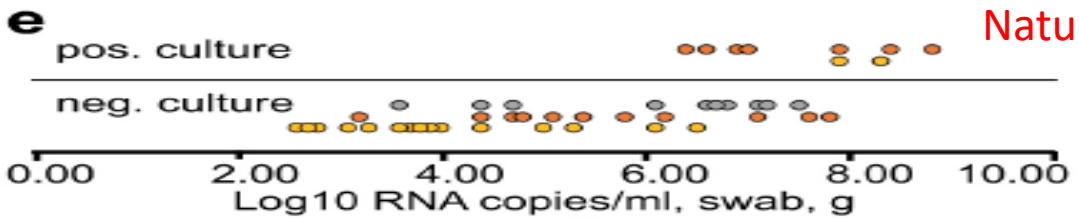
Accepted: 24 March 2020

Published online: 1 April 2020

Roman Wölfel[1,6], Victor M. Corman[2,6], Wolfgang Guggemos[3,6], Michael Seilmaier[3], Sabine Zange[1], Marcel A. Müller[2], Daniela Niemeyer[2], Terry C. Jones[2,4], Patrick Vollmar[1], Camilla Rothe[5], Michael Hoelscher[5], Tobias Bleicker[2], Sebastian Brünink[2], Julia Schneider[2], Rosina Ehmann[1], Katrin Zwirglmaier[1], Christian Drosten[2,7]✉ & Clemens Wendtner[3,7]✉

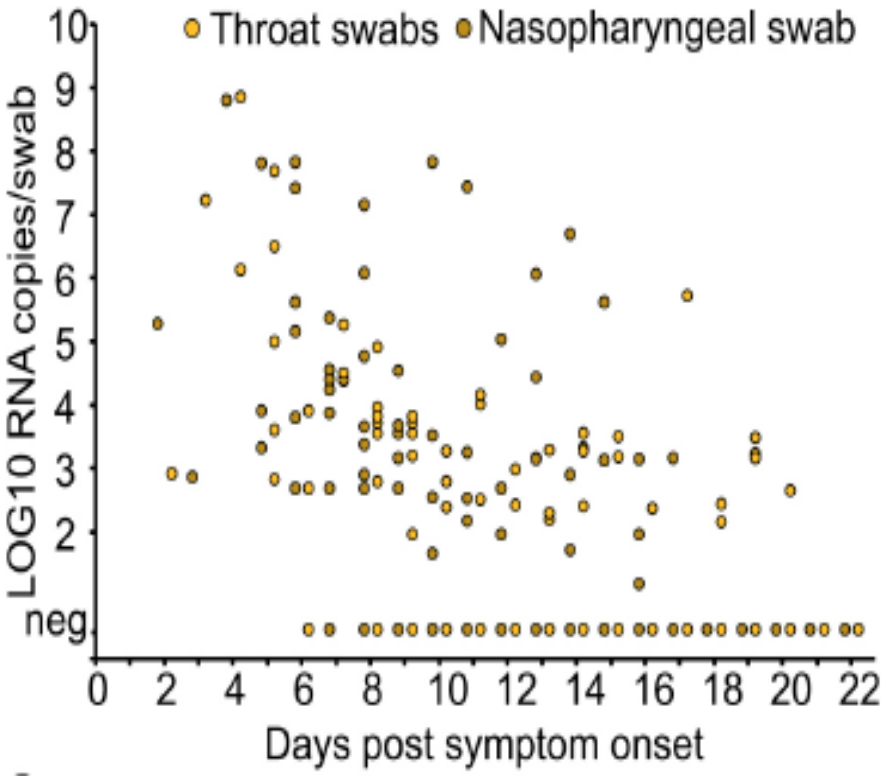


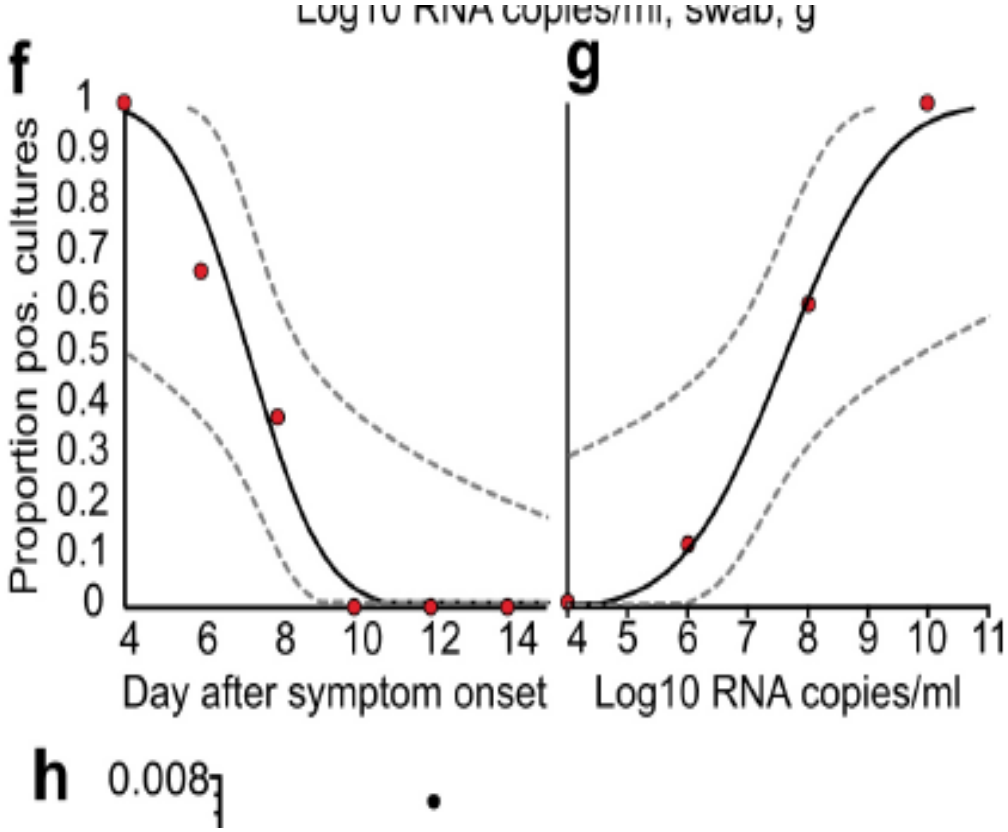




Nature 2020

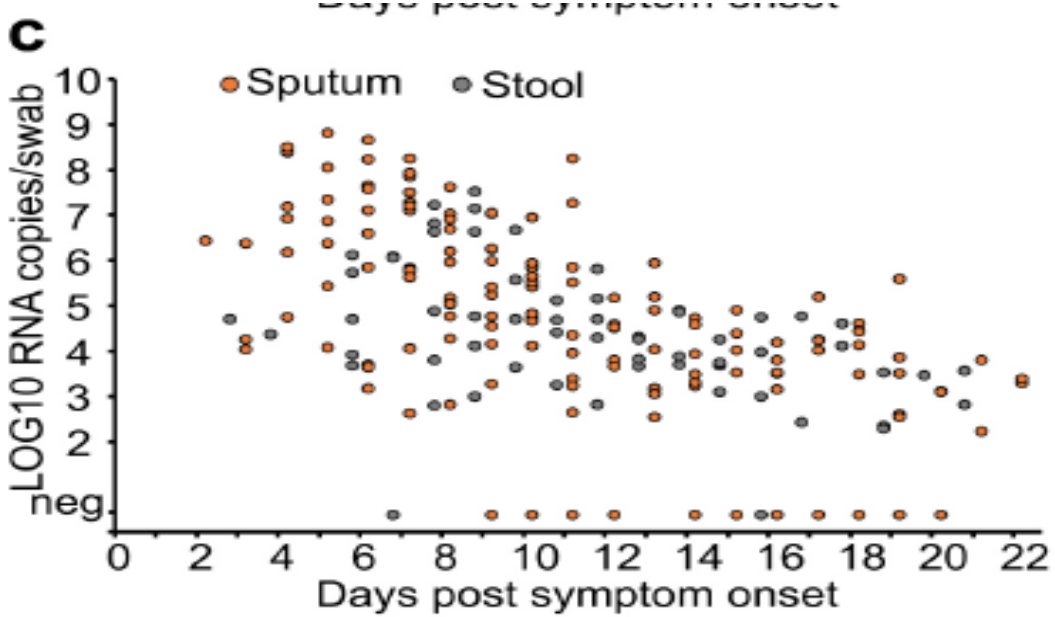
Throat swab and Nasopharyngeal swab

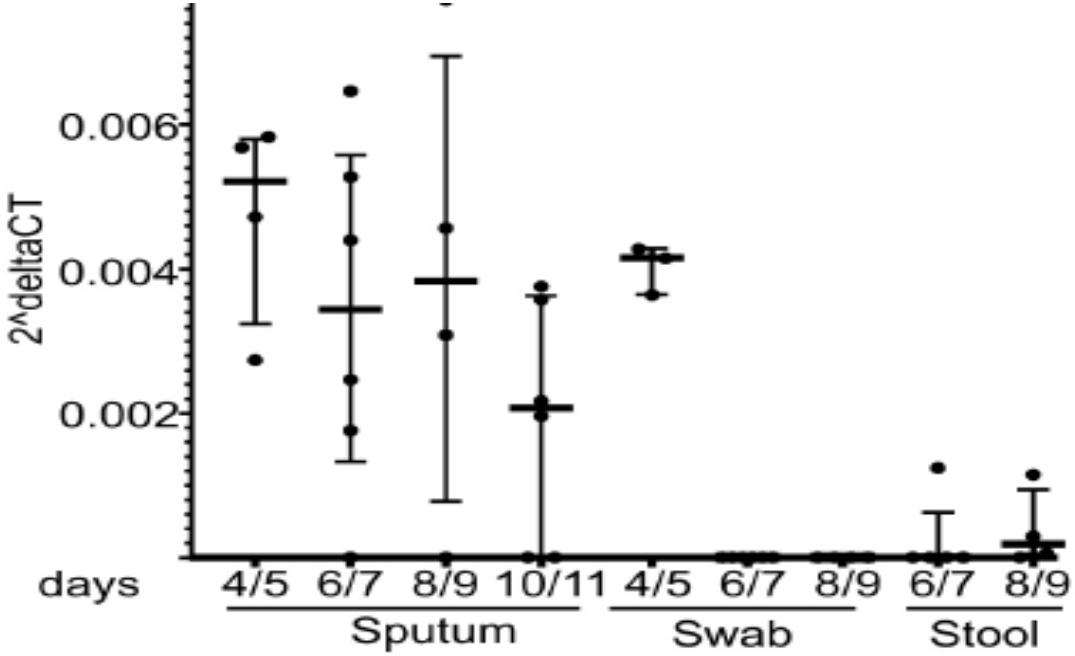




Nature 2020

RNA copies in sputum and stool





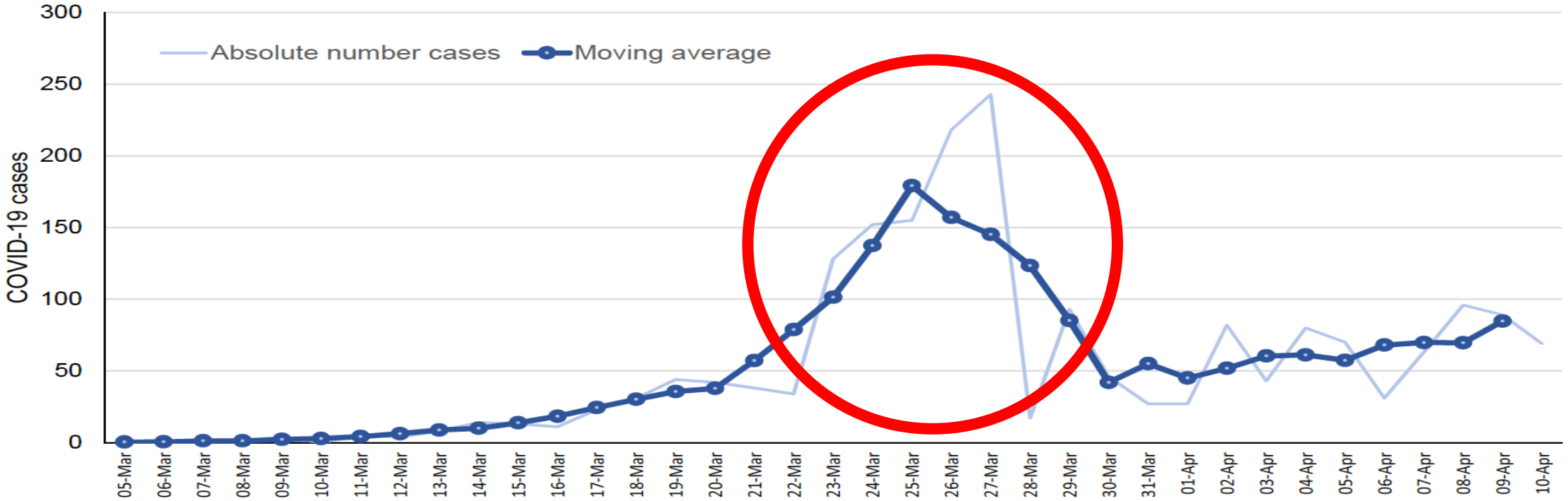
Nature 2020

Covid-19-severe cases

- **severe cases complicated by**
  - the acute respiratory distress syndrome (ARDS),
  - sepsis and septic shock, multiorgan failure, including acute kidney injury and cardiac injury.
- **Older age** and **co-morbid disease** have been reported as risk factors for death.
- This is highly contagious viral infection
  - with observed significant spread amongst the civilian population
  - and within the hospital setting.
- **Health care workers looking after these patients** are recognized more
  - and more as at increased risk of being infected themselves.

SA's SARS-CoV-2 epidemic - 3

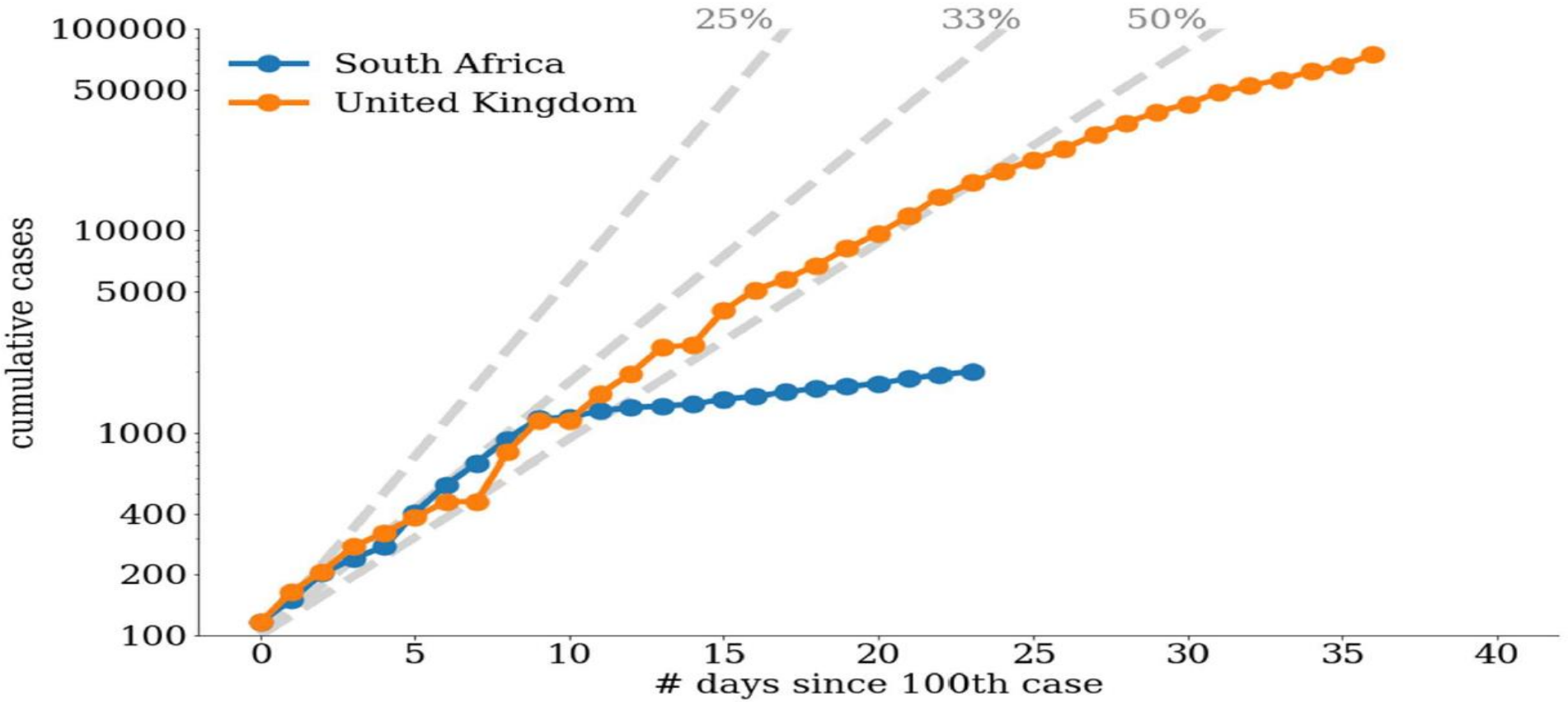
Trends in new cases



health
Department:
Health
REPUBLIC OF SOUTH AFRICA

CAPRISA

Covid-19 cases - SA vs UK
SA's expected vs actual trajectory

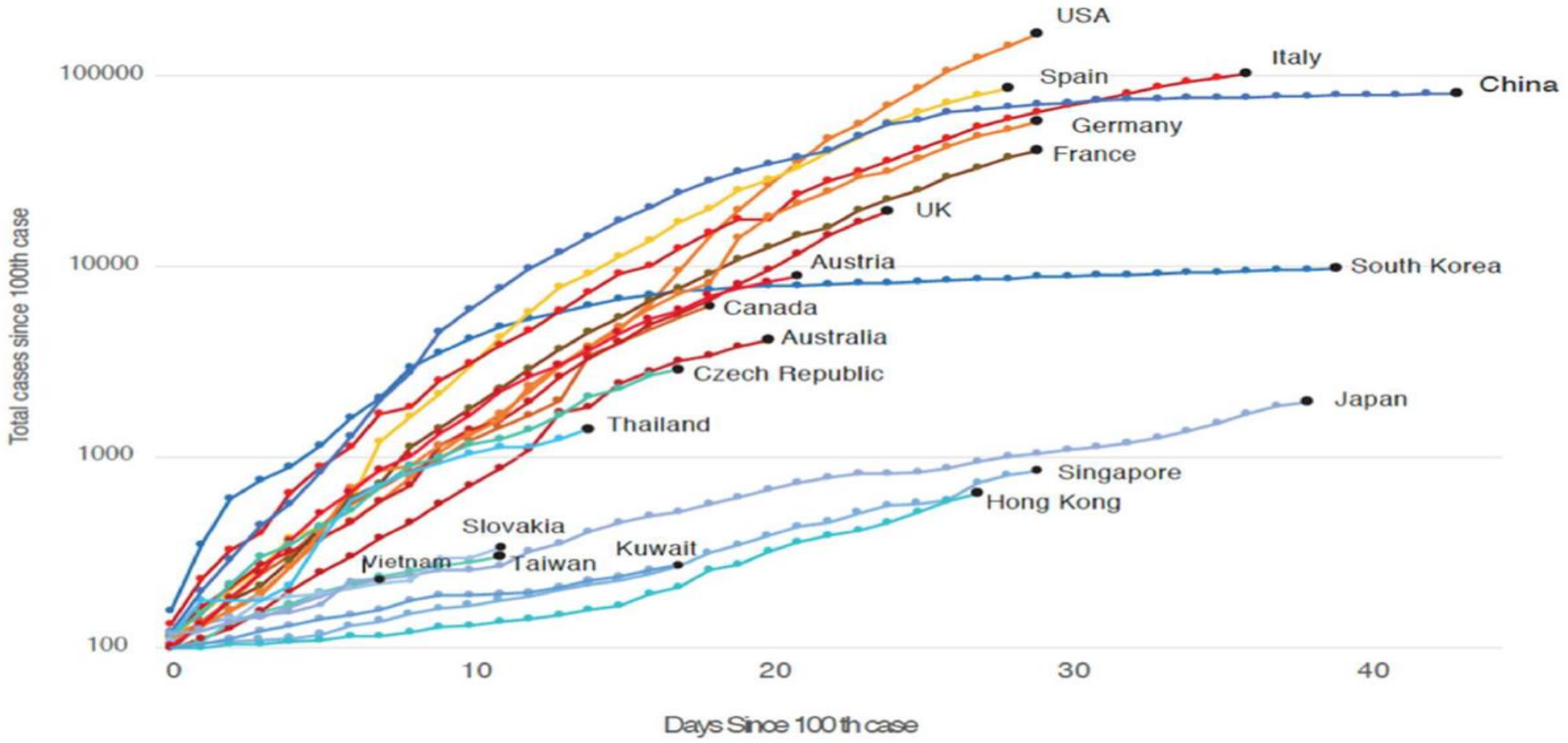


health
Department:
Health
REPUBLIC OF SOUTH AFRICA

Source: Tulio de Oliveira & UKZN CoV Big Data Consortium

CAPRISA

Country level epidemic trajectories

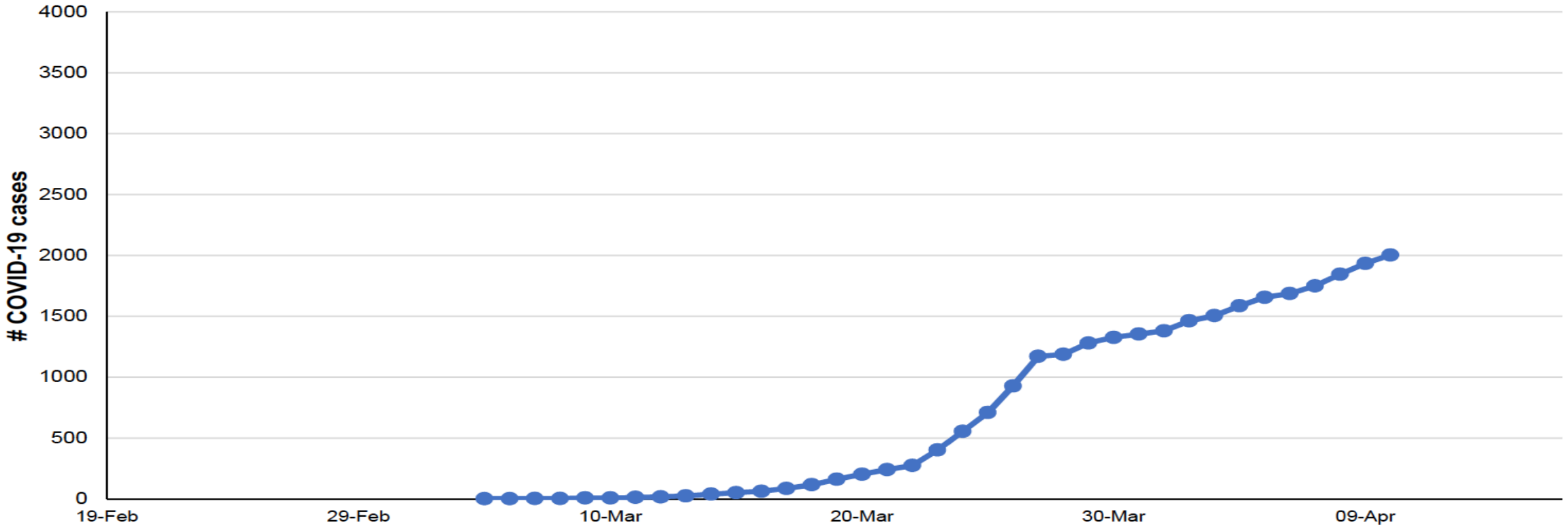


health
Department:
Health
REPUBLIC OF SOUTH AFRICA

CAPRISA

SA's SARS-CoV-2 epidemic - 2

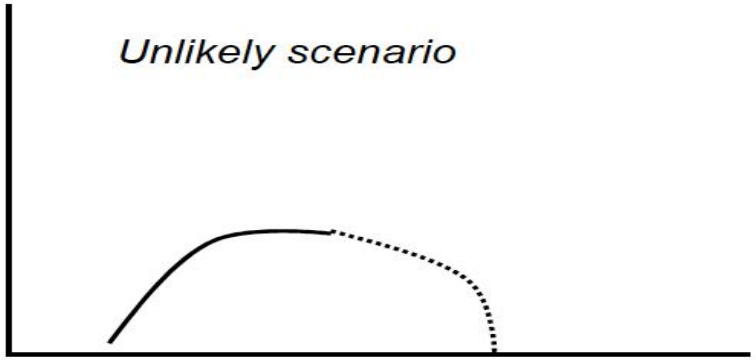
Trends in cumulative cases

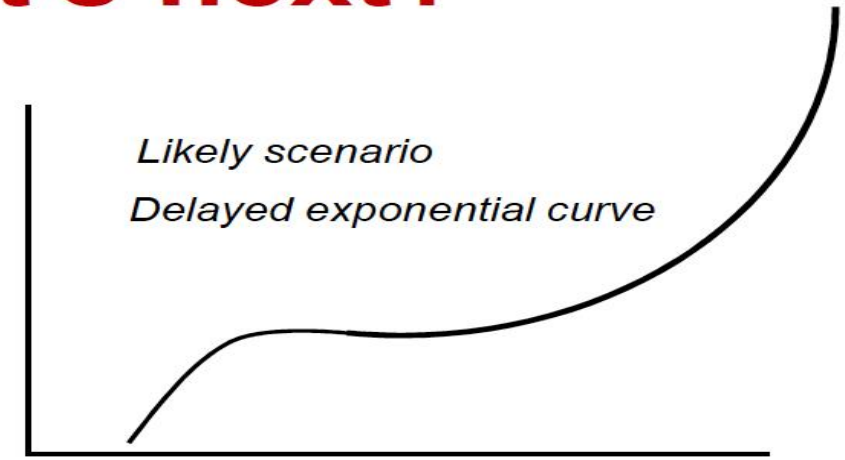


health
Department:
Health
REPUBLIC OF SOUTH AFRICA

CAPRISA

So what's next?

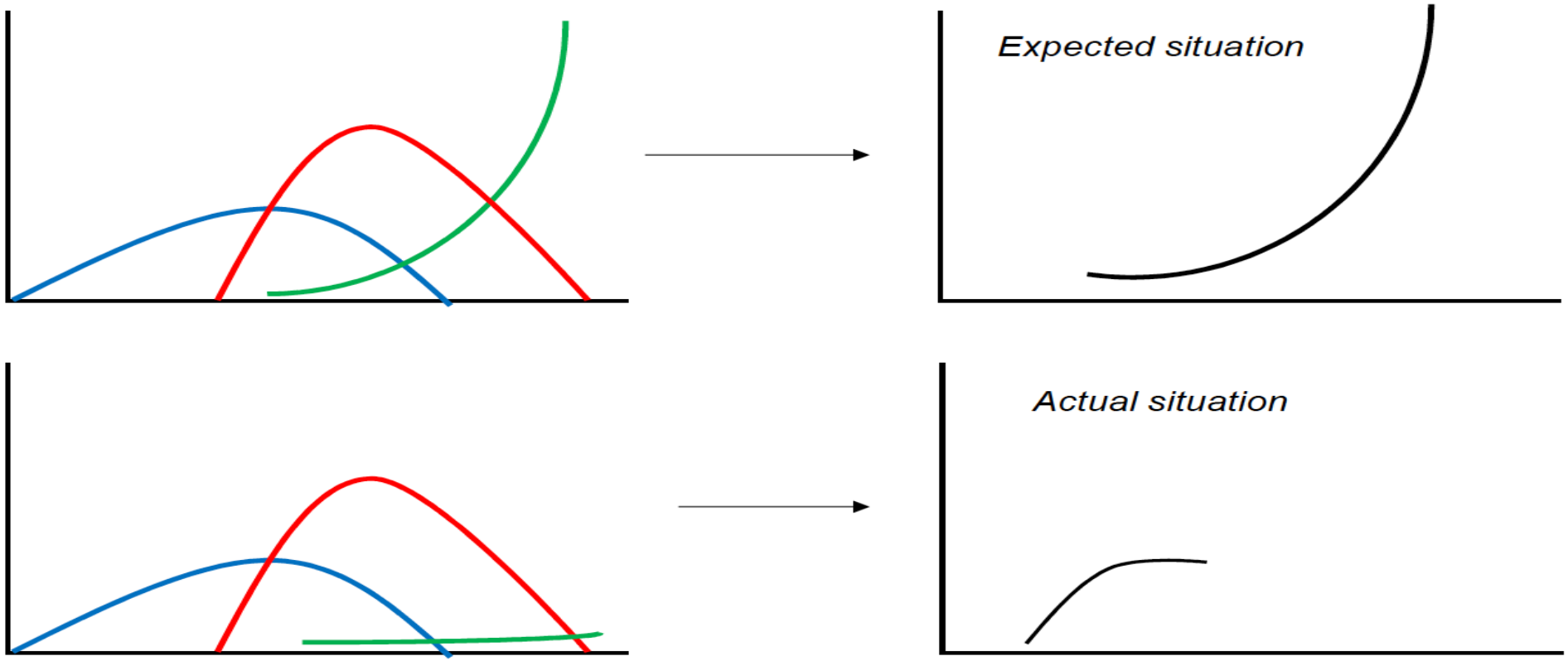




health
Department:
Health
REPUBLIC OF SOUTH AFRICA

CAPRISA

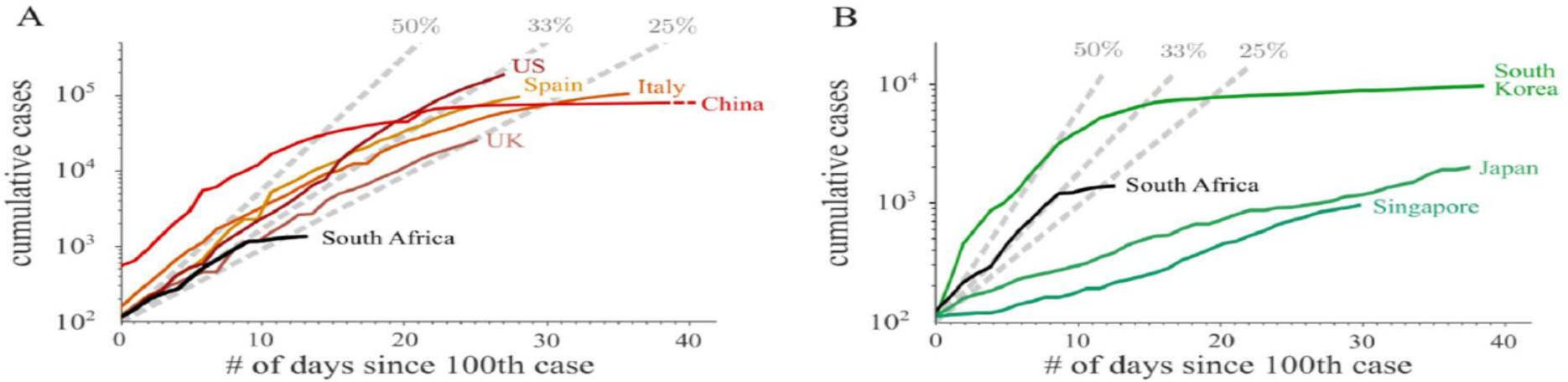
The 3 waves of the SA epidemic



health
Department:
Health
REPUBLIC OF SOUTH AFRICA

CAPRISA

SA's epidemic trajectory is unique…



Why is SA different - new cases declining to a plateau:

- **Are we missing cases due to low or declining testing coverage?**
- **Are there missing cases in poor communities due to skewed higher private lab testing?**
- **Is the reduction genuine and due to the interventions in SA's Covid-19 response?**

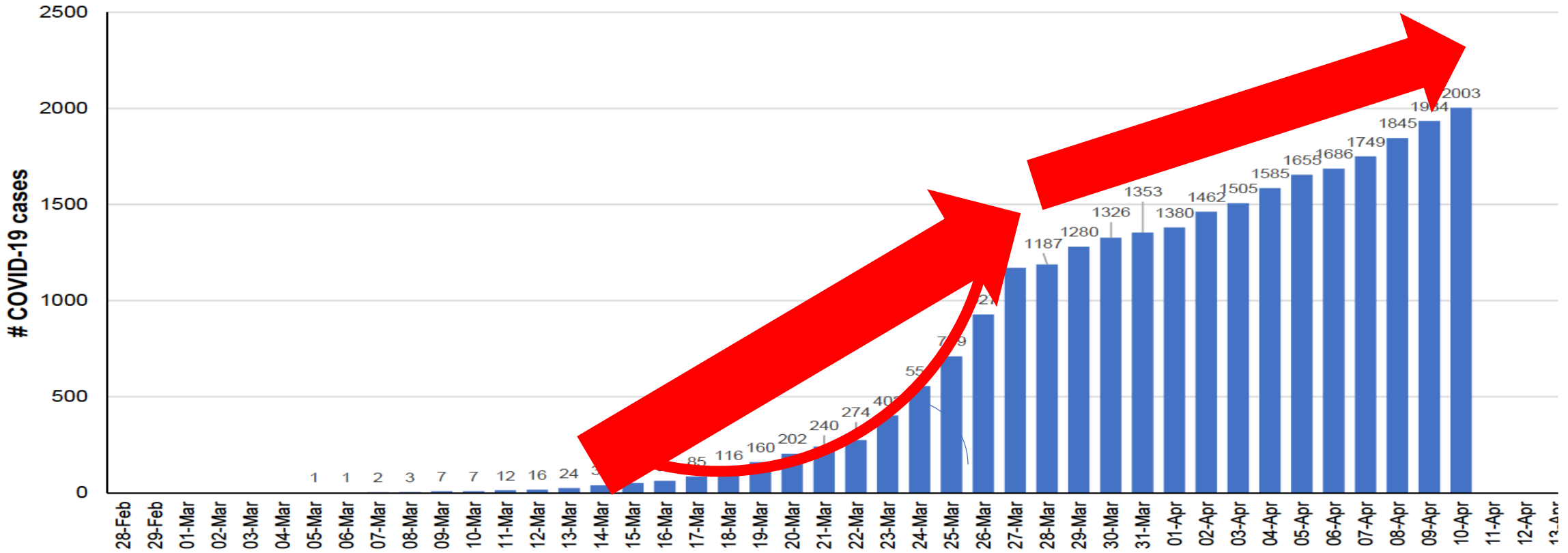
health
Department:
Health
REPUBLIC OF SOUTH AFRICA

Diagram source: Tulio De' Oliviera & KZN CoV Big Data Consortium

CAPRISA

SA's SARS-CoV-2 epidemic - 1

Cumulative number of cases



health
Department:
Health
REPUBLIC OF SOUTH AFRICA

CAPRISA

Stages of SA's COVID-19 response

Stage 1: Preparation

Stage 2: Primary prevention

Stage 3: Lockdown

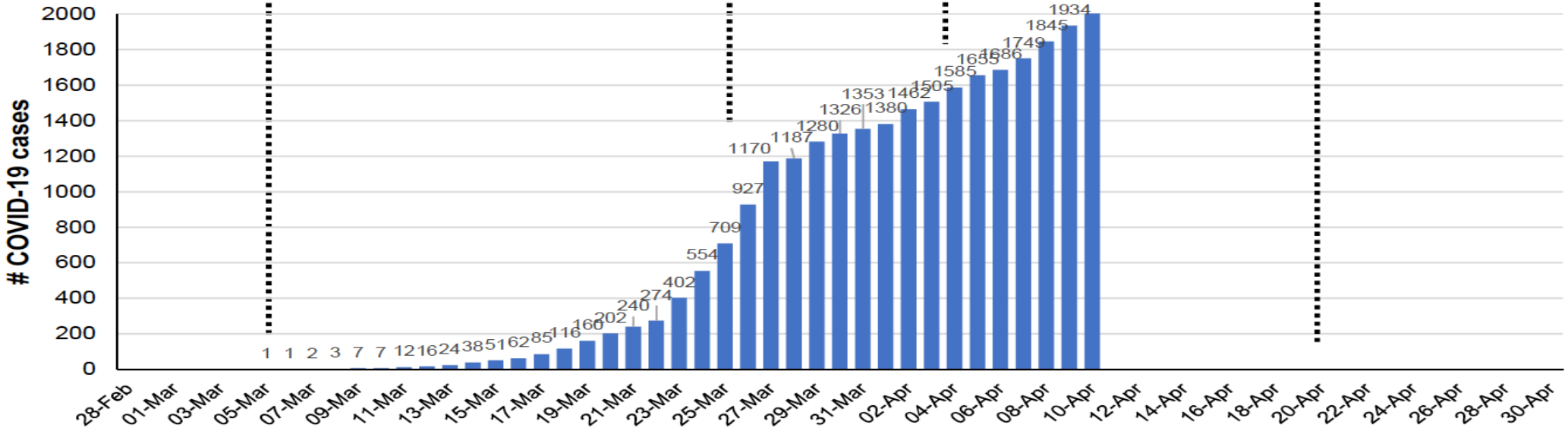
Stage 4: Active case-finding

Stage 5: Hotspots

Stage 6: Medical care

Stage 7: Death, bereavement and aftermath

Stage 8: Vigilance



health
Department:
Health
REPUBLIC OF SOUTH AFRICA

CAPRISA

Protection of staff and patients

- Protection of negative staff and patients is paramount
- Stringent measures to limit its spread must be taken promptly
- The Clinix group of hospitals see an array of patient through it isolation
- It is very likely therefore that we will see these patients with COVID-19 and SARS Covid2

Patient flow

- The flow of suspected or confirmed patients with Covid-19 or SARS Covid 2
  - Gate entrance screening questionnaire by dedicated teams
  - Triaging of all adult patients with undifferentiated severe acute respiratory distress
  - Grouping of patients into specific clinical categories of mild, moderate and severely

Patient Flow

- The clinical management of admitted COVID-19 patients at DGMAH according to their
  - clinical category of mild-, moderate- or severe disease
- Algorithms of management
- General critical care principles in managing COVID-19 patients
- Intubation and ventilation protocols for COVID-19 patients at DGMAH
- IPC Recommended Personal Protective Equipment (PPE) for COVID-19 at DGMAH
- Disposal of PPE’s
- Medical waste management
- Monitoring of Health Care Workers

Entry points

- Patients will enter the hospital either as:
  - walk-ins
  - patients brought in by wheelchair / stretcher / ambulance
- All patients should have initial screening done at their point of entry. Screening will identify the following
- 3 groups:
  1. Confirmed COVID-19 cases (test done, result known)
  2. Suspected COVID-19 cases (PUI)
  3. Not Suspected

11.1 Screening Form A

GAUTENG PROVINCE
HEALTH
REPUBLIC OF SOUTH AFRICA

DR GEORGE MUKHARI ACADEMIC HOSPITAL:
EMERGENCY DEPARTMENT

Date:	
Patient's Name and Surname:	
Patient's ID / Hospital File Number:	
Patient's contact number:	

Coronavirus (COVID-2019) Screening Questionnaire for WALK-IN PATIENTS

CASE DEFINITION	Do you have ANY of the following symptoms:		
	1. Cough	YES	NO
	2. Sore Throat	YES	NO
	3. Shortness of breath	YES	NO
	4. Fever	YES	NO

Yes to ANY

Give patient a **standard surgical mask** and to escort them to TENT 2 for testing. (Alternative to isolation room in Emergency Department.)

Doctor in the Emergency Department to contact NICD hotline and manage patient as per protocol.

No to ALL

Check for other risk factors

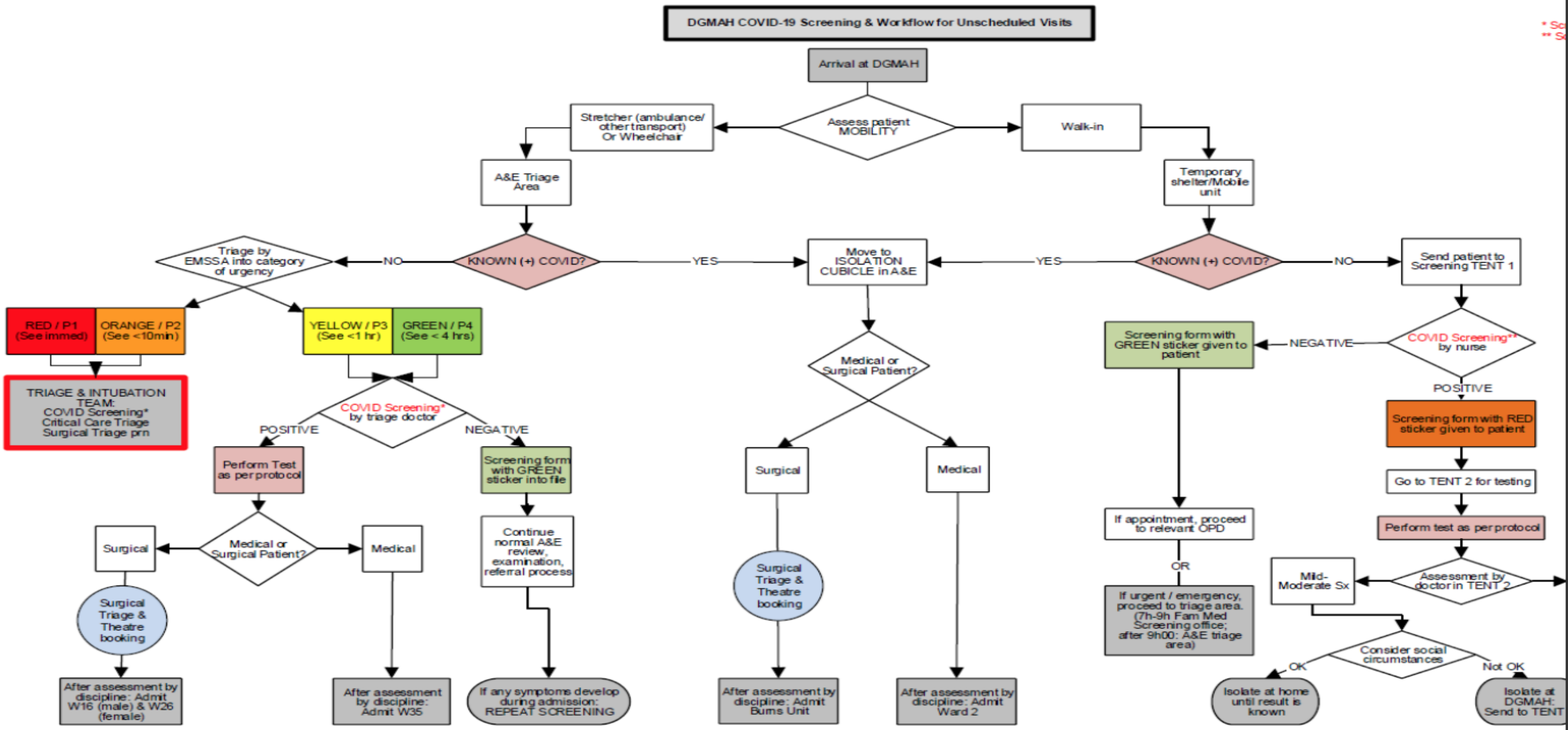
Yes to ANY

HIGH RISK CASES	In the past 14 days, have you had a chest infection AND	YES	NO
	ANY one of the following:		
	1. Have you had contact with any person who has been diagnosed with novel corona virus infection (COVID-19)?	YES	NO
	2. Have you travelled out of the country?	YES	NO
	3. Have you had contact with any person who has travelled out of the country?	YES	NO
	4. Have you worked in, or attended a health care facility where patients with COVID-19 infections were being treated? (includes health care workers, administrative staff and support staff like cleaners)	YES	NO

No to ALL

Flow of patients

- **Walking**
  - Will be directed to a screening area (tent)
  - The screening will be done by the nurse – using a predetermined questionnaire
- If the patient is found to be positive then the patient is given a **red sticker** and **a mask and proceed to tent 2 for testing** and escorted to the isolation area
- Patient found to be negative on their screening are then given a **green sticker** and allowed on to the premises to attend to their appointment


DGMAH COVID-19 Screening & Workflow for Unscheduled Visits
Arrival at DGMAH
Assess patient MOBILITY
Stretcher (ambulance/ other transport) Or Wheelchair
Walk-in
A&E Triage Area
Temporary shelter/Mobile unit
KNOWN (+) COVID?
NO
YES
Triage by EMSSA into category of urgency
Move to ISOLATION CUBICLE in A&E
KNOWN (+) COVID?
YES
NO
Send patient to Screening TENT 1
RED / P1 (See immed)
ORANGE / P2 (See <10min)
YELLOW / P3 (See <1 hr)
GREEN / P4 (See < 4 hrs)
TRIAGE & INTUBATION TEAM: COVID Screening* Critical Care Triage Surgical Triage prn
COVID Screening* by triage doctor
POSITIVE
NEGATIVE
Perform Test as per protocol
Screening form with GREEN sticker into file
Medical or Surgical Patient?
Surgical
Medical
Surgical Triage & Theatre booking
After assessment by discipline: Admit W16 (male) & W26 (female)
After assessment by discipline: Admit W35
Continue normal A&E review, examination, referral process
If any symptoms develop during admission: REPEAT SCREENING
Surgical Triage & Theatre booking
After assessment by discipline: Admit Burns Unit
After assessment by discipline: Admit Ward 2
Screening form with GREEN sticker given to patient
NEGATIVE
COVID Screening** by nurse
POSITIVE
Screening form with RED sticker given to patient
Go to TENT 2 for testing
Perform test as per protocol
If appointment, proceed to relevant OPD
OR
If urgent / emergency, proceed to triage area. (7h-9h Fam Med Screening office; after 9h00: A&E triage area)
Mild-Moderate Sx
Assessment by doctor in TENT 2
Consider social circumstances
OK
Not OK
Isolate at home until result is known
Isolate at DGMAH: Send to TENT

Suspected Covid-19 cases

- Ideally identified before they enter the facility
- Given a surgical mask
- Advised on cough etiquette
- Directed to a testing site
- A broad range of differential diagnosis should be entertained
- The patient should be tested
  - Both oropharyngeal and nasopharyngeal swabs should be taken
  - Correct label of the specimen
  - Storage at 2-8 degrees
- Mild symptoms can be sent home for quarantine whilst waiting for results

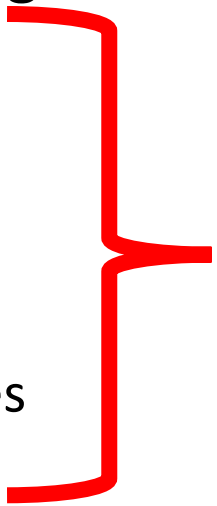
Confirmed cases

- Can be managed at home if mild – self isolation
- Supportive oxygen is the mainstay of supportive therapy
- For intubated patients with ARDS-use lung protective ventilation strategies

PPE

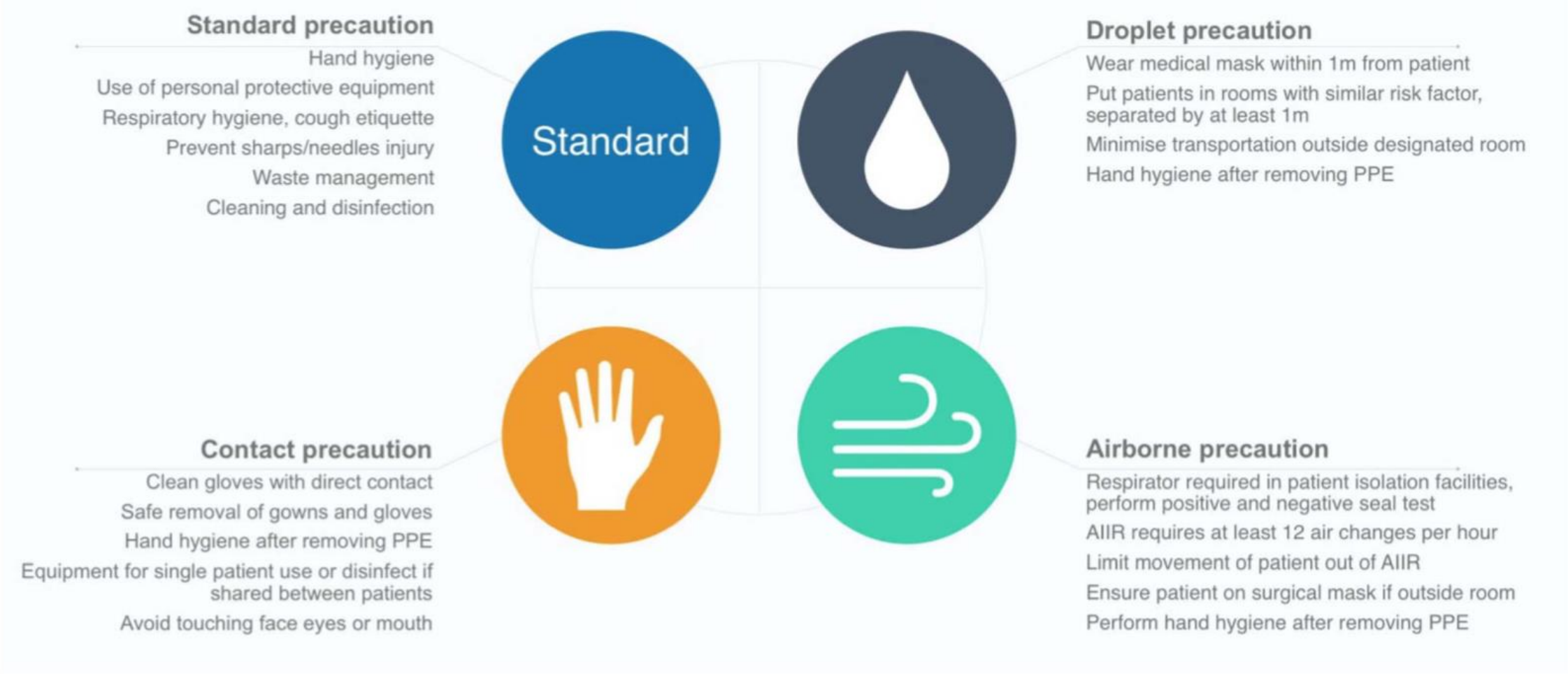
PPE

- For majority of COVID-19 patient interactions PPE consists of:
  - Gloves
  - Mask
  - Apron
- When performing aerosol generating procedures such as
  - Taking swabs
  - Intubation
  - Nasal surgery
  - Endoscopy
  - ENT procedures
  - Ophthalmology procedures
  - Neurosurgical procedures

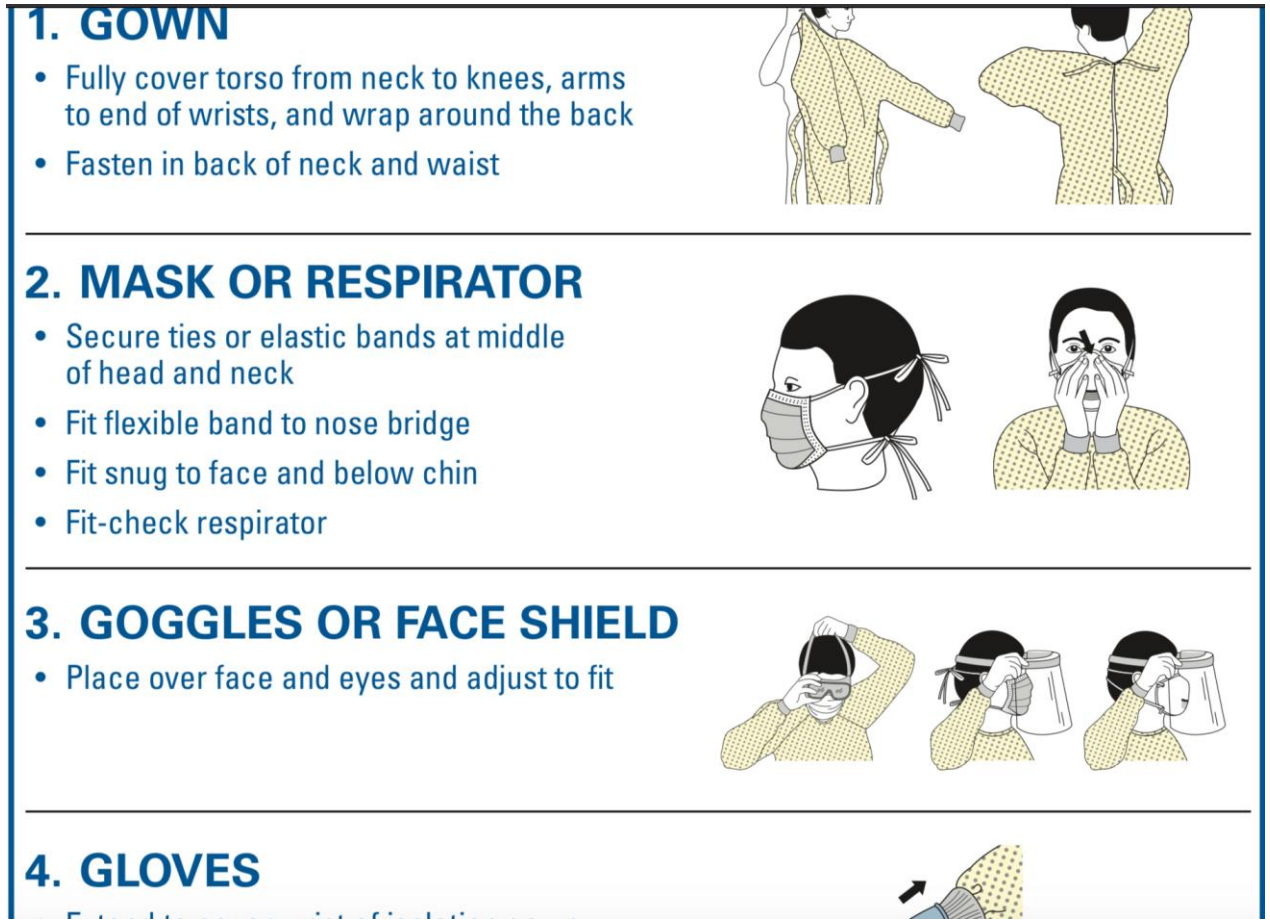


N95 respirator
Eye protection

Precautions



SEQUENCE OF DONNING



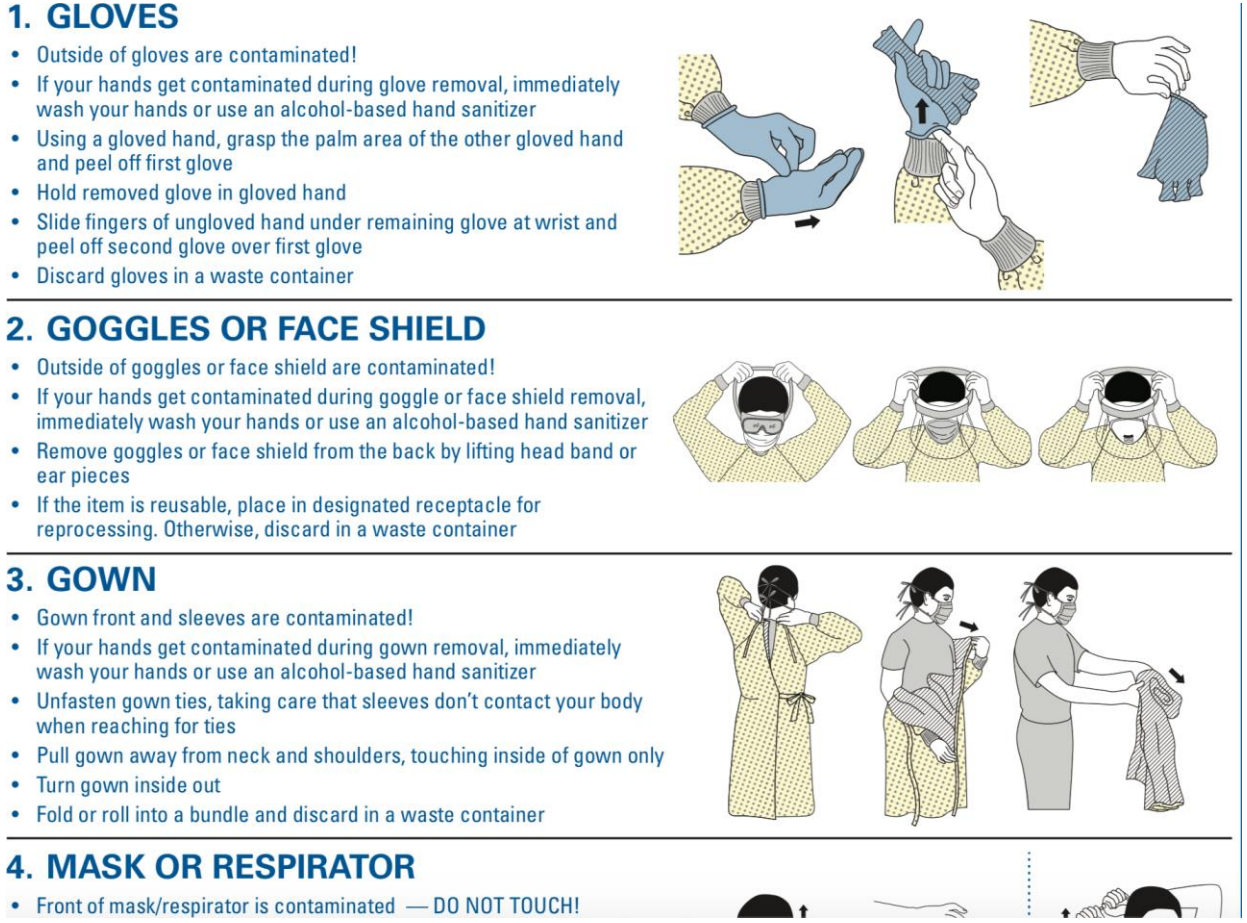
GOW-GOWN

MAS-MASK

GOG-GOGGLES

GLO- GLOVES

Sequence of taking off PPE



1. GLOVES

- Outside of gloves are contaminated!
- If your hands get contaminated during glove removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Using a gloved hand, grasp the palm area of the other gloved hand and peel off first glove
- Hold removed glove in gloved hand
- Slide fingers of ungloved hand under remaining glove at wrist and peel off second glove over first glove
- Discard gloves in a waste container

2. GOGGLES OR FACE SHIELD

- Outside of goggles or face shield are contaminated!
- If your hands get contaminated during goggle or face shield removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Remove goggles or face shield from the back by lifting head band or ear pieces
- If the item is reusable, place in designated receptacle for reprocessing. Otherwise, discard in a waste container

3. GOWN

- Gown front and sleeves are contaminated!
- If your hands get contaminated during gown removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Unfasten gown ties, taking care that sleeves don't contact your body when reaching for ties
- Pull gown away from neck and shoulders, touching inside of gown only
- Turn gown inside out
- Fold or roll into a bundle and discard in a waste container

4. MASK OR RESPIRATOR

- Front of mask/respirator is contaminated — DO NOT TOUCH!

Pnemonic : GLO GOG GOW MAS

GLO- GLOVES

GOG-GOGGLES

GOW –GOWN

MAS-MASK

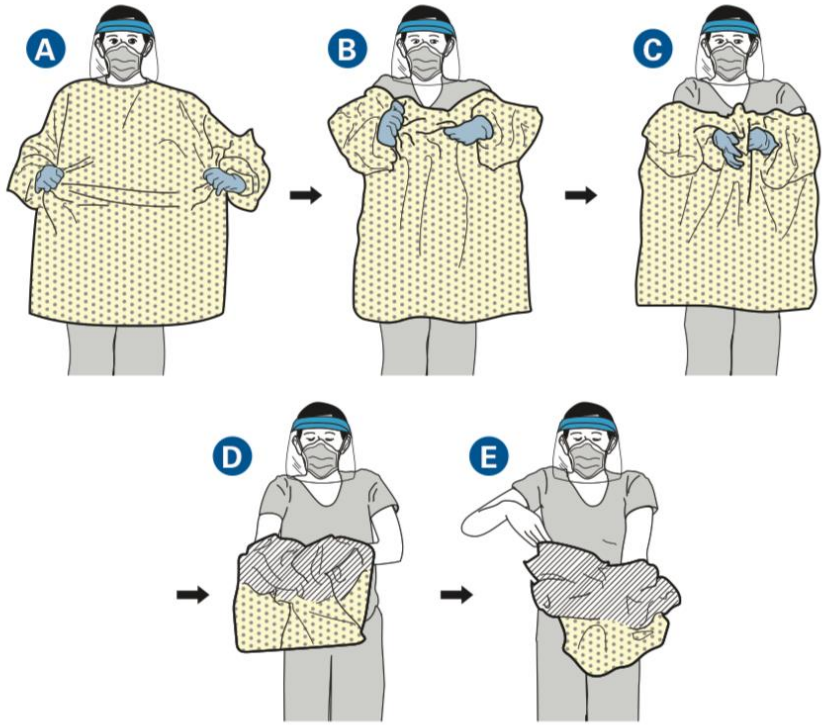
WAS –WASH THE HANDS

Alternative way of removing PPE

Here is another way to safely remove PPE without contaminating your clothing, skin, or mucous membranes with potentially infectious materials. **Remove all PPE before exiting the patient room** except a respirator, if worn. Remove the respirator **after** leaving the patient room and closing the door. Remove PPE in the following sequence:

1. GOWN AND GLOVES

- Gown front and sleeves and the outside of gloves are contaminated!
- If your hands get contaminated during gown or glove removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Grasp the gown in the front and pull away from your body so that the ties break, touching outside of gown only with gloved hands
- While removing the gown, fold or roll the gown inside-out into a bundle
- As you are removing the gown, peel off your gloves at the same time, only touching the inside of the gloves and gown with your bare hands. Place the gown and gloves into a waste container



De-Isolation

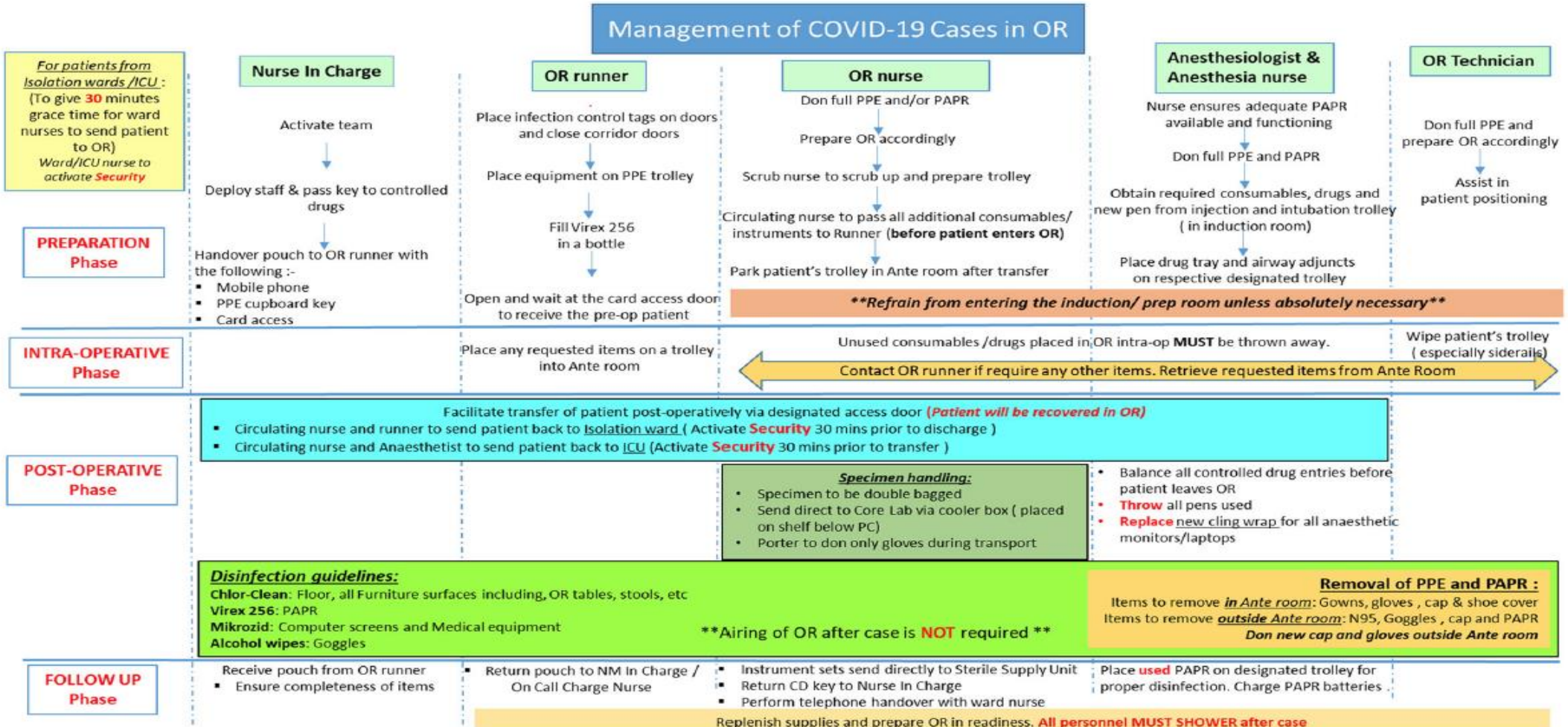
- Mid symptoms – may be deisolated after 14 days after the onset of symptoms- PCR test may not be necessary
- Severe disease – 14 after becoming stable (supplemental oxygen is discontinued)

Can J Anesth/J Can Anesth
https://doi.org/10.1007/s12630-020-01617-4

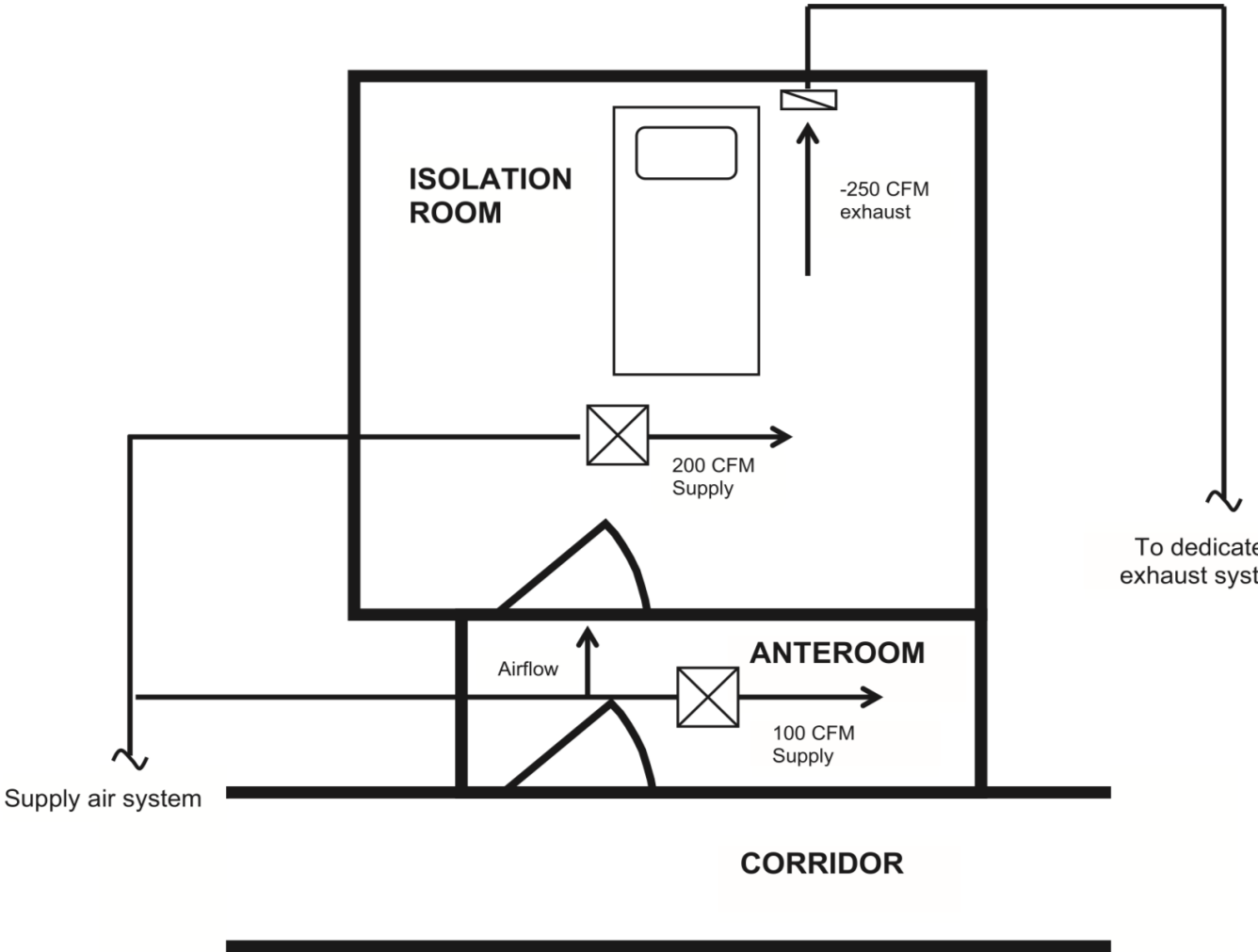
CORRESPONDENCE

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



Airborne Infection Isolation Requirement (AIIR)



Ventilation- ensure >12 air changes/hour
Good mixing and directional air flow
Clean air introduced near the health worker whilst exhaust air removed near the patient
Negative pressure ; generated when exhaust air exceeds supply air
Room must be sealed except gap under the door
Exhaust ductwork integrity; exclude leaks
If we use circulating air system, then we must use High Efficiency Particulate air(HEPA) filter
Anteroom- provide air lock between the Airborne infection Isolation and the corridor

Airborne infection isolation operating theatre

- Operations should be performed in Airborne Infection Isolation room
- Operating theatre may be converted to Airborne Infection Isolation (AII) by installing negative pressure and sealing the room
- Regular inspection by engineers is required to maintain the integrity of an isolation theatre.
-

guidelines on the usage of isolation theatres

- Designate an infection control team for development of guidelines
- monitoring staff adherence
- revising protocols as the situation is updated
- set criteria for the use of isolation theatre and workflow on how to initiate
- Dedicate staff to ensuring pressure of the isolation room meets criteria for airborne infection control
  Ensure timely notification of all anaesthesiologists, nurses, assistants, and surgeons involved in the operation Specify personal protection equipment required in the theatre
  Specify designated equipment, including disposable ones, for confirmed cases
  Put up signs on the doors to notify staff, and minimise traffic in and out of an isolation room
  Utilise the AIIR for recovery of extubated patients to minimise unnecessary contact with staff or other patients Identify/establish protocols for decontamination of the room after a suspected or confirmed case

Patient transfer

- Avoid transfer if possible
- Surgical mask must be given to patients to avoid droplet spread
- Apply low setting oxygen setting to maintain oxygenation whilst avoiding aerosol droplet
- Health care worker involved in the transfer must wear PPE
- Plan the route and phone ahead of transfer
- Avoid transfer of the patient through recovery and the rest of the hospital
- Otherwise partition the other patient from the infected patients

List of anaesthetic and surgical procedures that are considered aerosol generatin

Surgical

- Rigid bronchoscopy
  - During the procedure, the airway is not protected. Although the glottis is stented open by the bronchoscope and effective cough is not possible, forceful expiration may be encountered when a patient is allowed to ventilate spontaneously. If patient is paralyzed and jet ventilation is required, it is likely aerosolised particles will be generated. During intermittent ventilation, the use of high flow O2 $>$ 6L/min is highly likely to be required.
- Tracheostomy
  - The procedure necessitates circuit disconnection and reconnection. Circuit leaks, endotracheal cuff or tracheostomy cuff leaks, or mal-positioning of a tracheostomy tube are not uncommon and all have the capacity to generate secretory droplet. Re-intubation may be required should tracheostomy become unsuccessful.
- Surgery involving high-speed drilling
  - High speed devices used in dental surgery and orthopaedic surgeries were shown to be able to generate an aerosol cloud which could contaminate the theatre environment.

Anaesthetic

- Awake fibre-optic intubation
  - During fibre-optic intubation, coughing, which is potentially aerosol-generating, is largely unavoidable. Coughing is particularly difficult to avoid during topicalisation of the airway, regardless of using spray-as-you-go techniques or trans-tracheal application of local anaesthetics.
- Mask ventilation
  - Mask ventilation has been shown to disperse tiny droplets. It is identified as a risk factor in the spread of SARS infections across healthcare workers. More dispersion occurs in those less experienced with mask ventilation.
- Intubation and extubation
  - Aerosol generation is a risk if the patient is not fully paralyzed during intubation. Although rapid-sequence induction should preclude the need for mask ventilation prior to intubation, mask ventilation may still be required to maintain oxygenation if difficulty with intubation is encountered.
  - Extubation often induces some coughing which may generate aerosols. Suctioning attempts and the use of high flow oxygen may also aerosolise particles.
- High flow nasal cannula
  - Use is controversial. Effective treatment often requires 40-60L/min oxygen flow. In simulated settings, tightly fitted high flow nasal cannula causes minimal aerosol-generation but if nasal prongs not properly applied, aerosol-generation could be significant.

List of anaesthetic and surgical procedures that are considered aerosol generation

Surgical

Rigid bronchoscopy

During the procedure, the airway is not protected. Although the glottis is stented open by the bronchoscope and effective cough is not possible, forceful expiration may be encountered when a patient is allowed to ventilate spontaneously. If patient is paralyzed and jet ventilation is required, it is likely aerosolised particles will be generated. During intermittent ventilation, the use of high flow O2 > 6L/min is highly likely to be required.

Tracheostomy

The procedure necessitates circuit disconnection and reconnection. Circuit leaks, endotracheal cuff or tracheostomy cuff leaks, or mal-positioning of a tracheostomy tube are not uncommon and all have the capacity to generate secretory droplet. Re-intubation may be required should tracheostomy become unsuccessful.

Surgery involving high-speed drilling

High speed devices used in dental surgery and orthopaedic surgeries were shown to be able to generate an aerosol cloud which could contaminate the theatre environment.

Anaesthetic

Awake fibre-optic intubation

During fibre-optic intubation, coughing, which is potentially aerosol-generating, is largely unavoidable. Coughing is particularly difficult to avoid during topicalisation of the airway, regardless of using spray-as-you-go techniques or trans-tracheal application of local anaesthetics.

Mask ventilation

Mask ventilation has been shown to disperse tiny droplets. It is identified as a risk factor in the spread of SARS infections across healthcare workers. More dispersion occurs in those less experienced with mask ventilation.

Intubation and extubation

Aerosol generation is a risk if the patient is not fully paralyzed during intubation. Although rapid-sequence induction should preclude the need for mask ventilation prior to intubation, mask ventilation may still be required to maintain oxygenation if difficulty with intubation is encountered.

Extubation often induces some coughing which may generate aerosols. Suctioning attempts and the use of high flow oxygen may also aerosolise particles.

High flow nasal cannula

Use is controversial. Effective treatment often requires 40-60L/min oxygen flow. In simulated settings, tightly fitted high flow nasal cannula causes minimal aerosol-generation but if nasal prongs not properly applied, aerosol-generation could be significant.

High flow nasal cannula

Use is controversial. Effective treatment often requires 40-60L/min oxygen flow. In simulated settings, tightly fitted high flow nasal cannula causes minimal aerosol-generation but if nasal prongs not properly applied, aerosol-generation could be significant.

Non-invasive ventilation

Experiments with inspiratory positive airway pressure (IPAP) have shown that, despite a fitted mask, tiny droplets may still be dispersed from leaks. The higher the IPAP, the further the droplets can disperse.

Sputum suctioning

Coughing is associated with droplet dispersion. Suctioning may induce coughing and subsequently has the potential to generate aerosolised particles .

Cardiopulmonary resuscitation (CPR)

CPR was identified as a cause of SARS infection spread across healthcare workers, as it often involves mask ventilation, airway suctioning, and intubation, combined with environments that may not facilitate control of secretions or aerosolised particle generation.

Induction

- Minimise number of people in room during induction
- Intubate by experienced practitioner to reduce attempts and time, consider double gloving
- Preoxygenate with minimal gas flow possible i.e. less than 6L per min, ensure good seal with facemask
- Give fentanyl slowly, in small aliquots if required to reduce coughing
- Utilise rapid sequence induction to reduce the need for mask-ventilation
- Maintain airway patency, ensure onset of paralysis before performing intubation, to avoid coughing
- Usetwo-handgriptooptimisesealifmask-ventilationbecomesnecessary.Askforassistancewithbagging,whileutilisingthe
- lowest flows. Give small tidal volumes.
- Start positive pressure ventilation only after the cuff of the endotracheal tube is inflated
- Remove outer gloves after intubation if using the double glove technique to reduce environmental contamination
- Use pre-cut tape to secure endotracheal tube
- Confirm tube position by observing bilateral chest rise or ultrasound, as auscultation may be difficult due to personal
- protective equipment(15).
- Perform hand hygiene

Preoperative assessment of patients at risk of COVID-19.

Preoperative assessment

History:

- Presence of dry cough, fever, shortness of breath
- Travel history to high-risk area, close contact with COVID-19 patients
- Occupational exposure
- Contact history
- Cluster phenomenon

Physical examination and investigation:

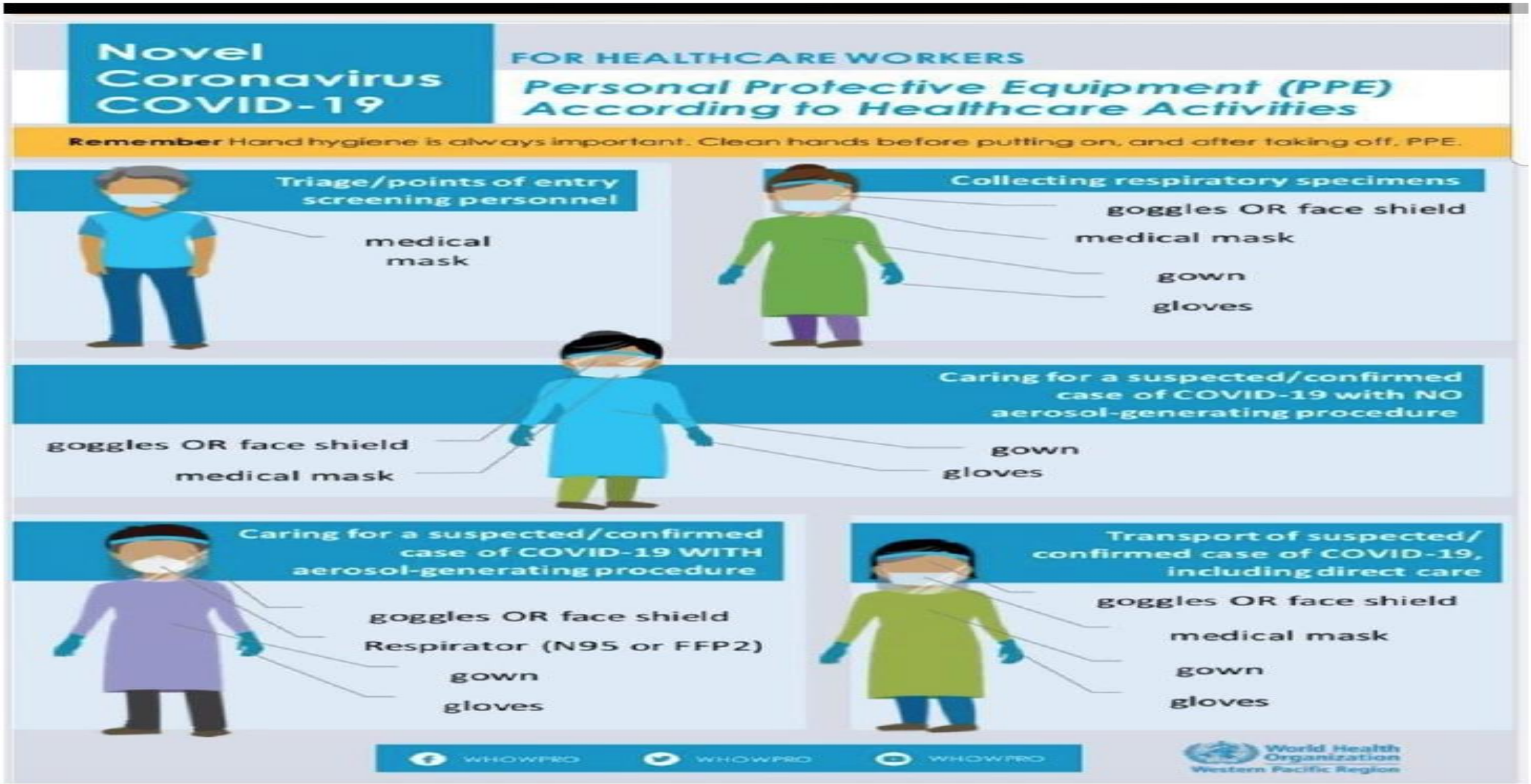
- Check for presence of fever
- Check blood pressure and pulse to look for presence of shock, check SpO_2 for desaturation
- Auscultate for crepitations and wheezing
- Look for leukopenia, lymphocytosis and lymphopenia from complete blood count
- Assess organ function from liver function test and renal function test
- Look for consolidations on chest x-ray
- If CT-thorax available, look for presence of multi-lobar ground glass appearance

Covid-19

- Its highly infectious by droplets and touching contaminated surfaces
- There is no established fecal oral route transmission but there has been viral shedding in the stools
- Its reproductive rate Ro (number of individuals infected by a confirmed case) Ro>1
  - Ro>1 = highly infectious
  - Ro<1 = not highly infectious
- The reproductive rate of Covid-19 is currently 2-2,3 = this indicates a growing epidemic

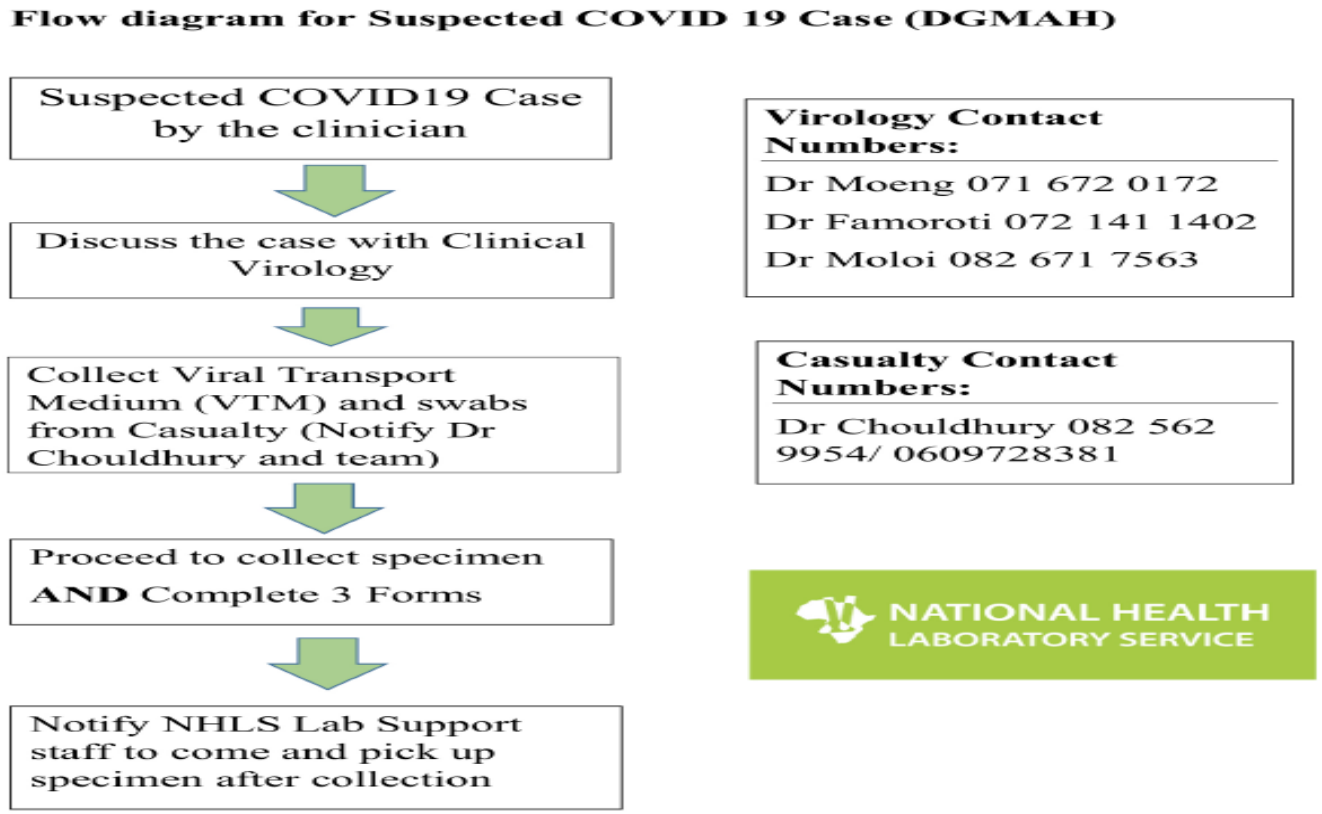
8 IPC Recommended Personal Protective Equipment (PPE)

Personal protective equipment is in short supply nationally and internationally. Appropriate use of PPE's to limit staff infection while avoiding abuse and therefore depleting stock is a crucial balance to reach. The diagram below from the WHO guidelines, shows scenarios with the different grade/level of PPE needed.



Flow diagram for a COVID-19

DGMAH COVID-19 SOP



Thank you