



# Interim Brief Refresher Training Course on Management of Covid-19 Infection

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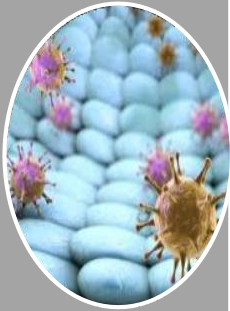
1. SARS CoV -2 virus and approaches to it reach diagnosis
2. Current laboratory practice



# LABORATORY TESTING RELATED COVID-19



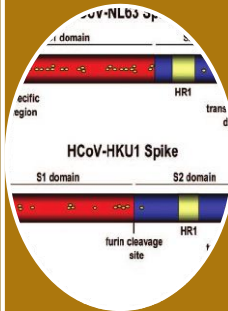
# SEVEN COVS THAT CAN INFECT HUMAN AND CAUSE RESPIRATORY DISEASES



HCoV  
-  
229E



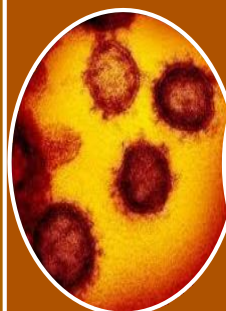
HCoV  
-  
OC4  
3



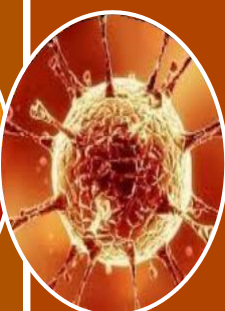
HCoV  
-  
NL63



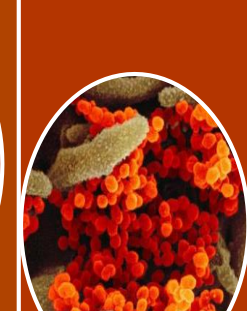
HKU  
1



SARS-  
CoV



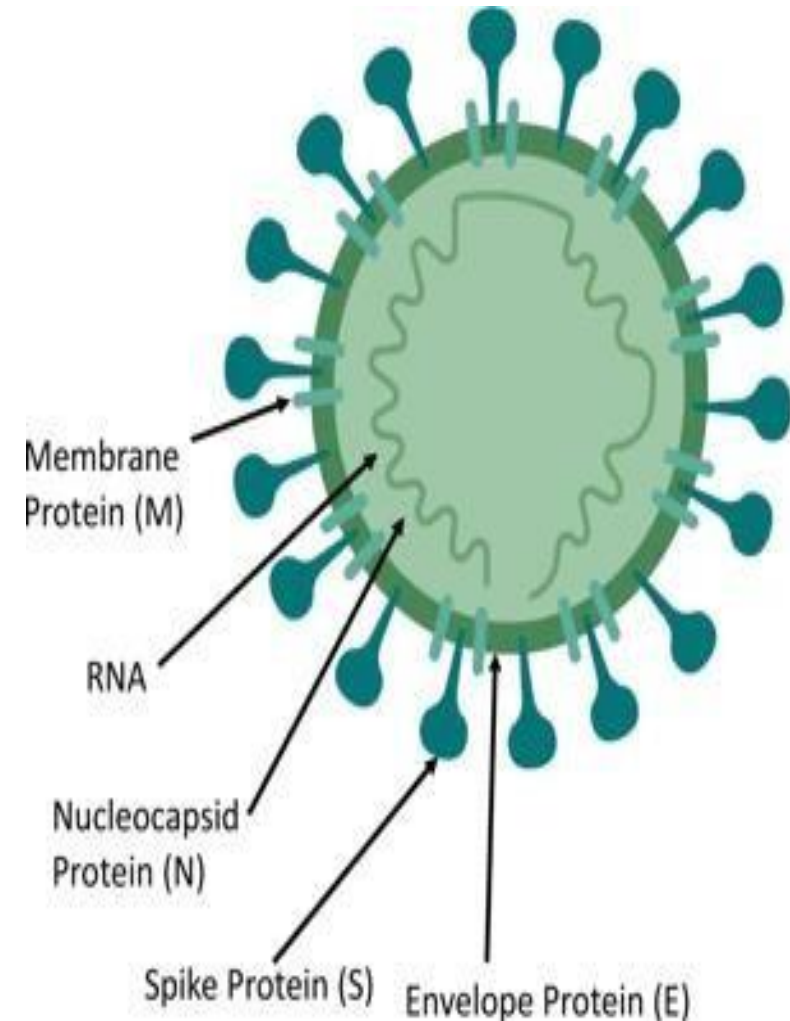
MERS  
-  
CoV



SARS-  
CoV2



# MAIN STRUCTURE OF CORONA VIRUSES



Structural Protein	Function of Protein
Nucleocapsid Protein (N)	<ul style="list-style-type: none"><li>Bound to RNA genome to make up nucleocapsid</li></ul>
Spike Protein (S)	<ul style="list-style-type: none"><li>Critical for binding of host cell receptors to facilitate entry of host cell</li></ul>
Envelope Protein (E)	<ul style="list-style-type: none"><li>Interacts with M to form viral envelope</li></ul>
Membrane Protein (M)	<ul style="list-style-type: none"><li>Central organiser of CoV assembly</li><li>Determines shape of viral envelope</li></ul>

- It has been noted that some CoVs do not need to have the full ensemble of structural proteins to make virions, highlighting that certain proteins may be dispensable or compensated by the function of non-structural proteins.

# NUCLEIC ACID TESTING (RNA SARS COV- 2)

Upper  
airway

Nasopharyngeal  
swabs

Nasal swabs

Nasopharyngeal  
secretions

Lower  
airway

Sputum

Airway  
secretion

Bronchoalveolar  
lavage fluid

Other

Blood

Feces

Urine

Conjunctival secretions



# Specimens taking

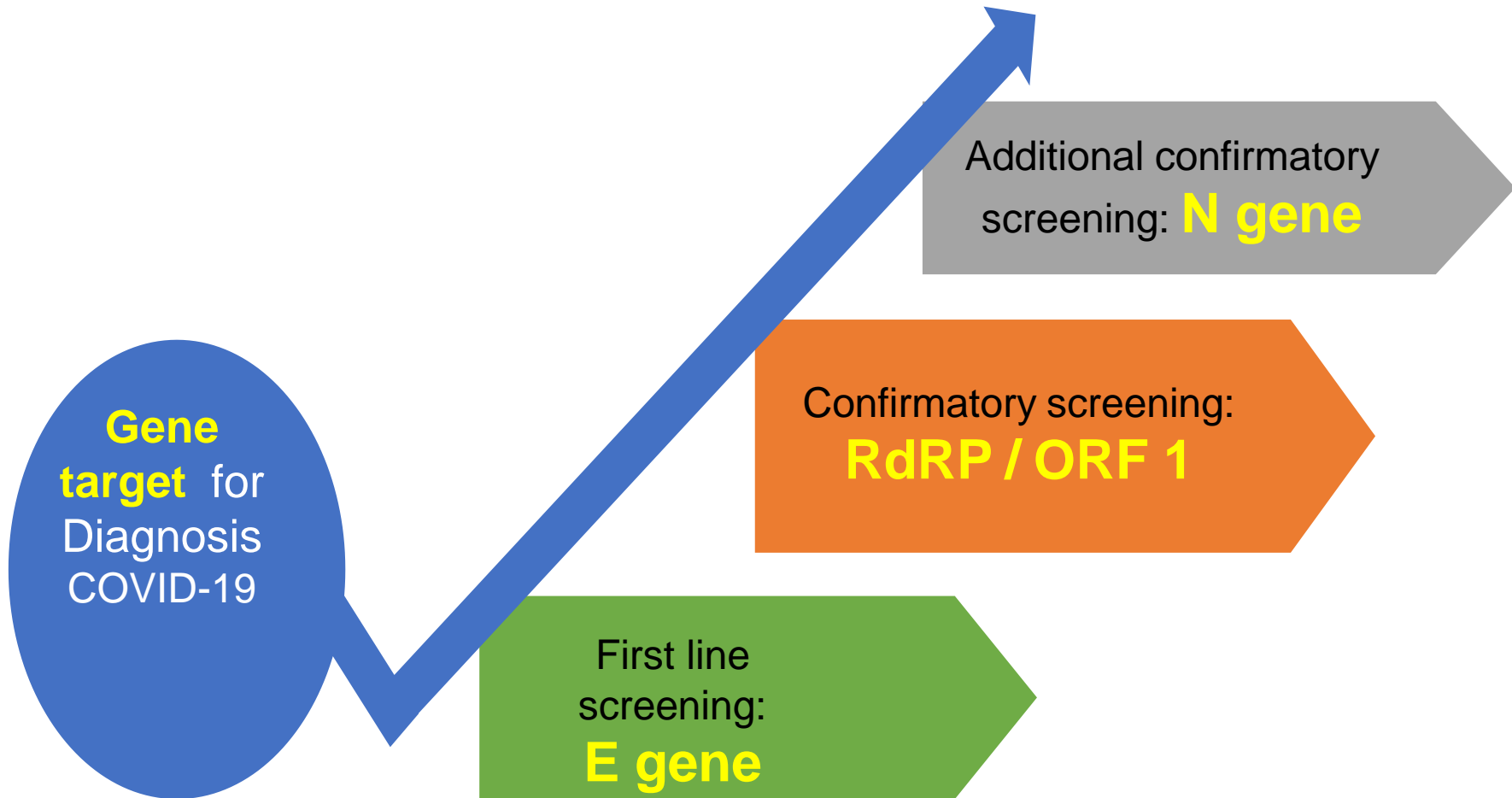


**Collection of an upper respiratory specimen**  
(i.e., nasopharyngeal AND oropharyngeal swabs)

Analysis of the sample by  
**(real-time) reverse transcription  
polymerase chain  
reaction (rRT-PCR)**



# Gold standard for Diagnosis COVID-19

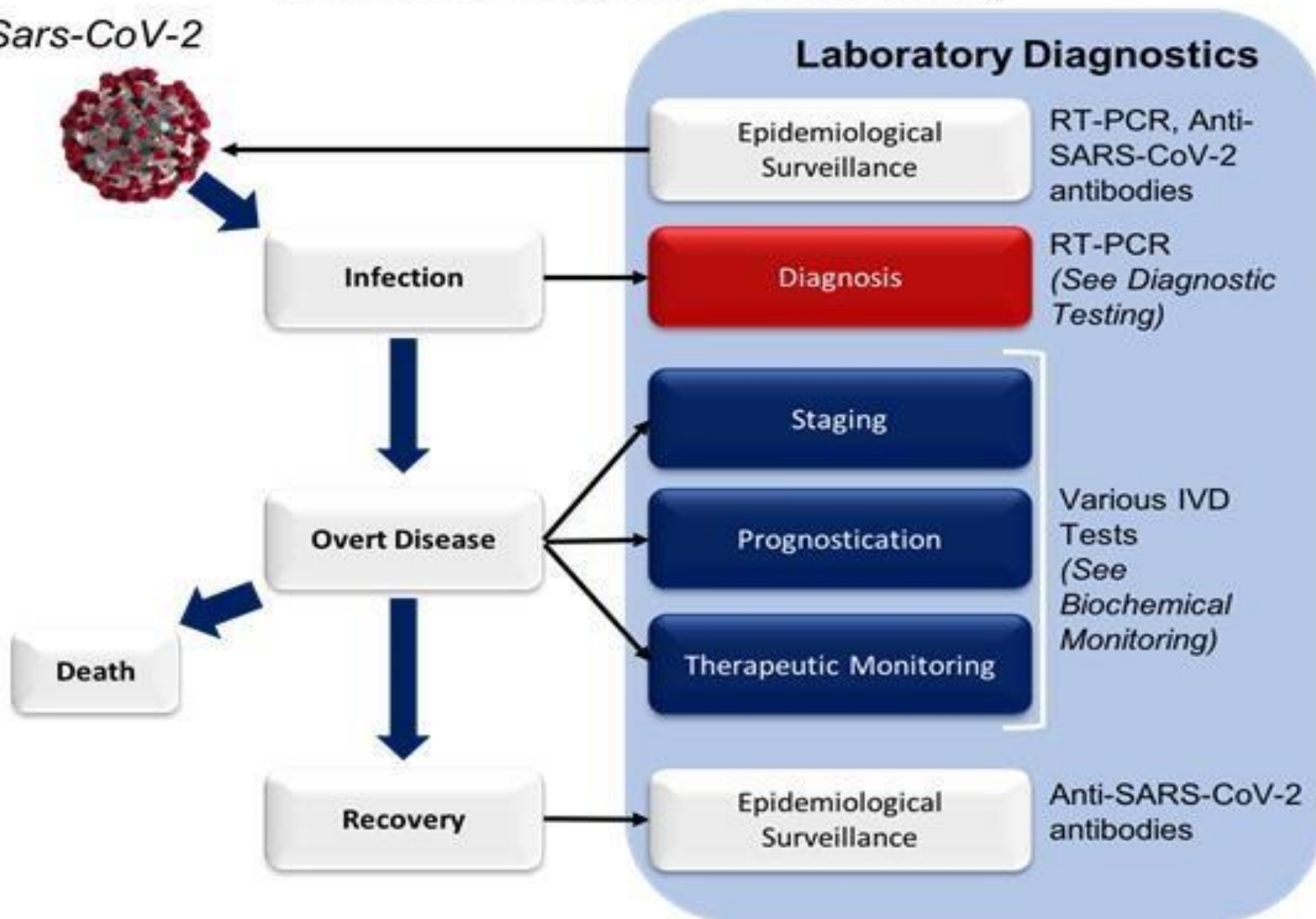
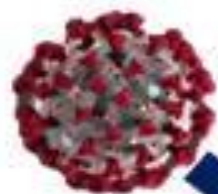




# The Critical Role of Laboratory Medicine in COVID-19

(Modified from: Lippi et al, PMID: 32191623)

Sars-CoV-2



# DIFFERENT TYPE OF ANALYTE LABORATORY TESTING RELATED COVID-19

## RNA

ORF1a/b  
Gene  
N Gene  
E Gene  
S Gene

rRTPCR,  
LAMP,  
NGS

## Antigen

N Protein  
S Protein

ELISA,  
Immuno-  
chromatogra-  
phy

## Antibo- dy

IgG  
IgG  
IgA

ELISA, Immuno-  
chromatograph  
y,  
Chemiluminos-  
cence immnoassay

## Host Respons e

CBC  
CRP  
D Dimer  
SGOT  
Albumin

Enzymatic,  
colorimetry,  
flowcytometry,  
impedance

## Potential Susceptibil ity

ACE2 Gene  
HLA Gene

Genotyping  
microarray,  
RTPCR,  
Sanger Seq,  
NGS



# FREQUENT LABORATORY ABNORMALITIES IN PATIENTS WITH COVID-19 INCLUDE:

Lymphopenia (35-75%)

↑ C reactive protein (CRP 75-93%)

↑ Lactate dehydrogenase (LDH; 27-92%)

↑ Erythrocyte sedimentation rate (ESR; up to 85%)

↑ D-dimer (36-43%)

↓ Albumin (50-98%)

↓ Hemoglobin



# MAJOR PREDICTORS OF COVID-19 SEVERITY

- ↓ Lymphocyte count
- ↓ Albumin
- ↑ Neutrophil count
- ↑ Lactate dehydrogenase (LDH)
- ↑ Aminotransferases
- ↑ Cardiac biomarkers (e.g., cardiac troponins)
- ↑ D-dimer
- ↑ Procalcitonin
- ↑ C reactive protein (CRP)



# WHY MIGHT COVID-19 TESTS FAIL?

They may be in the **early stage** of the disease with a **viral load that is too low to be detected.**

They may have **no major respiratory symptoms**, so there could be **little detectable virus** in the patient's throat

There may have been a **problem with sample collection**, meaning there was very little sample to test.

There may have been **poor handling and shipping** of samples and test materials.

There may have been **technical issues inherent in the test**, e.g. virus mutation.

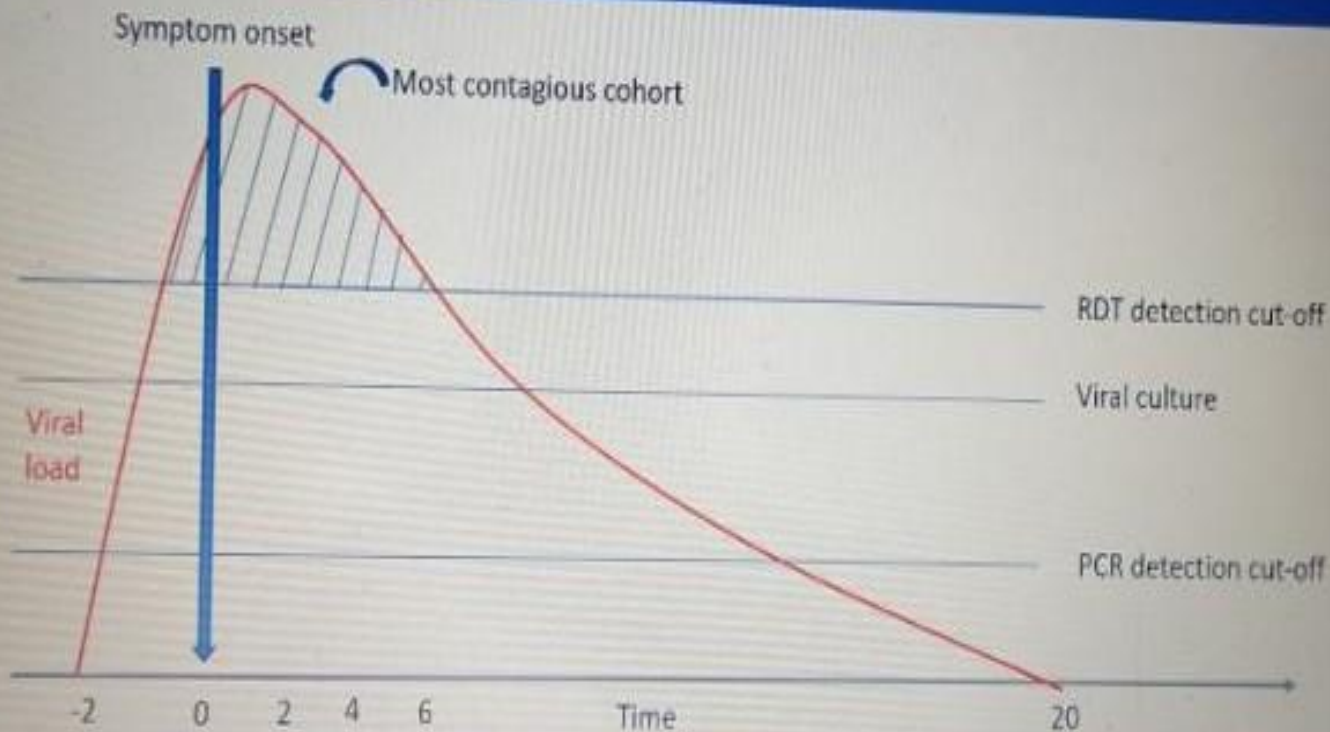
# Antigen-detection in the diagnosis of SARS-CoV-2 infection

- Ag-RDTs could play a significant role in guiding patient management, public health decision making and in surveillance of COVID-19 if correctly performed and interpreted.
- High specificity is necessary to avoid many false-positive results.
- Sensitivity will depend on the status of patients studied (degree of illness, days since onset of symptoms, etc.) as well as the product quality, but **should reach a minimum of  $\geq 80\%$ .**



# Who can be detected with an Ag RDT?

22 September 2020





# SEROLOGICAL TESTING FOR SARS COV- 2

- **Much debate regarding the current value of serological testing in COVID-19 diagnosis and monitoring.**
- **Not currently recommended by the WHO, CDC, NHS or other health organizations.**
- Purpose to research and in immunization program
- A concern regarding their use in the acute phase of infection as they detect infection too late in the course of illness(usually more than 7-10 days) and they also may cross-reaction with serologic responses to seasonal coronaviruses.



# Summary of some differences between RT-PCR test and Rapid Antigen test

	RT-PCR test	RDT Antigen test
Intended use	Detect current infection	Detect current infection
<b>Analyte detected</b>	<b>Viral RNA</b>	<b>Viral antigen</b>
Specimen type	Nasal swab, sputum swab, saliva	Nasal swab
Sensitivity	High	Moderate
Specificity	High	Moderate
Test complexity	Varies	Relatively easy to use
Authorized to use at POC	Most are not, few are	Yes
Turn around time	Up to 2 days	Approximately 15 to 30 minutes
Cost/Test	Moderate	Low



# Existing COVID-19 PCR Labs in Myanmar








## ➤ Starting date of COVID-19 testing in Myanmar

- NHL RT-PCR – 20.02.2020 ★
- NHL Cobas 6800 – 28.04.2020 ★
- DMR - 23.04.2020 ★
- No.1 DSGH Yangon - 27.04.2020 ★
- No. 2 DSGH Naypyitaw – 27.04.2020 ■
- DSMRC Naypyitaw – 01.04.2020 ■
- PHL Mandalay - 01.06.2020 ▲
- PHL Mawlamyine - 04.06.2020 ●
- PHL Taunggyi – 10.09.2020 ◆

## ➤ First positive case was detected on 23<sup>rd</sup> March 2020



# Plan expansion of PCR platforms

1. Magway General Hospital 
  2. Myitkyina General Hospital 
  3. Sittwe General Hospital 
  4. University of Medicine 1, Yangon
  5. Aung Sann TB Hospital
  6. Naypyitaw 1000-bedded hospital 
  7. Muse General Hospital 
  8. Lashio General Hospital 
- 



# COVID-19 (GeneXpert) testing Labs in Myanmar

No.	Location	No.	Location
1.	National Health Laboratory	16.	Magway Reigional General Hospital
2.	Naypyitaw 1000 bedded Hospital	17.	Taungoo General Hospital
3.	Myitkyina General Hospital	18.	Pyay General Hospital
4.	Bhamaw General Hospital	19.	Bago General Hospital
5.	Kawthaung General Hospital	20.	Kyaingtone General Hospital
6.	Dawei General Hospital	21.	Tachilek General Hospital
7.	Myeik General Hospital	22.	Muse General Hospital
8.	Hpa-Ann General Hospital	23.	Loikaw General Hospital
9.	Myawaddy General Hospital	24.	Hahka General Hospital
10.	Patheingyi General Hospital	25.	Tedim General Hospital
11.	Myaungmya General Hospital	26.	Pyinoolwin General Hospital
12.	Sittwe General Hospital	27.	Specialist Hospital Waibargi , Yangon
13.	Kyaukpadaung General Hospital	28.	Yangon General Hospital
14.	Monywa General Hospital	29.	University of Medicine 2
15.	Kalay General Hospital		



# Training on Covid-19 testing at Hospital Laboratories

- **Training on COVID-19 Testing using the GeneXpert platform with safety precautions was conducted on 11 & 12 August 2020 by two batches.**



# Antigen based RDTs

- The following Antigen based RDTs are approved in WHO EML;
  - **STANDARD Q COVID-19 Ag - SD BIOSENSOR**
  - **Abbott Panbio™ Covid-19 Ag Rapid Tests**
- MoHS procured 800,000 numbers of **STANDARD Q COVID-19 Ag - SD BIOSENSOR** Antigen based RDTs



# <https://youtu.be/jTprqq4rk0w>

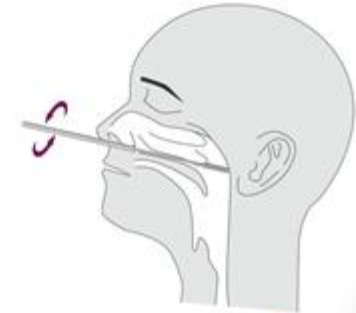
## Myanmar version in you tube



နာခေါင်းတို့ပတ် (Nasopharyngeal Swab)  
နာခေါင်းတို့ပတ်မှနမူနာကို ဂူးထိအတွင်းပါရှိသော ဝိုင်သတ်  
ထားသော တို့ပတ်အားအသုံးပြုပါ။

နာခေါင်းတို့ပတ်မှနမူနာကို ဝိုင်သတ်  
ခါး 180° လှည့်ပါ။ (Once swab is in  
location, rotate the swab 180°)

၁၀ စက္ကန့် မှုတ်ထားပါ။ (And  
leave in place for 10 seconds to  
saturate the swab tip)



SD BIOSENSOR

Buffer ခြံဝရထားသည့် နမူနာအရည်အား  
Test Device ၏ နမူနာအရည်ထည့်ရန်ခွက်  
အတွင်းသို့ ခုတ် (3 drops) ထည့်ပါ။



SD BIOSENSOR

အသုံးပြုပြီး ဝမ်းသပ်ပစ္စည်းများအားစွန့်ပစ်ခြင်း  
အသုံးပြုပြီးနောက် တို့ပတ် Buffer Tube လက်အိတ်၊ အကာကွယ်ဝတ်နဲ့၊  
အကာကွယ်မျက်နှာ၊ မျက်နှာနှင့်နာခေါင်းစည်း နှင့် ဝမ်းသပ်ပစ္စည်းတို့ကို  
ပီပီပစ္စည်းစွန့်ပစ်ခွက်သို့သို့ သေချာစွာစနစ်တကျစွန့်ပစ်ပါ။



SD BIOSENSOR

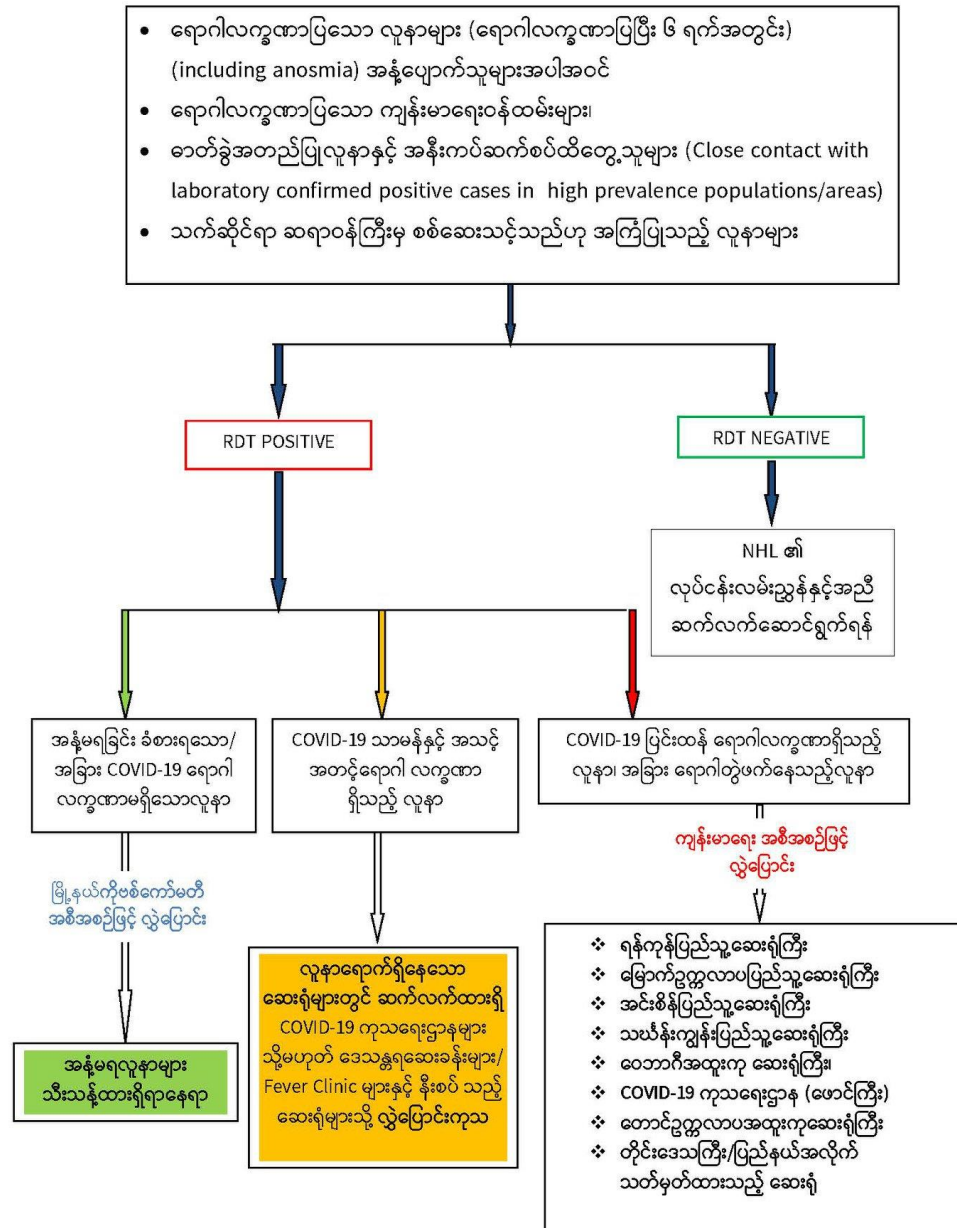
ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော်အစိုးရ  
ကျန်းမာရေးနှင့်အားကစားဝန်ကြီးဌာန



Standard Q COVID-19 Antigen (RDT) Test ဖြင့် ဆောင်ရွက်မည့်အစီအစဉ်  
လုပ်ငန်းလမ်းညွှန် (Version - 3)

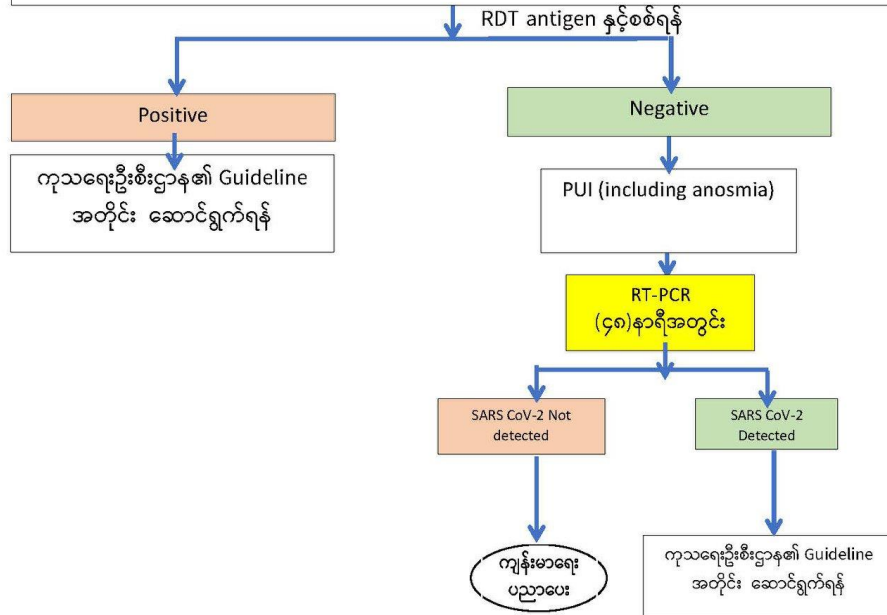
နေ့ရက် - ၂၀၂၀ ပြည့်နှစ်၊ အောက်တိုဘာလ ၁၀ ရက်  
နေရာ - နေပြည်တော်

## Standard Q COVID-19 Antigen (RDT) Test ဖြင့် ဆောင်ရွက်မည့်အစီအစဉ် (Flowchart)



ရောဂါလက္ခဏာပြသော လူနာများတွင် COVID-19 ရောဂါ ဓာတ်ခွဲစစ်ဆေးခြင်း  
လုပ်ငန်းစဉ်ပြဇယား(၁)

- ရောဂါလက္ခဏာပြသော လူနာများ (ရောဂါလက္ခဏာမပြမီ ၂ ရက်နှင့် ရောဂါလက္ခဏာပြပြီး ၆ ရက်အတွင်း)  
(အနံ့ပျောက်သူများအပါအဝင်) (including anosmia)
- သက်ဆိုင်ရာ ဆရာဝန်ကြီးမှ စစ်ဆေးသင့်သည်ဟု အကြံပြုသည့် လူနာများ



ချွင်းချက်

> ရောဂါကူးစက်ဖြစ်ပွားခြင်း မရှိသောနေရာများနှင့် ဖြစ်ပွားမှုနည်းသော နေရာများ၌ မသုံးစွဲသင့်ပါ။

ဓာတ်ခွဲ အတည်ပြုလူနာနှင့် အနီးကပ်ထိတွေ့ခဲ့သူများအား COVID-19 ရောဂါ ဓာတ်ခွဲစစ်ဆေးခြင်း

လုပ်ငန်းစဉ်ဩဇာ (၂)

Q Center ၌ စစ်ဆေးရန်

ဓာတ်ခွဲအတည်ပြုလူနာနှင့် အနီးကပ်ဆက်စပ်ထိတွေ့သူများ  
(Close contact with laboratory confirmed positive cases in high prevalence populations/ areas)  
(Asymptomatic close contacts)

COVID-19 ဓာတ်ခွဲအတည်ပြု လူနာနှင့် အနီးကပ်ထိတွေ့ပြီး (၅)ရက်မြောက်နေ့၌  
ပထမအကြိမ် RDT antigen စစ်ရန်

Positive

ကုသရေးဦးစီးဌာန၏ Guideline  
အတိုင်း ဆောင်ရွက်ရန်

Negative

ဒုတိယအကြိမ် RDT antigenစစ်ရန်  
(1-2 days after first RDT test)

Positive

ကုသရေးဦးစီးဌာန၏ Guideline  
အတိုင်း ဆောင်ရွက်ရန်

ဓာတ်ခွဲစစ်သပ် စစ်ဆေးရန် သတ်မှတ်ရက်မပြည့်မီ ရောဂါလက္ခဏာများ ပေါ်ပေါက်လာပါက ချက်ချင်း ဓာတ်ခွဲ စစ်ဆေးရန်

မှတ်ချက်။

- ရောဂါကူးစက်ဖြစ်ပွားမှုမြင့်မားသည့်ဒေသမှ လာရောက်သူများ
- ပြည်ပခရီး(ရေကြောင်းလေကြောင်း၊ ကုန်းလမ်း)မှ ပြန်လည်ရောက်ရှိလာသူ
- Stay home area မှရောက်ရှိလာသူတို့ကို RDT ဖြင့်အထက်ပါ လုပ်ငန်းစဉ်အတိုင်း စစ်ဆေးနိုင်ပါသည်။

Negative

No symptom

ကျန်းမာရေး  
ပညာပေး

Symptoms appear

RT-PCR  
(ချက်ချင်း)

SARS CoV-2  
Detected

ကုသရေးဦးစီးဌာန၏ Guideline  
အတိုင်း ဆောင်ရွက်ရန်

SARS CoV-2  
Not detected

ကျန်းမာရေး  
ပညာပေး

## Full PPE donning

- <https://www.facebook.com/MinistryOfHealthAndSportsMyanmar/videos/1454047304769366/>
- Full PPE doffing
- <https://www.facebook.com/MinistryOfHealthAndSportsMyanmar/videos/2471207030000853/>



- PPE donning
- <https://www.facebook.com/watch/?v=243896340322748>
- PPE doffing
- <https://www.facebook.com/MinistryOfHealthAndSportsMyanmar/videos/163261101596416/>





- Sample collection
- <https://www.facebook.com/MinistryOfHealthAndSportsMyanmar/videos/2288715998089038/>
- PCR test at NHL
- <https://www.facebook.com/199295433433103/posts/3245152578847358/>
- RDT SOP version 3
- <https://www.facebook.com/199295433433103/posts/3863016623727614/>



# Laboratory Biosafety

- Develop **Laboratory Biosafety Training Curriculum** and distribution to all level laboratories
- **ToT Training** on Laboratory Biosafety Training Curriculum
- Provide **biosafety practices** especially on COVID-19 specimen collection and transport
- **Decontamination** procedures for biohazard waste
- **Proper use of PPE** through biosafety trainings and distribution of Laboratory Biosafety Training Curriculum

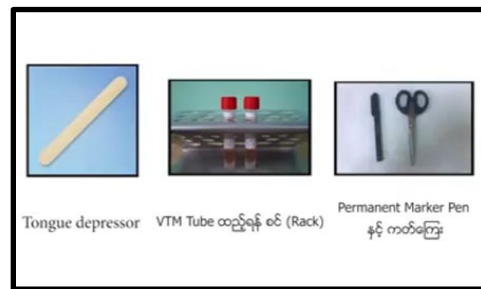


# Development and dissemination of guidelines and SOPs .....1

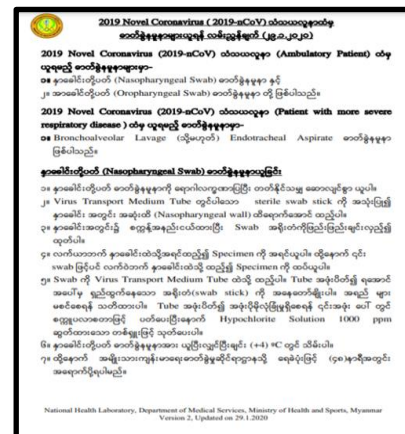
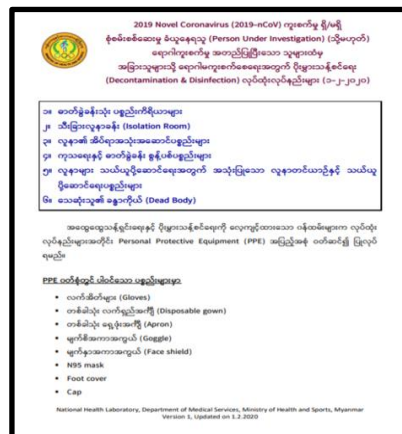
Video clip creation on proper donning and doffing of full level PPE and distributed to all laboratories for reference



Video clip creation on Method of proper sample collection and sample transportation and proper handling of samples and distributed for reference

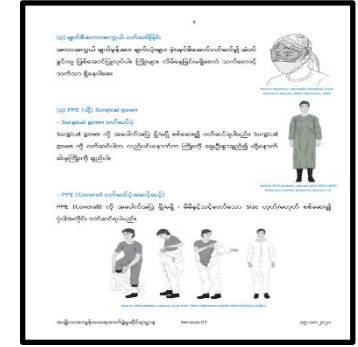
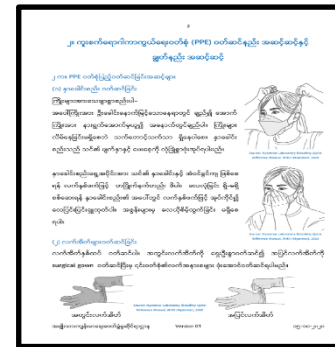
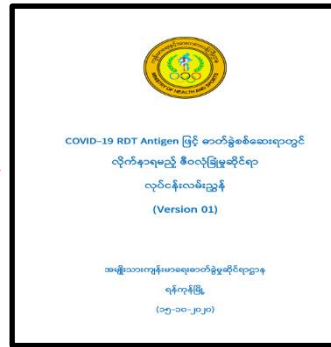


Distribution of Guidelines on Sample collection, packaging and transportations, Decontamination and Disinfection procedures

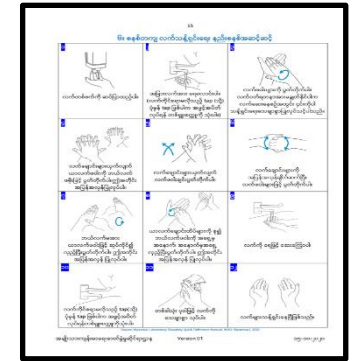
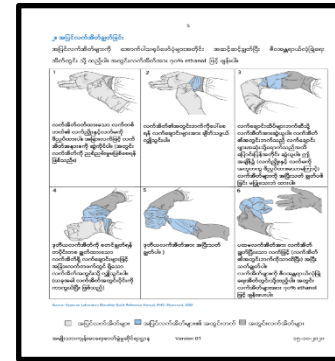


# Development and dissemination of guidelines and SOPs .....2

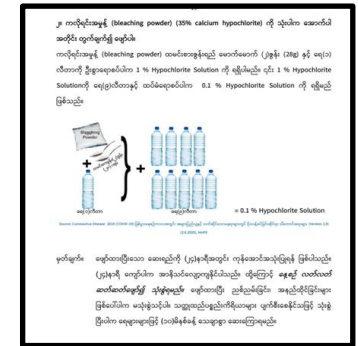
Develop guidelines on using Rapid diagnostic testing (RDT) (V 01)



Develop guidelines on laboratory waste management system



Guidelines on using disinfectants





To All The Wonderful  
Healthcare Workers



Thank You ! Thank you!  
**THANK YOU!**

- Welcome  
for your  
comments  
&  
questions!