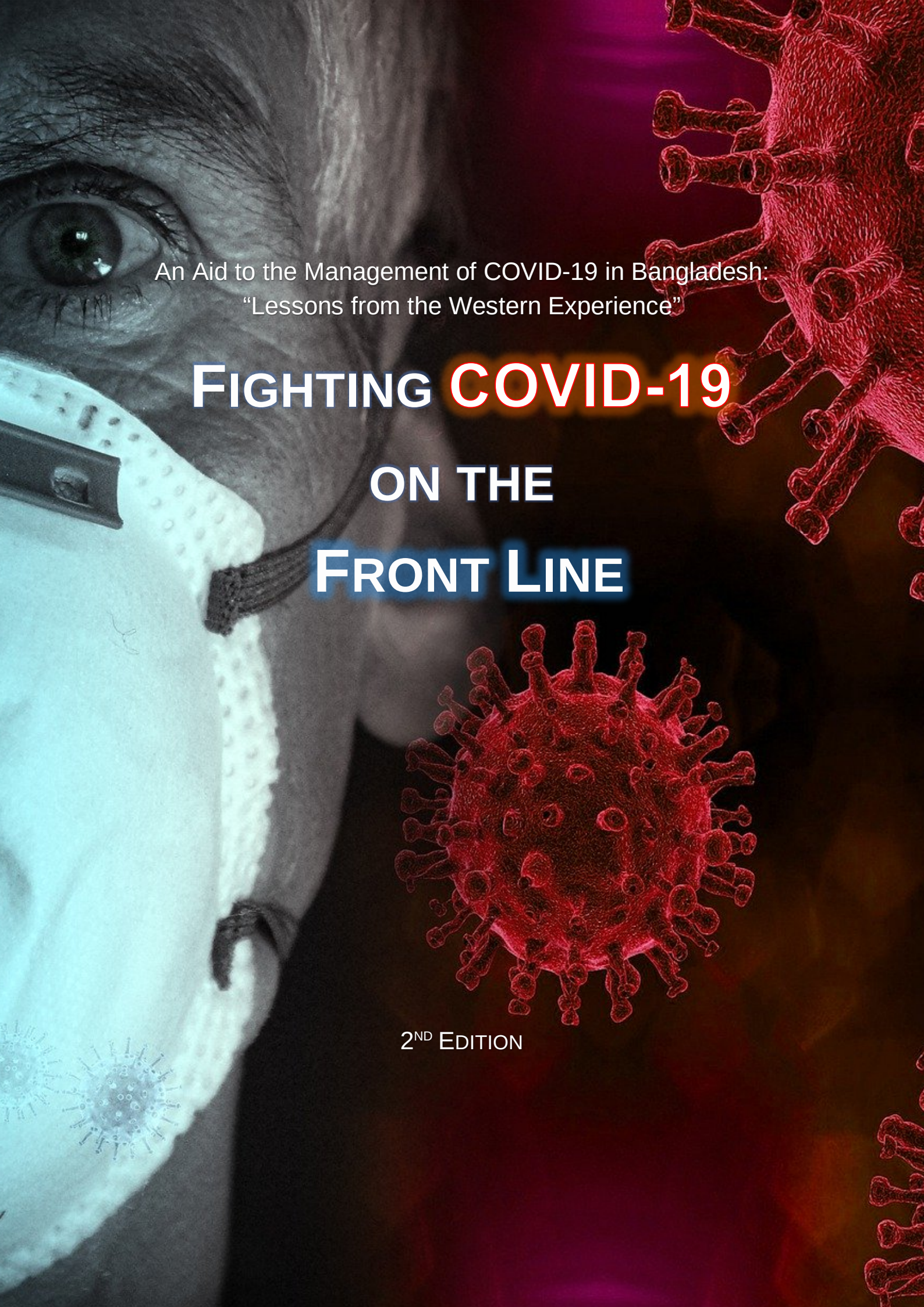


An Aid to the Management of COVID-19 in Bangladesh:
"Lessons from the Western Experience"

FIGHTING COVID-19 ON THE FRONT LINE

2ND EDITION

An Aid to the Management of COVID-19 in Bangladesh:
"Lessons from the western experience"

FIGHTING COVID-19 ON THE FRONT LINE

Second Edition is published on May 10, 2020

First Edition: May 2, 2020 (Revised: May 3, 2020)

This guidebook is available free for download and distributing from the following website (also future updates)

shakilfarid.com/covid19

PREFACE

Throughout the world, health authorities are facing unprecedented difficulties in dealing with the current COVID-19 crisis. Authorities in Bangladesh have already formulated robust national guidelines with the help of local experts. This handout is a small effort by some highly motivated Bangladeshi doctors living in the UK and USA to supplement local guidelines in Bangladesh. This will hopefully enable local experts in Bangladesh to be kept updated about local treatment protocols worldwide for this difficult group of patients. In the absence of evidence for specific drug therapy, mostly supportive treatment is provided throughout world. Specific drug therapy is provided to only a select group of patients who are enrolled within a clinical trial. This document has been edited by two very experienced and well-respected Bangladeshi editors in order to make it more relevant for Bangladeshi doctors. We are very grateful to our authors for giving their valuable time despite being completely inundated with work during this pandemic. Most of the materials are adapted from the most recent national guidelines in the UK (NHS England, NICE, NHS Improvement, UK Royal Colleges, Public health England, WHO, CDC, Trust Intranets) and modified for Bangladesh. This handout will be updated regularly as we learn more about the disease and the guidelines get updated.

Preface to 2nd Edition: The second edition adds a Bengali translated version of the key guidelines, **few** new chapters, significant changes to some chapters and inclusion of updated information. The relevant chapters can be accessed by pressing the page no button on the index.

On behalf of the authors

Dr. Shakil Farid ***MBBS (SSMC), FCPS, MRCS Ed, FRCS (C-Th), MBA (Heath Executive)***

Consultant Cardiac Surgeon, Oxford University Hospitals NHS Trust. Oxford, United Kingdom

Website: http://shakilfarid.com Correspondence: shakil.farid74@gmail.com

10th of May, 2020

INTERNATIONAL EDITORS

EDITORS FROM BANGLADESH

*Our little effort is dedicated to **Dr. Abdul Mabud Chowdhury (Faisal)** (CMC) and all the other front line health care workers who died on the line of duty. **Dr. Faisal** was a dear friend of the authors of this book. He was a Consultant Urologist at Homerton University Hospitals.He died of COVID-19 few weeks after raising concerns about the lack of PPE to the UK government. He was a great humanitarian, leader and visionary. He will be missed by all of us.*

ADVISORY BOARD

National Professor Shahla Khatun

Prof of Gynaecology and Obstetrics
Chairman, Green Life Hospital

Prof A K Azad Khan

Prof of Gastroenterology
President, Diabetic Association of Bangladesh

Prof. Kanak Kanti Barua

Ex Professor and Chairman, Dept of Neurosurgery
Vice Chancellor, Bangabandhu Sk. Mujib Medical University, Dhaka.

Prof M. Nazrul Islam

UGC Prof of Cardiology,
Vice Chancellor, Bangabandhu Sk. Mujib Medical University, Dhaka.

Maj Gen Md Azizul Islam

Consultant physician General, Prof of Medicine and Oncologist
Bangladesh Armed Forces, Ministry of Defence, Dhaka Cantonment.

Prof Liaquat Ali

Former Vice Chancellor, Bangladesh University of Health Sciences

Prof Mujibur Rahman

Prof and Head of dept of Medicine, Dhaka Medical College and Hospital
Controller of Examinations, BCPS

Prof Abdul Wadud Chowdhury

Prof and Head dept of Cardiology,
Dhaka medical college and Hospital

Prof Md Robed Amin

Prof of Medicine
Dhaka Medical College and Hospital

List of Contributors:

Dr Moshfiq Abeer MRCP(UK), MRCP (Resp Med)

Consultant Respiratory Physician, Hull and Yorkshire Hospital, UK.

Prof AKM Akhtaruzzaman MBBS, DA, MD

Professor and Chairman, Department of Anaesthesia, Analgesia and Intensive Care Medicine, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh

Dr Kazi Asif Adnan MBBS, MRCP(UK)

Consultant Interventional Cardiologist, Sandwell and West Birmingham Hospitals NHS Trust, UK

Prof Shafi Ahmed PhD, FRCS (General Surgery)

Prof of Surgery, Laparoscopic Colorectal Surgeon, The Royal London Hospital, UK.

Dr Chowdhury H Ahsan MRCP, MD, Ph.D., FSCAI

Clinical Professor of Medicine, Director, Cardiac Catheterization and Intervention
Director, Cardiovascular Research University Medical Center, Las Vegas, Nevada

Dr Nashid Noor Alam MBBS MRCP MRCP (Geriatric Medicine) FRCP

Consultant Physician/Geriatrician/Stroke Physician, Antrim Area Hospital, Northern Health and Social Care Trust, Norther Ireland, UK.

Dr. Basher M Atiquzzaman, MD

Faculty, College of Medicine, University of Central Florida
Consultant, Gastroenterology and Hepatology, Digestive and Liver Center of Florida Orlando, Florida

Dr Iffat Azim MBBS MPH

General Practitioner, Harley Street Health Centre, London

Prof Tipu Zahed Aziz F.Med.Sci.

Prof of Neurosurgery, Nuffield Department of Surgery, Oxford University Hospitals NHS Foundation Trust, UK.

Dr Snehashish Banik MRCP(UK), FHEA(UK)

Consultant Acute Medicine and Acute Stroke, Aberdeen Royal Infirmary, NHS Grampian, Scotland.

Director, Academic Foundation Program, North Scotland Deanery.

Dr Verona Beckles Bsc, MBBS, MSc, MRCS(Ed), FRCS(Ed)

Consultant, Trauma & Orth, Queen's Hospital, Barking, Havering and Redbridge NHS Foundation Trust, UK.

Dr Sarah Choudhury MBBS. MRCP (Acute medicine), FRCP, DIP MED SC (Medical Toxicology)

Consultant in Acute Medicine, Northwest Anglia NHS foundation Trust, UK.

Dr Shakil Farid MBBS FCPS(Surgery) MRCSEd, FRCS(C-Th), MBA (*Health Executive)*

Consultant Cardiac Surgeon with special interest in Aortic Surgery, Oxford University Hospitals NHS Foundation Trust, UK.

Dr S A Haider MBBS MRCP (UK)

Consultant Physician, Geriatrician and Stroke Physician, King's Mill Hospital, Sherwood Forest Hospital NHS Foundation Trust, Birmingham, UK.

Dr Farzana Haque MBBS MRCP(UK)

Clinical Research Fellow, Hull and York Medical School, Specialty Registrar Oncology, Queens Oncology Centre, Hull Teaching Hospital, UK.

Dr Tahmina Haque MBBS MRCPsych Dip in Psychiatry

Consultant Psychiatrist, Leeds and York Partnership NHS Foundation Trust, UK.

Dr Omar Hasan MD FACC

Attending interventional Cardiologist, Clinical Assistant Professor Hackensack University Medical Center, NJ, USA.

Dr Mehedi Hasan MBBS, FCPS, MRCP, FRCPath

Consultant Haematologist, Lister Hospital, North and East Hertfordshire NHS Trust, UK.

Dr Nayeem Hasan MBBS

Specialty Doctor, Acute Medicine, West Suffolk Hospital NHS Foundation Trust, UK.

Dr Tanjina Hossain, MD, FACE

Associate Professor, Endocrinology, Green Life Medical College

Dr Syed Shahreer Huq MBBS MRCP (Resp Med) FRCP RPSGT

Somnologist (ESRS), Consultant Respiratory and Sleep Physician, University Hospital Birmingham NHS foundation Trust, UK

Dr Zahed Ikram MBBS, MRCP, FRCP

Consultant in Geriatric Medicine, Western Sussex Hospitals NHS Trust, UK.

Dr Javed Imam MBBS, MRCP

Consultant, Stroke Medicine, West Suffolk Hospital NHS Foundation Trust, UK.

Dr Tasbirul Islam MD, MRCP(UK), FRCP, FCCP

Clinical Associate Professor, Indiana University School of Medicine., Medical Director, Indiana University Arnett Hospital, USA.

Dr Taufiq Islam MBBS, MRCS, FCPS

Surgical Assistant, Division of Thoracic Surgery, Royal Alexandra Hospital, Edmonton, AB, Canada

Dr Bandana Rajbhandari Joshi MBBS FRCPCH

Consultant Community Paediatrician, Dip Neurodisability, St Mary's Hospital, Northamptonshire Healthcare NHS Foundation Trust, UK

Dr Zahed Khan MRCP (medicine) MRCP (Medical oncology)

Consultant Medical Oncologist, Clatterbridge Cancer Centre NHFT, UK

Dr Jeenat Khan MBBS

Specialty Doctor, Geriatric Medicine & Stroke, South Eastern Health and Social Care Trust, Northern Ireland, UK.

Dr Rahila Khan MBBS, MRCOG, MD

Consultant, Obstetrician and Gynaecologist, Lead in Maternal Medicine and Diabetic Pregnancy, *Worthing Hospital, UK.*

Dr Samia Mubin MBBS FCPS MRCS

Associate Professor of Surgery, BSMMU, Dhaka, Bangladesh.

Dr Quazi Rezina Naquib MBBS, DCH, MRCPCH

Paediatrician, East Kent Hospitals University Hospitals Foundation Trust Kent, UK.

Dr Quazi Selina Naquib MBBS, MRCOG, DFFP

Obstetrician and Gynaecologist, Whips Cross University Hospital, London.

Dr Ashrafun Nessa MRCS, MCPS FCPS

Specialty Registrar, General Surgery, Aberdeen Royal Infirmary, NHS Grampian, Scotland, UK.

Dr Sharmin Afroz Panna MBBS MSc (Psychiatry)

Specialty Doctor, Specialist Secure Unit, Mental Health, Merseycare NHS Foundation Trust, UK.

Dr Jhumur Pati MBBS FRCS FRCS (Urology)

Consultant Urological Surgeon, Homerton University Hospital and Barts Health NHS Trust, UK.

Dr Shama Parveen MBBS MRCPsych

Consultant Psychiatrist in Intellectual Disability, Sussex Partnership Foundation NHS Trust, UK.

Dr Indrajit Prasad FCPS, MD, FACE

Associate Professor, Endocrinology, Dhaka Medical College and Hospital

Dr Sabyasachi Roy MBBS

Internal Medicine Trainee, Royal Cornwall Hospitals NHS Trust, UK.

Dr Shahriar MD Sadek MBBS MRCSEd, FRCS

Consultant General and Colorectal Surgeon, Royal London Hospital, Barts Health NHS Foundation Trust, UK.

Dr Lunik Rollei Sarder MBBS MRCEM FRCEM

Emergency Medicine Consultant, Queen's Hospital, BHR University Hospitals NHS Trust, UK.

Dr Rana Sayeed *MBBS MRCP (UK) FRCS (CTh) PhD*

Consultant Cardiac Surgeon and Clinical Lead, Oxford University Hospitals NHS Foundation Trust, UK.

Dr Kazi Fatema Shahadat MBBS, MRCGP

GP Partner and Trainer, Betts Avenue Medical Centre, Newcastle, UK.

Dr Afroza Shameen MMedSci (UK), MBBS(DU)

Specialty Doctor, Accident and Emergency, Doncaster Royal Infirmary, Doncaster and Bassetlaw Teaching Hospitals NHS Foundation Trust, UK.

Dr Arifa Siddika MBBS, MRCS, FRCS (Gen and Colorectal Surg)

Consultant, General and Colorectal Surgery, Homerton University Hospital, London, UK.

Dr Quazi Mahmud Siddiqui MBBS, FCPS, FRCA

Consultant Anaesthetist, Rockhampton Base Hospital and Senior Lecturer, University of Queensland Rural Medical School, Queensland, Australia

Dr Tasmin Sultana MBBS

Specialty Doctor, Trauma & Ortho, Queen's Hospital, Havering and Redbridge NHS Foundation Trust, UK.

Dr Farhana Tasneem Rimi MBBS MRCP

Clinical Research Fellow (Cardio), University Hospital Leicester NHS Trust, UK., Clinical PhD student, Cadiovascular Science and Sports Physiology, Loughborough University, UK.

Dr. Muhammad Shamse Tabriz MD

Consultant, Infectious Disease, Advocate Christ Medical Center, Clinical Associate Prof of Medicine, University of Illinois, Chicago, USA.

Dr Md Zaker Ullah MBBS, FRCSEd, FRCS (Gen and Breast Surg)

Consultant General and Oncoplastic Breast Surgeon, Whipps Cross University Hospital, Barts Health NHS Trust, UK.

Dr Nihad Yasmin MD Board certified (Internal medicine and Rheumatology)

Attending Rheumatologist, Advocate Aurora Health, Wisconsin, USA.

Acknowledgements

We are very grateful to **Dr. Sajid Muhaimin Choudhury** (Assistant Professor, Department of Electrical and Electronic Engineering, BUET; http://sajid.buet.ac.bd) for compiling and designing the whole document . We are also grateful to **Dr. Kaiser Nasrullah Khan, Dr. Sabyasachi Roy** (and other members of the **SSMC Alumni Association, UK)** for their help in initiating the process of writing this book.

Special thanks to **Dr Samia Mubin** and **Dr Arifa Siddika** for coordinating the cross-country communications and to **Dr. Parul Akhtar** for collecting the author details.

We are also grateful to the following experts for their advice with the preparation of the manuscript:

Dr. Andrew Johnson, Consultant Intensivist, Oxford University hospitals, **Dr. Katie Jeffrey**, Director, Nuffield dept of infectious diseases and **Dr. Anny Sykes**, Consultant Respiratory physician, Oxford University Hospitals NHS Trusts.

The cover image is taken from pixabay.com (by @enriquelopezgarre).

Table of Contents

1.COVID19 – Key Recommendations for Bangladesh

- Focus of management is supportive care. The vast majority of patients recover without any intervention and can be managed at home.
- There is no proven pharmacological therapy. None are currently recommended outside the remits of clinical trial. There is preliminary evidence that Remdesivir reduces time to recovery, and it has Emergency Use Authorization from the US FDA for seriously ill hospitalized Covid-19 patients.
- All hospitals should accept COVID 19 patients who require hospitalization. This can be done by having **RED (COVID confirmed),** **AMBER (suspected COVID)** and **GREEN (NON-COVID)** zones in each hospital. **Aerosol generating procedures-AGPs (ICU/endoscopy suites/theatres etc.) should be treated as RED zone.**
- Tests for COVID 19 have significant percentage of false negatives. If suspicion remains high, the patient should be treated as COVID 19 based on clinical judgement and test should be repeated.
- Correct oropharyngeal and nasopharyngeal swab collection (+ sputum if pneumonia) technique is vital to reduce false negative tests. Multiple testing sites should be available throughout the country.
- For critically ill patients, careful fluid (avoid excessive fluid) balance and oxygen administration is the mainstay of therapy. SaO2 target of 92-96% (COPD 88-92%) should be the aim.
- Consider trial of HFNC, (CPAP and NIV where facilities are available), awake proning before mechanical ventilation.
- Remember the risk of acute kidney injury. Review medications, maintain euvolemic status and treat shock.
- COVID 19 patients have increased cardiac complications. Observe for features of cardiovascular disease.
- Use thromboprophylaxis for all hospitalized patient with COVID 19.
- Personal Protective Equipment (PPE) – PPE should be worn for all patient contacts. Please see PPE chapter for details.

- Healthcare personnel do not need to self-isolate if they have been in contact with a patient with COVID 19. They can carry on providing patient care with appropriate PPE unless symptomatic or tested positive for COVID 19.
- Healthcare personnel must isolate at home and should contact a health professional for advice if they get symptoms of COVID 19.
- Watch out for atypical presentations in older people – falls, confusion etc.
- It is not necessary to have a negative test result to release an infected person from isolation/hospital. An infected person may be considered recovered (a) 8 days after onset of symptoms for mild cases if there has been no fever and clinical improvement of other symptoms for 72 hours, (b) 14 days for severe cases. Post viral cough may persist.

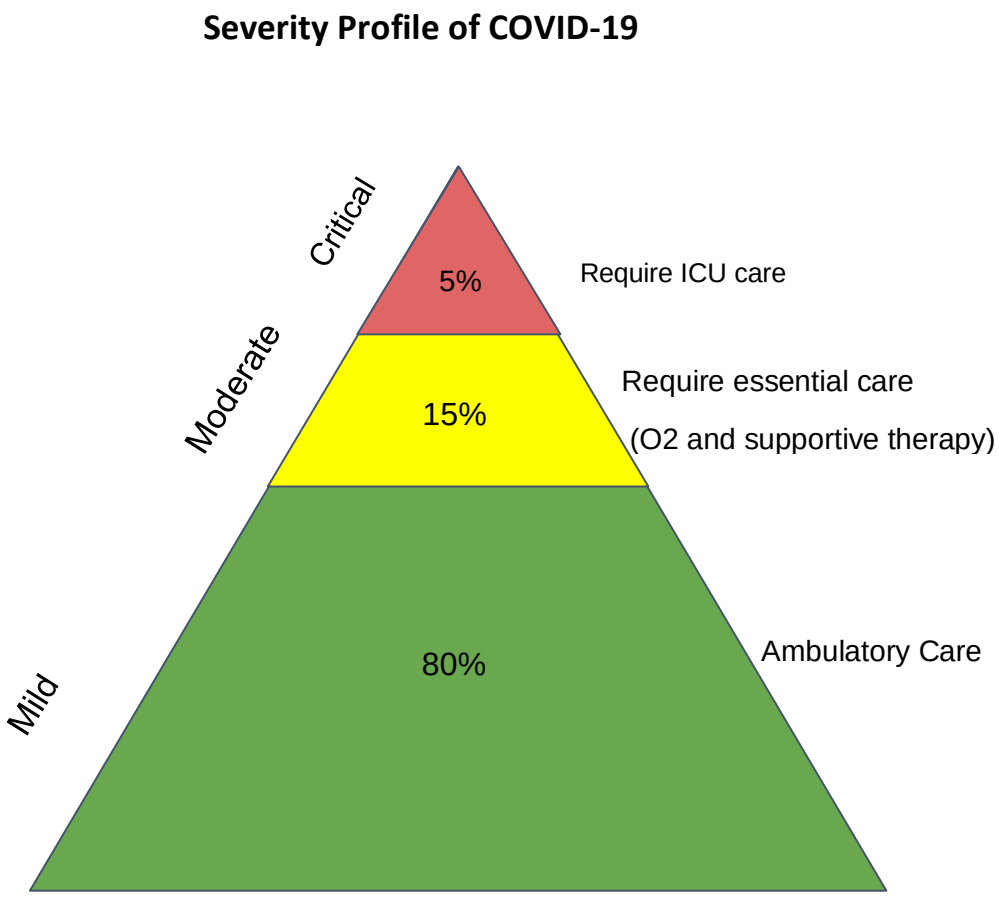
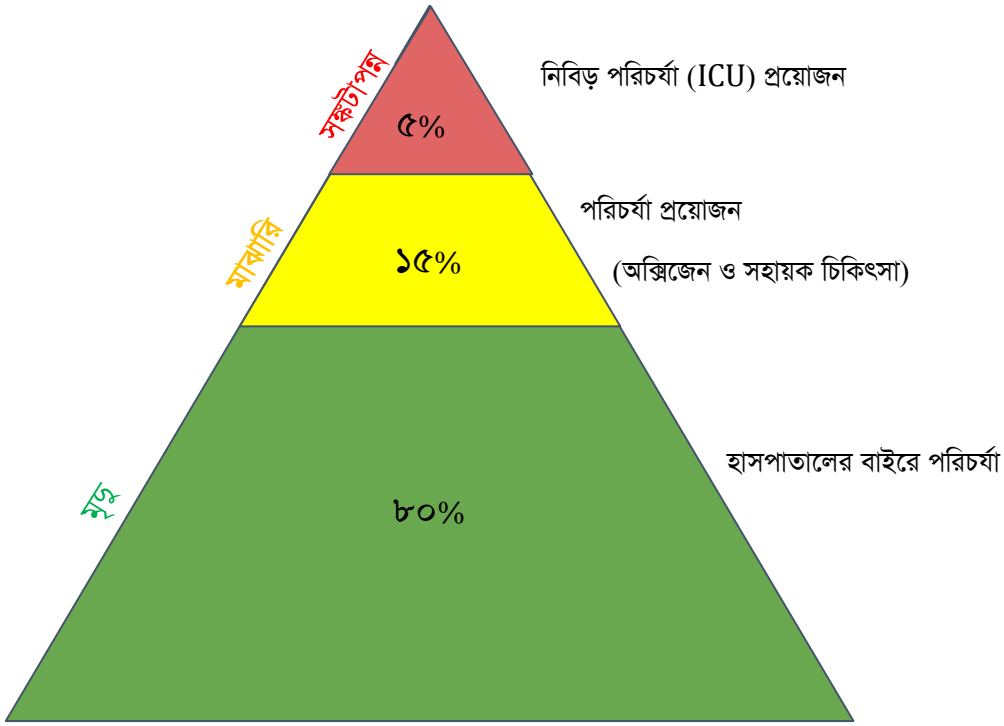


Figure 1: Severity profile of COVID19. Figure form Wu et al 2020[2]

কোভিড-১৯ - মূল প্রস্তাবনা

- কোভিড-১৯ ব্যবস্থাপনার মূল বিষয় হল সাপোর্টিভ কেয়ার বা সহায়ক চিকিৎসা।বিশাল সংখ্যক রোগী বাড়িতে থেকেই এবং তেমন কোন চিকিৎসা ছাড়াই সেরে উঠবেন।
- এখন পর্যন্ত নিরাময়কারী তেমন কোন ওষুধ পাওয়া যায় নি।ক্লিনিকাল ট্রায়াল বা গবেষণার বাইরে কোন ওষুধকে এখনো চিকিৎসা ব্যবস্থায় সুস্পষ্ট ভাবে সুপারিশ করা হয় নি।একেবারে প্রাথমিক পর্যায়ের কিছু গবেষণা থেকে বলা যায় যে রেমডিসিভির আরোগ্য লাভের সময়কে ত্বরান্বিত করতে সক্ষম আর তাই ইউএস এফডিএ হাসপাতালে ভর্তি গুরুতর অসুস্থ কোভিড-১৯ রোগীদের ক্ষেত্রে এই ওষুধের জরুরি প্রয়োগের নির্দেশনা দিয়েছে।
- সব হাসপাতালই যেন ভর্তিযোগ্য কোভিড-১৯ রোগীদের কে গ্রহণ করে।এটা তখনই সম্ভব যদি হাসপাতালগুলোকে **লাল এলাকা (কোভিড)**, **হলুদ এলাকা (কোভিড সন্দেহজভাজন)** আর **সবুজ এলাকা (নন কোভিড রোগী)** -তে বিভাজন করা থাকে।এরোসল উৎপাদন কারী প্রক্রিয়া (নিবিড় পরিচর্যা কেন্দ্র (ICU) /নন ইনভেসিভ ভেন্টিলেশন (NIV) / এন্ডোস্কোপিক স্যুট) সব সময় লাল এলাকাতে করা উচিৎ।
- কোভিড পরীক্ষার ফলাফলের একটি বড় অংশ ফলস নেগেটিভ আসতে পারে।যদি সন্দেহের মাত্রা বেশি থাকে তবে ক্লিনিকাল বিচারেই কোভিড রোগী ধরে নিয়ে চিকিৎসা করতে হবে এবং পুনরায় পরীক্ষা করাতে হবে।
- ফলস নেগেটিভ রিপোর্টের ঝুকিঁ কমাতে সঠিক পদ্ধতিতে নাক বা গলা থেকে নমুনা সংগ্রহ করা জরুরি।সারা দেশে অনেক পরীক্ষা কেন্দ্র থাকা উচিত।
- গুরুতর অসুস্থ কোভিড রোগীদের ক্ষেত্রে সঠিক তরল ব্যবস্থাপনা (ফ্লুইড ব্যালান্স) আর সময়মতো অক্সিজেন সরবারাহ হচ্ছে সবচেয়ে গুরুত্বপূর্ণ চিকিৎসা।উদ্দেশ্য থাকবে অক্সিজেন স্যাচুরেশন ৮৮-৯৬% রাখা (অক্সিজেন সরবরাহ যথেষ্ট থাকলে ৯২-৯৬%)
- যেখানে সুবিধা আছে সেখানে নন ইনভেসিভ ভেন্টিলেশন (NIV), মেকানিকাল ভেন্টিলেশন এর আগে awake proning এর ট্রায়াল দেয়া যেতে পারে।
- আকস্মিক কিডনি বিকলের ঝুঁকি বিবেচনায় রাখতে হবে।সেজন্য বার বার ওষুধ আর দেহে পানির ভারসাম্য ঠিক আছে কিনা রিভিউ করতে হবে আর শক এর চিকিৎসা করতে হবে।
- কোভিড-১৯ রোগীদের হৃদযন্ত্রের জটিলতার ঝুঁকি অনেক।তাই হৃদরোগের লক্ষণগুলো বার বার খেয়াল করতে হবে।
- হাসপাতালে ভর্তি যে কোন কোভিড রোগীর থ্রম্বোপ্রফাইলেক্সিস ব্যবহার করতে হবে।
- কোন নিশ্চিত বা সন্দেহভাজন কোভিড রোগীর সংস্পর্শে আসার সময় পর্যাপ্ত ব্যক্তিগত সুরক্ষা সামগ্রী বা পিপিই, সার্জিকাল মাস্ক, ডিসপোজেবল এপ্রন এবং গ্লাভস পরিধান করতে হবে।এরোসল তৈরি হয় এমন পদ্ধতির জন্য চোখের সুরক্ষা, এফএফপি ২\৩, কেএন৯৫, এন৯৫ মাস্ক, ফুল হাতা তরলনিরোধী গাউন এবং গ্লাভস পরতে হবে।হাত ধোয়া, পিপিই সঠিক পদ্ধতিতে পরা ও খোলার নিয়মগুলো কঠোরভাবে মানতে হবে।
- কোন স্বাস্থ্যকর্মী কোভিড রোগীর সংস্পর্শে এলে তার সেলফ আইসোলেশনে যাবার প্রয়োজন নেই।সঠিক সুরক্ষা সামগ্রী পরে তারা সেবা চালিয়ে যেতে পারবেন যদি না নিজে অসুস্থ বোধ করেন বা কোভিড পজিটিভ হন।
- স্বাস্থ্যকর্মীরা যে কোন উপসর্গ দেখা দিলে বাড়িতে আইসোলেশনে থাকবেন এবং চিকিৎসককে জানাবেন।
- বয়স্ক ব্যক্তিদের ক্ষেত্রে অপিরিচিত বা কম পরিচিত উপসর্গগুলোকে বিবেচনায় রাখুন -যেমন-অসংলগ্ন আচরণ, পড়ে যাওয়া ইত্যাদি।
- হাসপাতাল থেকে ছাড়পত্র দেবার জন্য পরীক্ষার ফলাফল নেগেটিভ আসতেই হবে এমন কোন কথা নেই।একজন সংক্রমিত ব্যক্তিকে তখনই সুস্থ হিসেবে ধরে নেয়া যাবে যখন-১. মৃদু উপসর্গের রোগীদের ক্ষেত্রে উপসর্গ দেখা দেবার পর ৮ দিন পার হয়ে গেছে এবং বিগত ৭২ ঘন্টা ধরে কোন জ্বর বা অন্যান্য উপসর্গ নেই, ২. গুরুতর অসুস্থ রোগীর ক্ষেত্রে ১৪ দিন পার হয়ে গেলে।ভাইরাস সংক্রমণ উত্তর কাশি তখনও থাকতে পারে।

কোভিড-১৯ এর তীব্রতা



2.Tests for COVID-19

Dr. Zahed Ikram

When to test? Whom to test? What to test? How often to test? And, what to do with test results?

If the entire world's population could be tested all at once, with a test providing 100% specificity and sensitivity, we might be able to identify all infected individuals and sort people into those who at that moment in time were asymptomatic, minimally/moderately symptomatic, and severely symptomatic. The asymptomatic and minimally/moderately symptomatic could be quarantined to avoid the spread of the virus, with the severely symptomatic managed and isolated in health care settings. Contract tracing could be carried out to find those at risk of being in the incubation period by virtue of their exposure. Alternatively, testing for a host response, if, again, the test were 100% sensitive and specific, could identify those previously exposed to the virus and label those who are immune to the virus, who could be designated to work in settings where potentially infected individuals (e.g., sick patients in hospitals) might otherwise pose a risk.

However, no test is 100% specific and sensitive through the course of an illness, and we do not know if previous exposure to Covid-19 gives immunity.

The following are the types of tests available for Covid-19:

TEST 1. TESTS FOR VIRAL RNA

Most tests currently used for direct detection of SARS–CoV-2 identify viral RNA through nucleic acid amplification, usually using PCR. An important consideration is exactly what gets tested for viral RNA. Tests that detect viral RNA are contingent on viral RNA being present in the sample collected. The most common sample types being tested are swabs taken from the nasopharynx and/or oropharynx, with the former considered more sensitive than the latter; if both are collected, the two swabs may be combined and tested simultaneously in a single reaction to conserve reagents. Health care professionals usually collect these swabs; however, patients or parents (in the case of young children) can collect their own swabs. This saves PPE and protects the healthcare worker. Following collection, swabs are placed into a liquid to release virus/viral RNA from the swabs into solution. Then, viral RNA is extracted from that solution and subsequently amplified (e.g., by reverse transcription-PCR).

For patients with pneumonia, in addition to nasopharyngeal and oral secretions, lower respiratory tract secretions, such as sputum is tested (bronchoalveolar lavage

currently avoided). Early results also indicate that saliva samples may be useful for testing. Detection rates in each sample type vary from patient to patient and may change over the course of individual patients' illnesses. The true clinical sensitivity of any of these tests is unknown; a negative test does not therefore negate the possibility that an individual is infected. If the test is positive, the result is most likely correct. Viral RNA-based tests are the best tests that we have in the setting of an acute illness. It is important to recognize that the accuracy of the test is affected by the quality of the sample, and thus it is critical that the sample be obtained in a proper (and safe) manner. Testing patients for SARS–CoV-2 helps identify those who are infected, which is useful for individual patient management, as well as for implementation of mitigation strategies to prevent spread in health care facilities and in the community.

Who should be tested?

1. Testing of patients likely to have SARS–CoV-2 who are in health care facilities or long-term-care facilities, alongside potentially ill workers critical to the pandemic response, including health care workers, public health officials, and other essential leaders and key workers, is a priority.
2. Testing anyone who has symptoms compatible with COVID-19 should be considered, since broad testing will help define who has this infection, allowing control of its spread.
3. Given that SARS–CoV-2 can infect anyone and result in transmission prior to the onset of symptoms or even possibly without individuals ever developing symptoms, testing asymptomatic patients could theoretically be considered. Unfortunately, little is known at this time about viral RNA detection in asymptomatic patients, and such testing strategies may stretch available resources beyond realistic limits.
4. If suspicion is strong, a second or even third test may be performed.
5. It is not necessary to have a negative test result to release an infected person from isolation/hospital. An infected person may be considered recovered (a) 8 days after onset of symptoms for mild cases if there has been no fever and clinical improvement of other symptoms for 72 hours, (b) 14 days for severe cases. Post viral cough may persist.

TEST 2. SEROLOGY

The other broad category of tests is those that detect IgM, IgA, IgG, or total antibodies (typically in blood). Development of an antibody response to infection can be host dependent and take time; in the case of SARS–CoV-2, patients seroconvert between 6 and 15 days post onset of the illness. The best tests claim 100% sensitivity at day 14 of the illness. As a result of this natural delay, antibody testing is not useful in the setting of an acute illness. It is not known for certain whether individuals infected with SARS–CoV-2 who subsequently recover will be protected,

either fully or partially, from future infection with SARS–CoV-2 or how long protective immunity may last.

Antibody tests for SARS–CoV-2 may facilitate (i) contact tracing—RNA-based tests can help with this as well; (ii) serologic surveillance at the local, regional, state, and national levels; and (iii) identification of those who have already had the virus and thus may (if there is protective immunity) be immune.

1. Assuming there is protective immunity, serologic information may be used to guide return-to-work decisions, including for individuals who work in environments where they can potentially be re-exposed to SARS–CoV-2 (e.g., healthcare workers).
2. May also be useful to identify individuals who may be a source for potentially therapeutic or prophylactic neutralizing antibodies (convalescent serum).
3. Antibody testing can be employed retrospectively to determine the true scope of the pandemic and assist in the calculation of statistics, including the case fatality rate.

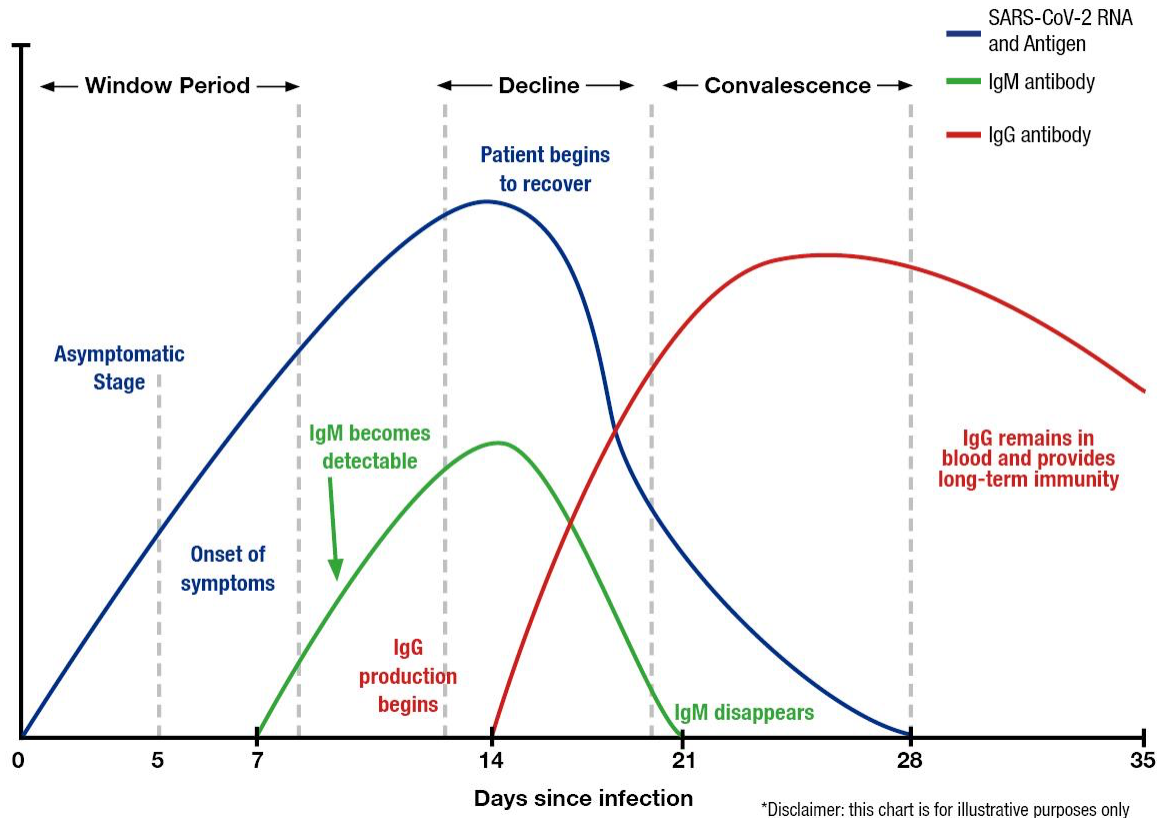
The best serological tests involve the drawing of a blood sample. There are currently 160 serological tests available in the USA, 12 of which have been given Emergency Use Authorisation by the FDA.

Other tests:

There are other blood tests which may be abnormal in Covid-19 but are not helpful in diagnosing Covid-19. These include – Fibrinogen, D-dimer, CRP, aPTT, PT, platelet count, lymphocyte count, LDH. The interpretation of these results is dealt with in other parts of this handbook. Broadly, these tests are used to monitor for possible complications of Covid-19.

Tests for SARS-CoV-2/COVID-19 and Potential Uses

Type of Test	Measure	Value	Beneficiary
Nucleic acid amplification test for viral RNA *(nasopharyngeal swab, oropharyngeal swab, sputum, bronchoalveolar lavage fluid, others)*	Current infection with SARS-CoV-2	• Inform individual of infection status so they can anticipate course of illness and take action to prevent transmission • Inform patient management and actions needed to prevent transmission • Inform actions needed to prevent transmission	• Individual • Healthcare or long-term care facility • Public health
Antibody detection	Past exposure to SARS-CoV-2	• Detect susceptible individuals (antibody negative) and those previously infected • Identify individuals with neutralizing antibodies • Facilitate contact tracing and surveillance	• Identify those potentially immune to SARS-CoV-2 (if tests can detect protective immunity, individuals could be returned to work) • Healthcare facilities: Experimental therapy • Public health



Source: Diazyme Laboratories, Inc. (https://archive.is/vkEGJ)

References:

1. Report from the American Society for Microbiology COVID-19 International Summit, 23 Mar 2020: Value of Diagnostic Testing for SARS–CoV-2/COVID-19
2. Roche.com
3. Effectiveness of patient-collected swabs for influenza testing. Mayo Clin Proc 87: 548 –554
4. Negative nasopharyngeal and oropharyngeal swab does not rule out COVID-19. J Clin Microbiol 26 Feb 2020
5. Saliva is more sensitive for SARS-CoV-2 detection in Covid-19 patients than nasopharyngeal swabs Willey, Fournier, Ko. (not peer reviewed)

3. Keeping patients out of hospital

Dr Kazi Fatema Shahadat, Dr Iffat Azim

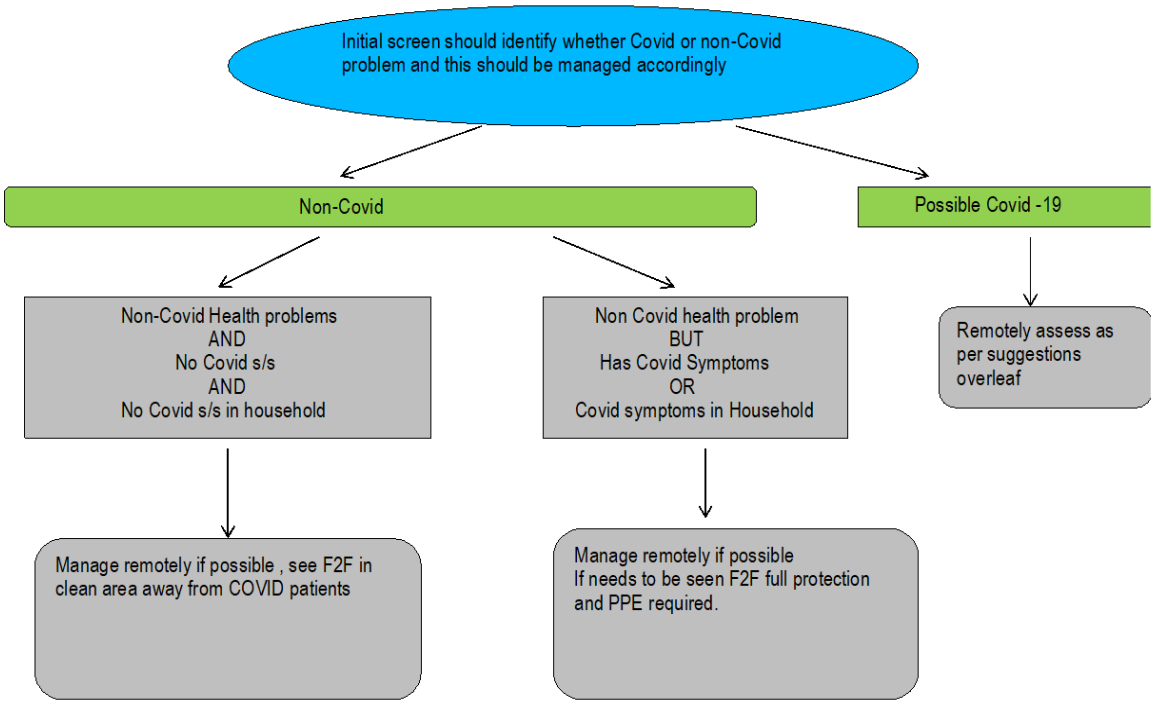
Why keep patients out of hospital:

- To avoid unnecessary admission and made bed available for sick patient.
- Minimize the health risks to health care worker, patients and wider communities.
- Most patients with COVID-19 can be managed remotely with advice on symptomatic management and self-isolation.
- Although such consultations can be done by telephone in many cases, video provides additional visual cues and therapeutic presence

Tools for Remote Assessment:

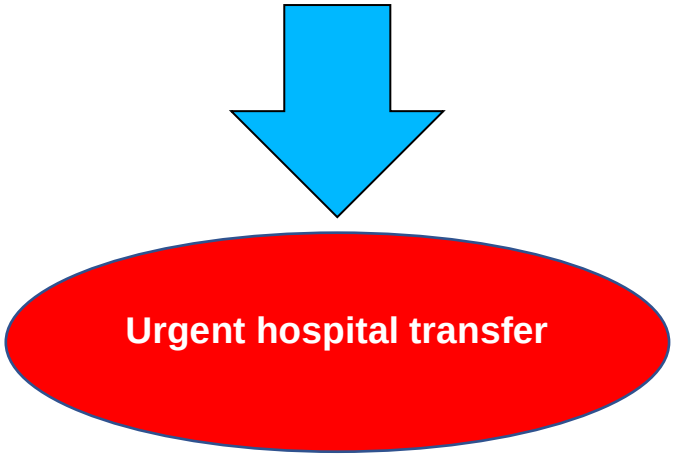
- Telephone consultations.
- Video consultations - AccuRx, Viber, WhatsApp, Facebook messenger apps etc. can be used
- Smart watch or smart phone.
- Information can be shared with physician using BP machine, Pulse oximeter, Thermometer at home.
- Hotline phone number

REMOTE ASSESSMENT FOR EVERY PRIMARY CONTACT



Red flags symptoms:

- Severe breathlessness or difficulty breathing.
- Pain or pressure in the chest.
- Blue lips or face.
- History suggestive of shock such as cold and clammy with mottled skin, new confusion, becoming difficult to rouse or significantly reduced urine output.
- Haemoptysis occurs in about 1% of covid-19 patients and seems to be a poor prognostic symptom.



Staying at home and shielding (High Risk group)

You're strongly advised to stay at home at all times and avoid any face-to-face contact if you're clinically extremely vulnerable to protect yourself. This is called 'shielding'.

Shielding means:

- Do not leave your house.
- Do not attend any gatherings. This includes gatherings of friends and families in private spaces, for example, family homes, weddings and religious services.
- Strictly avoid contact with someone who is displaying symptoms of Coronavirus (COVID-19). These symptoms include high temperature and/or new and continuous cough.

Living with other people during Self Isolation

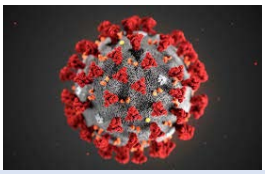
- The rest of your household do not need to start shielding themselves, but they should do what they can to support you in shielding and to carefully follow the local protocols.
- At home you should:
- Minimise the time spent in shared spaces such as kitchens, bathrooms and sitting areas, and keep shared spaces well ventilated. Always keep separate towels for your yourself.
- **Keep 2 meters (3 steps) away from people you live with and encourage them to sleep in a different bed where possible.**

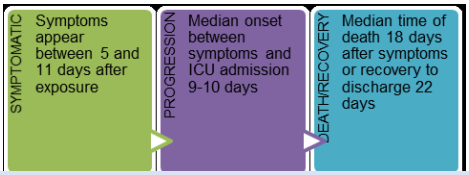
References:

- Guidance and standard operating procedures- General Practice in the context of Coronavirus (COVID-19); Version 2.1 NHS England and NHS Improvement
- Primary care Pathways.co.uk/covid-19/clinical-assessment/pathways
- BMJ (British Medical journal)
- UK guidelines in Practice highlights
- GOV.UK website
- Red Whale GP Update
- www.nice.org.uk/guidance

4.COVID-19 severity scoring tools and Non-ICU Management

Dr. Mosfiq Abeer, Dr Farzana Haque, Dr Afroza Shameen, Dr Tasbirul Islam





Case definition for possible case:

1. Clinical or radiological pneumonia ***or***
2. Acute Respiratory Distress Syndrome ***or***
3. Influenza like illness

CLINICAL ASSESSMENT for those who *may* require hospital admission

- House in side-room or cohort area and wear personal protective equipment according to local guidance
- History, examination and standard observations (pulse, RR, BP, temperature, pulse oximetry, capillary refill time)
- If not known positive AND requires admission do nasopharyngeal swab

SEVERITY ASSESSMENT

- **Consider the following risk factors for mortality:**
- Older age group: Mortality high over 60 years
- **Co-morbidity: especially cardiac / hypertension, diabetes, COPD/Asthma, current smoker, obesity**
- **Immunocompromise: HIV/AIDS, severe malnutrition, Chronic steroid use, Immunosuppressive medication, ongoing anti-cancer treatment**
- Sepsis red flags (see box below) and Severity scoring tool (see box below)
- Severe acute respiratory distress
- Low functional status and / or poor social circumstances
- High risk relative at home and unable to self-isolate (may be unrealistic in pandemic)

CONSIDER the following tests according to comments below and necessity for admission or clinical decision making:

- FBC, BCP, CRP, Blood Culture (if fever or sepsis or severe illness) *before* antibiotics- Expect Lymphopenia, high CRP and AKI
- Chest radiograph for ALL patients needing admission to hospital- **Typically patchy ground glass opacities peripheral, basal and bilateral (unilateral in 25%)**
- ECG (Do Troponin if new changes)
- Nasopharyngeal swab (broad-based respiratory PCR)- **As sensitivity is not 100%, one negative swab does NOT rule out COVID. Send a second swab, and sputum, if clinical suspicion high.**
- Consider COVID prognostic indicator- D-dimer, ferritin– high values indicate cytokine storm/MAS
- Consider early chest CT/CTPA specially if PE is suspected- **ground-glass opacities (GGO): bilateral, basal, peripheral; sensitivity around 80%**

POTENTIAL COMPLICATIONS

- Acute Respiratory Distress Syndrome and Respiratory Failure
- Sepsis +/- Septic Shock
- Disseminated Intravascular Coagulation
- Pulmonary Embolism
- Arrhythmias / Heart Failure

Use

COVID-19 Severity Assessment tool

ASK-ASSESS-SCORE-GRADE

https://bit.ly/2yaghXK

SEPSIS RED FLAGS

- New altered mental state
- RR ≥25 *or* new need for ≥40% O2
- Heart rate ≥130/min
- SBP <90mmHg
- No urine in last 12 hours (or <0.5ml/kg/hr)
- Lactate >2 (if >4 refer to critical care)
- **Coagulopathy**

FBC: Full blood count (same as CBC for Bangladesh), BCP: Biochemical profile (Liver function test, renal function test, electrolytes, Ca etc.)

COVID-19 SEVERITY SCORING TOOL

Full name:	DOB:	Sex: M F

START HERE:

ASK

		Score – circle only those that apply
Comorbidities	>2 comorbidities *or* Immunocompromised *or* Cardiovascular disease	2

COMORBIDITIES:
- ☐ Hypertension
- ☐ Diabetes
- ☐ COPD/Asthma
- ☐ TB
- ☐ Current smoker

IMMUNOCOMPROMISE:
- ☐ HIV/AIDS
- ☐ Severe malnutrition
- ☐ Chronic steroid use
- ☐ Immunosuppressive medication
- ☐ Ongoing cancer treatment

ASSESS

		Score – circle only those that apply
Mobility	With help	1
	Stretcher	2
Assessment	Difficulty breathing *or* Unresponsive	3
Temperature	≤ 35 **(Fahrenheit ≤95*, ≥101*)**	2
	≥ 38.5	3
Pulse	≤ 45	2
	≥ 110	3
Respiratory rate	≤ 9	2
	20 - 27	2
	≥ 28	4
Systolic BP	≤ 90	4
	≥ 160	2

SCORE

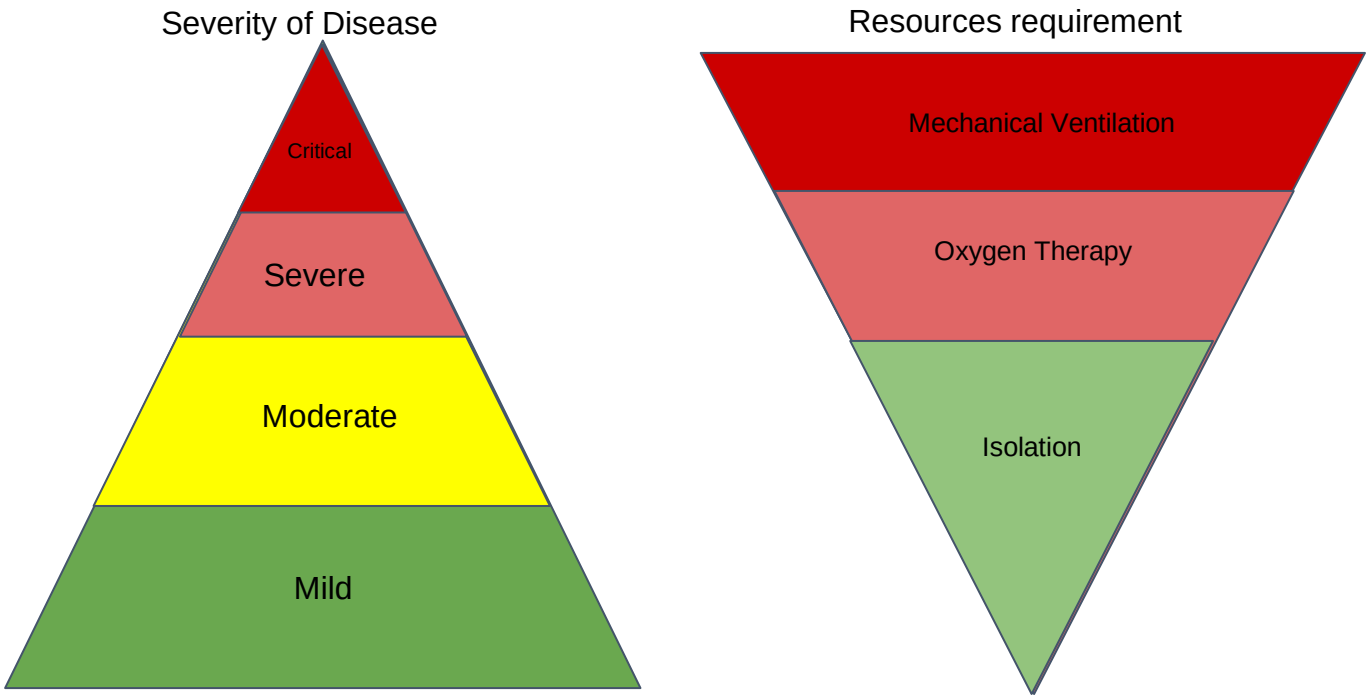
Total (add all those circled):

GRADE

1-4: GREEN MILD / MODERATE	5-7: YELLOW SEVERE	8+: RED CRITICAL
Less likely to need oxygen.	Less likely to need mechanical ventilation. Likely needs oxygen.	Probably needs mechanical ventilation.

Ref: Wallis et at Afr J Emerg Med. 2020 Apr 2 (doi: 10.1016/j.afjem.2020.03.002)

How is care of COVID-19 patients determined?



1-4: GREEN
MILD / MODERATE
Less likely to need Oxygen

Management – Non-Severe / Home
CATEGORY A PATIENTS
- Home (unless clinical judgement = NO)
- Analgesia and / or antipyretics as needed
- Oral fluids
- **Antibiotics:** If pneumonia or any other superadded infection- use antibiotic according to local guideline

RESPIRATORY SUPPORT

Oxygen Maintain Sats 92 - 96% (88-92% in known COPD with CO2 retention) Target lowered anticipating shortage of oxygen supply

Nasal Cannulae 1-5 litres/min

Hudson mask 5-10 litres/min

Non rebreathe mask – 10-15 litres/min

Reserve Fixed performance Venturi masks (40%-60%) for those at risk of hypercapnia

5-7: YELLOW
SEVERE
Less likely to need mechanical ventilation
Likely needs Oxygen

Management – Non-Severe / Hospital
CATEGORY B PATIENTS
- Admit unless judgement = discharge is safe
- Oxygen as indicated (target SaO2 92-96%; 88-92% if risk of type II respiratory failure)
- **DVT prophylaxis with LMWH**
- Escalation plan to HDU/ICU
- Oral/IV fluids to maintain urine output ≥0.5mL/Kg/hour; target = euvolaemia
- **Antibiotics:** If pneumonia or any other superadded infection- use antibiotic according to local guideline

Switch to oral ASAP when clinically indicate

FLUID MANAGEMENT
- AVOID vigorous fluid resuscitation – patients *rarely* shocked on admission (it may exacerbate ARDS)
- Assess fluid status and encourage oral rehydration where possible
- Consider gentle IV fluid to cover insensible losses (high Temp and RR) - max 2 litres/day

8+: RED
CRITICAL
Probably needs mechanical ventilation

Management – Severe/ Hospital/ Admit
CATEGORY C PATIENTS
- Oxygen as indicated (target SaO2 92-96%; 88-92% if risk of type II respiratory failure)
- Call critical care if respiratory distress
- **DVT prophylaxis with LMWH**
- Escalation plan to HDU/ITU
- Oral/IV fluids to maintain urine output ≥0.5mL/Kg/hour; target = euvolaemia
- **Antibiotics:** If pneumonia or any other superadded infection- use antibiotic according to local guideline

Switch to oral ASAP when clinically indicated

REMEMBER
- Antiviral or other immunomodulatory medications should only be used as part of a clinical trial, **NO TREATMENT HAS PROVEN BENEFIT YET**
- Empirical antibiotics for suspected bacterial pneumonia
- Corticosteroids should NOT generally be used (unless for co-existent indication)
- Prone positioning – see below
- **Thromboprophylaxis** – It is a hypercoagulable condition

PRONE POSITIONING IN COVID-19 Oxygenation in patients ventilated on Intensive Care improves significantly with intermittent prone positioning It is less clear whether this intervention improves symptoms or outcomes in pre-Critical Care patients but anecdotally it does

When to *consider* discussion with Critical Care Team?
- Severe acute respiratory distress
- Persistent hypoxia SaO2 <92% or (if done) PaO2 <8Kpa ***despite*** maximal oxygen
- Progressive hypercapnia
- Severe acidosis (pH<7.26) ***or*** Septic shock despite resuscitation ***or*** Lactate >4

When to switch from IV to oral antibiotics?
- Oral route intact (*Orals:*use antibiotic according to local guidelines)
- Objective improvement for 24 hours (e.g. RR decreasing, SaO2 increasing, etc.

When to discharge home?
- Modifiable risk factors have objectively improved for 48-72 hrs
- Ability to maintain oral intake and social conditions are acceptable
- Discharge after shower and in clean clothes
- Advise to seek attention if worsening
- Patients should not use public transport
- Patients should be advised to self-isolate for **7day or 14 days depending on severity of disease and immune status**
- Patients should be advised about hand and cough / sneezing, etc. hygiene

General schema for respiratory support in patients with COVID-19

Deterioration

Low flow nasal cannula
- Typically set at 1-6 liters/minute.

High flow nasal cannula

High flow and Titrate FiO2 to keep O2 saturation more than 90% and also consider awake proning

CPAP/BiPAP
- Titrate CPAP up as tolerated (in more severe hypoxemia might target ~15-18 cm)
- Viral filter.
- N95 mask & aerosol precautions.
- (Helmet interface likely ideal if available).

Awake pronation plus {High Flow Nasal Cannula or CPAP}
- If tolerated, awake patient may lie in a prone position (ideally for 12-18 hr/day).
- Limited to cooperative patients. *May be useful if access to ventilator is limited.*

Invasive mechanical ventilation
- Target tidal volumes of ~6 cc/kg.
- Permissive hypercapnia may be useful to allow for lung-protective settings.
- May use conventional lung-protective ventilation strategies or APRV.

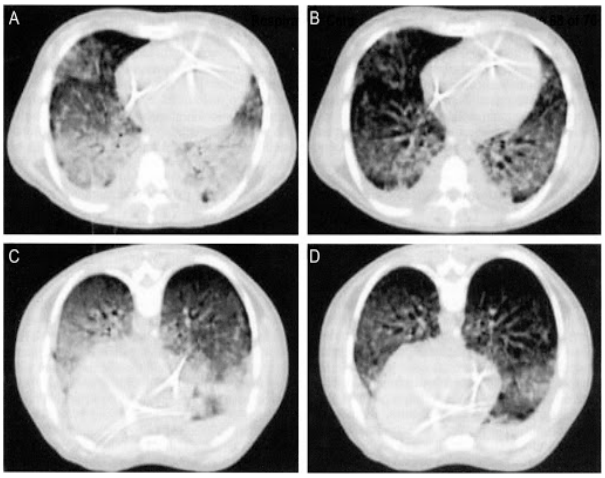
Prone positioning
- Consider for severe hypoxemia (e.g. PaO2/FiO2 << 150) that doesn't respond to ~12-24 hours of invasive ventilation with high mean airway pressure (e.g. high PEEP or APRV).

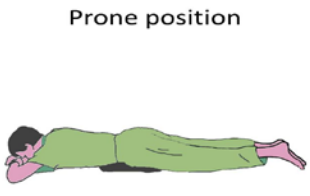
VV-ECMO
- Indications remain unclear.
- Early discussion with ECMO center or team may be advisable.

Recovery

The optimal strategy for respiratory support in COVID-19 remains unknown. Patients with more complex respiratory disease (e.g. COPD plus COVID-19) might benefit from BiPAP. Choice of CPAP vs. HFNC may vary depending to resources and patient preference. COVID appears to cause progressive micro-atelectasis, which responds well to CPAP.

-The Internet Book of Critical Care, by @PulmCrit





Effect of prone positioning

https://emcrit.org/ibcc/covid19/

5. Emergency Department Triage guideline for suspected COVID-19 Patients

Dr Lunik Rollei Sarder

Aim:

1. Effective early clinical diagnosis and initiation of treatment in any designated COVID-19 unit with standard or minimal or no investigation facilities.
2. Categorise suspected cases and early recognition of the level of care required.
3. Preventing transmission of disease to the community, other patients and care providers.

Settings:

1. **Isolated room for triage:** Assessment and documentation to take place in opposite corners of the room by different individuals to minimise contamination.
    a. Assessment corner: Assessment bed or trolley, nonfabric/synthetic mattress or cover.
    b. Documentation corner: Table, chair, patient notes, investigation forms, stationery for documentation ideally at least 6 ft away from assessment trolley.
    c. If possible to arrange separate entry or exit for the room and if not possible ensure free corridor for entry/exit to prevent droplet spread.
    d. If there is unidirectional airflow in the room, the arrangement should be such the flow maintain from documentation corner to assessment corner (source of air may be window/air conditioner)
    e. One patient to be allowed to enter the assessment room in any given time.
    f. No more than one accompanying attendant with the patient allowed in assessment room to prevent the spreading of disease.

2. **Required Team members:**(three persons)
    a. Assessment Doctor- one
    b. Nurse or Health care assistant to do observation - one
    c. Second doctor for documentation/ treatment prescription/ request investigations (not in contact of the patient)– one *(If the second doctor is not available, documentation can be done by Nursing staffs / Paramedics/ Medical assistants using simplified proforma attached).*

3. **Personal Protective Equipment:**
    a. Surgical face mask: for all team members (Need to be changed if moist or contaminated). N95, KN95, FFP2 mask and face shield for AGPs.
    b. Disposable polythene/ plastic apron for assessment doctor and nurse (Need to be changed in between every patient)
    c. Disposable gloves for assessing doctor and nurse. Need to wash hands in between every patient.
    d. Care provider must not touch face without washing hands with soap for at least 20 seconds to prevent fomite transmission.

4. **Prevent transmission:**
    a. Patients and attendants to wear surgical face masks all the time.
    b. The bed mattress must be cleaned with an antiseptic *(eg: i. 70% isopropyl alcohol with 0.5% chlorhexidine or ii. appropriate antiseptic approved by Drug Authority Bangladesh)* after assessing every patient (and change of bedsheet every time where applicable) to prevent fomite transmission.
    c. Patient notes to be hand into patient's attendant (for non-admitting patients)/ or healthcare worker transferring the patient to the ward (for admitting patients) in a plastic envelope and wiped frequently to prevent fomite transmission.
    d. Social distance should be maintained where possible without any exception.
    e. Regular hand wash to be ensured.

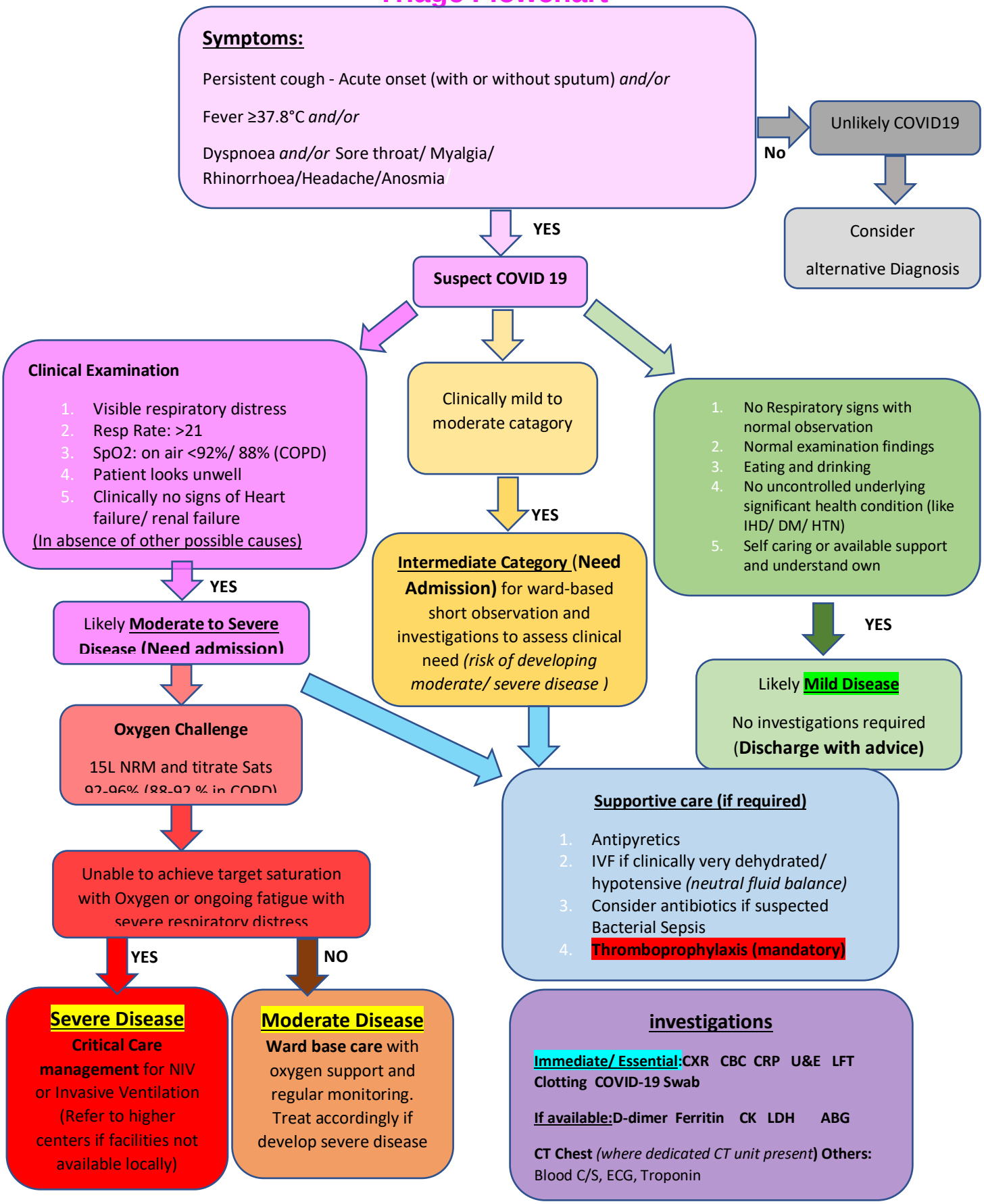
5. **Medical equipment:** Need to be wiped with an antiseptic *(eg. as above)* after assessing every patient.
    a. Blood pressure monitor
    b. Thermometer
    c. Pulse oximeter
    d. Stethoscope

References:

- Specialty guides for patient management during the coronavirus pandemic Clinical guide for the management of emergency department patients during the coronavirus pandemic 17 March 2020 Version 1
- World Health Organization. Infection prevention and control during health care when novel coronavirus (nCoV) infection is suspected. Accessed on March 20
- COVID-19: investigation and initial clinical management of possible cases, PHE 18th March 2020
- King's Critical Care – Evidence Summery Clinical management of COVID – 19
- Loss of sense of smell as marker of COVID-19 infection - ENTU

Emergency Department Triage guideline for suspected COVID-19 Patients for Universal Healthcare Settings in Bangladesh:

Triage Flowchart



Emergency Department Triage guideline for suspected COVID-19 Patients for Universal Healthcare Settings in Bangladesh: Triage Proforma

Name: **DOB/ Age:** **Next of Kin:** **Hospital Number:** **Phone number:**	**Address:**

Presenting Complaints *(Please tick as appropriate with duration)*

□ Fever …….. days □ Cough …….. days □ Sputum …….. days □ SOB …….. days □ Abdo pain ……days □ Diarrhoea …….. days	□ URT Symptoms ……days □ Myalgia/ Rhinorrhoea/Headache…….days □ Anosmia/hyposmia …….days □ Others:

Observations

RR	SpO_2	Temp	BP	HR	GCS

Examination

Respiratory Distress: Y / N, **Cyanosis: Y/ N ,** **Pale/ Clammy: Y/ N**

A:

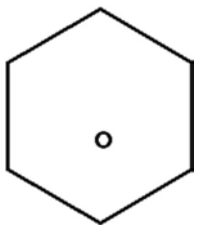
B:

C: CRT: Sec

JVP: Elevated/ Not

Oedema: Present (Up to) / Absent

Heart sounds: S1 + S2 +



D: GCS: ……/ 15 (E: / 4, M: / 6, V:

Neurology:

E:

Diagnosis /Management plan

Primary Dx: COVID19 ☐	Moderate or severe ☐	Intermediate category ☐	Mild disease ☐
	Oxygen ☐ Supportive Rx ☐ Investigation ☐ Ward/ ITU admission ☐	Supportive Rx ☐ Investigation ☐ Ward Admission ☐	Advice given ☐ No investigation ☐ Discharge home ☐
Secondary Diagnosis			

6.COVID-19 isolation and discharge pathways

Dr. Shakil Farid, Dr. Sarkar Haider, Dr. Zahed Ikram

Criteria for discharge of patients to own home:

1. Patient's clinical status is appropriate for discharge.
2. Patient should be afebrile (temp <37.8*C) for 48-72 hours and should have improved or recovering respiratory symptoms (except cough, which can persist for longer period).

Advice regarding isolation for discharged patients:

CASE STATUS	DESCRIPTION	GUIDANCE
Hospitalised suspected or confirmed COVID-19 cases	Patients who are hospitalised with suspected or laboratory confirmed COVID-19	**If testing capacity allows:** For a clinically recovered patient, two negative RT-PCR tests from respiratory specimens at 24 hours interval at least 8 days after onset of symptoms **If limited/no testing capacity:** * Patient can be discharged based on clinical criteria * Discharged patient should self-isolate at home until resolution of fever for at least 3 days and clinical improvement of other symptoms AND *until 8 days for mild cases or for 14 days for severe cases after the onset of symptoms
Hospitalised suspected or confirmed COVID-19 cases	Discharged to home where vulnerable adults present	Self-isolation until 8 days after the onset of symptoms have passed AND resolution of fever for at least for 3 days AND clinical improvement of other symptoms.
Hospitalised suspected or confirmed COVID-19 cases	Immunocompromised patients	Self-isolation until at least 14 days after symptom onset AND resolution of fever for at least 3 days AND clinical improvement of symptoms other than fever.
Non hospitalised Mild suspected or confirmed COVID-19 cases	Confirmed COVID-19 patients (Non health care workers) never hospitalised due to mild symptoms or asymptomatic presentation	These patients can end self-isolation 8 days after the onset of symptoms AND resolution of fever AND clinical improvement of other symptoms for at least for 3 days.
Non hospitalised Mild suspected or confirmed COVID-19 cases	Confirmed COVID-19 patients (Health care workers/law enforcement/firefighters) never hospitalised due to mild symptoms or asymptomatic presentation	End isolation after resolution of fever for at least 3 days AND after 8 days from the onset of symptoms have passed. Healthcare workers can return to work immediately after that, using a surgical mask during work hours until 14 days after the onset of symptoms have passed. If testing capacity allows, for a clinically recovered patient, two negative RT-PCR tests from respiratory specimens at 24 hours interval, at least eight days after onset of symptoms.
Family members and other categories of contacts of COVID-19 patient	Partners and spouses, family members and other persons sharing housing or taking care of COVID-19 patients	Caretakers of COVID-19 patients should self-quarantine for 14 days after last contact with sick spouse/relative. Caretakers or family members that develop symptoms in the 14-day quarantine period, should stay in home isolation for eight days after onset of symptoms AND until resolution of fever for at least three days AND clinical improvement of other symptoms.

Key points

Unless you are blessed with extensive testing capacity with rapid results –

1. Hospitalised suspected or confirmed COVID-19 cases - * Patient can be discharged based on clinical criteria

* Discharged patient should self-isolate at home until resolution of fever for at least 3 days and clinical improvement of other symptoms AND *until 8 days for non severe cases or for 14 days for severe cases after the onset of symptoms

2. Non hospitalised Mild suspected or confirmed COVID-19 cases - These patients can end self-isolation 8 days after the onset of symptoms AND resolution of fever AND clinical improvement of other symptoms for at least for 3 days.

3. Confirmed COVID-19 patients (Health care workers/law enforcement/firefighters) never hospitalised due to mild symptoms or asymptomatic presentation - End isolation after resolution of fever for at least 3 days AND after 8 days from the onset of symptoms have passed.

Healthcare workers can return to work immediately after that, using a surgical mask during work hours until 14 days after the onset of symptoms have passed.

4. Partners and spouses, family members and other persons sharing housing or taking care of COVID-19 patients - Caretakers of COVID-19 patients should self-quarantine for 14 days after last contact with sick spouse/relative.

Caretakers or family members who develop symptoms in the 14-day quarantine period, should stay in home isolation for eight days after onset of symptoms AND until resolution of fever for at least three days AND clinical improvement of other symptoms.

Ref:

European Centre for Disease Prevention and Control (ECDC). Novel coronavirus (SARS-CoV-2). Discharge criteria for confirmed COVID-19 cases – When is it safe to discharge COVID-19 cases from the hospital or end home isolation? 2020 [07 April 2020].

7. ICU Management Strategies

Dr Tasbirul Islam

Respiratory failure:

- It is conventionally defined by an arterial oxygen tension (PaO2) of <8.0 kPa (60 mmHg), an arterial carbon dioxide tension (PaCO2) of >6.0 kPa (45 mmHg) or both. **(Silent Hypoxia- Hypoxia without clinical symptoms, common in COVID-19)**
- Hypoxemic respiratory failure (type I) is characterized by an arterial oxygen tension (PaO2) lower than 60 mm Hg (<8 kPa) with a normal or low arterial carbon dioxide tension (PaCO2).
- Hypercapnic respiratory failure (type II) is characterized by a PaCO2 higher than 45 mm Hg (>6 kPa). Hypoxemia is common in patients with hypercapnic respiratory failure.

ARDS (Berlin definition):

- Acute onset <7 days
- Bilateral pulmonary infiltrate
- PaO2:FiO2 ration <300 on PEEP 5

ARDS severity	PaO2/FiO2	Mortality
Mild	>200, <300	27%
Moderate	>100, <200	32%
Severe	<100	45%

ARDSnet FiO2/PEEP table:

Lower PEEP/Higher FiO2

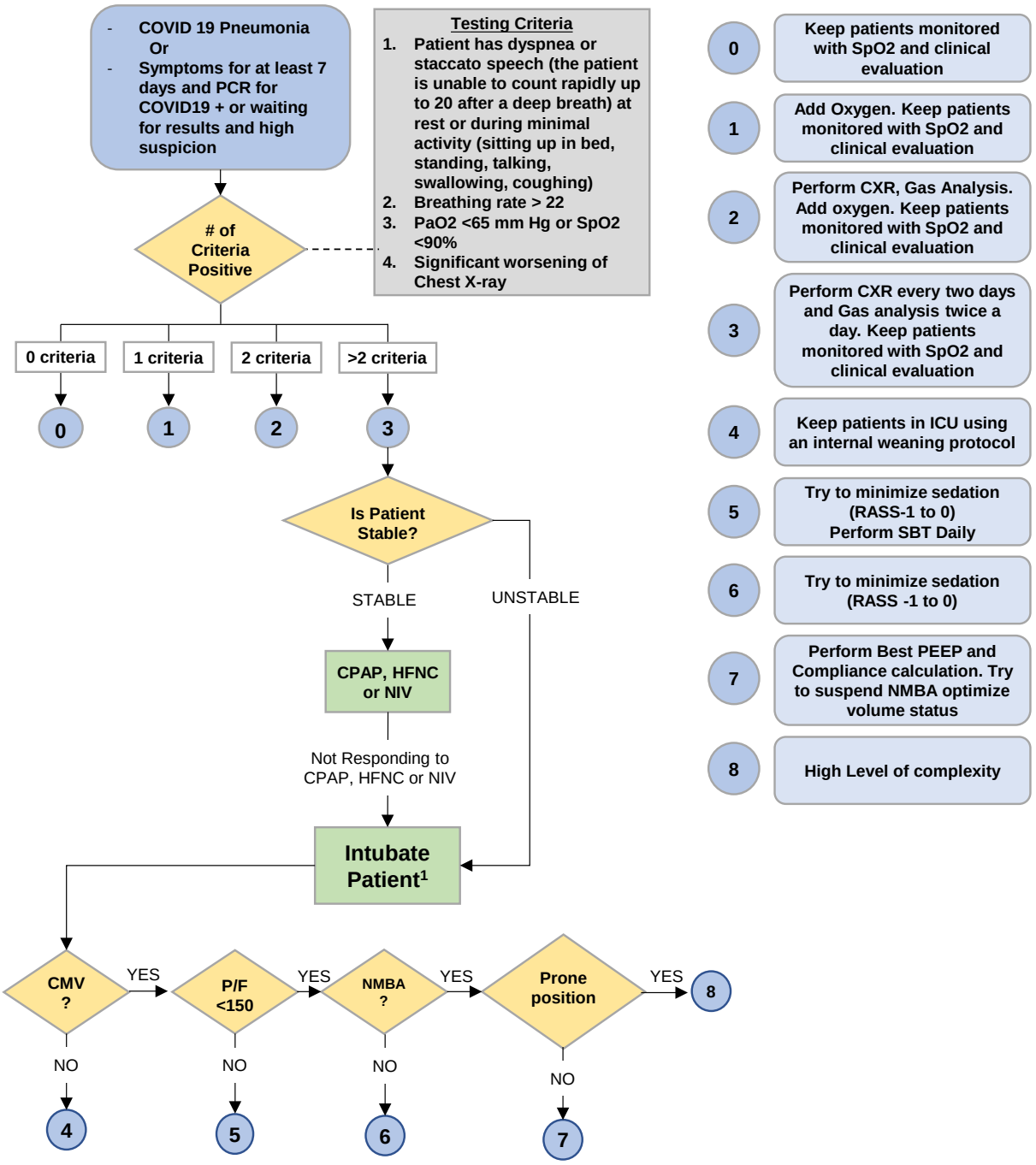
FiO2	0.3	0.4	0.4	0.5	0.5	0.6	0.7	0.7	0.7	0.8	0.9	0.9	0.9	1.0
PEEP	5	5	8	8	10	10	10	12	14	14	14	16	18	18-24

Higher PEEP/Lower FiO2

FiO2	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.5	0.5	0.5-0.8	0.8	0.9	1.0	1.0
PEEP	5	8	10	12	14	14	16	16	18	20	22	22	22	24

Resources:
http://www.ardsnet.org/files/ventilator_protocol_2008-07.pdf

BRESCIA COVID-19 RESPIRATORY SEVERITY SCALE - BCRSS



[1] Consider age, comorbidity and cognitive decline
[2] Inclusion criteria:
- Low risk of high SARS-COV2 viral load (no fever > 72h, Symptoms >7 days)
- IL-6 > 40 pg./ml or high plasmatic d-dimer and/or CRP and/or ferritin and/or fibrinogen.

Ref: Duca Et al Emerg Med Pract. 2020 Apr 16;22(5 Suppl):CD1-CD2

Go to this website for an online version of the flowchart.

https://www.mdcalc.com/brescia-covid-respiratory-severity-scale-bcrss-algorithm

In **SARS CoV-2 (Covid-19)** the pulmonary injury pattern is not entirely similar to ARDS, as hypoxia is prevalent and pulmonary compliance is generally high. In general, two categories of patients may be identified:

1. **High-pulmonary compliance patients with isolated viral pneumonia.**
    A) The main finding is hypoxic vasoconstriction, explaining the observed severe hypoxemia. In those patients, the major issue is related to perfusion, as lungs are inflated and increasing PEEP may not help.
    B) High PEEP and prone positioning do not lead to recruitment of collapsed areas, but they only adjust pulmonary perfusion.
    C) Pressure-Controlled, time-cycled ventilation may be a better choice to employ to improve oxygenation
    D) Respiratory rates should not exceed 20 breaths/min
    E) Tidal volumes generated may be much higher than 6 ml/kg (IBW) but should be tolerable as long as plateau pressure is maintained <30 cm H2O in normal BMI patients. May allow slightly higher plateau pressures based on BMI, chest wall thickness and other factors described in literature.
    F) Inverse Ratio Ventilation may be employed in view of above mechanics.
2. **Low-pulmonary compliance patients with lung injury pattern similar to traditional ARDS.**
    A) These may have concomitant bacterial or other co-infections or interstitial lung injury
    B) Standard ARDSnet strategy should be used for tidal volume, plateau pressure and PEEP goals

Approach considerations:

1- **Low flow O2 delivery devices:**
Nasal cannula (up to 6LPM and provide up to 50% FiO2; Simple mask (up to 10 LPM and provide up to 60% FiO2); Venturi mask (up to 15 LPM and provide 50% FiO2); Partial rebreather mask (15 LPM and provide 70% FiO2); Non rebreather mask (15 LPM and provide 100% FiO2)

2- **High flow delivery device:**
High Flow Nasal cannula (HFNC): up to 70 LPM and provide 100% FiO2
Advantages: Well tolerated, generate PEEP (1 PEEP for every 10L)

3- **Non-invasive positive pressure ventilation**:
CPAP: (Setting 5-20 cmH2O) and used for type I respiratory failure;
BiPAP (Setting EPAP 4-16 cm H2O, IPAP 10-20 cmH2O and minimum pressure support 4 cmH2O) and used for both type I and type II respiratory failure.
    Increase CPAP or EPAP for hypoxia
    Increase pressure support (IPAP-EPAP) for hypercapnia

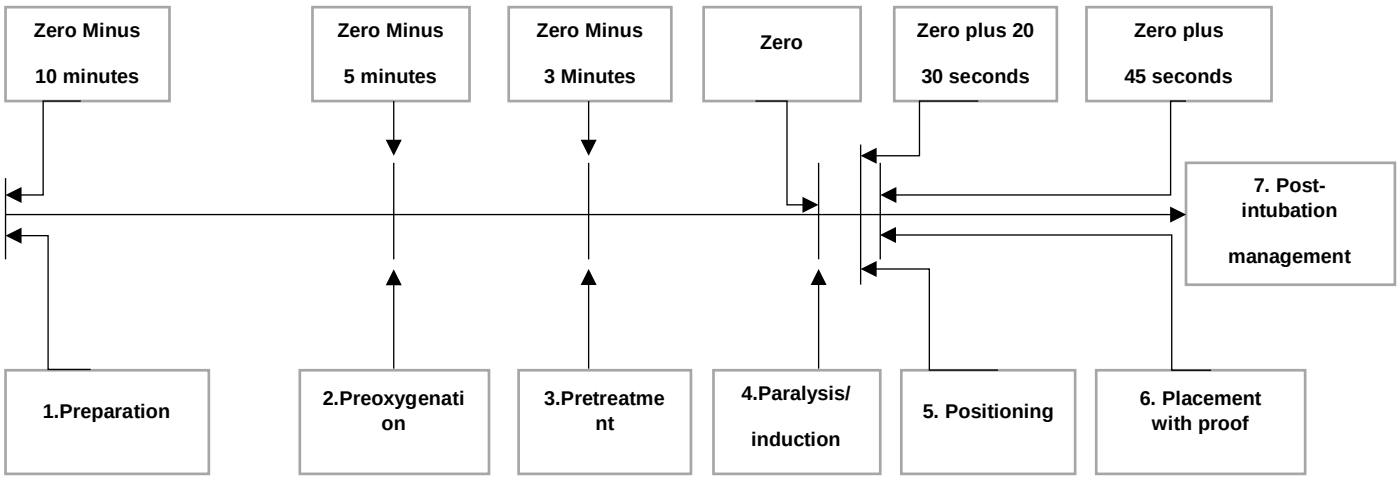
4- **Mechanical ventilation**.

5- **Pulmonary vasodilator:** Nitric oxide is a lipophilic gaseous molecule that readily diffuses across pulmonary membranes, causing localized vasodilatory effects in the pulmonary vascular bed. It is used to combat vasoconstriction, V / Q mismatching, arterial hypoxemia, and pulmonary hypertension associated with ARDS. NO improves oxygenation but doesn't have any effect on mortality.

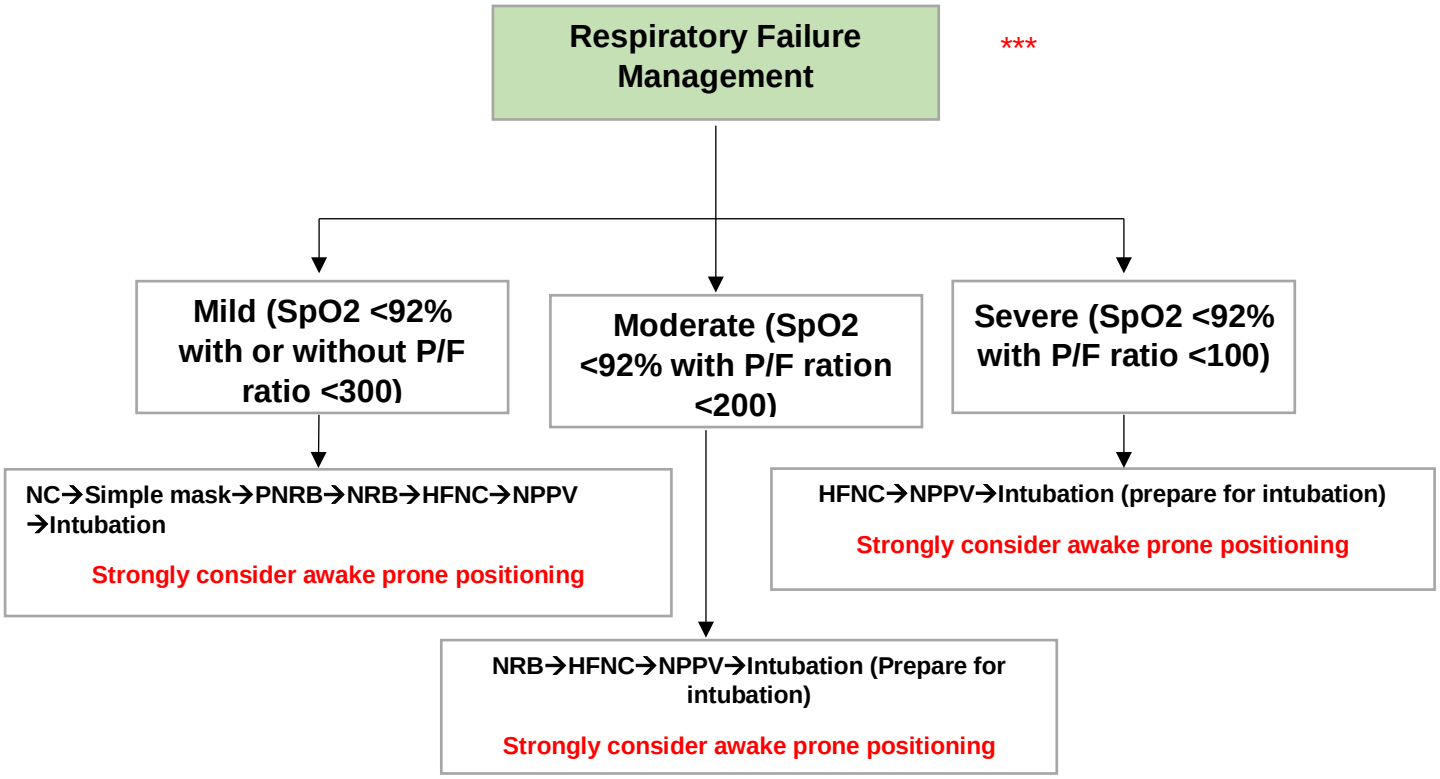
6- **ECMO**

Intubation Protocol	Extubation Protocol
• It's an aerosol generating procedure • Use negative pressure or single room • Use proper PPE including face shield/goggles, N95 or KN95 • Bed-up-head -elevated position • Avoid bagging • Use exhalation HME filter if bagging required • Adequate preoxygenation with NRB • Have vasopressors prepared prior to induction Rapid sequence intubation (RSI) using adequate sedation and neuromuscular blockade. • Video laryngoscopy over direct laryngoscopy • Post-intubation and ventilation should only be initiated once ETT cuff is inflated.	• After decision is made to extubate, huddle with nurses to have game plan and back up options • It is aerosol generating procedure • Nurse turns off tube feeding. • All should wear PPE including N95, + face shield /goggles . • Airway management equipment outside the room for reintubation • Place surgical mask on patient's face above ETT. • Feeding tube is removed first, mouth and ETT suctioned • Nasal cannula with O2 placed before extubation • Ventilator shut off first • ETT removed and at same time mask pulled down over patient's mouth

Timeline of Rapid Sequence Intubation



1. **Preparation** – Assemble all necessary equipment, drug, etc.;
2. **Preoxygenation** – Replace the nitrogen in the patient's functional reserve with oxygen – "nitrogen wash out – oxygen wash in."
3. **Pretreatment** – Ancillary medications are administered to mitigate the adverse physiologic consequences of intubation;
4. **Paralysis with induction** – Administer sedative induction agent via IV push, followed immediately by administration of paralytic via IV push;
5. **Positioning** – Position patient for optimal laryngoscopy; Sellick's maneuver, if desired, is applied now;
6. **Placement with proof** – Assess mandible for flaccidity; perform intubation, confirm placement;
7. **Post-intubation management** – Long-term sedation/analgesia/paralysis as indicated;



***
In USA HFNC is preferred if patient require NC>6 LPM. HFNC is not widely available in Bangladesh;

Awake Proning:

While proning has been used with good result in patient with ARDS but recent anecdotal reports showed benefit in non-intubated patient. A CARP (COVID Awake Repositioning/Proning Protocol) has been suggested.

Early intubation:

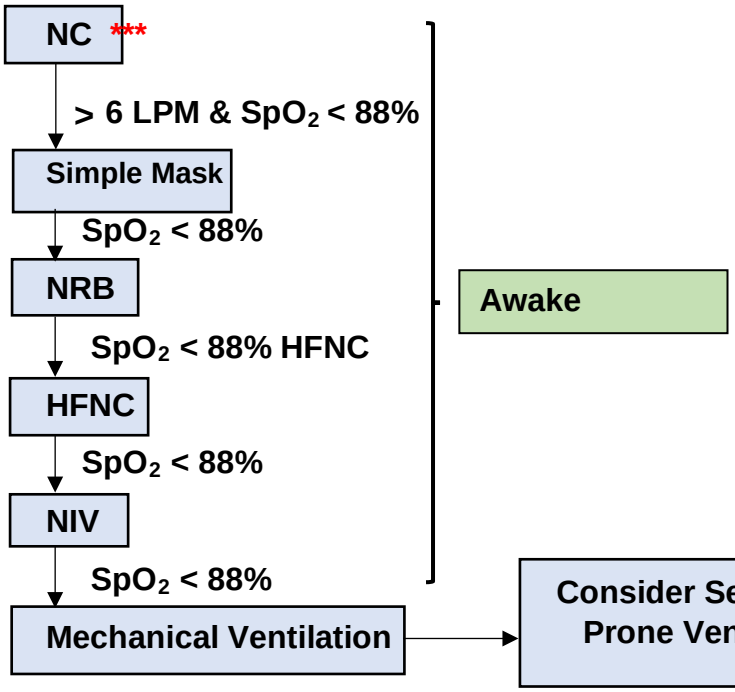
Early intubation is discouraged in COVID 19 patient. There is no evidence that early intubation instead of HFNC or NIV improves outcome. Data from China, Italy and USA showed significantly higher mortality rate in intubated patient.

Aerosol Generating Procedures (AGPs)

- Intubation
- Extubation
- Bronchoscopy
- Nebulizer
- NIV
- Open Suction
- Tracheostomy
- CPR
- AMBU/manual bagging

Resources:

Practical recommendations for critical care and anesthesiology teams caring for novel coronavirus (2019-nCoV) patients. Can J Anesth. https://doi.org/10.1007/s12630-020-01591-x



Goal of therapy:

- PaO2/FiO2 ratio >150
- PaO2 >55 mmHg
- SpO2 >88%
- pH >7.30
- Plateau pressure <30 cmH2O
- Driving pressure (Plateau pressure - PEEP) <15

Consider Sedation + Paralysis + Prone Ventilation (12-16 hrs)

Initial Mechanical Ventilation Setting:

- **Pressure Controlled Ventilation for high lung compliance patients**

o PC 15 to 25cmH2O range(above PEEP)
o Plateau pressure <30cmH2O
o Respiratory Rate <20/min
o Inverse Ratio Ventilation may be used

- **ARDS NET Strategy for low lung compliance patients**

o TV 4-8 ml/kg IBW based
o PEEP Strategy as per ARDSnet PEEP/FiO2Table
- Optimize sedation & analgesia
- Consider Recruitment Maneuver
- Diuresis if clinically indicated

o UOP≥0.5ml/kg/hr. with MAP≥60mmHg

PLATEAU PRESSURE GOAL: ≤ 30 cm H2O:

- Check Pplat (0.5 second inspiratory pause), at least q 4h and after each change in PEEP or VT.
- If Pplat > 30 cm H2O: decrease VT by 1m/kg steps (minimum= 4 ml/kg)
- If Pplat < 25 cm H2O and VT < 6 ml/kg, increase VT by 1 ml/kg until Pplat > 25 cm H2O or VT= 6 ml/kg.
- If Pplat <30 and breath stacking, or dys-synchrony occurs: may increase VT in 1 ml/kg increments to 7 or 8 ml/kg if Pplat remains <30 cm H2O;

***
In USA HFNC is preferred if patient require NC>6 LPM. HFNC is not widely available in Bangladesh; NIV should be used in negative pressure or single room.

Recommended Induction Agents and Dosing:

MED	DOSE	RANGE
Propofol	1.5 mg/kg	1-2 mg/kg
Ketamine	2 mg/kg	1-2 mg/kg
Midazolam	0.3 mg/kg	0.2-0.3 mg/kg
Fentanyl	4 mcg/kg	2-5 mcg/kg
Etomidate	0.3 mg/kg	0.2-0.6 mg/kg
Succinylcholine	1 mg/kg	1-2 mg/kg
Rocuronium	1 mg/kg	1-2 mg/kg

Caution: Propofol may increase triglyceride.

Recommended Labs:

On admission: COVID-19 testing; CBC with differential; LFT; Urea; Creatinine; CRP; D-dimer; Ferritin; LDH; Troponin and BNP.

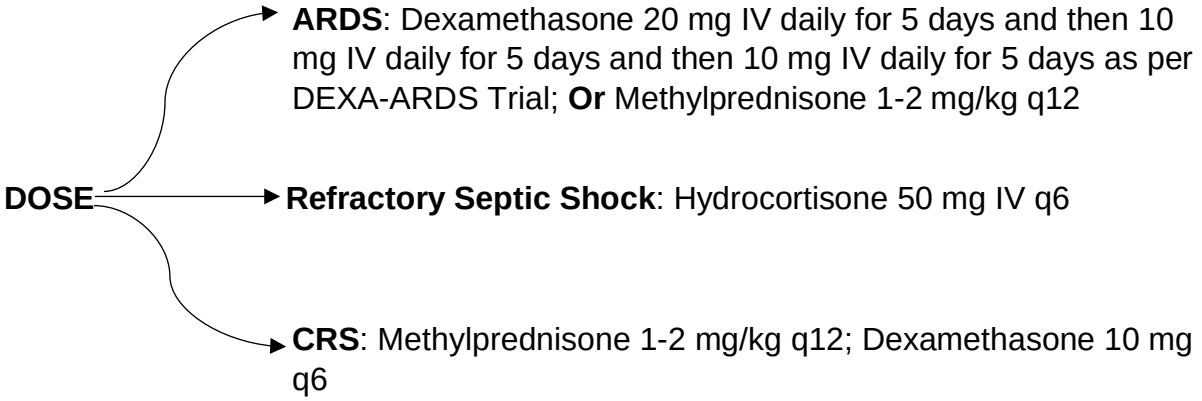
Every 72 hours: CBC with differentials, CRP, D-dimer, Urea, Creatinine and Troponin

Daily lab as needed.

MEDICATION THERAPIES and SUPPORTIVE CARE IN ICU:

Steroid:

1. Systemic steroids should in general be **AVOIDED.**
2. SCCM and ESICM recommend steroid in ARDS.
3. SCCM and ESICM recommend steroid in severe pneumonia.
4. Surviving sepsis campaign recommend steroid in septic shock.
5. ADRENAL trial in 2018 showed decrease ventilator and ICU day with steroid but no mortality benefit.
6. APPROCCHSS in 2018 trial showed mortality benefit.
7. DEXA-ARDS trial showed (P/F ratio <200) showed mortality benefit.
8. Small Chinese retrospective non RCT trials in COVID-19 patient showed decrease ventilator day and mortality benefit.
9. Dose for ARDS:



Resources:

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6400118/
Am J Respir Crit Care Med. 2017 May 1;195(9):1253-1263
Surviving Sepsis Campaign: Guidelines on the Management of Critically Ill Adults with Coronavirus Disease 2019 (COVID-19)
https://clinicaltrials.gov/ct2/show/NCT01731795
J Infect. April 2020. doi:10.1016/j.jinf.2020.03.039
JAMA Intern Med. March 2020. doi:10.1001/jamainternmed.2020.0994

TOCILIZUMAB:

(Based on available data, the evidence for benefit is weak)

1. COVID-19 positive
2. All of the following respiratory findings:
   a. Abnormal chest imaging consistent with COVID-19
   b. Rapidly worsening gas exchange/respiratory status over 24-48 hours and requiring >6 L/min O2 or on mechanical ventilation
3. Absence of systemic bacterial or fungal co-infection
4. High clinical suspicion for cytokine release syndrome supported by elevated inflammatory markers (e.g., ferritin >600 ug/mL; D-dimer >1.0 mg/L) and clinical declines

Dose:

- Adult Dosing (≥18 years): 8 mg/kg (max: 800 mg/dose)
- Pediatric Dosing (<18 years): Wt <30 kg—12 mg/kg; Wt >30 kg—8 mg/kg (Max: 800 mg/dose)
  Duration: 1 dose; Can repeat in 12 hours if no clinical improvement. Max 2 doses.

Resource:
http://www.med.umich.edu/asp/pdf/adult_guidelines/COVID-19-treatment.pdf

Convalescent plasma: (Must meet all criteria):

1. Age >18 years old
2. Positive SARS-CoV-2
3. Admitted in ICU
4. Informed consent
5. Severe or life threatening disease defined by at least one of the following:

   - Increasing dyspnea
   - Respiratory rate >30
   - SpO2 <88%
   - P/F ratio <300
   - Lung infiltrate >50% within 24-48 hours
   - Septic shock
   - Multi organ failure

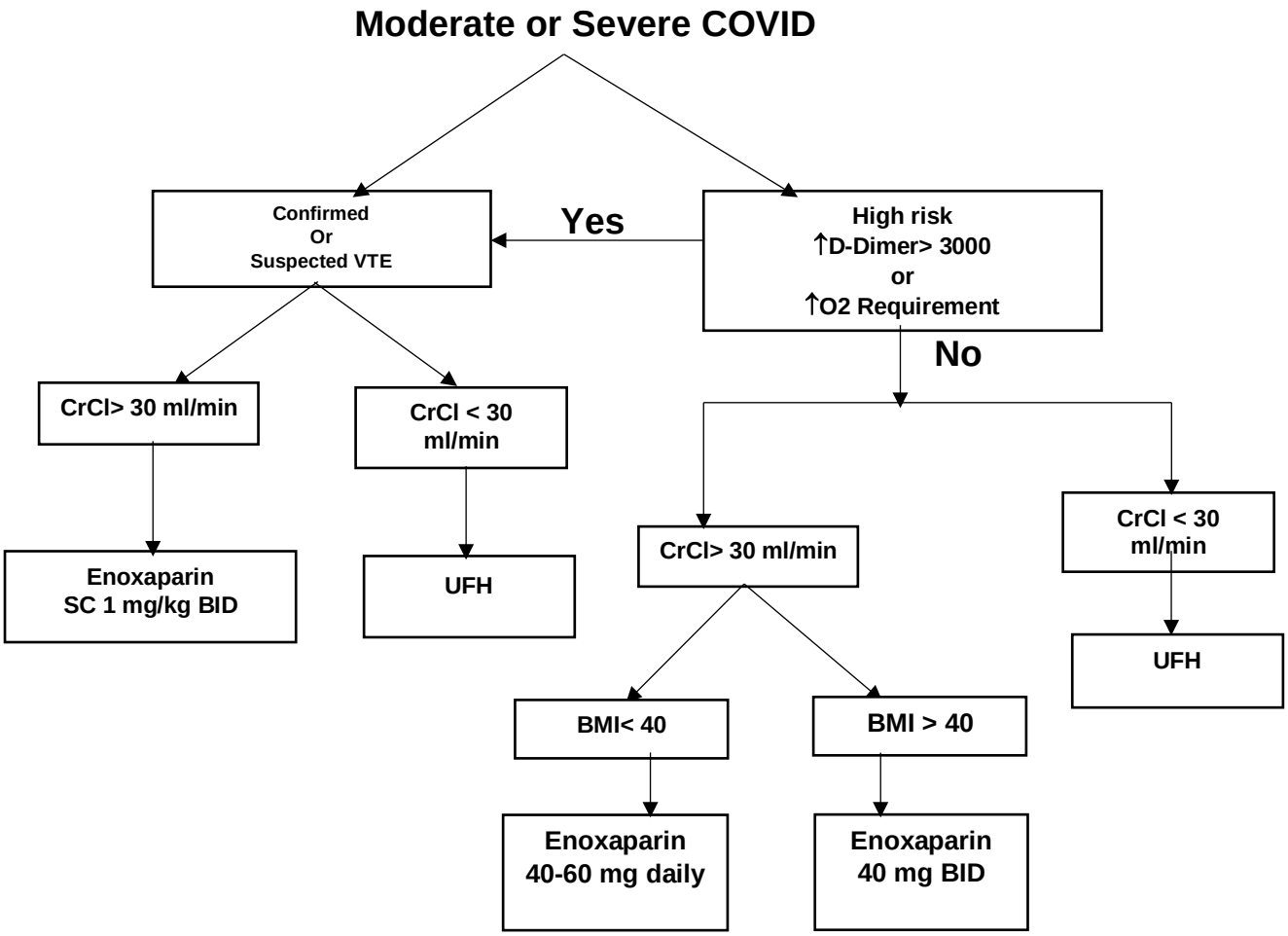
Resource:
https://team.myiuhealth.org/COVID-19

Remdesivir:

Dose: 200 mg IV x 1 day, then 100 mg daily x 4-9 days (total duration 5-10 days);

Indication:
- Hypoxia on O2 or vent;

Exclusion:
- Multi organ failure
- Shock



***UFH:** Unfractionated Heparin

Inclusion: All admitted patients with moderate to severe COVID-19

Exclusion: High risk of bleeding as judged by treating physician, older age, advanced liver or renal disease, previous h/o bleeding;

Critically or Severely ill patients should be discharged with DOAC X 4 weeks confirmed or suspected VTW should be discharged with DOAC X 3-6 months

Baseline and daily: CBC, PT/PTT, D-dimer

Oral anticoagulant should be switched to LMWH or UFH on admission

Empiric antibiotics: Consider strongly as per local antibiogram.

In patients with COVID-19 and hypoxic respiratory failure requiring mechanical ventilation, superinfection is reasonably common in this population. 15% of hospitalized COVID-19 patients developed a secondary bacterial infection and the median time to secondary bacterial infection was 17 days (13 to 19 days). Of all COVID-19 patients in their cohort, 79% had a WBC.

Resource:
https://www.sccm.org/getattachment/Disaster/SSC-COVID19-Critical-Care-Guidelines.pdf

Sedation:

1. Target RASS 0 to -2
2. Target RASS -3 or -4 if continuous NMBA is needed.
3. Fentanyl is the first choice (address pain and sedation).
4. Not routinely utilizing ketamine infusions over other agents such as propofol or midazolam.
5. Dexmedetomidine shouldn't be used as first agent.
6. Propofol and hypertriglyceridemia: Increased risk due to probable HLH-type syndrome monitor CK, acidosis, and early checking of triglycerides.

Resources:
SCCM PADIS Guidelines 2018
https://journals.lww.com/ccmjournal/Fulltext/2018/09000/Clinical_Practice_Guidelines_for_the_Prevention.29.aspx

Neuromuscular blockade:

1. Considerations for NMBA
2. Consider intermittent boluses first and assess for efficacy
3. If continuous infusion is needed due to persistent Dyssynchrony or profound hypoxia
4. Monitor train of four (TOF) to assist in titrating to lowest effective dose
5. Complications of NMBA:

    a) Corneal abrasion and the need of lubricating eye ointment

    b) Prolonged weakness

    c) Higher incidence thrombosis and the need for DVT prophylaxis

Resource:
Surviving Sepsis Campaign: Guidelines on the Management of Critically Ill Adults with Coronavirus Disease 2019 https://www.esicm.org/wp-content/uploads/2020/03/SSC-COVID19-GUIDELINES.pdf

Hemodynamic support:

1. Target MAP>60, instead of >65.
   2. Consider balanced crystalloid fluid (Ringer lactate, Hartmann's) over normal saline (higher incidence of AKI) and colloid.
   3. Fluid sparing strategies and dynamic measures like PLR, Lactate, capillary refilling time to assess fluid status/responsiveness.
   4. Conservative over liberal fluid strategy.
   5. Norepinephrine as the first-line vasoactive agent, over other agents.
   6. If norepinephrine is not available, either vasopressin or epinephrine as the first-line vasoactive agent, over other vasoactive agents.
   7. Vasopressin as a second-line agent over increasing norepinephrine.
   8. If there is evidence of cardiac dysfunction and persistent hypoperfusion despite fluid resuscitation and norepinephrine, add dobutamine, over increasing norepinephrine dose.
   9. Refractory shock add low-dose corticosteroid therapy ("shock-reversal"), over no corticosteroid therapy (IV Hydrocortisone 50 mg q6).

   Resource:
   https://www.sccm.org/getattachment/Disaster/SSC-COVID19-Critical-Care-Guidelines.pdf

Feeding strategies (Nutrition):

1. Early enteral feeding within 24-48 hours is helpful.
   2. Starting feeds at 25-50% caloric goal and increasing to 100% over 3-7 days is reasonable.
   3. Use trophic or trickle diet (10-20 cc/hour) in hemodynamically or respiratory unstable patient
   4. Don't check gastric residual volumes (GRVs) routinely.
   6. Consider post pyloric tube placement or prokinetics in a patient with high GRVs or vomiting.
   7. Avoid post pyloric feeding in unstable patient (higher incidence of non-occlusive bowel necrosis)

   Resources:
   Surviving Sepsis Campaign: Guidelines on the Management of Critically Il Adults with Coronavirus Disease 2019 https://www.esicm.org/wp-content/uploads/2020/03/SSC-COVID19-GUIDELINES.pdf
   2019 ESPEN guidelines and 2016 SCCM/ASPEN guidelines

Blood glucose (BG):

1. Target BG 140-180 mg/dl.
2. Use sliding scale initially but change to drip if requiring higher insulin or BG is not well controlled.

Vitamin C, Thiamine and Vit B12:

Recent studies (CITRIS-ALI and VITAMINE trial) showed vitamin C did not significantly improve organ dysfunction scores or alter markers of inflammation and vascular injury. IV Vitamin C can give falsely high finger prick glucose level and may cause overuse of insulin with hypoglycemic episode. **Not recommended.**

Resources:

JAMA. 2019;322(13):1261-1270. doi:10.1001/jama.2019.11825
JAMA. 2020;323(5):423-431. doi:10.1001/jama.2019.22176

8. Evidence for specific pharmacological treatment for COVID-19

Dr Sarah Choudhury, Dr Zahed Ikram

No proven effective therapy for this virus has been found to date. Below we go through some of the common drugs that are being used in various trials-

Remdesivir –

Remdesivir is a broad spectrum antiviral drug developed by Gilead Sciences. It was originally developed for Ebola and Marburg virus diseases but was ineffective against these.

On 1 May 2020, the U.S. FDA granted Emergency Use Authorisation (EUA) for remdesivir to be used for severe Covid-19.

The FDA defined severe disease is defined as patients with low blood oxygen levels or needing oxygen therapy or more intensive breathing support such as a mechanical ventilator.

The FDA determined that it was reasonable to believe that remdesivir may be effective in treating COVID-19, and that, given there are no adequate, approved, or available alternative treatments, the known and potential benefits to treat this serious or life-threatening virus currently outweigh the known and potential risks of the drug's use.

Side effects of remdesivir include: increased levels of liver enzymes, which may be a sign of inflammation or damage to cells in the liver; and infusion-related reactions, which may include low blood pressure, nausea, vomiting, sweating, and shivering.

The issuance of an EUA is different than FDA approval. In determining whether to issue an EUA, the FDA evaluates the available evidence and balances any known or potential risks of any unproven products with any known or potential benefits of making them available during the emergency.
Coronavirus (COVID-19) Update: FDA Issues Emergency Use Authorization for Potential COVID-19 Treatment

The trial that the EUA was based on was the Adaptive Covid-19 Treatment Trial (ACTT), sponsored by the National Institute of Allergy and Infectious disease (NIAID), part of the National Institutes of Health.

An independent data and safety monitoring board (DSMB) overseeing the trial met to review the data and noted that remdesivir was better than placebo from the perspective of the primary end point, time to recovery. Recovery was defined as being well enough for hospital discharge or returning to normal activity level. The median time to recovery was 11 days compared to 15 days for those on placebo. The results also suggested a survival benefit, but the difference was not statistically significant (niaid.nih.gov).

On the basis of this evidence, the NIH decided to terminate the trial prematurely as they decided that they had enough evidence regarding the primary end point – time to recovery. However, this does mean that the question of mortality benefit remains unanswered (this was one of 28 secondary end points). The investigators have also not defined what they mean by 'severe Covid-19', as all hospitalised Covid-19 patients were eligible for inclusion.

Inclusion Criteria:

- Adults hospitalized with SARS-CoV2

  (subgroups – "Hospitalised, requiring supplemental oxygen" and "Hospitalised, not requiring supplemental oxygen")

Adult dosing –200 mg as a single dose intravenously on day 1, followed by 100 mg once daily for a total duration of 5 to 10 days

(clinicaltrials.gov)

On April 29, 2020, Gilead Sciences also issued a press release stating that the SIMPLE trial had concluded that there was no difference between the 5 and 10 day course.

https://www.gilead.com/news-and-press/press-room/press-releases/2020/4/gilead-announces-results-from-phase-3-trial-of-investigational-antiviral-remdesivir-in-patients-with-severe-covid-19

A previous trial with remdesivir in Wuhan with the primary end point of time to recovery was inconclusive, perhaps because it was underpowered. (Wang, Zhang, Du G; remdesivir in adults with severe COVID-19: A randomised, double-blinded, placebo controlled, multicentre trial. Lancet April 29 2020)

The Directorate general of Drug Administration in Bangladesh has given authorisation to pharmaceutical companies in Bangladesh to produce remdesivir. Some of these companies are in the process of importing the raw materials – the source is not known. The Drug Administration have not yet decided when to make the drug available for clinical use, as they are waiting for the trial results to be available in full.

Hydroxychloroquine-

1. News briefing from China reported chloroquine was successfully used to treat a series of over 100 COVID-19 cases- claimed improved radiologic findings, enhanced viral clearance and reduce disease progression.

Validity of these claims are doubtful as clinical trial design and outcome data not presented or published for peer review.

2. A French study carried out with a very small sample size and six patients receiving hydroxychloroquine and azithromycin, several patients had to be removed due to early recession of treatment resulting from critical illness or intolerance of medications so not enough evidence to prove any benefit.

3. China-prospective study of 30 patients randomised to hydroxychloroquine plus standard of care (supportive care, interferon and other antivirals) or standard care alone-no difference in virologic outcome.

4. FDA have reviewed case reports in the FDA Adverse Event Reporting System database, the published medical literature, and the American Association of Poison Control Centers National Poison Data System concerning serious heart-related adverse events and death in patients with COVID-19 receiving hydroxychloroquine and chloroquine, either alone or combined with azithromycin or other QT prolonging medicines. Adverse events were reported from the hospital and outpatient settings for treating or preventing COVID-19, and included QT interval prolongation, ventricular tachycardia and ventricular fibrillation, and in some cases death. FDA was continuing to investigate these safety risks in patients with COVID-19 and will communicate publicly when more information is available.

Lopinavir/Ritonavir and other retrovirals-

Early reports of above for treatment of COVID-19, mostly case reports and small retrospective, non-randomised cohort studies.
Cao and Colleagues- Open labelled RCT, in 199 patients comparing Lopinavir-Ritonavir with standard care. This showed no difference in time to improvement or difference in viral clearance or 28 day mortality.

Ribavirin-

Inconclusive data and produces significant dose dependent haematologic toxicity (5)

Oseltamivir-

No role in management of COVID-19 (12). It has been found to be useful only for influenza.

Favipiravir (Avigan)-

This is being manufactured in Bangladesh.
Influenza drug currently in phase III trial in Japan and USA. Previous trial in China was inconclusive due to poor trial design. Results expected in July 2020.

Umifenovir-

A non-randomised study in China on 67 patients showed lower mortality and higher discharge rates, now ongoing RCTs in China to evaluate this.

Interferon alpha and beta-

No animal or human data exist to recommend use for COVID-19, and it remains to be seen whether they confer protection for patients already taking them for other indications.

Corticosteroids-

Observational studies in patients with SARS and MERS reported no associations of corticosteroids with improved survival but demonstrated an association with delayed viral clearance from the respiratory tract and blood and high rates of complications including hyperglycaemia, psychosis and avascular necrosis. It is more useful in secondary bacterial infection rather than viral pneumonia.

The potential harms and lack of proven benefit for corticosteroids cautions against their routine use in patients with COVID-19 outside an RCT unless a concomitant compelling indication, such as chronic obstructive pulmonary disease exacerbation or refractory shock exists.

Invermectin –

This is an anti-parasitic drug. There is no evidence that it is effective in the treatment of Covid-19.

Anti-cytokine or Immunomodulatory agents-

The underlying pathophysiology of significant organ damage in the lungs and other organs is caused by an amplified immune response and cytokine release, or “cytokine storm.” Tocilizumab, a monoclonal antibody IL-6 receptor antagonist, has approval from US FDA to treat RA and cytokine release syndrome following chimeric antigen receptor T-cell therapy. Given this experience, tocilizumab has been used in small series of severe COVID-19 cases with early reports of success.

Sarilumab (Kevzara) is also in a trial in critically ill Covid19 patients.

Convalescent plasma -

Another potential therapy for COVID-19 is the use of convalescent plasma. The rational being that antibodies from recovered patients may help with both free virus and infected cell immune clearance. A world-wide safety and efficacy trial in being done in seriously ill patients. This is discussed further in page the ‘ **28. Future directions**’ chapter.

Conclusion:

As Covid19 is a new disease and most patients make a full recovery, use of experimental drugs outside of trials is not recommended. The likelihood is that unless administered within strict trial protocols, these drugs will harm some patients. Anecdotal evidence in this situation is not useful as most of these patients recover with supportive treatment or with no intervention.
Remdesivir has EUA in USA for seriously ill hospitalized Covid-19 patients. Preliminary reports show that it reduces time to recovery but there was no significant mortality benefit.

References:

- GaoJ,TianZ,YangX.Breakthrough: chloroquine phosphate has shown apparent efficacy in treatment of COVID-19 associated pneumonia in clinical studies. *Biosci Trends*. 2020; 14(1):72-73. doi:10.5582/bst.2020.01047
- GautretP,LagierJC,ParolaP,etal. Hydroxychloroquine and azithromycin as a treatmentofCOVID-19:resultsofanopen-label non-randomized clinical trial. *Int J Antimicrob Agents*. Published online March 20, 2020. doi:10.1016/j. ijantimicag.2020.105949
- ChenJ,LiuD,LiuL,etal.Apilotstudyof hydroxychloroquine in treatment of patients with common coronavirus disease-19 (COVID-19).
  J Zhejiang Univ (Med Sci). Published online March 6, 2020. doi:10.3785/j.issn.1008-9292.2020.03.03
- CaoB,WangY,WenD,etal.Atrialof lopinavir-ritonavir in adults hospitalized with severe COVID-19. *N Engl J Med*. Published online March 18, 2020. doi:10.1056/NEJMoa2001282
- StockmanLJ,BellamyR,GarnerP.SARS: systematic review of treatment effects. *PLoS Med*. 2006;3(9):e343. doi:10.1371/journal.pmed.0030343
- WangZ,YangB,LiQ,WenL,ZhangR.Clinical Features of 69 cases with coronavirus disease 2019 in Wuhan, China. *Clin Infect Dis*. Published online March 16, 2020. doi:10.1093/cid/ciaa272
- KalilAC.TreatingCOVID-19—off-label drug use, compassionate use, and randomized clinical trials during pandemics. *JAMA*. Published March 24, 2020. doi:10.1001/jama.2020.4742
- NIH news release 29/4/20. NIH Clinical Trial shows Remdesevir accelerates Recovery from Advanced Covid-19
- StockmanLJ,BellamyR,GarnerP.SARS: systematic review of treatment effects. *PLoS Med*. 2006;3(9):e343. doi:10.1371/journal.pmed.0030343
- ArabiYM,MandourahY,Al-HameedF,etal; Saudi Critical Care Trial Group. Corticosteroid therapy for critically ill patients with Middle East respiratory syndrome. *Am J Respir Crit Care Med*. 2018;197(6):757-767. doi:10.1164/rccm.201706- 1172OC
- MehtaP,McAuleyDF,BrownM,SanchezE, Tattersall RS, Manson JJ; HLH Across Specialty Collaboration, UK. COVID-19: consider cytokine storm syndromes and immunosuppression. *Lancet*. 2020;395(10229):1033-1034. doi:10.1016/S0140- 6736(20)30628-0

- ChenL,XiongJ,BaoL,ShiY.Convalescent plasma as a potential therapy for COVID-19. *Lancet Infect Dis*. 2020;20(4):398-400. doi:10.1016/ S1473-3099(20)30141-9
- James M. Sanders, PhD, PharmD; Marguerite L. Monogue, PharmD; Tomasz Z. Jodlowski, PharmD; James B. Cutrell, MD Pharmacologic Treatments for Coronavirus Disease 2019 (COVID-19) A Review. *JAMA*. doi:10.1001/jama.2020.6019 Published online April 13, 2020.
- https://www.fda.gov/safety/medical-product-safety-information/hydroxychloroquine-or-chloroquine-covid-19-drug-safety-communication-fda-cautions-against-use
- https://www.jwatch.org/na51293/2020/04/09/favipiravir-potential-antiviral-covid-19
- https://academic.oup.com/ofid/article/7/3/ofaa102/5810740
- https://www.europeanpharmaceuticalreview.com/news/116003/global-trial-to-evaluate-kevzara-sarilumab-as-covid-19-therapy-initiated/

9.Thromboprophylaxis and management of coagulopathy in COVID-19

Dr Mehedi Hasan

1. Introduction:

COVID-19 is a systemic infection caused by a novel coronavirus (SARS-CoV-2), with a significant impact on the hematopoietic system and haemostasis.

Current evidence suggests that patients affected by this novel coronavirus are more prone to venous thromboembolism (VTE), mainly due to hypoxia, systemic inflammatory response and prolonged immobilization. Intensive care procedures, such as mechanical ventilation or central venous cannulation, increase VTE risk further.
Several coagulation abnormalities have been described so far in these patients, including elevated D-dimer, prolonged prothrombin time (PT), activated partial thromboplastin time (aPTT) and increase in fibrin degradation products (FDP). Furthermore, some patients may develop life-threatening complications, such as disseminated intravascular coagulation (DIC), which necessitates continuous vigilance and prompt intervention.
Higher D-Dimer levels in COVID-19 patients are associated with worse prognosis, higher risk of Adult Respiratory Distress Syndrome (ARDS) and increased chance of admission to intensive care.

2. VTE Prophylaxis:

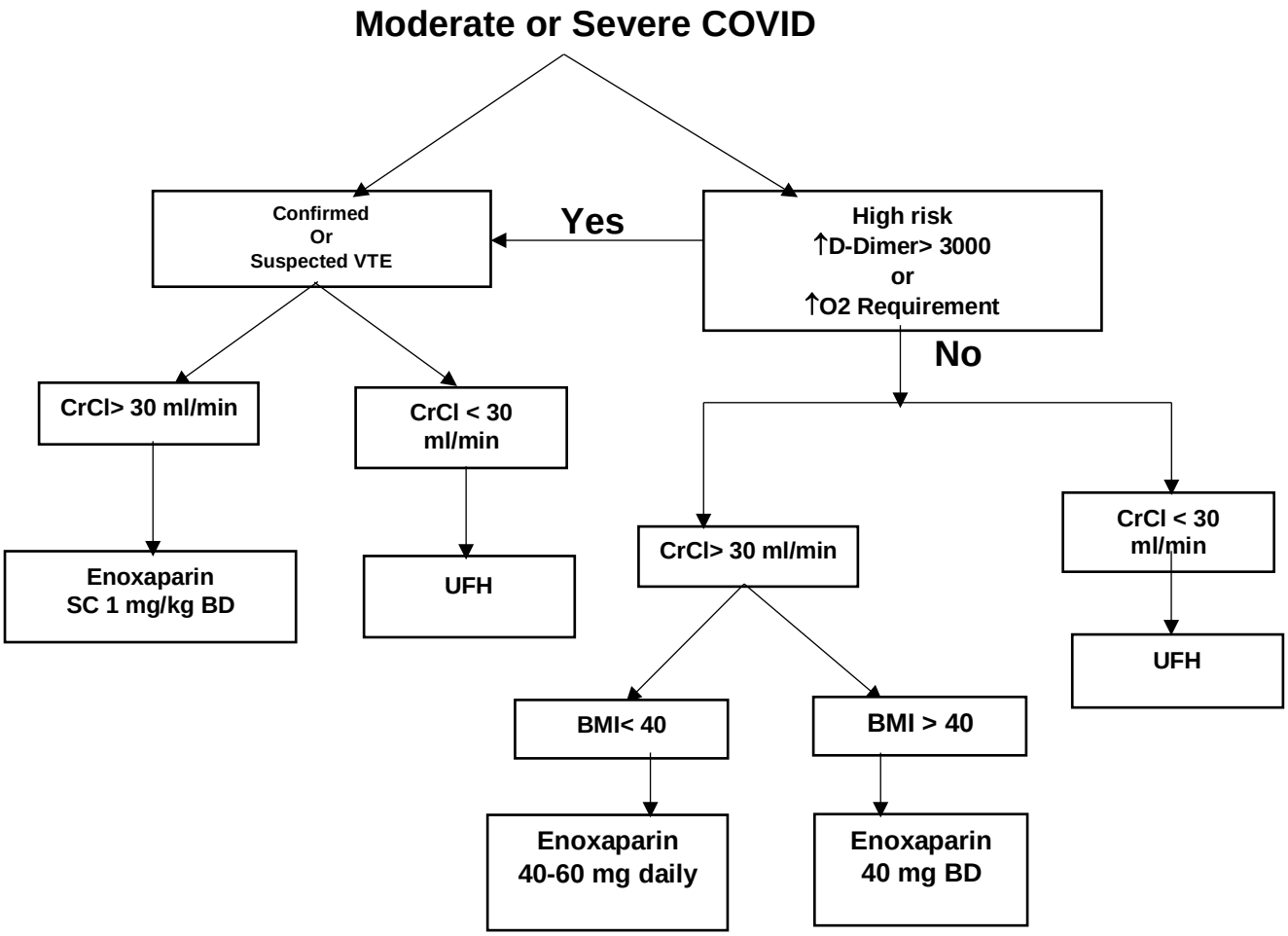
All patients admitted to hospital with confirmed or suspected COVID-19 should at least have the following tests:

- Full blood count (FBC)
- Urea & electrolytes
- LFTs
- Coagulation screening
- D-dimer

All patients should be monitored closely for bleeding complications, as well as heparin-induced thrombocytopenia.

3. DOSE:

a) If CrCL >30 ml/min— enoxaparin 40 mg SC daily
b) If CrCL <30 ml/min— UFH (Heparin)
c) If BMI >40, use enoxaparin 40 mg SC BD
d) If anticoagulation is contraindicated, use mechanical device.
e) Confirmed DVT/PE— enoxaparin (1mg/kg BD)
f) Suspected DVT/PE like worsening oxygenation, swollen leg or markedly increase D-dimer from baseline and unable to do imaging, advice full dose anticoagulation with enoxaparin/direct oral anticoagulants (apixaban/rivaroxaban/edoxaban/dabigatran)



***UFH:** Unfractionated Heparin

Inclusion: All admitted patients with moderate to severe COVID-19

Exclusion: High risk of bleeding as judged by treating physician, older age, advanced liver or renal disease, previous h/o bleeding;

Critically or Severely ill patients should be discharged with DOAC X 4 weeks confirmed or suspected VTW should be discharged with DOAC X 3-6 months

Baseline and daily: CBC, PT/PTT, D-dimer

Oral anticoagulant should be switched to LMWH or UFH on admission

4. Extended thromboprophylaxis on discharge

Clinicians should consider extended thromboprophylaxis for up to 4 weeks from the date of discharge with LMWH/DOAC (i.e. apixaban 2.5mg twice daily or rivaroxaban 10mg daily) on the basis of individual risk/benefit assessment (e.g critical care stay, reduced mobility, previous VTE) and D-Dimer levels (i.e >1000).

1. Management of patients on oral anti-coagulation on admission:

Patients admitted on warfarin or treatment dose DOAC, should be converted to a treatment dose of dalteparin according to their weight and renal function.

2. Coagulopathy management:

A. Abnormal coagulation results do not require correction in patients who are not bleeding unless an interventional procedure is planned.

B. In patients with major bleeding stop any anticoagulation, give empirical Fresh frozen plasma (FFP) and red cells followed by blood products determined by repeat coagulation screens, using PT/INR >1.5 or APTT > 1.5 as an indication to give FFP 15-25mg/Kg. For fibrinogen <1g/l give cryoprecipitate or fibrinogen concentrate. If platelets <30x 10^9/L give a pool of platelets.

C. Management of disseminated intravascular coagulation (DIC) in COVID-19

DIC can occur in patients in intensive care which may lead to multi-organ failure.
It is uncertain whether COVID-19 has unique characteristics to cause DIC. It seems more plausible that DIC develops in patients with COVID-19 after they become hypoxic, and/or have secondary bacterial infection.

To aid diagnosis of DIC, it is recommended to use the International Society on Thrombosis and Haemostasis (ISTH) DIC score (Table 4).

Table: Society on Thrombosis and Haemostasis (ISTH) DIC score.

-	Score
Platelet Count	
>100 x 10^9/L	0
50-100 x 10^9/L	1
<50 x 10^9/L	2
D-dimer	
No increase	0
Moderate increase (1 – 10 times upper limit of normal)	2
Strong increase (> 10 times upper limit of normal)	3
Fibrinogen	
> 1.0 g/L	0
≤ 1.0 g/L	1
Prothrombin time prolongation	
< 3 s	0
3 – 6 s	1
> 6 s	2
Overt Disseminated Intravascular Coagulation	**≥ 5**

- A score < 5 means DIC is unlikely and the score should be recalculated every 1-2 days as necessary. The best management of DIC is to identify and treat the underlying condition.

- **Recovery from DIC is dependent on endogenous fibrinolysis breaking down the disseminated thrombi. This process will be inhibited by tranexamic acid which is an anti-fibrinolytic, hence tranexamic acid should not be used in COVID-associated DIC.**

- Manage bleeding with blood product replacement as per managing major bleeding as above i.e. if PT/INR or APTT ratios are greater than 1.5 then give FFP 15-25mg/Kg; if fibrinogen is <1.5g/l then give a source of fibrinogen- either cryoprecipitate or fibrinogen concentrate. If platelet are < 30x 10^9/L then give platelets.
- If overt thromboembolism or organ failure due to clot (i.e. purpura fulminans) consider low dose anticoagulation with unfractionated heparin pump to switch off stimulus to coagulation activation. Be mindful that there has been no mortality benefit of therapeutic anticoagulation and so run aPTT target < 1.5 or anti-Xa levels 0.6-1.0 in DIC. (Levi et al., Blood, 2018)

References:

- A. Lavinio, A. Johnston. Reducing the risk of venous thromboembolism in critically ill patients – Version 3. Clinical Guidelines from Cambridge University Hospital, April 2020.
- Tang N, Bai H, Chen X, Gong J, Li D, Sun Z. Anticoagulant treatment is associated with decreased mortality in severe coronavirus disease 2019 patients with coagulopathy [published online ahead of print, 2020 Mar 27]. *J Thromb Haemost*. 2020;10.1111/jth.14817. doi:10.1111/jth.14817
- Klok FA, Kruip MJHA, van der Meer NJM, et al. Incidence of thrombotic complications in critically ill ICU patients with COVID-19 [published online ahead of print, 2020 Apr 10]. *Thromb Res*. 2020;S0049-3848(20)30120-1. doi:10.1016/j.thromres.2020.04.013
- Kahn SR, Lim W, Dunn AS, et al. Prevention of VTE in nonsurgical patients: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. Chest 2012 Feb; 141(2 Suppl): e195S-e226S.
- Witt DM, Nieuwlaat R, Clark NP, et al. American Society of Hematology 2018guidelines for management of venous thromboembolism: optimal management of anticoagulation therapy. Blood Adv 2018 Nov 27; 2(22): 3257-3291.
- Spyropoulos AC, Lipardi C, Xu J, et al. Modified IMPROVE VTE Risk Score and Elevated D-Dimer Identify a High Venous Thromboembolism Risk in Acutely Ill Medical Population for Extended Thromboprophylaxis. TH Open 2020 Jan; 4(1): e59-e65.
- Chen J, Wang X, Zhang S, et al. Findings of acute pulmonary embolism in COVID- 19 patients. Lancet Infect Dis 2020; [in press].
- Levi M, Scully M. How I treat disseminated intravascular coagulation. Blood. 2018 Feb 22;131(8):845-854. doi: 10.1182/blood-2017-10-804096.
- Thachil J et al J Thromb Haemost 2020 Mar 25
- Hunt BJ. Bleeding and coagulopathies in critical care.N Engl J Med. 2014 Feb 27;370(9):847-59. doi: 10.1056/NEJMra1208626.

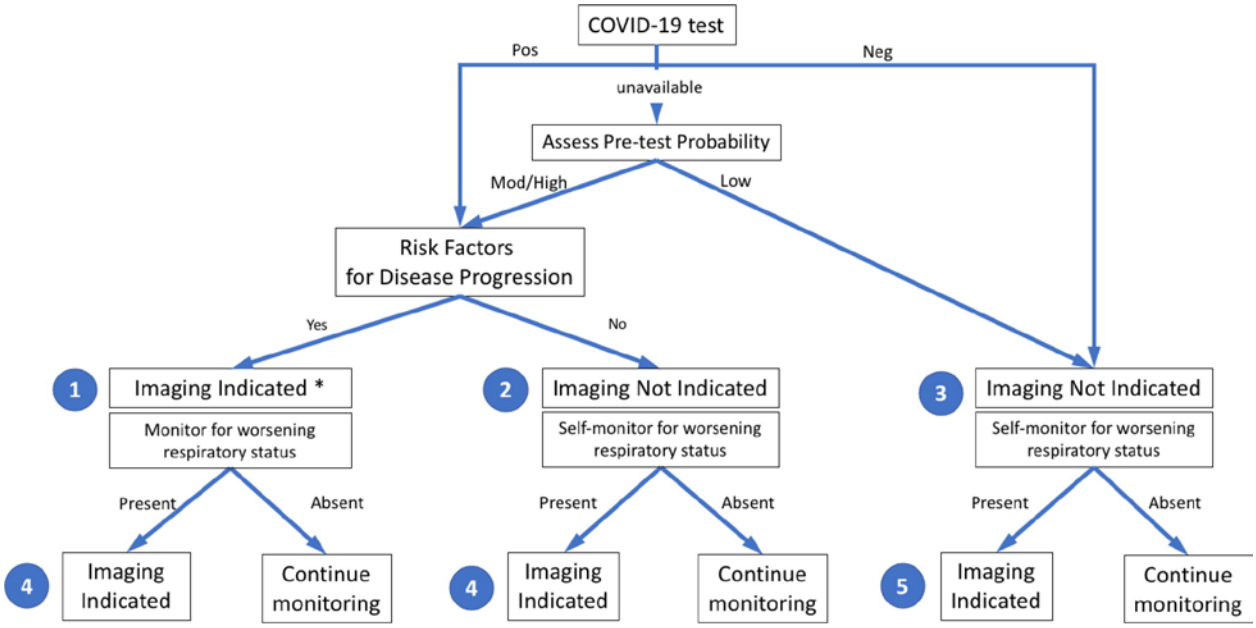
10.The role of chest imaging in COVID-19 patients

Dr Tasbirul Islam

The threshold for the imaging of patients with potential/confirmed COVID-19 demonstrates a degree of variation globally due to local resources, the published guidelines of individual learned bodies and sociocultural approaches to imaging.

KEY POINTS:

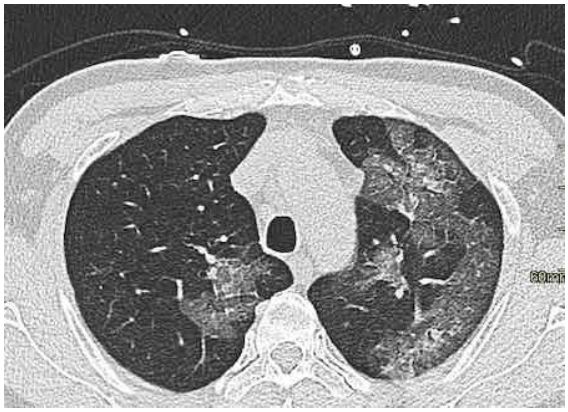
- CXR or CT scan shouldn't be used to diagnose COVID-19. Viral testing (RT-PCR) remains the only specific method of diagnosis.
- Imaging is not indicated in asymptomatic or mild cases.
- Normal CXR or CT scan doesn't exclude COVID-19 (up to 50% patients with COVID-19 may have normal CT scans, especially on day 0-2 of commencement of the disease).
- Generally, the findings on chest imaging in COVID-19 are not specific, and overlap with other infections.
- CXR is insensitive in mild or early COVID-19 infection. Chest-films can be useful in the follow-up of the disease.
- CT is more sensitive for early parenchymal lung disease, disease progression, and alternative diagnoses including acute heart failure from COVID-19 myocardial injury.
- CT is indicated in patients with functional impairment, hypoxemia, or both, after COVID-19 recovery.
- COVID-19 testing is warranted in patients incidentally found to have findings suggestive of COVID-19 on a CT scan.
- Daily CXR's are not indicated in stable intubated patient.



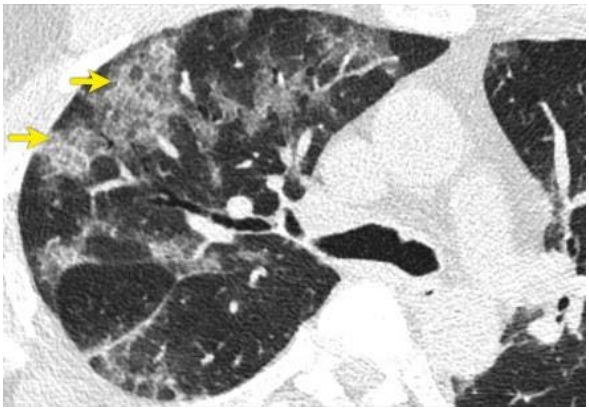
* Clinical judgement should dictate the use of imaging through consideration of patient risk factors and local resources.

CT chest patterns in COVID-19 patient:

- Multifocal, bilateral, peripheral ground glass pattern (GGO) is the most common findings.
- Sometimes crazy paving pattern (thickened interlobular and intralobular lines in combination with a ground glass pattern) found in later stage of the disease.
    - GGO pattern: 88%
    - Bilateral involvement: 88%
    - Posterior distribution: 80%
    - Multilobar involvement: 79%
    - Peripheral distribution: 76%
    - Consolidation: 32%

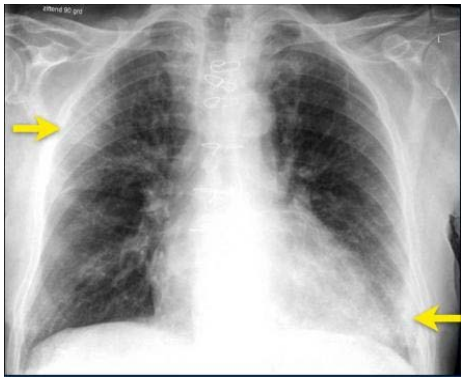


GGO pattern

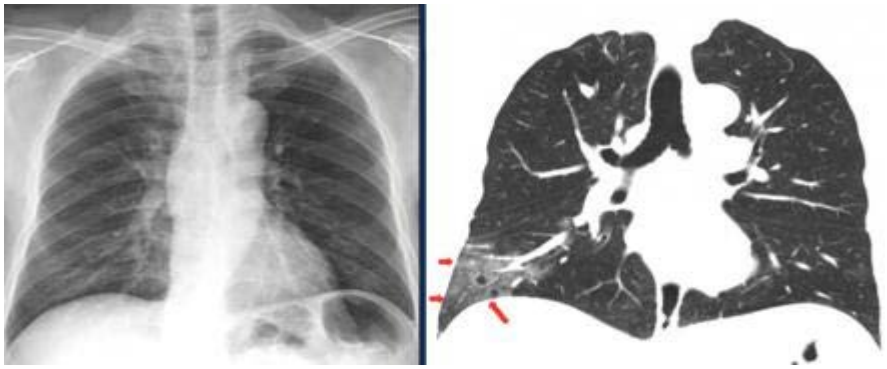


Crazy Paving pattern

CXR patterns in COVID-19 patient:



CXR is insensitive in early stage:



CXR **CT chest**

Ultrasound chest imaging of COVID-19 patients is not included as it is not widely available and lack of direct experience in Bangladesh.

Reference:

- Image sources: https://radiologyassistant.nl/chest/lk-jg-1

11.Infection Control

Dr. Muhammad S. Tabriz

Introduction:

Infection prevention and control (IPC) is one of the most important aspects for any healthcare facility to ensure the safety of patients, healthcare personnel, and the environment. Every healthcare facility must establish its own infection control protocols for safe operation of all aspects of healthcare delivery. Such protocols need periodic review and updates based on any new outbreaks and available resources in order to remain effective.

An effective infection control program requires multidisciplinary approach, participation, commitment and coordination among different departments- administration, engineering, environmental services (cleaning, disinfection and waste disposal), Infectious disease specialists, microbiologists, and in some cases local and governmental agencies.

Hospitals and healthcare facilities in Bangladesh must take into consideration other variables such as building structure, single room vs. ward, ventilation, use of air conditioning, fan etc.

Infection Control Basics

Sources of Infection

Person

- People, including:
    - Patients
    - Healthcare workers
    - Visitors/household members
    - Community members
- ***Hands are the most common source for spreading infection***

Environment

- Dry surfaces in patient care areas (ie. bed rails, medical equipment, countertops, tables, etc.)
- Wet surfaces, moist environments, and biofilms (ie. faucets and sinks, equipment such as ventilators)
- Indwelling medical devices (ie. catheters and IV lines)
- Dust or decaying debris (ie. construction dust or wet substances from water leaks)
- For environmental cleaning and disinfection establish a protocol and checklist and verify compliance.
- Identify and take extra caution for “High touch surface”- bed rails, table top, IV pole, chair, sink, light switch, door knobs, toilet seat, flush handle etc. Clean these surfaces frequently.

Infection control precaution can be broadly divided into two parts:

1. Standard precautions: applies to all patient care
2. Transmission-based precautions: based on organisms and their mode of transmission

Standard Precautions

- Assume that every person is potentially infected or colonized with a pathogen that could be transmitted in the healthcare setting
- Should be used for all patient care at all times
- ***Hand hygiene*** before and after each patient encounter
- Gown, gloves, and eye protection as needed
    - e.g. If any contact with bodily secretions is anticipated, gloves/gowns should be used. Similarly, if any splash of secretions is anticipated, use eye protection
    - Use of gloves does not replace hand hygiene
- Safe disposal and cleaning of instruments/linens per protocol
- Proper cough etiquette

Hand Hygiene:

Hand hygiene is **the single most** important component of infection control measures.

"My five moments of hand hygiene" from the WHO initiative for clean hands[1]:

1. Before touching a patient
2. Before clean/aseptic procedures
3. After bodily fluid exposure/risk
4. After touching a patient
5. After touching patient surroundings

Proper hand hygiene should be performed for at least 20 seconds.

- Wash with soap and water:
    - When hands are visibly soiled
    - Infectious diarrhea *Clostridium difficile*, Norovirus
    - Before eating, after using the washroom
- Use alcohol-based hand sanitizer (minimum 60% alcohol):
    - When hands are not visibly soiled

Cough Etiquette

- Cough/sneeze into tissue - properly dispose of in waste basket
- Cough/sneeze into sleeve, not hands
- If sick, wear a mask
- Perform proper hand hygiene after coughing/sneezing into tissue or sleeve

Transmission-based Precautions

Contact Precaution:

- Follow Standard precaution, plus gloves/gowns at all times in patient rooms
    - Gloves/gowns should be removed **before** leaving patient room
    - Gloves/gowns should not be reused between visiting multiple patients
- Use dedicated noncritical items (ie. stethoscope, thermometer, BP machine, etc.) for a single patient
    - If unable to do so, then disinfect each item properly after each use
- A few examples of infection/organism where contact isolation is needed:
    - MRSA, MDRO, CRE
    - Enteric infections *Clostridium difficile*, Norovirus

Droplet Precaution:

Droplets are respiratory secretions ≳ 5 microns

- Transmission occurs within 3-6 ft. of source through coughing, sneezing, talking
- Wear a surgical mask at all times in patient room/area
    - Remove upon exiting the room
- Pathogen examples:
    - N. meningitidis, Bordetella pertussis, Mycoplasma pneumoniae
    - Influenza, parainfluenza, adenovirus, rubella

Airborne Precaution:

Airborne droplets nuclei are respiratory secretion particles <5 microns and remain suspended in the air for longer time/distance

- Private patient rooms with negative air pressure, 6-10 air change/hour
    - Uses High Efficiency Particulate Air (HEPA) filter
- Wear respirator, N-95 mask, Powered Air Purifying Respirator (PAPR)
    - All healthcare personnel will have to be trained and fit-tested to be able to use respirator
- Pathogen examples:
    - Tuberculosis, viruses- Varicella, measles, smallpox

Combining more than one precaution:

- Contact and droplet
    - MRSA pneumonia, Metapneumovirus, RSV

  Contact and airborne:

    - Varicella (Chicken Pox), Disseminated Zoster

Infection Control Guidance for COVID-19

According to the CDC, the goal of infection prevention and control (IPC) activities in the coronavirus disease 2019 (COVID-19) response is to support the maintenance of essential healthcare services by preventing healthcare-associated transmission of SARS-CoV-2 among healthcare workers (HCW) and patients.[2]

This requires:

- Rapid identification of suspect cases
- Immediate isolation and referral for testing
- Safe clinical management
- Adherence to standard IPC precautions

A clear understanding of the mode of transmission of COVID-19 is important to implement interventions to control and prevent COVID-19 infection.

Mode of transmission[3,4]:

- **Primarily by droplets**: When the infected person speaks, coughs, or sneezes, respiratory droplets can enter the mouth, nose, or eyes of people who are nearby or even inhaled by people within close proximity (3-6 feet) of the infected individual.
- **Contact**: Indirect transmission may occur with contact via hand contaminated by infected person's hand or contaminated surfaces then subsequent self-contamination by touching the eyes, nose, or mouth.
- **Possible aerosols/airborne**: although less is known about transmission via aerosols or small respirable particles, aerosol generating procedures may play a role in transmitting infection. However, airborne transmission over long distances from person to person is unlikely.
    - Examples of aerosol generating procedures include: intubation, mechanical ventilation, non-invasive ventilation such as BiPAP and CPAP, manual ventilation, cardiopulmonary resuscitation, bronchoscopy, open suctioning of airways, and sputum induction.
    - Although there is limited data, the following procedures may also generate aerosols such as nebulizer administration and high flow oxygen delivery

Based on mode of transmission following infection control precaution are recommended for SARS-CoV2:

1. Place suspected patient under Investigation (PUI) or confirmed case of COVID-19 in contact and droplet isolation
2. Multiple confirmed cases can be cohorted in a single room/ward, however suspected cases need to be placed in single rooms until confirmed. If single rooms are not available, the patient's bed should be placed at least 1 meter apart in a well-ventilated room.[5]
3. Use a negative pressure room for aerosol generating procedures; if unavailable, use a well-ventilated single room

Strategies to prevent and control COVID-19 infection in healthcare facilities[4]

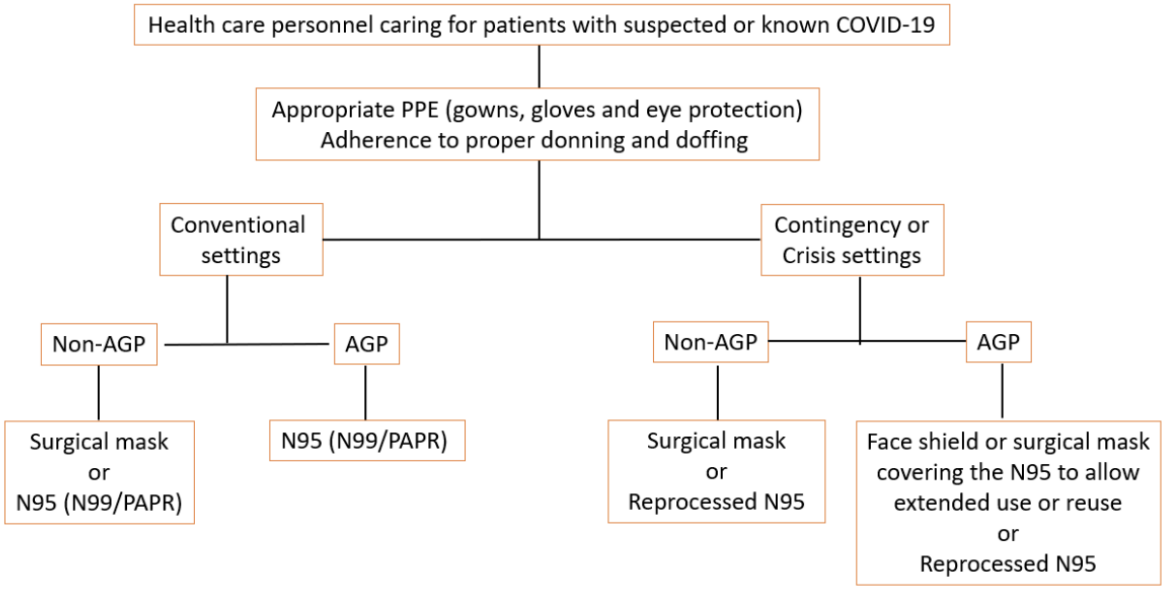
We can approach and implement the steps to minimize the risk of exposure and control infection at 3 different levels of intervention:

1. **The patient**:
    - Educate patients on hand hygiene and the importance of wearing face mask/cloth mask.
    - Based on recent findings it is possible for asymptomatic or pre-symptomatic patients to contribute to the transmission of COVID-19. Current recommendations for source control by symptomatic and asymptomatic individuals include wearing a cloth face covering or facemask. By wearing a facemask or face covering, respiratory secretions from the mouth and nose can be contained and prevent/reduce the spread of SARS CoV-2.

2. **The healthcare facility**:
    - Establishing triage protocols
    - Establishing separate units for COVID-19 suspected and confirmed cases
    - Providing adequate equipment and resources to practice infection prevention and control including adequate hand hygiene material and implementing environmental cleaning and disinfecting protocols, and providing appropriate personal protective equipment (PPE), as well as proper training to all HCW on how to use PPE.

3. **The healthcare worker**:
    - Healthcare workers are those in direct contact with patients as well as other ancillary personnel
    - Healthcare workers must be educated and trained on appropriate infection prevention and control basics and appropriate use of PPE based upon their level of interaction with patients.
    - It's important to practice hand hygiene frequently, refrain from touching the face, and avoid touching the front of the mask when wearing a medical mask/respirator

Figure 1. IDSA Algorithm for Appropriate PPE in Conventional and Contingency or Crisis Settings



AGP: aerosol-generating procedures; **PPE**: personal protective equipment

Personal protective equipment (PPE) for healthcare workers[4,7]:

- The Occupational Safety and Health Administration (OSHA) defines PPE as specialized clothing or equipment worn by an employee for protection against infectious materials.[6]
- Healthcare worker should be trained on proper donning (putting on) and doffing (removal) of PPE
- PPE for protection against COVID-19 include: gowns, gloves, masks and respirators, eye covers (i.e. goggles), or face shields
    - *Gowns*
        - It's recommended to use long-sleeved water-resistant gowns. If water-resistant gowns are unavailable, a single-use plastic apron can be worn over the non-water-resistant gown. Normal disposable isolation gowns as well as standard surgical gowns may also be used[8]
        - Reusable washable water-resistant cloth gowns may also be used if available
        - The use of boots, coverall, and apron is not required during routine care[5]
    - *Gloves*
        - Non-sterile disposable patient examination gloves used in the typical healthcare setting are recommended
        - Currently the CDC does not recommend double gloves when caring for COVID-19 patients
    - *Masks and respirators*
        - Surgical or medical face masks are used for droplet precaution

        - Respirators include N95, powered air purifying respirator (PAPR), filtering facepiece (FFP2 and FFP3) are used for airborne precautions
            - Proper training and appropriate fit testing program are required for the use of respirators
        - Recommendations for using surgical masks or N95 respirator:
            - For confirmed COVID-19 patients, the CDC recommendation prefers use of N95 respirators over surgical masks. However, surgical masks are also acceptable for use except during aerosol generating procedures.
            - The Infectious Disease Society of America (IDSA) published their recommendations for the use of masks as shown below. Contingency or crisis settings refer to situations where there are a shortage of masks or respirators such as this COVID-19 pandemic:[9]
    - *Eye covers (i.e. goggles) or face shields*
        - It is recommended to wear goggles to protect the eye mucosa. The face shield offers additional protection if the reuse of N95/FFP respirators are intended
    - *Head covers and shoe covering*
        - According to the IDSA there is insufficient data available to support the use of head covering and shoe covers when taking care of COVID-19 patients
        - The European Centre for Disease Control (ECDC) and WHO do not include the head coverings and shoe covers as recommended PPE for healthcare workers taking care of COVID-19 infected patients.
- Due to shortages as a result of the current COVID-19 pandemic, N95 respirators and eye shields may be worn in extended use or reused with appropriate precaution and protocols[10]
    - *Reuse*
        - When the N95 respirator and/or eye shield is removed in between patient encounters
        - There is no set number of reuses for N95 respirators, however up to 5 reuses are recommended
    - *Extended use*
        - When N95 and/or eye shield is used for multiple patients without removal between each patient care
        - Surgical masks may also be worn in extended use up to 6 hours as long as the outer surface of the mask is not touched by the healthcare worker
        - Extended use is preferred over reuse to minimize potential contamination during donning and doffing

Using PPE:[11]

Healthcare workers caring for infected patients should perform the following steps to wear PPE before entering the patient room:

1. Gather the appropriate PPE to wear
2. Perform hand hygiene with hand sanitizer
3. Put on isolation gown and make sure to tie all ties on the gown
4. Put on N95 mask or use a facemask if N95 mask is unavailable
    - Do NOT place N95 respirator or facemask under the chin or store in pockets
5. Put on face shield or goggles for full face coverage
6. Perform hand hygiene by washing hands
7. Put on gloves, making sure to cover the cuff/wrist of the gown

Healthcare workers should perform the following steps to remove PPE:

1. Remove gloves, making sure to avoid further contamination of the hands
2. Remove gown and dispose in appropriate bin
3. Exit patient room
4. Perform hand hygiene by washing hands appropriately
5. Remove face shield or goggles without touching the front of the face shield or goggles
6. Remove N95 respirator or facemask without touching the front of the N95 respirator or facemask
7. Perform hand hygiene after removing N95 respirator/facemask
    - If required to reuse, perform hand hygiene before putting it on again

Estimated needs of PPE for COVID-19 in the healthcare facility:

It is a common misconception in Bangladesh that the number of PPE can be estimated based on the number of physicians or healthcare workers taking care of suspected or confirmed patients of COVID-19. However, the number of sets for PPE depends on the total number of suspected and confirmed cases of COVID-19. This is because PPE should be changed after each patient encounter. The exception is in cases where facemasks/N95 respirators and face shields/eye goggles are worn for extended use purposes in certain situations. The ECDC offers some guidance regarding how to estimate the number of sets of PPE needed per patient per day, as shown in the table below:[12]

Table 2. **Minimum number of sets for the different case scenarios**

	Suspected case	Confirmed case *Mild symptoms*	Confirmed case *Severe symptoms*
Healthcare staff	**Number of sets per case**	**Number of sets per day per patient**	
Nursing	1–2	6	6–12
Medical	1	2–3	3–6
Cleaning	1	3	3
Assistant nursing and other services	0–2	3	3
Total	**3–6**	**14–15**	**15–24**

- For more information refer directly to the ECDC guideline here: https://www.ecdc.europa.eu/sites/default/files/documents/novel-coronavirus-personal-protective-equipment-needs-healthcare-settings.pdf

Conclusion

When implementing infection prevention and control for COVID-19 in the setting of limited resources, an understanding of the basic concepts of the transmission of infection, standard precautions, and source control protocols is necessary.

This document offers a simplified outline based on recommendations by CDC, IDSA, WHO, and other larger organizations. For a comprehensive recommendation, please refer to your local institutional guidelines as well as local resources available. Some references are provided in the table below for guidance.

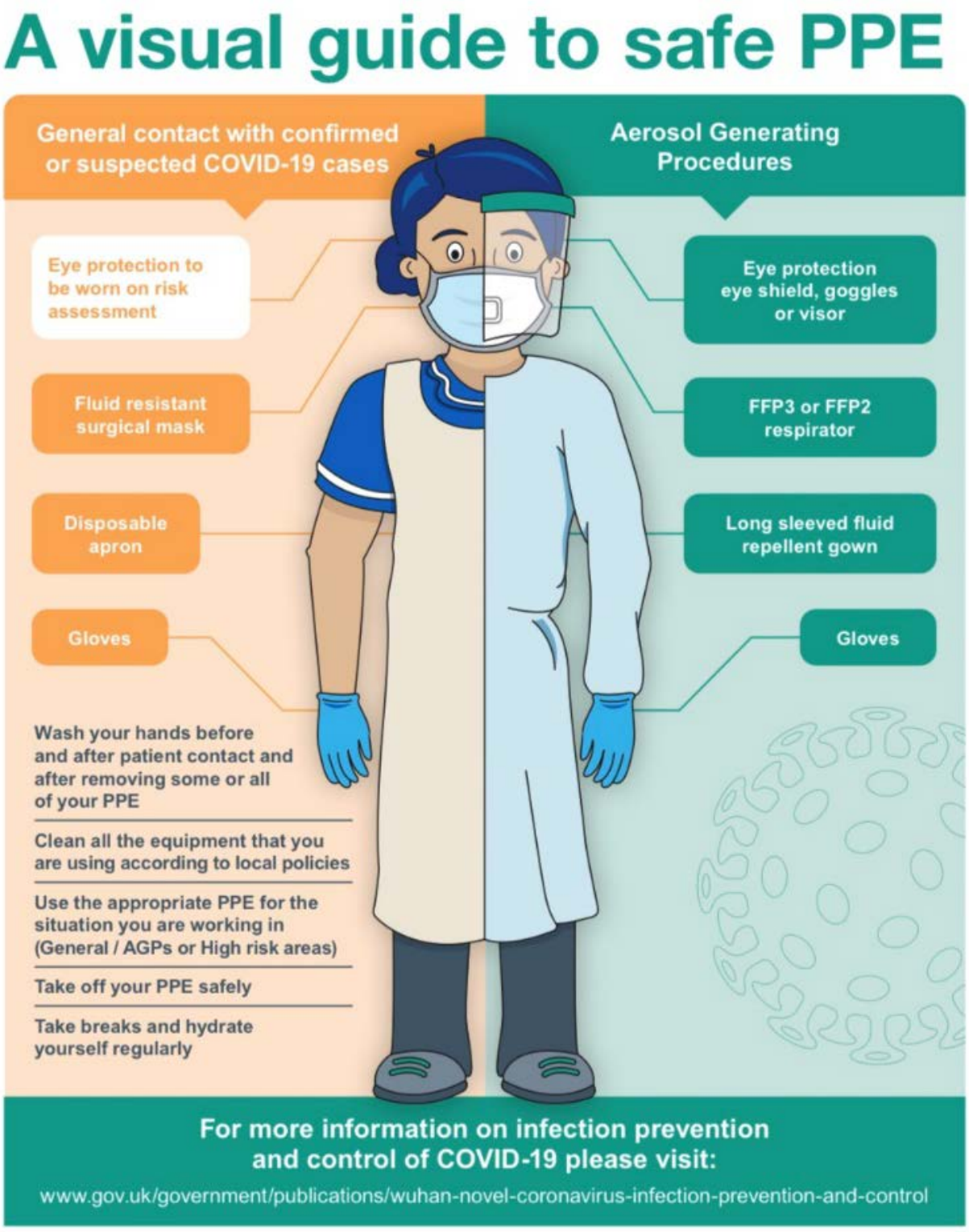
Helpful Resources	Links
Hand Hygiene Guidelines (CDC)	https://www.cdc.gov/handhygiene/providers/guideline.html
Using PPE (CDC)	https://www.cdc.gov/coronavirus/2019-ncov/hcp/using-ppe.html
Donning and Doffing of PPE (CDC)	https://www.cdc.gov/hai/pdfs/ppe/ppe-sequence.pdf
Decontamination and Reuse of Filtering Facepiece Respirators (CDC)	https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/decontamination-reuse-respirators.html
Rational Use of PPE (WHO)	https://apps.who.int/iris/handle/10665/331695
PPE Needs in Healthcare Settings; Table 2 - Minimum Number of PPE Sets Per Patient Per Day (ECDC)	https://www.ecdc.europa.eu/sites/default/files/documents/novel-coronavirus-personal-protective-equipment-needs-healthcare-settings.pdf

References:

- My 5 Moments for Hand Hygiene. World Health Organization. https://www.who.int/infection-prevention/campaigns/clean-hands/5moments/en/. Published April 21, 2017. Accessed April 30, 2020.
- Strategic Priority Infection Prevention and Control Activities for Non-US Healthcare Settings. Centers for Disease Control and Prevention. https://www.cdc.gov/coronavirus/2019-ncov/hcp/non-us-settings/ipc-healthcare-facilities-non-us.html. Published April 6, 2020. Accessed April 30, 2020.
- Healthcare Infection Prevention and Control FAQs for COVID-19. Centers for Disease Control and Prevention. https://www.cdc.gov/coronavirus/2019-ncov/hcp/infection-control-faq.html. Published April 23, 2020. Accessed April 30, 2020.
- Infection Control: Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Centers for Disease Control and Prevention. https://www.cdc.gov/coronavirus/2019-ncov/hcp/infection-control-recommendations.html. Published April 12, 2020. Accessed April 30, 2020.
- Infection prevention and control during health care when novel coronavirus (nCoV) infection is suspected. World Health Organization. https://www.who.int/publications-detail/infection-prevention-and-control-during-health-care-when-novel-coronavirus-(ncov)-infection-is-suspected-20200125. Published March 19, 2020. Accessed April 30, 2020.
- Occupational Safety and Health Administration. Safety and Health Topics | COVID-19 - Control and Prevention | Occupational Safety and Health Administration. https://www.osha.gov/SLTC/covid-19/controlprevention.html. Accessed April 30, 2020.
- Personal Protective Equipment: Questions and Answers. Centers for Disease Control and Prevention. https://www.cdc.gov/coronavirus/2019-ncov/hcp/respirator-use-faq.html. Published March 14, 2020. Accessed April 30, 2020.
- Guidance for wearing and removing personal protective equipment in healthcare settings for the care of patients with suspected or confirmed COVID-19. European Centre for Disease Prevention and Control. https://www.ecdc.europa.eu/en/publications-data/guidance-wearing-and-removing-personal-protective-equipment-healthcare-settings. Published February 28, 2020. Accessed April 30, 2020.
- Infectious Diseases Society of America Guidelines on Infection Prevention in Patients with Suspected or Known COVID-19. Infectious Diseases Society of America Guidelines on Infection Prevention in Patients with Suspected or Known COVID-19. https://www.idsociety.org/COVID19guidelines/ip. Published April 27, 2020. Accessed April 30, 2020.
- CDC - Recommended Guidance for Extended Use and Limited Reuse of N95 Filtering Facepiece Respirators in Healthcare Settings - NIOSH Workplace Safety and Health Topic. Centers for Disease Control and Prevention. https://www.cdc.gov/niosh/topics/hcwcontrols/recommendedguidanceextuse.html. Published March 27, 2020. Accessed April 30, 2020.
- Using Personal Protective Equipment (PPE). Centers for Disease Control and Prevention. https://www.cdc.gov/coronavirus/2019-ncov/hcp/using-ppe.html. Published April 3, 2020. Accessed April 30, 2020.
- Personal protective equipment (PPE) needs in healthcare settings for the care of patients with suspected or confirmed novel coronavirus (2019-nCoV). European Centre for Disease Prevention and Control. https://www.ecdc.europa.eu/en/publications-data/personal-protective-equipment-ppe-needs-healthcare-settings-care-patients. Published February 7, 2020. Accessed May 1, 2020.

12.Current recommendations for Personal Protective Equipment (PPE) in COVID-19:

Dr. Md Nayeem Hasan, Dr. Javed Imam, Dr. Arifa Siddika



Hospital areas should be designated carefully and marked as 3 different levels for ensuring adequate, appropriate level of PPEs:

1. Red Zone (High Risk area) – e.g Aerosol Generating Procedures are regularly done

2. Yellow Zone – (Moderate risk area)- Confirmed or suspected COVID 19 patients but no regular AGPs

3. Green Zone (Low Risk Area) – Non COVID wards

Aerosol-generating procedures (AGPs)

Procedures and patient care activities that can result in the release of airborne particles (aerosols). AGPs can create a higher risk of airborne transmission of infections. The following procedures are currently considered to be potentially infectious AGPs for COVID-19:

1) Endo tracheal intubation, extubation and related procedures
2) Manual bag valve ventilation and open suctioning of the respiratory tract (including the upper respiratory tract)
3) Tracheotomy or tracheostomy procedures (insertion or open suctioning or removal of tracheostomy tube)
4) Bronchoscopy and upper ENT airway procedures that involve suctioning
5) Upper GI endoscopy
6) Naso Gastric tube insertion/ removal
7) Surgery and post mortem procedures involving high-speed devices (i.e diathermy, laparoscopic surgery)
8) Some dental procedures (for example, high-speed drilling, scaling)
9) Non-invasive ventilation (NIV); Bi-level Positive Airway Pressure Ventilation (BiPAP) and Continuous Positive Airway Pressure Ventilation (CPAP)
10) High Frequency Oscillatory Ventilation (HFOV)
11) Induction of sputum

Red Zone High risk acute areas:

1. ICU or areas with invasive/ mechanical ventilation
2. Emergency department -Resuscitation areas or areas involving procedures of high-risk transmission e.g AGP or chance of contact with body fluid
3. Wards with non-invasive ventilation.
4. Operating theatres.
5. Endoscopy units for
   I. upper Respiratory,
   II. ENT
   III. Upper GI endoscopy
6. other clinical areas where AGPs are regularly performed.

All AGPs or in High risk areas (Red Zones) Needs higher level PPE –

1. Scrubs and FFP2/FF3 / KN95/N95 respirators – For all time and All staffs
2. Disposable Fluid resistant gown – long sleeve and full cover, Disposable plastic Aprons, and Disposable Gloves (For any patient contact)
3. Face / Eye protection – Goggles or full-face visors (Only for patient contacts involving AGPs)

2. Yellow Zone – (Moderate risk area)-

a. Minimum PPE to enter:

All staffs - Fluid resistant surgical masks

b. Minimum for patient contact:

- Eye protection
- Plastic Apron
- Gloves

Any Aerosol generating procedure:

- FFP3/n95 mask
- Eye protection
- Gown
- Gloves

3.Green Zone–

Recommended PPE for patient contact (When health care professionals are less than 2 meters with patient):

- Surgical masks
- Eye protection
- Gloves
- Plastic Apron

- A short video guide to fitting the 3M 1863 FFP3 mask is available here - **https://youtube.com/watch?v=-HNCe4ISTfg** ****NEW - 3rd April 2020**

- WHO guidance for masks - https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public/when-and-how-to-use-masks
- https://www.youtube.com/watch?v=P3fIZuW9P_M&feature=emb_rel_end
- https://www.youtube.com/watch?v=v93rcPkFkZc&feature=emb_rel_end

Summary of recommended PPE in different areas of Hospital

Context	Gloves	Plastic Apron	Gown	Surgical Mask	Fluid resistant surgical mask (IIR)	FFP2/3 or N95	Face / Eye Protect[1]
Performing a single AGP [2,9]on possible or confirmed case outside Red Zone[4]	Single use[5]	X	Single use[5]	X	X	Single use[5]	Single use[5]
Working in Red Zone[4] with possible[3] or confirmed cases	Single use[5]	Single use[5]	Sessional use[6]	X	X	Sessional use[6]	Sessional use[6]
Working inpatient with possible[3] or confirmed cases- Direct Care within 6 ft	Single use[5]	Single use[5]	X	X	Sessional use[6]	X	Sessional use[6]
Working inpatient with possible or confirmed cases Not within 6 ft	X	X	X	X	Sessional use[6]	X	Single[5] or Sessional[6]
Working in Emergency department / Acute assessment – Direct patient care within 6 ft	Single use[5]	Single use[5]	X	X	Sessional use	X	Risk assess[7] Sessional [6]
All individuals transferring Possible[3] or confirmed cases (within 6 ft)	Single use[5]	Single use[5]	X	X	Single[5] or Sessional [6]	X	Risk assess[7] Single[5] or sessional[6]
Operation theatre with possible [3]or confirmed cases (Not AGPs)	Single use[5]	Single use[5]	Risk assess[7] single use [5]	X	Single[5] or Sessional [6]	X	Single[5] or Sessional[6]
Labour ward – 2nd/3rd stage labour of Vaginal delivery – possible[3] or confirmed cases	Single use[5]	Single use[5]	Single use[5]	X	Single[5] or Sessional [6]	X	Single[5] or Sessional[6]
Inpatient care to any individuals in the extremely vulnerable group undergoing shielding [8]	Single use[5]	Single use[5]	X	Single use[5]	X	X	X

Summary of Recommended PPE in different setting in the OPD

Context	Gloves	Plastic Apron	Gown	Surgical Mask	Fluid resistant surgical mask (IIR)	FFP2/3 or N95	Face / Eye Protect[1]
Direct patient care – possible or confirmed case (< 6 ft)	Single use[5]	Single use[5]	X	X	Sessional use[6]	X	Sessional use[6]
Direct patient care – possible or confirmed case (> 6 ft)	X	X	X	X	Sessional use[6]	X	Single[5] or Sessional[6]
Performing an aerosol generating procedure on a possible or confirmed case	Single use[5]	X	Single use[5]	X	X	Single use[5]	Single use[5]

More details -

1. Face / Eye Protection - may be single or reusable face/eye protection/full face visor or goggles.

2. The list of aerosol generating procedures (AGPs) has been described above.

3. A COVID case is any individual meeting case definition for a possible or confirmed case: Case definitions: possible case, as of 13 March 2020

3.1 Patients who meet the following criteria (inpatient definition)-

a. requiring admission to hospital and have either clinical or radiological evidence of pneumonia.

b. acute respiratory distress syndrome (ARDS**)** or

c. influenza like illness (fever ≥37.8°C and at least one respiratory symptom

3.2 Patients who meet the following criteria and are well enough to remain in the community-

a. new continuous cough and/or

b. high temperature Individuals with cough or fever should stay at home.

4. Higher risk acute areas / Red zone as described above where AGPs done regularly

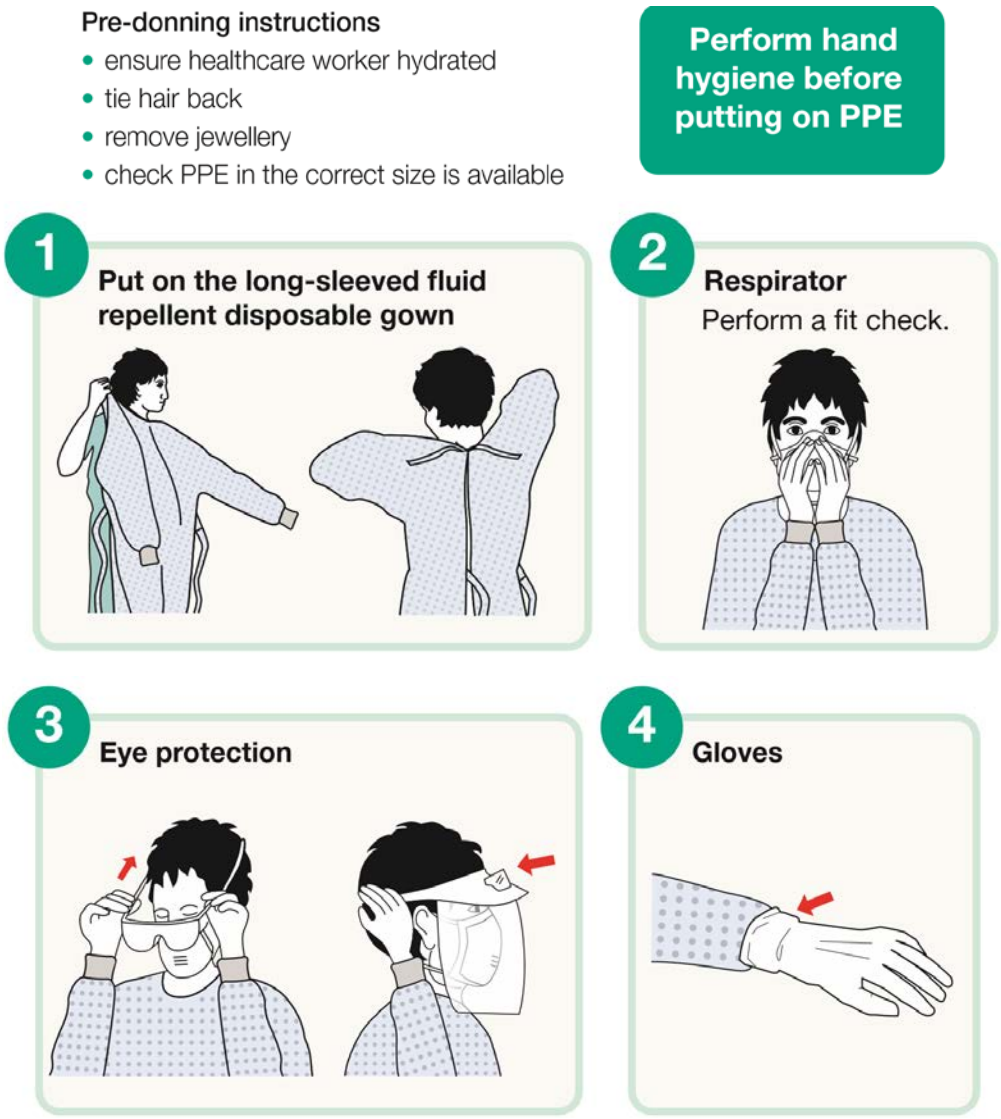
5. Single use refers to disposal of PPE or decontamination of reusable items e.g. eye protection or respirator, after each patient and/or following completion of a procedure, task, or session; dispose or decontaminate reusable items after each patient contact.

6. A session refers to a period of time where a healthcare worker is undertaking duties in a specific care setting/exposure environment e.g. on a ward round; providing ongoing care for inpatients. A session ends when the healthcare worker leaves the care setting/exposure environment. PPE should be disposed of after each session or earlier if damaged, soiled, or uncomfortable.

7. Risk assessed use refers to utilizing PPE when there is an anticipated/likely risk of contamination with splashes, droplets of blood or body fluids.

Donning and Doffing of PPE:

COVID-19: Donning of Personal Protective Equipment (PPE)



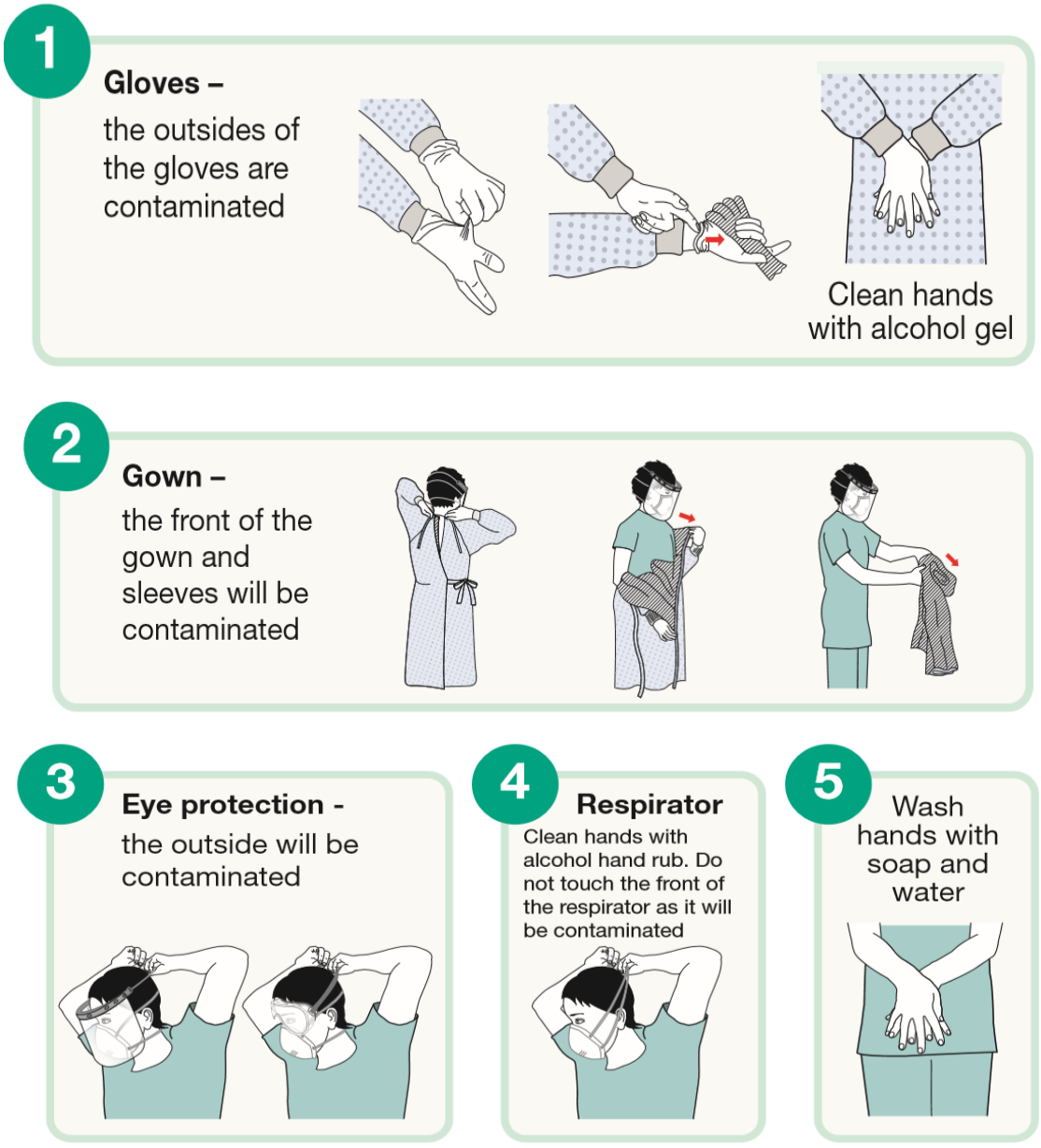
PPE should be put on and removed in an order that minimises the potential for self-contamination.

https://www.youtube.com/watch?v=kKz_vNGsNhc

Remember –

1. Ensure Proper Fit while wearing Respirator – making sure nose and mouth properly covered, mould the metal part over the bridge of the nose and press all around the face seal to be sure it is tightly in place no air leaks around the edges .
   Avoid touching the mask while wearing it. Do not leave the mask hanging from one ear or hanging around neck, after each use, please take highest care and properly dispose the masks after use

COVID-19: Removal of Personal Protective Equipment (PPE)



The order for PPE removal is *(Please note multiple time hand hygiene required to reduce risk of contamination)*

1. gloves
2. hand hygiene
3. apron or gown
4. eye protection
5. hand hygiene
6. surgical face mask or FFP3 respirator
7. hand hygiene

https://www.youtube.com/watch?v=oUo5O1JmLH0

Remember –

1. Remove the mask using the appropriate technique: After putting on, never touch the front of the mask, untie it from behind. Do not touch the front of the gown or gloves as they are contaminated with viruses. If by any chance, after removal or whenever inadvertently touched, clean hands using an alcohol-based hand rub or soap and water if hands are visibly dirty – please wash hands properly with soap. Do not touch face, mouth, nose or eyes.

2. Replace masks as soon as they become damp with a new clean, dry mask. • Do not re-use single-use masks. • Discard single-use masks after each use and dispose of them immediately upon removal.

References:

- Public Health England, Gov. UK https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/879107/T1_poster_Recommended_PPE_for_healthcare_workers_by_secondary_care_clinical_context.pdf
- Public Health England guideline for NHS UK developed with Academy of Royal Colleges, UK and Health Protection Scotland
- WHO guidance on infection Prevention: COVID19

13.Protection for Health care workers and precautions after inadvertent exposure

Dr. Shakil Farid, Dr. Sabyasachi Roy, Dr Sarkar Haider

Identification of health care workers (HCW) at risk

High Risk Group

HCW should work from home and should be removed from direct frontline for 2-3 months during the peak period. It will include only a small proportion of HCW.

Includes:

•Solid organ transplant recipients

•People with specific cancers:

a) People with cancer who are undergoing active chemotherapy or radical radiotherapy for lung cancer
b) People with cancers of the blood or bone marrow such as leukaemia, lymphoma or myeloma who are at any stage of treatment
c) People having immunotherapy or other continuing antibody treatments for cancer
d) People having other targeted cancer treatments which can affect the immune system, such as protein kinase inhibitors or PARP inhibitors
e) people who have had bone marrow or stem cell transplants in the last 6 months, or who are still taking immunosuppression drugs

•People with severe respiratory conditions including severe asthma and severe COPD, cystic fibrosis.

•People with rare diseases and inborn errors of metabolism that significantly increase the risk of infections (such as SCID, homozygous sickle cell).

•People on immunosuppression therapies sufficient to significantly increase risk of infection.

•Women who are pregnant with significant heart disease, congenital or acquired.

Moderate Risk Group

Should work remotely well away from the frontline. They can still contribute in many ways away by avoiding high risk area, i.e. avoid exposure prone procedure, avoid performing aerosol generating procedures in patients with COVID.

Includes:

•Chronic (long-term) respiratory diseases, e.g. chronic asthma, chronic obstructive pulmonary disease (COPD), emphysema or bronchitis

•Chronic heart disease, such as heart failure

•Chronic kidney disease

•Chronic liver disease, such as hepatitis

•Chronic neurological conditions, such as Parkinson's disease, motor neuron disease, multiple sclerosis (MS), a learning disability or cerebral palsy

•Diabetes

•Problems with spleen – for example, sickle cell disease or splenectomised patient

•A weakened immune system - such as HIV and AIDS, or medicines such as steroid tablets or chemotherapy

•Seriously overweight (a BMI of 40 or above)

•Aged over 70 years, regardless of health conditions

•Pregnant women under 28 weeks' gestation with no underlying health conditions.

1. Providing appropriate PPE in the high risk area.
   One of the most important areas is the emergency department/ OPD, where the COVID status of the patients is unknown. There should be a designated **RED zone** in the emergency department where appropriate PPE should be provided.

2. Frequent testing of frontline staff and isolating the ones who are positive. It's also important to test their contacts as well.

3. Mental helpline to the frontline staff.
   Many of the frontline health care workers are at risk of developing post-traumatic stress disorder, stress related fatigue etc. It's important to create a mental health help line or counselling services for those in need.

4. Change in the pattern of shift work which will reduce the number of health care workers exposed on the front line at the same time. Various shift patterns have already been implemented in Bangladesh and other countries such as few days on and few days off (example dividing the HCWs in few teams and have 12 hour shift for 3-5 consecutive days followed by few days off).

5. Provision of alternate accommodation should be provided to those with vulnerable family members at home.

6. Please note that there is NO EVIDENCE TO RECOMMEND THE USE OF CHEMOPROPHYLAXIS with hydroxychloroquine[1].

7. Minimise the frequency of patient encounters i.e. use of automated machines to check observations, use of once daily IV antibiotics where possible.

Health care professionals who have had contact with a confirmed /possible case without wearing recommended PPE:

1. No restrictions. Daily monitoring of symptoms. It is advisable to have a COVID test if possible (not according to UK guideline though).
2. If they develop symptoms- Swab for COVID-19 test and Self-isolate immediately.
3. If COVID-19 positive – Self-isolate for 7 days from the day of positive test. Return to work when afebrile for 48 hours and recovery of respiratory symptoms (except cough, which can persist for longer period) and 7-day isolation period is completed.
4. If COVID negative and no symptoms – can return to work.
5. If COVID negative, but symptomatic – Self-isolation for 7 days as possible COVID patient.

Reference:

1. https://www.cebm.net/covid-19/hydroxychloroquine-for-covid-19-what-do-the-clinical-trials-tell-us/
2. NHS-England and SFH NHS Foundation Trust infection control guidelines

14.Extended use or re-use of N-95/FFP3 and reusable gowns:

Dr Tasmin Sultana, Ms Verona Beckles

There is acute shortage of PPE throughout the world. Due to the acute shortage it's really important to optimise the use of PPE and reuse them wherever possible.

Key Points:

- It's important to discard N95/FFP3 masks contaminated with blood, respiratory or nasal secretions.
- A cleanable face shield or surgical mask on top of this mask to prevent spilling of bodily fluids can be used.
- Clean hands with soap and water or an alcohol-based hand sanitizer before and after touching or adjusting the respirator (if necessary, for comfort or to maintain fit).
- Avoid touching the inside of the respirator. If inadvertent contact is made with the inside of the respirator, discard the respirator and perform hand hygiene as described above.
- Recommended max continuous use of 8 hours in one day between breaks for these masks is extended use. *One mask can be re-used max up to 5 cycles without loosing its functional integrity.

***Taking it off(doffing)in the same day during meal break/toilet break and wear it back(donning) after break with precautions is of crucial importance.

- **If you have 5 of N-95/FFP3 masks, you can re-use them up to 25 days, max up to 5 cycle per mask recommended by the CDC without damage or changing its functional integrity.**

Day 1- Doffing mask no. 1 using the ribbon attached on the edge of mask, put it in paper bag, write 1 on bag for mask no.1, put it away in well-lit area for next re-use on day 6(on the polymer fabric of N-95/FFP3 the virus may be viable up to 2-3 days max, as the closest to it is cardboard on which virus survive only 24hr).

Day 2-Use the mask no.2 on day 2, doffing after hand wash and with precautions, put it in paper bag, write No. 2 on it, keep it away in well-lit area for re-use on day 7.Repeat same cycle for the mask no. 3, 4 and 5 , after using them accordingly **on day 3,4 and 5.**

Day 6- you will wear the mask you have worn on day 1, as kept it no. 1 labelled bag, re-use as you will use a new one as there is no viable virus attached to its surface.

- There are 3 ways of decontaminating N-95/FFP3, none can be done by individual but in a given facility

    1.VHP-Vaporised hydrogen peroxide-USA-FDA issued

    2.UVGI-Ultraviolet ray germicidal irradiation-USA-FDA not issued

    3.Moist heat-USA FDA not issued

- Washing of Reusable gowns: Most of the reusable PPE gowns used in Bangladesh are made of parachute material. Ideally, they should be sterilised using hydrogen peroxide gas plasma sterilization method. This is happening in most of the hospitals in the big cities where facilities are available. However, where these facilities are not available (in villages or small towns) detergent boiled water and occasionally bleach mixed boiling water can be used to sterilise them (taken from local sources in Bangladesh).

Reference:
https://www.cdc.gov/niosh/topics/hcwcontrols/recommendedguidanceextuse.html

15.Heart disease and COVID-19

Dr Farhana Tasneem Rimi, Dr Shakil Farid, Dr. Kazi Asif Adnan, Dr Rana Sayeed, Dr Omar Hasan, Dr. Chowdhury H. Ahsan

Introduction: Patients with cardiac diseases may present with symptoms and signs which may raise suspicion of COVID19 infection and need to be triaged accordingly so that the health care workers are protected. COVID 19 infection itself may have cardiovascular manifestations and can lead a variety of cardiovascular complications.

Pathophysiology:

Multiple mechanisms have been described (Fig.1), these may lead to following clinical presentations:

Acute Myocarditis: Systemic inflammatory response of severe -a high level of cytokine surge, along with direct myocyte injury can lead to myocarditis and biomarker like troponin can increase. It may present with increased heart rate and congestive symptoms with left ventricular systolic dysfunction in association with pneumonia and other COVID 19 presentations.

SARS-CoV2 virus uses ACE2 receptors as an entry point to the cell. ACE 2 receptor expressed in both type1 and type 2 pneumocytes are also expressed in other cell types, such as endothelial cells. ACE2 is an inverse regulator of the Renin-Angiotensin System. This interaction of SARS-CoV2 with ACE2 can result in changes of ACE2 pathways leading to acute injury to the lung, heart, and endothelial cells**.**

Type 2 Myocardial Infarction (MI): As a result of increased cardiometabolic demand associated with the systemic infection and ongoing hypoxia caused by severe pneumonia or acute respiratory distress syndrome can lead to increased demand in the face of inadequate supply leading to myocardial damage.

Type 1 MI Acute plaque rupture or plaque erosion with activation of coagulation cascade and platelet activation leading to acute coronary syndrome presenting as ST elevation MI (STEMI) or non-ST elevation MI (NSTEMI). Cardiac care pathway for this in the current hospital environment with COVID 19 infection is elaborated in Fig1.

Type 1 MI with hypercoagulable state and stress cardiomyopathy (Takotsubo's syndrome) have also been reported in severe COVID19 patients.

Cardiac Arrhythmias: Hydroxychloroquine and azithromycin combination therapy has been used in COVID 19 without any conclusive evidence. However, the prolongation of QT intervals was noted more often in these patients and higher incidence of cardiac arrhythmias with increased mortality been reported in them. Electrolyte disturbance can also occur in severe COVID19 infection and trigger arrhythmias particularly in patients with underlying cardiac disease.

Patients with CV risk factors have been identified as particularly vulnerable populations with increased morbidity and mortality when suffering from COVID-19.[1,2] Moreover, a considerable proportion of patients may develop cardiac injury in the context of COVID-19 which portends an increased risk of in-hospital mortality. In a retrospective cohort study of 72314 cases in China[3] patients with CV comorbidities had fivefold higher mortality risk (10.5%).

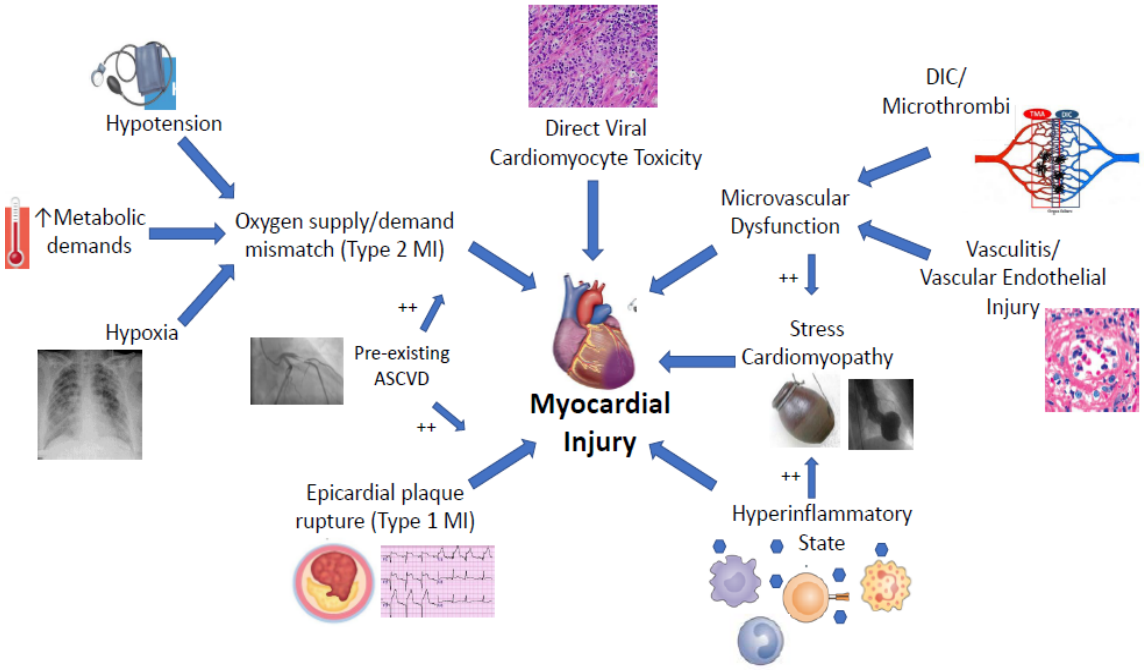


Fig1: COVID 19 infection and cardiac manifestations

Obligatory inpatients:

Emergency cases will continue to require admission and ongoing management, e.g. myocardial infarction, class IV heart failure, arrhythmias (such as uncontrolled AF or VT), endocarditis. Rapid treatment and discharge should be aimed for these patients.

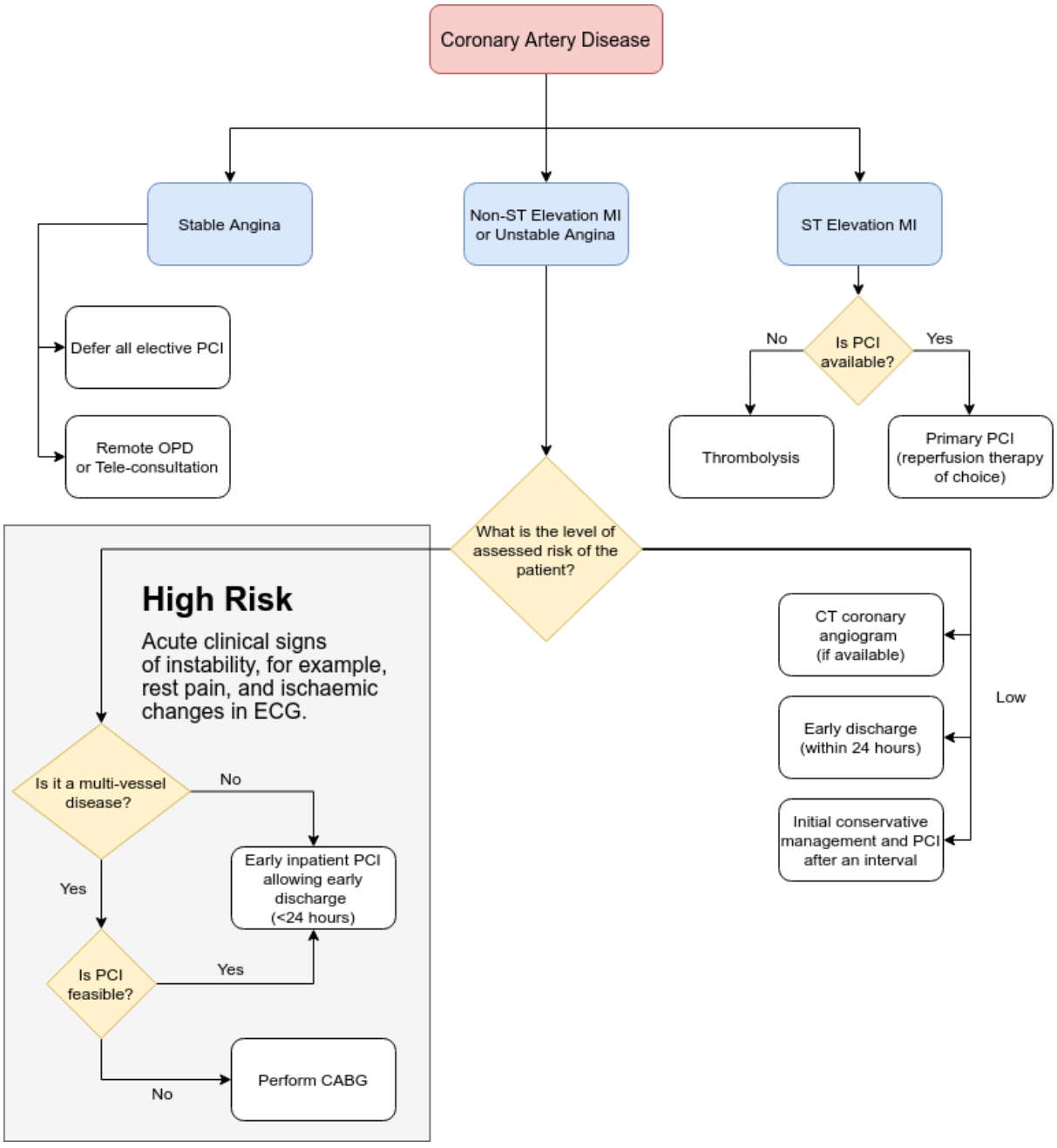


Fig 2: Summary of management of patients with Ischaemic Heart disease

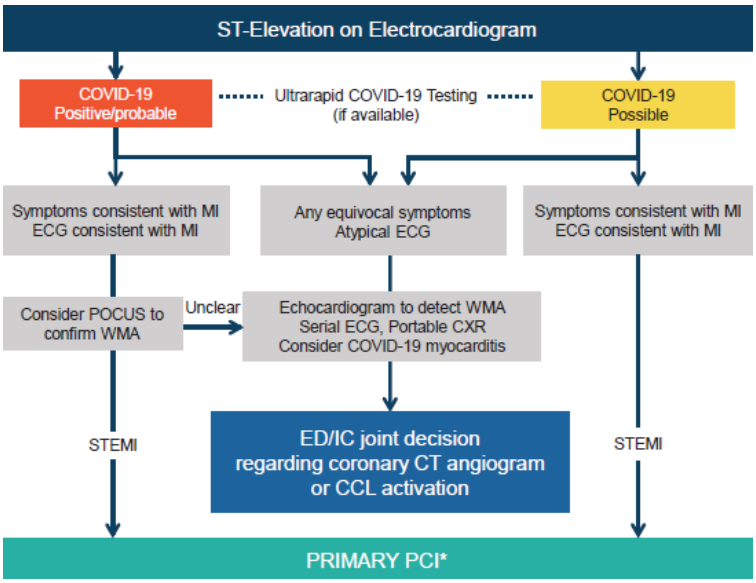


Fig 3: Evaluation of STEMI patient and decision making when the hospital is dealing with COVID 19 patients. (POCUS-point of care US, handheld Echo)

Ref: *Journal of American College of Cardiology, April 30, 2020*

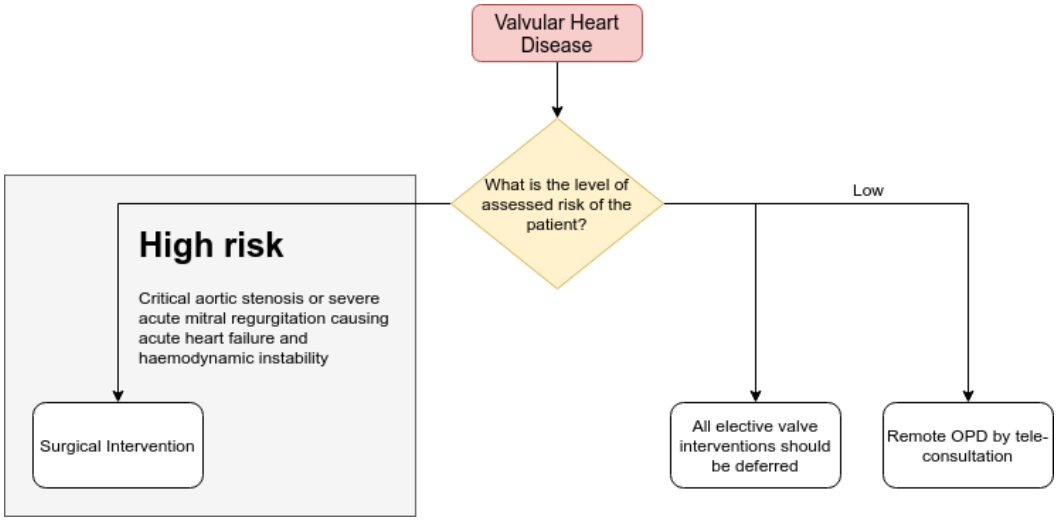


Fig 4: Summary of management of patients with Valvular Heart disease

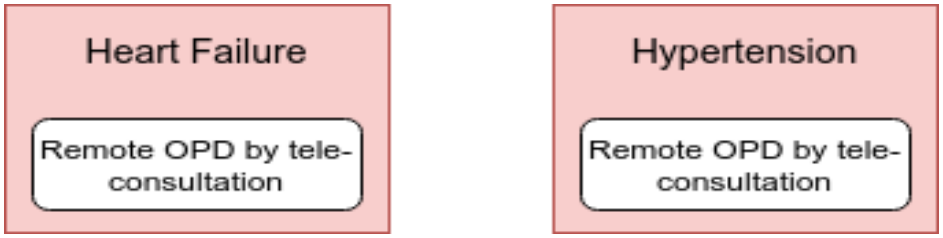


Fig 5: Summary of management of hypertension and heart failure

Outpatients: Where possible, appointments should be conducted remotely by telephone, e mail or video consultation and non-urgent appointments deferred.

Heart failure: Ambulatory stable HF patients (with no cardiac emergencies) should refrain from hospital visits. Guideline-directed medical therapy (including beta-blocker, ACEI, ARB or sacubitril/valsartan and mineralocorticoid receptor antagonist), should be continued in chronic HF patients, irrespective of COVID-19.

Hypertension: Many patients with treated hypertension will be unable to attend for their usual routine clinical review. When possible, patients should monitor their own BP as frequently as they usually would, using a validated home BP monitor.[4]

Concern has been expressed that treatment with ACEIs or ARBs might increase the risk of infection, or developing the severe consequences of infection with COVID-19.[5,6] This concern originates from a hypothesis that links the observations that COVID-19 invades cells by binding to the enzyme ACE2 which is ubiquitous and expressed on the surface of alveolar cells in the lung.[7,8] In some animal studies, but all, ACEIs or ARBs have been shown to increase ACE2 levels mainly in cardiac tissue.[9,10]

Indications for surgical intervention:

Wherever possible it's important to explore non-surgical options during the peak period.

Emergency (within 24 hours):

1. Repair of acute type A aortic dissection
2. Repair of ischaemic VSD
3. MI with severe haemodynamic instability where PCI is not an option
4. Severe ischaemic mitral regurgitation with haemodynamic instability

Urgent (within 72 hours)

1. Coronary artery disease with rest pain not amenable to PCI and non-responsive to maximal anti-anginal medication
2. Myxoma (with emboli and/or haemodynamically unstable)
3. Severe aortic valvular disease with haemodynamic instability/deteriorating symptoms (syncope/critical aortic stenosis/heart failure)
4. Severe mitral regurgitation with deteriorating symptoms (severe ischaemic mitral regurgitation)

Clinically Urgent Elective (within a month)

1. Severe coronary artery disease with complex anatomy (severe LMS, severe 3VD not amenable to PCI) and limiting symptoms
2. Severe aortic valve disease with symptoms on minimal exertion and/or deteriorating LV function

3. Severe mitral valve disease with symptoms on minimal exertion and/or deteriorating LV function (mitral stenosis unsuitable for balloon valvotomy)
4. High-risk recent NSTEMI where PCI is not an option.
5. Aortic aneurysm (Ascending aorta >6 cm, >5.5 cm in presence of connective tissue disease or family history of rupture/dissection, recent increase in dimensions or symptoms).

Managing patients with cardiovascular disease during COVID 19 pandemic: a personal perspective with case examples

Dr. Kazi Asif Adnan

In this section, 2 cases seen in last few weeks are discussed to provide some practical insight. All such recommendations are under regular review as we learn more about this new disease.

Case 1:

A 66-year-old man with severe COVID 19 pneumonia was transferred to ITU for intubation and ventilation. His HS-Troponin was raised, and ECG showed sinus tachycardia. Initial echocardiogram, pre-intubation, showed normal cardiac function. 4 days later, while his ventilation parameters were getting worse, a repeat echocardiogram showed severe RV and LV dysfunction with LVEF <20%. He was in sinus tachycardia and his BP was stable without any ionotropic support. He developed AKI and was put on CVVH. He was started on small dose of cardio selective beta blocker, ACE-I and spironolactone for his severe LV dysfunction. He gradually improved in terms of his ventilation parameters and a repeat echocardiogram after a week showed cardiac function completely back to normal.

Case 2:

84 year old female patient with known atrial fibrillation was admitted with COVID19 Pneumonia. She had persistent tachycardia (HR 130-160, AF) and was loaded with Digoxin and her Diltiazem was increased with no real effect on her HR. She continued to deteriorate with higher oxygen requirement and eventually was palliated as Intubation and ventilation was not appropriate due to poor baseline functional status.

Key points:

- Significant LV and RV dysfunction has been noted in COVID19 patients. Such cardiac dysfunction, which can be often transient, has also been noted in ITU patients in the past with severe infection/ sepsis. While these patients can be tried on conventional ‘disease modifying’ therapy for heart failure, there is no evidence about their efficacy.

- Debate exists about the role of ACE-I/ ARB in COVID19 patients. However, currently the evidence doesn't point to either harm or benefit whereas their role in severe cardiac dysfunction is well proven.
- Tachy-arrhythmias such as Atrial Fibrillation/ Flutter/ SVT are often associated with any infection as a new onset arrhythmia or poses challenges in rate control.
- All STEMIs, where possible, require immediate revascularisation with PPCI due to significant mortality and morbidity benefits.
- For centers offering PPCI service for STEMI, all staff inside the Cath lab should have PPE 2 (FFP3/N95 respirator masks, full sleeve fluid repellent aprons, visors/ goggles, theatre cap) as per the recommendations from BCS.
- Cath labs need to undergo 'deep clean' after any highly suspected or confirmed COVID19 patients as otherwise significant risk to multiple staff members and other patients due to risk of cross infection.

References:

- European Society of Cardiology Guidance for the Diagnosis and Management of CV Disease during the COVID-19 Pandemic (last updated on 21st April,2020)
- Clerkin KJ, Fried JA, Raikhelkar J, Sayer G, Griffin JM, Masoumi A, Jain SS, Burkhoff D, Kumaraiah D, Rabbani L, Schwartz A, Uriel N. Coronavirus Disease 2019 (COVID-19) and Cardiovascular Disease. Circulation 2020.
- Novel Coronavirus Pneumonia Emergency Response Epidemiology T. [The epidemio-logical characteristics of an outbreak of 2019 novel coronavirus diseases (COVID-19) in China]. Zhonghua Liu Xing Bing Xue Za Zhi 2020;41(2):145-151.
- Williams B, Mancia G, Spiering W, Agabiti Rosei E, Azizi M, Burnier M, Clement DL, Coca A, de Simone G, Aboyans V, Desormais I, Group ESCSD. 2018 ESC/ESH Guidelines for the management of arterial hypertension. Eur Heart J 2018;39(33):3021-3104.
- Zheng YY, Ma YT, Zhang JY, Xie X. COVID-19 and the cardiovascular system. Nat Rev Cardiol 2020. https://doi.org/10.1038/s41569-020-0360-5
- Fang L, Karakiulakis G, Roth M. Are patients with hypertension and diabetes mellitus at increased risk for COVID-19 infection? Lancet Respir Med 2020. https://doi.org/10.1016/S2213-2600(20)30116-8
- Hoffmann M, Kleine-Weber H, Schroeder S, Kruger N, Herrler T, Erichsen S, Schiergens TS, Herrler G, Wu NH, Nitsche A, Muller MA, Drosten C, Pohlmann S. SARS-CoV-2 Cell Entry Depends on ACE2 and TMPRSS2 and Is Blocked by a Clinically Proven Protease Inhibitor. Cell 2020. https://doi.org/10.1016/j.cell.2020.02.052
- Hamming I, Timens W, Bulthuis ML, Lely AT, Navis G, van Goor H. Tissue distribution of ACE2 protein, the functional receptor for SARS coronavirus. A first step in understanding SARS pathogenesis. J Pathol 2004;203(2):631-7. https://doi.org/10.1002/path.1570
- Ferrario CM, Jessup J, Chappell MC, Averill DB, Brosnihan KB, Tallant EA, Diz DI, Gallagher PE. Effect of angiotensin-converting enzyme inhibition and angiotensin II receptor blockers on cardiac angiotensin-converting enzyme 2. Circulation 2005;111(20):2605- https://doi.org/10.1161/CIRCULATIONAHA.104.510461
- Burrell LM, Risvanis J, Kubota E, Dean RG, MacDonald PS, Lu S, Tikellis C, Grant SL, Lew RA, Smith AI, Cooper ME, Johnston CI. Myocardial infarction increases ACE2 expression in rat and humans. Eur Heart J 2005;26(4):369-75; discussion 322-4. https://doi.org/10.1093/eurheartj/ehi114

A case of Arrhythmia

Dr. Chowdhury H. Ahsan

Background:
Previous to the COVOD19 pandemic, reports of QTc-prolongation and Torsades de pointes (TdP) related to HCQ use were relatively rare in the literature.[1,2,3,4,5] However, in a COVID-ravaged world, anecdotal reports of arrhythmia complications have increased exponentially in literature and among physician groups as medical workers use whatever tools are available to combat this illness. In a recent Brazilian study, death rate was 39% in the high-dose chloroquine group compared to 15% in the low-dose group.[6]
Here we present a patient which illustrates this issue and merits further discussion.

Case presentation:

A 71-year-old male patient with a history of hypertension and diabetes presented initially to the hospital with shortness of breath and cough, and immediately required ventilator support due to severe hypoxic respiratory failure. He was also noted to have significant intermittent fevers up to 103 degrees Fahrenheit. His initial COVID-19 test was negative; however, due to the strong suspicion for COVID-19, a repeat test was done, which was positive. During the hospital course, the patient was started on azithromycin and ceftriaxone for suspected pneumonia and finished a course of hydroxychloroquine, which included a loading dose then maintenance dose for a total of five days of therapy. His QTc remained above 500 milliseconds while on hydroxychloroquine therapy. The patient's medication profile was frequently reconciled to avoid further administration of QTc- prolonging medications. During the hospital course, the patient continued to require ventilator support and underwent frequent pronation due to oxygenation demands. On day 17 of hospitalization, the patient had a cardiac arrest with polymorphic Ventricular Tachycardia degenerating into Ventricular Fibrillation. Cardiopulmonary resuscitation(CPR) was immediately started and continued per ACLS guidelines. The patient was shocked multiple times and given several rounds of epinephrine, magnesium, bicarbonate, calcium and amiodarone. However, ventricular fibrillation was persistent and return of spontaneous circulation was not achieved. However, after twenty-two minutes of resuscitation attempts, the patient was pronounced deceased from ventricular fibrillation cardiac arrest.

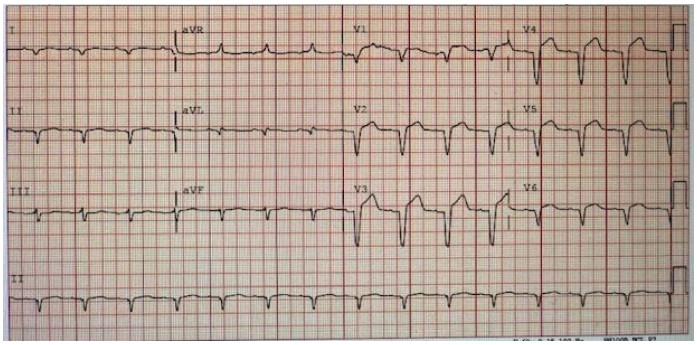


Figure 1. EKG prior to hydroxychloroquine initiation (QTc < 500 ms)

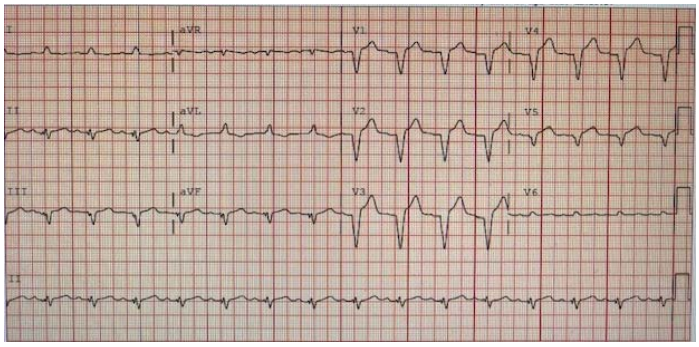


Figure 2. EKG after 5-day course of hydroxychloroquine (QTc 524 ms)

Discussion: Hydroxychlroquine and azithromycin combination can increase the QT interval and should be monitored. Any significant QTc-prolongation >500 milliseconds (msec) or TdP would be instantly recognized. Additionally, myocarditis that may often accompany COVID infections may show EKG changes. initial load of Hydroxychloroquine could quickly lead to QTc-prolongation.
COVID positive patients who may have other comorbidities (COPD, cardiovascular disease, diabetes, CKD etc) have increased risk for arrhythmias. Electrolyte abnormalities such as hypokalaemia or hypomagnesemia may contribute to QTc prolongation and ventricular arrhythmias. Another compounding issue is hydroxychloroquine-induced hypoglycaemia in diabetic, which can be associated with QTc-prolongation and TdP.[9,10] As hydroxychloroquine is metabolized by CYP3A4, any medication (for example, Azithromycin) that inhibits this enzyme may also elevated plasma levels of the drug and increase risk of QTc prolongation.[11] . Furthermore, cytokine release and inflammation due to or exacerbated by viral myocarditis by COVID 19 can also lead to QTc prolongation and is a poor prognostic indicator.[12,13] Due to illness-related stress, these patients may also develop ST elevation myocardial infarction (MI), non-ST elevation MI, stress cardiomyopathy or Takatsubo's syndrome, or myocardial injury in the form of type II MI secondary to profound hypoxia.

References:

1. Fda.gov; fact sheet for health care providers emergency use authorization (eua) of hydroxychloroquine sulfate supplied from the strategic national stockpile for treatment of covid-19 in certain hospitalized patients. 4/3/2020. [assessed 4/27/2020]
2. Roden*et al*.; Drug Interactions on QTc in Exploratory COVID-19 Treatment. Circulation 4/2020
3. Haeusler*et al*; The arrhythmogenic cardiotoxicity of the quinoline and structurally related antimalarial drugs: a systematic review. *BMC Med*. 2018; 16: 200.
4. Danielsson B, Collin J, Nyman A*, et al;* Drug use and torsades de pointes cardiac arrhythmias in Sweden: a nationwide register-based cohort study. *BMJ Open* 2020
5. Malaria Policy Advisory Committee Meeting; The cardiotoxicity of antimalarials. *WHO Evidence Review Group Meeting*, 13–14 October 2016
6. MaylaAbrielaSilva Borba, Fernando Fonseca Almeida Val, VandersonSouza Sampaio. Effect of high dose vs low dose of chloroquine diphosphate in patients hospitalized with COVID 19. *JAMA Network*OP, April 24, 2020.
7. Kim AY, Gandhi RT; Coronavirus disease 2019 (COVID-19): management in adults. Post TW, ed. UpToDate.
8. Perinel S, Launay M, Botelho-Nevers É, *et al*. Towards optimization of hydroxychloroquine dosing in intensive care unit COVID-19 patients [published online, April 7, 2020]. Clin Infect Dis.
9. Hannoodi F, Alwash H, Shah K, *et al*.; A Case of Hypoglycemiainduced QT Prolongation Leading to Torsade de Pointes and a Review of Pathophysiological Mechanisms.*ClinPract*. 2017 Jun 15;7(3):960
10. Gruden G, Giunti S, BaruttaF,*et al*.; QTc interval prolongation is independently associated with severe hypoglycemic attacks in type 1 diabetes from the EURODIAB IDDM complications study.*Diabetes Care*. 2012 Jan;35(1):125-7.
11. Chorin E, Dai M, Shulman E, *et al*. The QT interval in patients with COVID-19 treated with hydroxychloroquine and azithromycin. *Nat Med*. 2020.
12. Lazzerini PE, Capecchi PL, Laghi-PasiniF.Long QT Syndrome: An Emerging Role for Inflammation and Immunity.*Front Cardiovasc Med*. 2015 May 27;2:26.
13. Hung Y, Lin WH, Lin CS,*et al*. The Prognostic Role of QTc Interval in Acute Myocarditis.*ActaCardiol Sin*. 2016 Mar;32(2):223-30.

16. Kidney disease and COVID-19

Dr. Sarah Choudhury, Dr. Tasbirul Islam

Initial reports from Wuhan suggested that the burden of acute kidney injury with COVID-19 infection was relatively low, ranging from 3% to 9% but subsequent analyses demonstrated incidence rates as high as 15% and the incidence of needing renal replacement therapy might be up to 15-25%. A retrospective study of 201 patients with confirmed COVID-19 pneumonia in China showed that 41.8% developed ARDS and 4.5% developed AKI. Recent findings confirmed the close relationship between alveolar and tubular damage — the lung–kidney axis — in ARDS. The acute kidney injury (AKI) was mostly due to acute tubular necrosis and most AKI developed within 7 days of admission.

COVID-19 patients are tremendously catabolic with hyperkalemia, hyperphosphatemia, and profound metabolic acidosis. Patients with COVID-19 are also very thrombogenic, leading to premature clogging of dialysis filters and the formation of a so-called protein cake. COVID-19 patients have elevated levels of ferritin, which may be a marker of ferroptosis. Iron-mediated cell death may contribute to the enormous inflammation seen in these patients and could play a role in why they do worse.

Q & A:

1-Do you recommend that medical management be exhausted before using RRT?

--If patient is hypervolumic causing respiratory failure, try loop diuretics. If patient is hypovolemic, then try intravenous fluid. If patient is hypotensive, then try intravenous fluid, vasopressor to increase the blood pressure. Avoid nephrotoxic drugs.

2--Are you delaying RRT longer because of the shortage of machines or any clinical reasons?

We've to use RRT wisely, otherwise hospital will run out of machine and supplies.

3-Is continuous renal replacement therapy (CRRT) the preferred modality?

CRRT is preferred over conventional HD or PD in hemodynamically unstable patient.

4- What about resource-wise in terms of preserving dialysate?

Decrease flow rate to 15 ml/kg/hr from typical flow rate 20-25 ml/kg/hr to conserve resources.

5-What about anticoagulation in RRT?

Higher risk of filter clotting in COVID 19 patient. Anticoagulation is very important in COVID 19 patient and UFH is anticoagulation of choice.

6-Prefered vascular access?

RIJ→Femoral→LIJ

References:

- Uang C et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet.* 2020; 395: 497-506
- International Society of Nephrology Academy Online Learning. Webinar: COVID19 for the nephrologist: real-life experience from Italy.
- Cheng et al. Lancet 2020.
- A retrospective study of 201 patients with confirmed COVID-19 pneumonia in China showed that 41.8% developed ARDS and 4.5% developed AKI.
- Wu, C. et al. Risk factors associated with acute respiratory distress syndrome and death in patients with coronavirus disease 2019 pneumonia in Wuhan, China. *JAMA Intern. Med.*

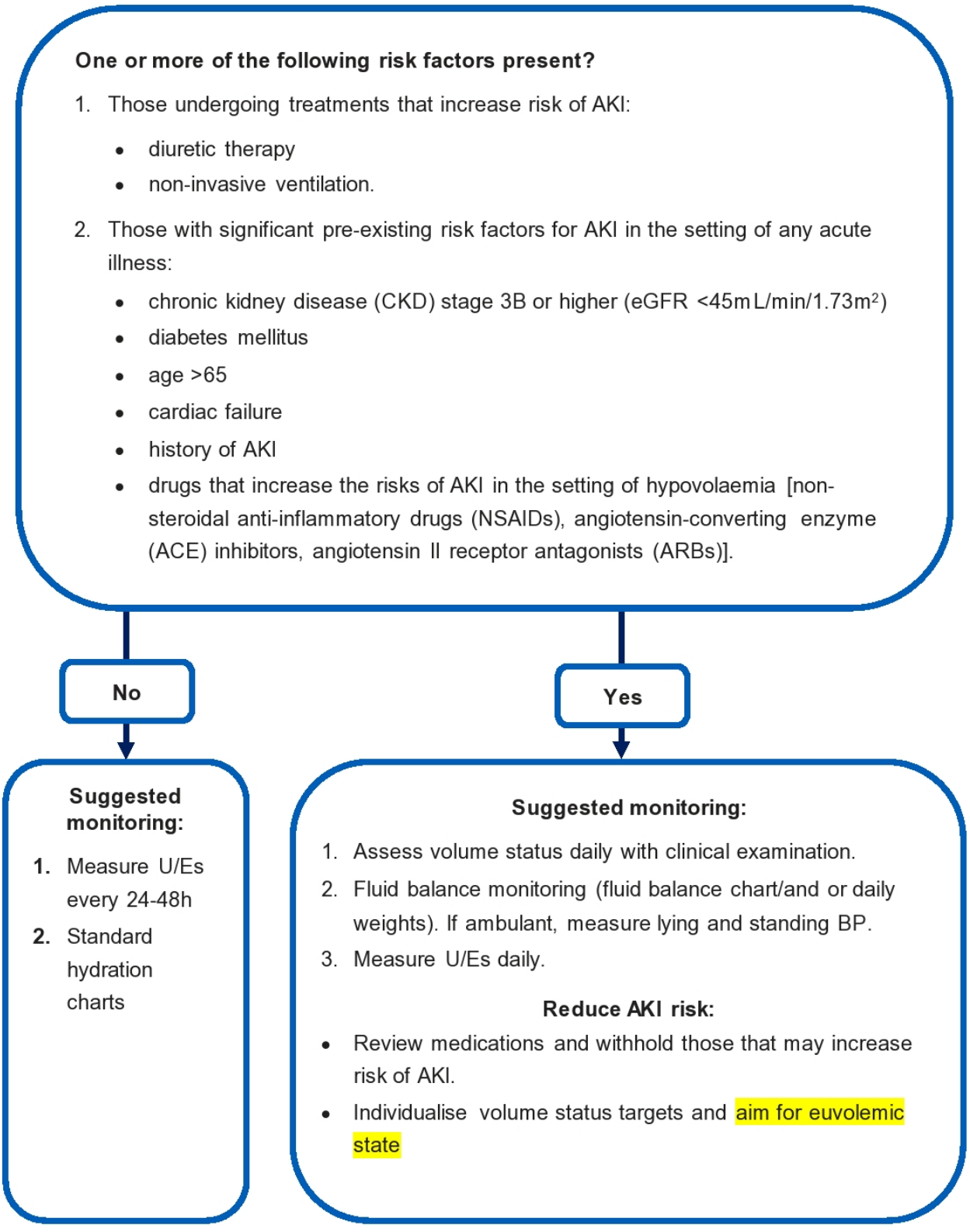
KDIGO AKI Staging

Stage	Serum creatinine	Urine output
1	≥ 1.5-1.9 times baseline (7 days) OR 26.5 µmol/L increase (48 hrs)	< 0.5 ml/kg/hr for 6-12 hrs
2	≥ 2.0-2.9 times baseline	< 0.5 ml/kg/hr for ≥12hrs
3	≥ 3.0 times baseline OR increase in creatinine to ≥ 354 µmol/L OR Renal replacement therapy	< 0.3 ml/kg/hr for ≥24hrs OR Anuria for ≥ 12hrs

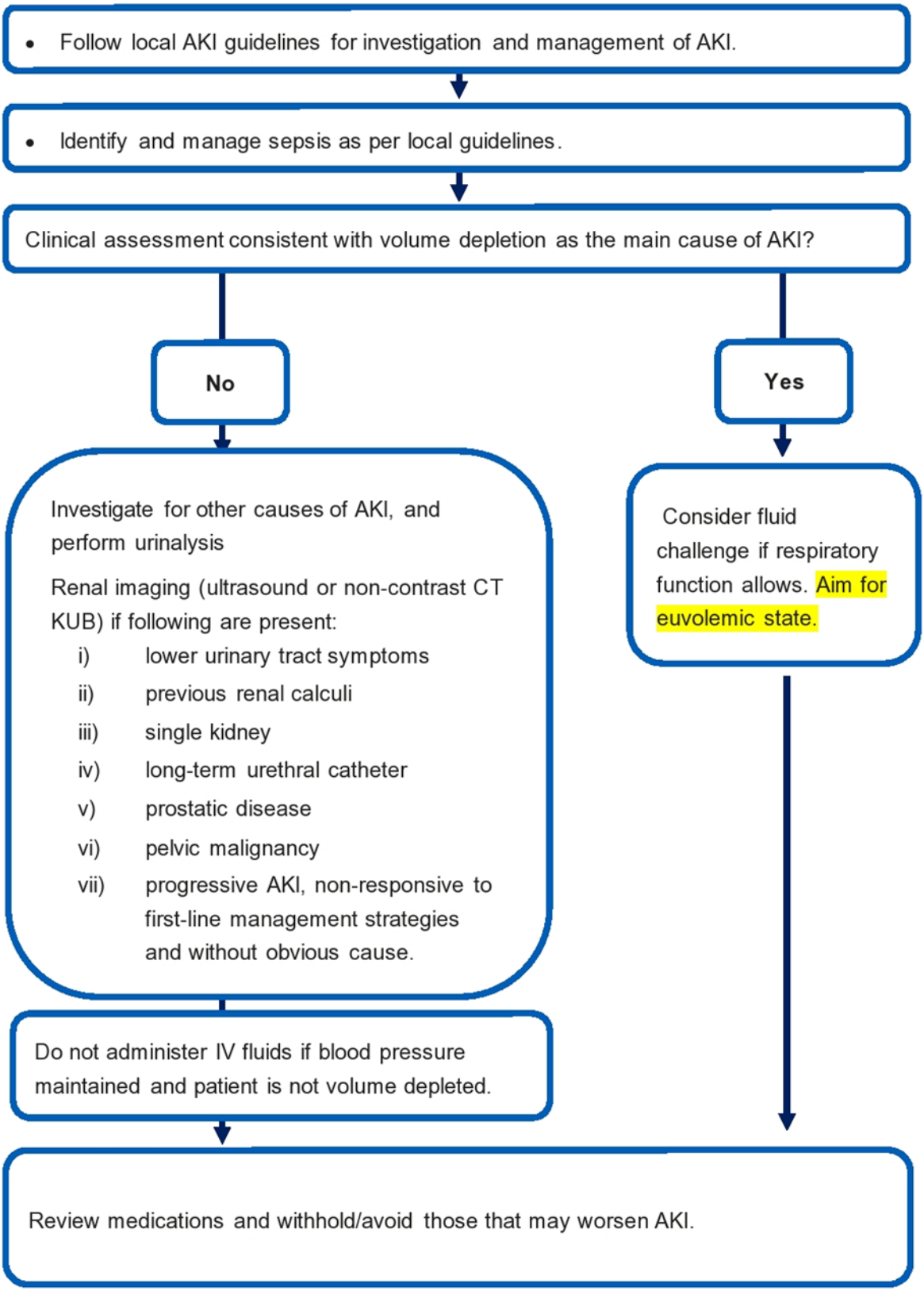
KDIGO AKI Guideline. Kidney inter., Suppl. 2012; 2: 1–138

Summary charts

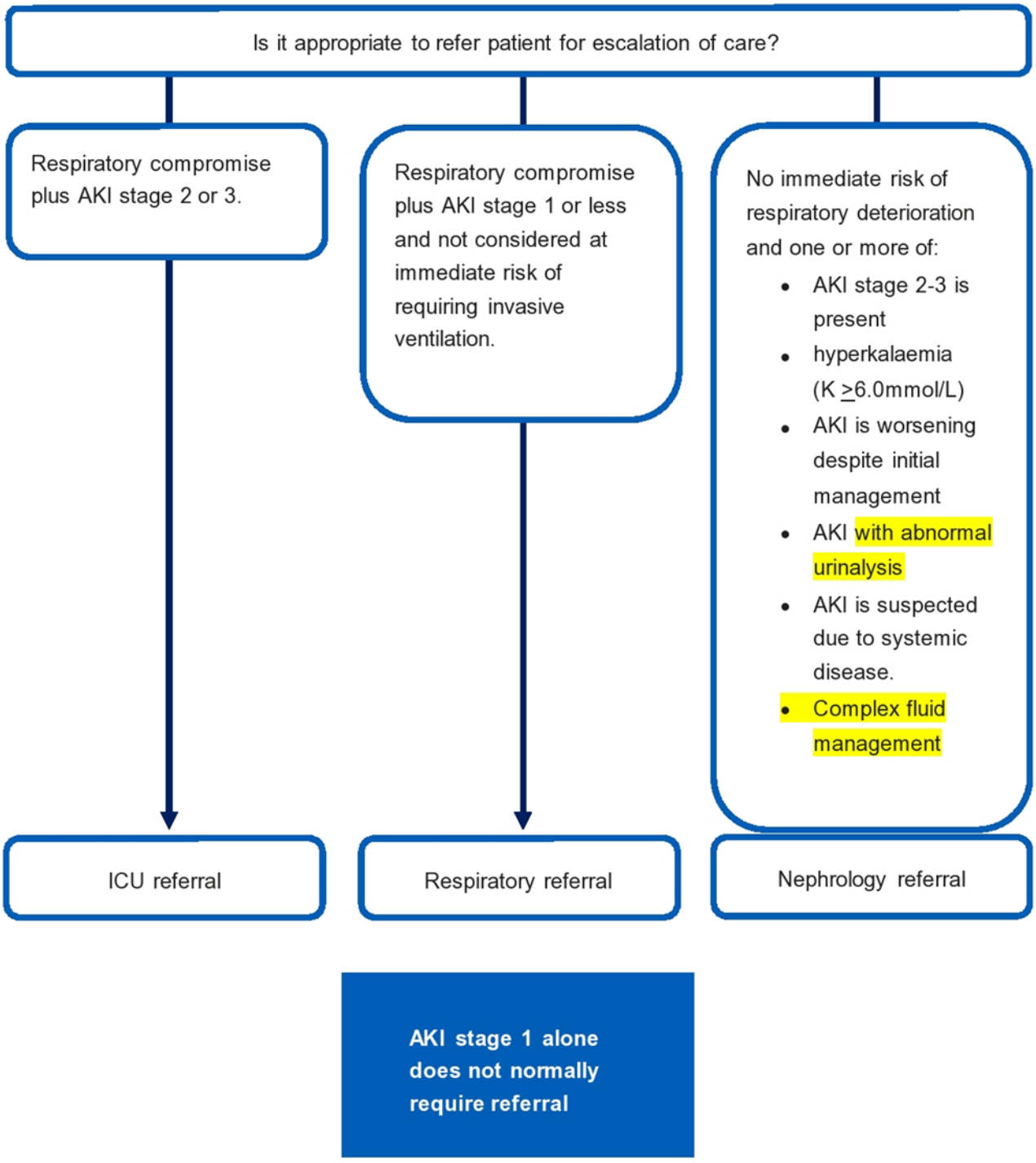
1. Assessing AKI risk



2. Responding to those who develop AKI



3. Referral



Reference:

This document has been collected and modified from the trust intranet page of Northwest Anglia NHS trust. This is a national guideline from NHS ENGLAND and NHS improvement.

17. Elderly patients and COVID-19

Dr Nashid Noor Alam, Dr Jeenat Khan

- **A) COVID 19: Special consideration and subtle differences in acute presentation of patients above 65**
- **B) Guidance for ward-based management of COVID cases (Ward round essentials**
- **C)Covid-19 Pandemic selection of patients above the age if 65 for suitability for escalation of care beyond ward level including Invasive ventilation in ICU setting**
- **D)End Of life care for Elderly COVID Patients who continues to decline and not for escalation:**

A) COVID 19: Special consideration and subtle differences in acute presentation of patients above 65

It is well recognised that due to physiological changes associated with normal ageing process many diseases present non classically or in a different way in patients above the age of 65 in the acute medical take. Not recognising this leads to adverse outcome and clinical errors in management of elderly and even misdiagnosis.

In this challenging time of the COVID-19 pandemic we should be mindful that presentation of COVID in patients above 65 as above can be quite different so a high index of suspicion and low threshold to isolate, test and manage these patients are absolutely vital.

Admitting doctor and the consultants responsible for the patients should be mindful of the following as per British Geriatric Society and Regional Geriatric programme of Toronto guidelines which is freely available online and summarised below:

- Typical symptoms of COVID-19 such as fever, cough, and dyspnoea may be absent in the elderly despite respiratory disease
- Only 20-30% of geriatric patients with infection present with fever
- Atypical COVID-19 symptoms include delirium, falls, generalized weakness, malaise,
- functional decline, and conjunctivitis, anorexia, increased sputum production, dizziness, headache, rhinorrhoea, chest pain, haemoptysis, diarrhoea, nausea/vomiting, abdominal pain, nasal congestion, and anosmia

- Tachypnoea, delirium, unexplained tachycardia, or decrease in blood pressure may be the presenting clinical presentation in older adults

- Threshold for diagnosing fever should be lower, i.e. 37.5°C or an increase of >1.5°C from usual temperature

- Older age, frailty, and increasing number of comorbidities increase the probability of an atypical presentation.

- Older adults may present with mild symptoms that are disproportionate to the severity of their illness

(Ref: British Geriatric Society www.bgs.org.uk)

B) Guidance for ward-based management of COVID cases (Ward round essentials)

- Wear your PPE – follow PPE guidance for correct donning of PPE. For aerosol generated
- procedures (AGP), use enhanced PPE irrespective of the treatment area
- Maintain social distancing on ward areas as much as possible (board rounds, MDT etc.)
- Maintain appropriate hygiene (hand/forearm wash etc.)
- One person to go in to see patient to reduce direct contact (should be of reasonable seniority)
- Do not take patient notes into the room or cohorted area/bay
- Check blood results and oxygen saturations/ observations before ward round if possible
- Check usual breathing status
- Ensure every patient has an escalation status even if stable on the day
- Assess for high risk factors for deterioration: heart disease, hypertension, obesity, stroke, diabetes, asthma, COPD, immunosuppression, cancers, increasing age/high frailty score etc.

Investigations:

- On admission- FBC, UEs, LFTs, CRP, INR, cardiac enzymes if chest pain/tightness
- During admission – blood tests as above and as indicated by clinical course
- CXR
- Blood culture, Urine culture, Sputum culture, swabs as appropriate

When with the patient:

- Assess for improvement/deterioration (ABCDE, saturation, symptoms of cough, fever, SoB)
- Inform and discuss with patient about issues like their priorities, DNACPR and escalation to ITU
- Complete DNACPR as appropriate after leaving the patient bedside.
- At least a daily review

Treatment guide:

- Oxygen: Aim for saturations between 92-96% (UHNM guide); (88-90% if COPD).
- Prefer mask to nasal cannula for oxygen and check flow rate hourly (4 hourly overnight))
- Fluid balance aim to achieve neutral fluid balance (**avoid iv fluids unless absolutely necessary**)
- Paracetamol for fever (avoid ibuprofen)
- Steroids- **do not use** unless for bronchospasm or patient is already on regular steroids
- Antibiotics: it is not unreasonable to give antibiotics for Community Acquired Pneumonia (CAP) if you think the patient has a bacterial component.
- Nursing: where possible encourage nursing the patient in **a prone position**. This is increasingly being used to improve ventilation outside critical care in the awake patient. https://www.youtube.com/watch?v=HCrSUwqoX0I
- Maintain nutrition and other good medical/nursing practices
- Bowel, catheter, pressure area, cannula, care
- Continue with VTE prophylaxis (and remember that PE or CCF may co-exist)
- Check regular medication written on drug chart and rationalize it
- Remember sick day rules and consider holding nephrotoxic medication, statins, alendronate etc.
- Nebulisers: No evidence of efficacy in COVID pneumonia, and theoretical (but low) risk of spreading the virus around. So, unless the patient has a severe asthma or COPD exacerbations requiring a nebuliser don't use them. **No role for routine use of saline nebulisers**.
- If needed, try to use inhalers with a spacer device instead of nebulizers.

After seeing patient:

- Wash hands/forearms thoroughly, use PHE guidance for safe doffing
- Team members to inform family of status on phone if possible and document in notes
- Update nursing staff especially re escalation status
- A negative test for COVID or absence of fever is not needed prior to discharge/de-escalation
- Cough may persist in some individuals, and should not be a reason to continue to stay in hospital

Look out for signs of deterioration:

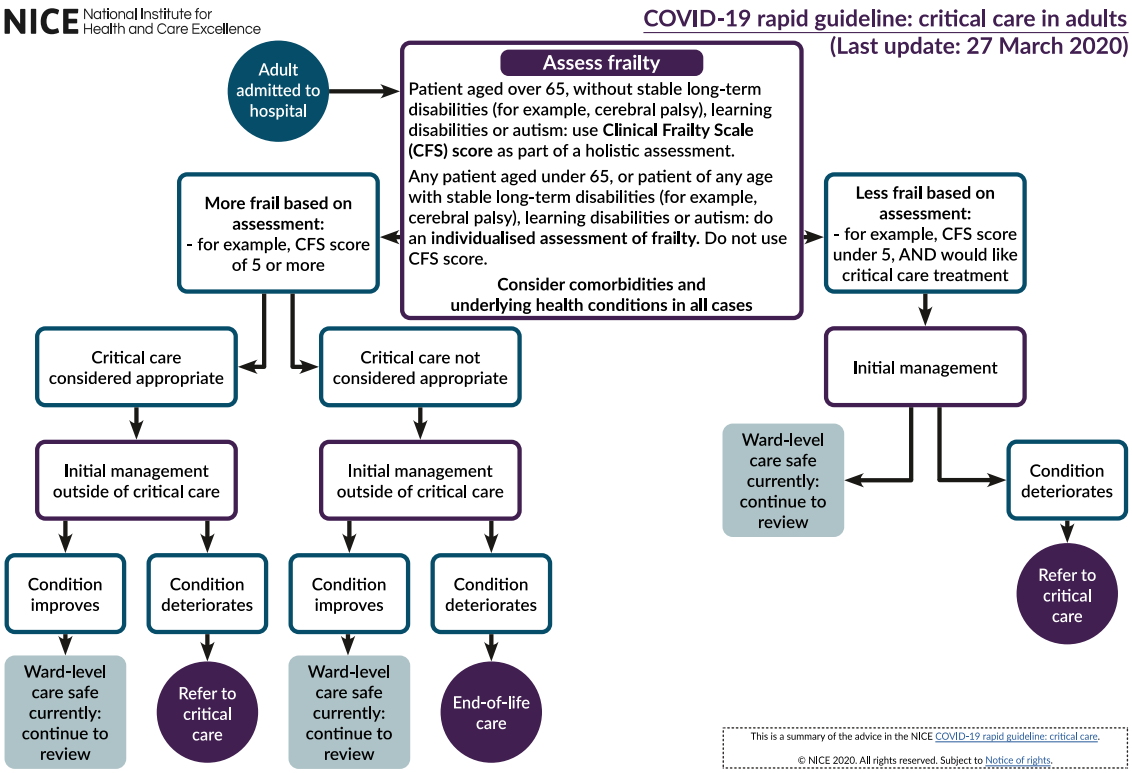
- Severe shortness of breath or Chest pain/pressure
- Little or no urine output, Cold hands or feet, blue lips or face, mottled skin, coughing up blood,
- Neck stiffness, non-blanching rash, becoming difficult to rouse or new confusion or delirium
- Oxygen requirement of more than 4 litres to maintain saturation above 90%
- Persistent temperature >38 C beyond day 7- review, exclude concurrent infection, FBC, UEs, CRP, LFT, CXR, senior review.
- ARDS picture/General deterioration and if for escalation

References:

- Adapted and modified from @betterageing/ https://bit.ly/covid-19wardroundguidance

C)Covid-19 Pandemic selection of patients above the age if 65 for suitability for escalation of care beyond ward level including Invasive ventilation in ICU setting

Various tools can be used to judge the suitability of escalation of care in elderly patients but NICE (National institute of Clinical Excellence) has endorsed the following quick and easy to follow flowchart which is simple to use and based on the well validated CFS (clinical Frailty score)



- Ref: NICE (https://www.nice.org.uk/guidance/ng159/resources/critical-care-admission-algorithm-pdf-8708948893)

Clinical Frailty Scale*

1 Very Fit – People who are robust, active, energetic and motivated. These people commonly exercise regularly. They are among the fittest for their age.

2 Well – People who have **no active disease symptoms** but are less fit than category 1. Often, they exercise or are very **active occasionally**, e.g. seasonally.

3 Managing Well – People whose **medical problems are well controlled,** but are **not regularly active** beyond routine walking.

4 Vulnerable – While **not dependent** on others for daily help, often **symptoms limit activities.** A common complaint is being "slowed up", and/or being tired during the day.

5 Mildly Frail – These people often have **more evident slowing,** and need help in **high order IADLs** (finances, transportation, heavy housework, medications). Typically, mild frailty progressively impairs shopping and walking outside alone, meal preparation and housework.

6 Moderately Frail – People need help with **all outside activities** and with **keeping house.** Inside, they often have problems with stairs and need **help with bathing** and might need minimal assistance (cuing, standby) with dressing.

7 Severely Frail – **Completely dependent for personal care**, from whatever cause (physical or cognitive). Even so, they seem stable and not at high risk of dying (within ~ 6 months).

8 Very Severely Frail – Completely dependent, approaching the end of life. Typically, they could not recover even from a minor illness.

9 Terminally Ill - Approaching the end of life. This category applies to people with **a life expectancy <6 months**, who are **not otherwise evidently frail.**

Scoring frailty in people with dementia

The degree of frailty corresponds to the degree of dementia. Common **symptoms in mild dementia** include forgetting the details of a recent event, though still remembering the event itself, repeating the same question/story and social withdrawal.

In **moderate dementia**, recent memory is very impaired, even though they seemingly can remember their past life events well. They can do personal care with prompting.

In **severe dementia**, they cannot do personal care without help.

* 1. Canadian Study on Health & Aging, Revised 2008.
2. K. Rockwood et al. A global clinical measure of fitness and frailty in elderly people. CMAJ 2005;173:489-495.

Clear communication with patients and/or next of kin if patient is unable to communicate to establish the wishes/concerns/fears and answer any questions pertinent to the patient and agreeing a common ground is absolutely vital. Miscommunication risks exacerbating anxiety and fear and medicolegal complaints.

D) End Of life care for Elderly Covid Patients who continues to decline and not for escalation:

Patients who are for maximum ward based management and have deemed unsuitable for cardiopulmonary resuscitation (CPR) should have their DNACPR status documented and cared for in the ward level with standard COVID management guidelines. However if these patients do not respond to treatment and continues to decline it would be ethical to shift to an End of Life care with comfort and dignity being the priority.

All Non-essential medications should be stopped and an individualised care pathway for terminal care should be adopted based on medical and good nursing care.

The clinical profile of COVID-19 lung disease driven dying is likely to include:

- High breathlessness / 'air hunger'
- High distress
- High delirium / agitation
- High fever
- Risk of cessation of life over a short number of hours.

Medication

<table>
<tr><th colspan="4">Breathlessness</th></tr>
<tr><td colspan="4">Consider whether the patient is benefiting from any oxygen prescribed. If not, consider discontinuing non-beneficial oxygen and using medication and non-pharmacological measures for symptom control.

Patients who are receiving medication via nebulisers may continue to do so in the context of COVID-19 lung disease. Currently corticosteroids are not recommended for managing the symptoms of dying of COVID-19 lung disease.</td></tr>
<tr><td colspan="4">Non-pharmacological measures to manage breathlessness should also be considered, these include positioning, relaxation techniques, wiping the face with cool wipes.

Fans must not be used in the context of COVID-19 infection as they increase aerosol spread of the virus.</td></tr>
<tr><td colspan="4">Early commencement of syringe pump, if available, is strongly recommended.</td></tr>
<tr><td rowspan="2">Morphine sulfate</td><td>Subcutaneous or slow intravenous injection</td><td>Start with 2 to 5mg as required; can be titrated to resolution of symptoms.</td><td rowspan="2">Titration frequency: subcutaneous 10-15mins; intravenous 3-5mins.
Consider using the higher dose if the patient is very distressed with breathlessness.
Consider using lower doses in elderly patients.
In patients who are already receiving regular opioid, use 1/6 of total daily opioid dose for as required dose.</td></tr>
<tr><td>Subcutaneous infusion</td><td>Start with 10 to 20mg over 24h.</td></tr>
<tr><td colspan="4">If the patient has known renal impairment (eGFR <30), consider using equivalent and equipotent doses of oxycodone, if immediately available, as required and alfentanil or oxycodone in an infusion.</td></tr>
</table>

Breathlessness			
Midazolam	Subcutaneous or slow intravenous injection	Start with 2 to 5mg as required; can be titrated to resolution of symptoms.	• Consider using the higher dose if the patient is very distressed with breathlessness. • Consider using lower doses in elderly patients. • Maximum dose 100mg over 24h.
	Subcutaneous infusion	Start with 10 to 20mg over 24h.	

Cough			
Morphine sulfate	Oral	5mg every hour as required	• Consider using lower doses in elderly patients. • In patients who are already receiving regular opioid, use 1/6 of total daily opioid dose for as required dose.
	Subcutaneous injection	2mg every hour as required	
	Subcutaneous infusion	10 to 20mg over 24h	
Codeine linctus	Oral	60mg every 6 hours as required	
If the patient has known renal impairment (eGFR <30), consider using equivalent and equipotent doses of oxycodone, if immediately available, as required and alfentanil or oxycodone in an infusion..			

Respiratory Secretions			
Suction is not recommended for patients dying rapidly with COVID-19 lung disease. Focus should be on treatment of distress related to secretions, or medical treatment of secretions. Outwith this context, if suction is being used for symptomatic relief in a palliative care setting, an appropriate level of PPE is required.			
Hyoscine Butylbromide	Subcutaneous injection	20mg every hour as required	
	Subcutaneous infusion	Up to 180mg over 24h	
Glycopyrronium	Subcutaneous injection	200micrograms every hour as required	
	Subcutaneous infusion	1.2mg over 24h	
Hyoscine Hydrobromide	Subcutaneous injection	400micrograms every hour as required	
	Subcutaneous infusion	2.4mg over 24h	

REF:

- Scottishpalliativeguidelines(https://www.palliativecareguidelines.scot.nhs.uk/guidelines/symptom-control/end-of-life-care-guidance-when-a-person-is-imminently-dying-from-covid-19-lung-disease.aspx)

Terminal delirium / Terminal agitation / Terminal restlessness			
A combination of midazolam and levomepromazine should be considered in terminal agitation/restlessness/delirium.			
Early commencement of syringe pump, if available, is strongly recommended.			
Midazolam	Subcutaneous or slow intravenous injection	Start with 2 to 5mg as required; can be titrated to resolution of symptoms.	• Titration frequency: subcutaneous 10-15mins; intravenous 3-5mins. • Maximum dose 100mg over 24h. • Better for agitation due to distress and anxiety. • Consider using lower doses in elderly patients. • High doses may be required in patients who have severe agitation.
	Subcutaneous infusion	Start with 10 to 20mg over 24h	
Levomepromazine	Subcutaneous injection	Start with 10 to 25mg every hour as required	• Doses over 100mg/day may be given under specialist advice. • Better for agitation due to delirium. • Consider using lower doses in elderly patients.
	Subcutaneous infusion	Start with 50mg over 24h (can be given as bd injections)	
Haloperidol Use where levomepromazine is not available.	Subcutaneous injection	1mg every 2 hours as required.	
	Subcutaneous infusion	Start with 5 to 10mg over 24h	
If the patient remains agitated, please contact your local palliative care team for further advice.			

Terminal delirium / Terminal agitation / Terminal restlessness			
Pyrexia			
Paracetamol	Oral, rectal or intravenous	1g every 4 to 6 hours; maximum 4g per day	• Use 500mg dose if: o Weight <50kg o Hepatic impairment o History of alcohol excess
Diclofenac	Oral or rectal	75mg to 150mg daily in divided doses	• Dilute in saline
	Subcutaneous or intramuscular injection	50mg every 8 hours as required	
	Subcutaneous infusion	150mg over 24h	
Ketorolac	Subcutaneous infusion	60mg over 24h	• Dilute in saline
	Subcutaneous injection	15mg every 8 hours as required	
Remember non-pharmacological measures such as reducing room temperature, removing excess bedding, and cooling forehead with tepid sponging (if PPE is available).			

Pain
Pain is not a prominent feature of COVID-19 lung disease. Paracetamol may be adequate analgesia in addition to the above medications for other symptoms. If this is not the case, refer to: https://www.palliativecareguidelines.scot.nhs.uk/guidelines/pain.aspx for advice.

18. Paediatrics / Neonates and COVID-19

Dr. Quazi Rezina Naquib, Dr Bandana Rajbhandari Joshi

This is an emerging science and data, evidence and recommendations are undergoing frequent changes, evaluation and update. The following information and management guidelines are collated from the RCPCH UK, DFTB COVID 19 evidence review, KCH London and EKHUFT guidelines.

Summary

Reassure parents and involve them in caring for their child and communicate well with colleagues

Be extra-vigilant in children with pre-existing conditions but reassure parents that the risks of comorbidities is much greater in adults than children

Chest x-rays (CXR), bloods, and blood gases are not routinely indicated in all children. However, these should be monitored in children with persistent fever, altered fluid balance, signs of liver dysfunction, or respiratory failure

Although recommended in some adult papers, the following medical treatments are likely to have more side-effects than beneficial effects in children and are not routinely indicated: bronchodilators, systemic steroids, antibiotics, antivirals, and diuretics.

Despite emerging concern about Angiotensin Converting Enzyme (ACE) Inhibitors and non-steroidal anti-inflammatory drugs (NSAIDs), there is insufficient evidence for stopping this if children have been taking them for pre-existing conditions and such an action may be harmful. In otherwise well children, paracetamol should be taken as the first-line antipyretic, and ibuprofen only taken with caution.

Escalate respiratory support as per local respiratory failure pathways. Do not use high flow nasal cannula oxygen if the child is saturating adequately with low flow oxygen.

A. Introduction:

Vast majority of the children with COVID 19 have self-limiting illness without complications and will only present with mild symptoms. Many symptoms and parameters are different in children compared to adults.

B. Transmission:

Evidence suggests transmission from a child to an adult is low.

C. Clinical presentation:

No symptoms on admission consistently predict the outcome in children.

- The commonest features are fever and/or cough (each around 50%).
- Cough is typically dry (productive sputum in one study-3%). Fever in children with COVID-19 tends to subside within three days.
- Myalgia, lethargy, reduced feeding, coryzal symptoms, sore throat, hoarseness, shortness of breath, rash (vasculitis or chilblain like rash mostly in the foot), irritability, GI symptoms have also been reported.
- Wheeze is uncommon.

D. **Vulnerable groups: (**Much less common in children)

- Solid organ transplant recipients.
- People with specific cancers:
    - people with cancer who are undergoing active chemotherapy
    - people with lung cancer who are undergoing radical radiotherapy
    - people with cancers of the blood or bone marrow such as leukaemia, lymphoma or myeloma who are at any stage of treatment
    - people having immunotherapy or other continuing antibody treatments for cancer
    - people having other targeted cancer treatments which can affect the immune system, such as protein kinase inhibitors or PARP inhibitors
    - people who have had bone marrow or stem cell transplants in the last 6 months, or who are still taking immunosuppression drugs
- People with severe respiratory conditions including severe asthma and severe chronic obstructive pulmonary (COPD), cystic fibrosis.
- People with rare diseases and inborn errors of metabolism that significantly increase the risk of infections (such as Severe combined immunodeficiency (SCID), homozygous sickle cell).
- People on immunosuppression therapies sufficient to significantly increase risk of infection.
- Severe asthma, other long-term respiratory conditions, immunocompromised, Cyanotic or, haemodynamically significant heart disease, Chronic Kidney disease (Parental smoking, poor housing and nutrition may also be associated with severity).

E. Supportive Medical Care

Admission:

Majority of the children with mild symptoms will not require admission.

Do NOT examine oropharynx unless absolutely necessary – if needed, wear full PPE, for suspected acute tonsillitis. If clinically indicated can prescribe antibiotic without examining.

Investigations:

Majority have asymptomatic or mild disease only.

Investigations not routinely required for children with mild-moderate disease requiring only supportive care, beyond those required to exclude alternative diagnoses and/or persistent fever, altered fluid balance, liver dysfunction and respiratory failure.

Alternative diagnoses are to be considered in children presenting as unwell, following the same investigation and management practice and pathways in place prior to the outbreak.

1. **Blood tests**

- **CBC** –Leucopenia common. Lymphocyte count normal or high, Lymphopenia rare.
- **CRP** – may be raised (10% - 20% children, max value reported 33)
- **LFTs** – AST ALT can be raised and may be associated with severe illness, pneumonia and drug treatments. Not routinely checked unless severe illness/indicated.

Please see additional investigations (table) for severely unwell children

2. **Radiology**

- Chest x-rays and CT scans usually show non-specific findings and not routinely indicated unless there is a specific clinical question or requiring oxygen on Day 3 of admission/progressive hypoxemia/ deteriorating/requiring CPAP.
- Portable chest X Rays recommended to minimise movement around the hospital.
- If Lobar collapse, likely to be bacterial pneumonia and not COVID-19. No studies have described lobar collapse, pneumothorax, or effusion in children with COVID-19.
- CT Scans are not helpful with diagnosis or management and are not indicated. Transferring infected children to the CT scanner puts other children at risk.

3. Additional diagnostic tests for severely unwell children (table)

For children presenting/deteriorating with severe features consistent with ARDS

Initial diagnostic tests	
	FBC, U+E, LFT, CRP, Troponin, Ferritin, LDH, coagulation panel including D-Dimer *If considering immunomodulatory treatment send IL6 and soluble CD25
Microbiology	Blood cultures, urine MC&S, viral respiratory panel *HIV testing should be done in all children in whom treatment with lopinavir / ritonavir is being considered, but pending results should not delay treatment
Radiology	Chest x-ray
Other	Serum save, research bloods if appropriate in your setting In children <2 years of age consider lymphocyte subsets to exclude SCID (severe or critical illness only)
Suggested ongoing monitoring tests (if deteriorating patient)	
Haematology / biochemistry	FBC, U+E, LFT, CRP, Ferritin

4. Management

Fluids

- Acute Kidney injury (AKI) is a complication of viral infections.
- Most with mild illness do not require fluid restriction
- Restrict in moderate to severe respiratory compromise to reduce risk of ARDS.
- May need IV fluids in dehydration (due to Pyrexia, Anorexia, Tachypnoea),
- Monitor fluid balance, and measure daily weight if fluid intake is a concern.
- Renal profile blood tests and urine dipstick are not required in all unless there are concerns.
- Diuretics to be considered if worsening respiratory failure requiring CPAP or NIV or if evidence of pulmonary oedema on chest x-ray. (Involve critical care teams early in these cases).

Antipyretics:

- First line- Paracetamol
- Avoid ibuprofen in children with poor fluid intake or suspected AKI.
- If a child is requiring ibuprofen for relief of fever, this may reflect significant inflammation, or be a sign of sepsis, and have a lower threshold for checking blood inflammatory markers..

Antibiotics:

- Not routinely used unless in secondary infection or in alternative diagnosis like Lobar Pneumonia, Sepsis, bacterial infection etc. Antibiotic choice should be based on local guidelines.
- A respiratory sample for microbiological culture should ideally be sent prior to starting antibiotics.
- If CXR shows atypical infection, a macrolide may be indicated.

Respiratory support

- Most children are unlikely to develop respiratory failure.
- Low flow nasal cannula O2 if SpO2 <92% (Target SpO2 92-95%). If hypoxia persists, only then Opti flow /High flow O2 is indicated using appropriate PPE. If persistent hypoxia, increased work of breathing or high FiO2, consider CPAP or, early intubation and ventilation if available.
- Respiratory support not to be used routinely who are otherwise saturating adequately. No evidence of benefit of blood gases and should not be done routinely.
- Capillary blood gases can be used in children who despite administration of HFNC appear to require further respiratory support.

Bronchodilators

- Wheeze uncommon in Covid-19.
- Bronchodilators not to be used routinely unless suspicion of bronchoconstriction: (wheeze and prolonged expiration).
- If acute asthma: salbutamol via Metered dose inhaler (MDI) / Spacers rather nebulisation where possible. Oral steroid should be used as normal in children with asthma attacks.

Systemic Steroids:

- Not to be used routinely as likely to be harmful, prolongs viral shedding and immunosuppressive.

Antivirals and Immunomodulatory treatment

Currently limited evidence of efficacy of antiviral and immunomodulatory therapy for COVID19 in adults, and no evidence in children. The decision to start treatment should be made carefully on a case by case basis. Discussion within already established internal review pathways should be held, but also discussion with an external Paediatric Infectious Disease Specialist prior to starting antiviral therapy and/or a clinician with experience in the use of immunomodulatory therapy if these are being considered (immunology, haematology, bone marrow transplant, rheumatology).

Antiviral treatment is likely to have the most benefit in the first phase of illness. Immunomodulatory therapy may only be indicated if clear evidence of hyperinflammation, or in the second phase of the illness, and evidence is currently extremely limited.

Antiviral treatment and immunomodulatory treatment should be restricted for hospital use only and ***preferably in a clinical trial setting***.

Samples (respiratory and blood) should be sent for virology testing prior to initialising treatment and all patients should be discussed with microbiology/infectious diseases.

For patients in whom treatment with lopinavir/ritonavir (Kaletra) is being considered, an HIV test should be performed to avoid selecting for resistance in an undiagnosed child.

Treatment criteria

Treatment criteria		
Mild to moderate disease No O2 requirement Mild upper airway infection	All groups	Supportive care
Severe disease Mild - moderate ARDS**: 1. Unventilated requiring FiO2 >40% to maintain saturation 88-96% 2. Ventilation: • Oxygenation index: 4 ≤ 16 • Oxygenation saturation index: 5 ≤ 12.3	All groups Risk group*	Supportive care Treatment with antivirals may be considered Treatment with immunomodulatory therapy may be considered if evidence of hyperinflammation (raised CRP, Ferritin, IL6, sCD25)
Critical disease Severe ARDS**: • Oxygenation index ≤ 16 • Oxygenation saturation index: ≤ 12.3 Septic shock Altered consciousness Multi-organ failure	All groups	Supportive care Treatment with antivirals may be considered Treatment with immunomodulatory therapy may be considered if evidence of hyperinflammation (raised CRP, Ferritin, IL6, sCD25)

F. Complications

- Hypoxic Respiratory Failure – Rare only in 5% of symptomatic cases, progressing to ARDS only in 0.6%
- Shock – Rare, in symptomatic children who became critically ill, consider alternate diagnosis.
- Acute Kidney Injury, Myocardial dysfunction, Coagulation Dysfunction - as part of multiorgan dysfunction – Do Not use diuretics in AKI unless there is pulmonary edema.

Neonates born to COVID Positive Mother

No clear evidence of vertical transmission in neonate. Some cases – IgM +ve but baby remained well. Some babies born preterm, were relatively sicker but swabs were not positive.

Baby if well – to stay with mum. If mum wants to breast feed, advice mum to wear a mask during feeding and hand washing.

If needs resuscitation at birth – please follow local ''New born Life Support Protocol'' – Neonatal Team to follow PPE guideline.

If Preterm or, Unwell, need Neonatal Unit admission – treat accordingly including respiratory support as per local protocol. Need to be isolated. If baby on CPAP or, High Flow or, ventilated – Neonatal Staff needs full PPE.

If on low flow oxygen or, no respiratory support – staff to wear standard PPE

Key Recommendations in Paediatrics

1. Majority of the children with COVID-19 infection will be asymptomatic or, will have mild symptoms and can stay at home. If required, can be treated with Paracetamol and ensuring fluid intake.

2. In a sick child, always consider alternative diagnosis e.g - Acute asthma, Bacterial Pneumonia, Sepsis, Meningitis etc; please investigate and treat as soon as possible as per pre pandemic local protocol.

3. Majority of COVID 19 positive children who needs hospital admission will need only supportive treatment including oxygen.

4. Do not routinely use Bronchodilator, Systemic Steroids, Diuretics or, Antibiotics or, any trial drugs in COVID 19 positive children, unless has specific indication - for details see inside.

Reference:

- RCPCH UK, DFTB COVID 19 evidence review, Kings College Hospital, London, EKHUFT guideline

19.Obstetrics, Gynaecology and COVID-19

Dr. Quazi Selina Naquib, Dr. Rahila Khan

Patient presented with

Uncomplicated URTI:
- Sats ≥95% on air
- RR ≤20
- Fever
- Fatigue
- Cough
- Myalgia
- Sore throat
- Nasal congestion
- Headache
- Diarrhoea

Exclude non COVID-19 pathology

Risk assess for VTE
Score 1 for COVID-19 or Suspected COVID-19

Treat: Paracetamol for

Fetal concerns:

1. Stabilise mother
2. No change to indications for fetal steroids and magnesium
3. Time and mode of delivery according to obstetric indications (rarely required for maternal resuscitation)

Complicated disease=any of:
- Sats<95%
- Respiratory rate >20/min
- CXR (safe at all gestations): opacities not explained by other pathology
- ↓fetal movement. If ≥28 weeks: Have baby's movements reduced or changed?

Possible sepsis:
- HR>130/min
- Systolic BP<90mmHg (or drop >40mmHg)
- RR >25/min
- Altered mental state Lactate ≥2mmol/L
- ↓urine output
- Immunosuppression

Admit and inform obstetric

Investigate:
1. Covid-19 and URT viral testing
2. Bloods: FBC, UE, LFT, LDH, Coag, CRP, Bone, Ferritin, Troponin, ABG
3. Exclude other diagnoses if indicated: ECG, BNP, Echo, CTPA
4. CT chest (rare): as pregnant
5. CTG >28 weeks): coordinate by obstetric team if indicated.

Sepsis 6:
1. O2 to sats>94%
2. Blood cultures
3. IV antibiotics
4. Measure lactate
5. If lactate >2, cautious IV fluid (250ml, monitor and reassess)
6. Measure urine output

Treat:
1. O2 to sats>94% and monitor RR hourly
2. IV antibiotics as indicated in non-pregnant (penicillins, macrolides are safe, AVOID doxycycline)
3. Antivirals as indicated in non-pregnant (oseltamivir and zanamivir are safe), stop if influenza negative
4. VTE prophylaxis unless contra-indicated (e.g. plts<75, bleeding, anticipated delivery within 12 hours)
5. Proning (1st /early 2nd trimester, post partum) may help
6. Left lateral position if >20 weeks and hypotensive

Discharge:
1. Appropriate VTE prophylaxis
2. Isolation according to symptoms
3. Growth scan

If recurrent shortness of breath to return to hospital for re-assessment

Breastfeeding with precautions within isolation

Clinical improvement, sats>94% on air and no other complications for 24-48 hours

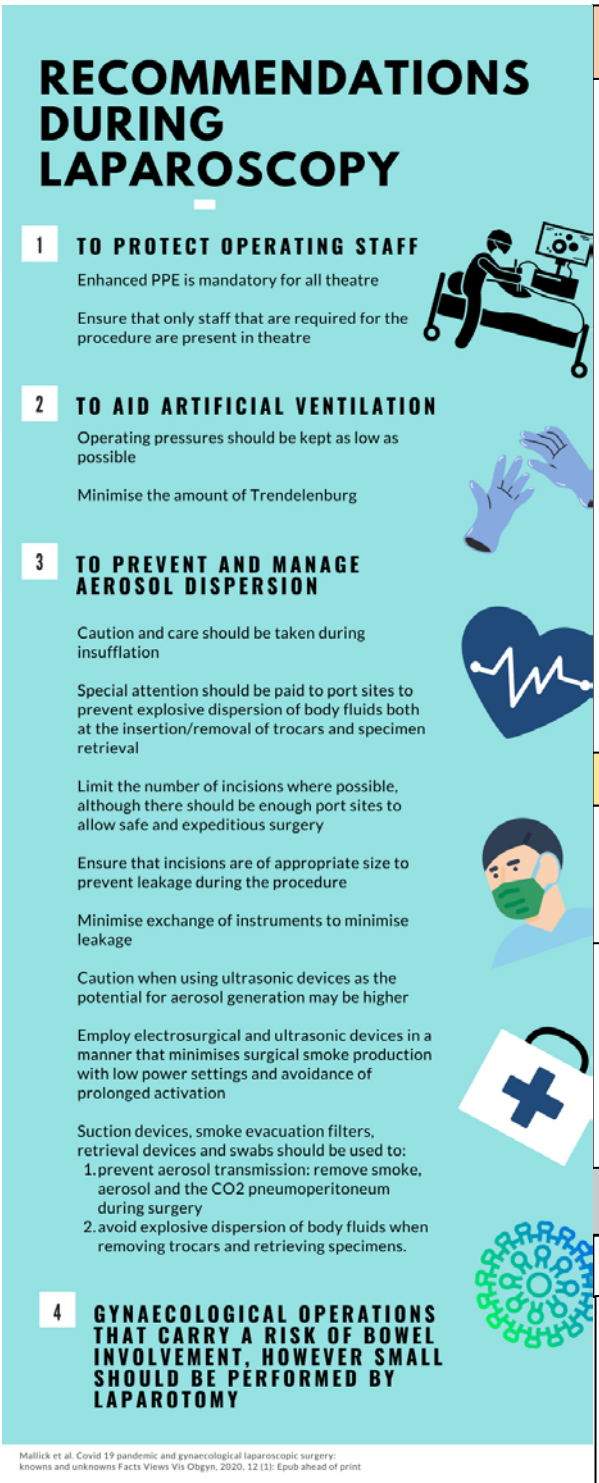
- **Increasing 02 requirements**
- **Increasing respiratory rate**
- **Other clinical concerns**

CRITICAL CARE

Antenatal appointments by Telephone clinic where possible, except walk-in emergency clinics. Manage miscarriage and Ectopic medically or conservatively in preference to surgical if haemodynamicaly stable . Emphasize on contraception. Temporarily withhold infertility treatments.

Antenatal/postnatal low molecular wt heparin for VTE prophylaxis:
Enoxaparine-
- <50kg: 20 mg daily
- 50-90kg: 4omg daily
- 91-130kg: 60mg daily (can be divided dose)

OBS &GYNAE Operative procedures and PPE for COVID-19



OBSTRETIC THEATRE

AGP (general anaesthesia)

- If a GA conversion is needed midway through a case: all staff to fit an FFP3
- For scrubbed staff: pause, remove sterile gloves and carefully fit an FFP3. Then replace sterile gloves.
- If safe to do so, whole team apart from anaesthetic team- to step back >2m from patient during intubation

Non- AGP (regional anaesthesia)
The Anaesthetic team will always wear FFP3 due to the risk of conversions to GA

Anaesthetic team

- FFP3 mask
- Eye protection
- Long-sleeved gown OR surgical gown
- Gloves

Rest of the MDT

- Surgical mask
- Eye protection
- Surgical gown OR apron (for non-scrubbed staff)
- Gloves

GYNAE THEATRES

AGP (Aerosol Generating Procedures) All procedures undue GA	**Non AGP- (Office hysteroscopy, MVA, LLETZ, Word catheter for Bartholin's)**
• FFP3 mask • Eye protection • Long-sleeved gown OR surgical gown • Gloves	• Surgical mask • Eye protection • Long sleeved surgical gown • Gloves

VAGINAL DELIVERY (Normal and Instrumental

Use of Entonox (Non AGP)

- Surgical mask
- Eye protection
- Apron/Long sleeved gown
- Gloves

For details on PPE please refer to page 72

Gynaecological Services and COVID-19

The RCOG and Specialist Societies have developed a range of guidance for gynaecological services during the COVID-19 pandemic
The following advice is provided as a resource for UK healthcare professionals and providers based on available evidence, good practice and expert advice.

The priorities are
1. Provision of safe care to women, including those with suspected/confirmed COVID-19.
2. To reduce the risk of person to person transmission of COVID-19.
3. To make the best use of very limited human and physical resources.

Please be aware that this is very much an evolving situation and this guidance is a living document that may be updated if or when new information becomes available.

Recommendations

1. To withhold all elective gynaecological surgeries including fertility treatments.
2. To have good contraception to avoid pregnancy. Contraception should be offered to all women after birth.
3. Only gynaecological emergency surgeries should be carried out.
4. Joint RCOG, BSGE and BGCS guidance for the management of abnormal uterine bleeding (Menorrhagia, Intermenstrual bleeding, Post coital bleeding, Post menopausal bleeding), hysteroscopy and colposcopy in the evolving Coronavirus (COVID-19) pandemic. These are frequent symptoms that raise concerns about gynaecological cancer.

https://www.rcog.org.uk/en/guidelines-research-services/coronavirus-covid-19-pregnancy-and-womens-health/coronavirus-covid-19-and-gynaecological-services/

Summary of the RCOG BSGE and BGCS guidelines:

Heavy Menstrual Bleeding (Menorrhagia)

- Managed by phone consultation. Risk of malignancy is negligible.
- If there are no symptoms of significant anaemia prescribe oral medication (Tranexamic acid/Mefenamic acid/OCP/cyclical Progesterone).
- Patient should be seen for further management if: The HMB is torrential and / or prolonged, resistant to oral treatments, severe anaemia is suspected.
- When seen the patient should have examination and investigations as usual.
- Management for severe HMB may include
    - Oral or i/v iron infusion according to the severity of the anaemia
    - Tranexamic acid and a course of high dose oral progestogens or Mirena IUS (if available)
    - GnRH analogues for refractory bleeding despite medical treatments and / or in the presence of significant uterine fibroids.
    - Consider 3-month course of GnRH analogues or delivery via the nasal route (nafarelin acetate spray). Add-back HRT should be considered, if GnRH analogue treatment is to be continued beyond 3-6 months.

- Endometrial hyperplasia & cancer should be managed according to local protocols & national guidance. Atypical endometrial hyperplasia can be managed with Mirena (if available) or Provera and repeat biopsy in 3 months.

Intermenstrual Bleeding

- Initially managed by telephone consultation. Focus should be on reassurance.
- Clinical history to determine the severity and the likely cause.
- Pregnancy should be excluded.
- If the likelihood of sexually transmitted infection or genital tract cancer is negligible, then
    - Reassure
    - Observation with phone follow up to see if the IMB subsides
    - Change of hormonal contraceptives in current users
    - Trial of hormonal contraceptives in non-users
- Women should only be asked to come for a pelvic examination, if:
    - STD or malignancy is suspected

Postmenopausal bleeding (PMB)

- 5 -10% of women with PMB will have endometrial cancer.
- Initially managed by phone consultation:
    - If they have suspected or confirmed COVID-19, they should not be seen until they are no longer infectious (14 days from the onset of symptoms) to avoid horizontal transmission.
    - Assess whether hospital assessment can be deferred for COVID-19 vulnerable patients. This risk needs to be balanced against the risk of delay in diagnosis of a gynaecological cancer on a case by case basis.
- When seen in clinic
    - A speculum examination should be performed to assess the cervix.
    - Measurement of the endometrial thickness (ET) by transvaginal ultrasound scan (TVS) should be the first line test. If ET is <4 mm the patient can be discharged.
    - If ET is >4mm - Hysteroscopy /endometrial biopsy should be done.
- Hysteroscopy, blind endometrial biopsy and polypectomy using electrosurgical or tissue removal systems do not pose an increased risk of transmission of SARS-CoV-2 to health care workers because the virus has not been identified in the genital tract in women with COVID-19.
- PPE – gloves, surgical mask, eye protection, long sleeved surgical gown.
- Where an inpatient procedure is to be undertaken, consider the use of conscious sedation and regional anaesthesia rather than general anaesthesia to prevent the generation of aerosols.
- Consideration should be given to insertion of a Mirena (if available) at the time of blind endometrial biopsy or hysteroscopy where there is considered a high risk of endometrial hyperplasia or cancer.
- Minimise the number of attendances at health care facilities for women with PMB, by offering TVS, clinical history taking, pelvic examination, hysteroscopy and / or blind endometrial biopsy at the same visit.
- Defer endometrial surveillance for non-atypical endometrial hyperplasia in women without abnormal uterine bleeding because the risk of progression to endometrial cancer is low.
- If cancer is diagnosed - should be referred to a gynaecological oncology for further management.

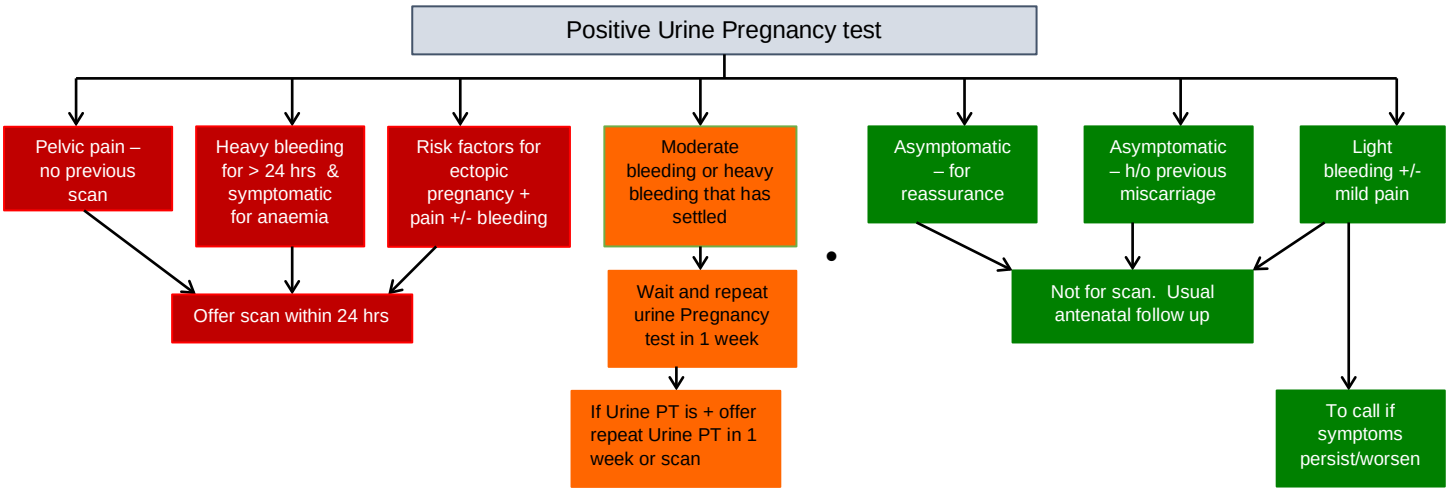
Post coital bleeding

- Women with PCB should initially be managed by phone consultation:
    - Cervical cancer is extremely unlikely if they have an recent negative cervical smear test.
    - If there are any risk factors for a sexually transmitted disease, they should be seen for further investigation and management.
    - If no recent negative cervical smear, then she should be seen for speculum exam to exclude cervical cancer and for a smear to be taken.

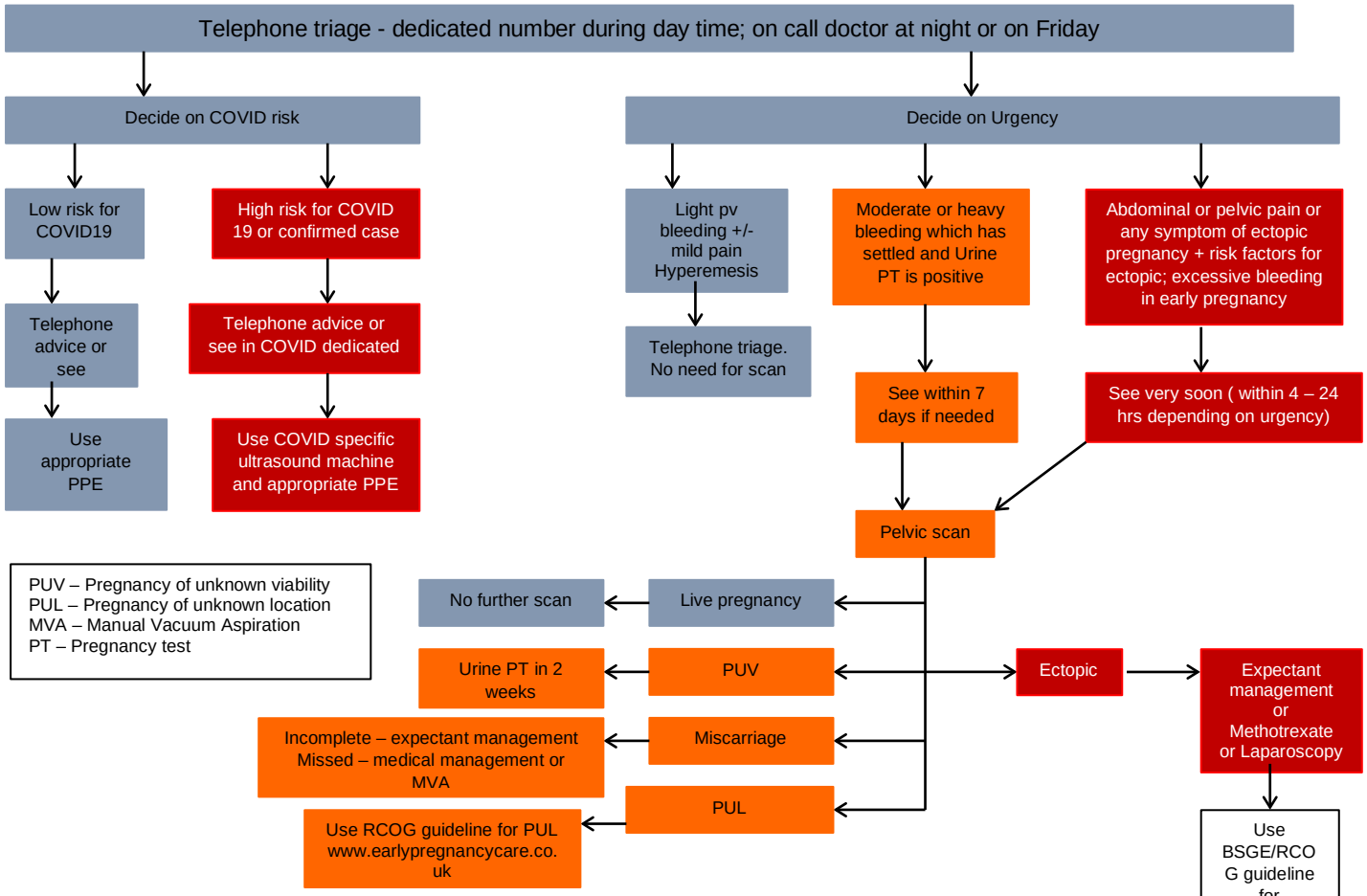
COVID-19 and Colposcopy

- In the current COVID-19 crisis, in line with UK screening programme guidance, only women who have had a recent cervical smear suggesting high grade moderate or worse, BNC in endocervical cells or possible glandular neoplasia, or suspicion of invasive disease should be seen for colposcopy.
- Evidence suggests that the presence of COVID-19 is very low in the lower genital tract and in blood. It is unlikely that smoke produced during a LLETZ procedure will contain COVID-19 virus particles.
- Cold (thermal) coagulation can be performed.
- In asymptomatic women: PPE - Gloves, apron and an appropriate mask should be worn for colposcopy face-to-face consultation and examination.
- Minimum number of staff should be present during procedures.
- A serviced smoke extractor must be used for any LLETZ procedures.
- Minimise use of coagulation with diathermy, as this causes greater dispersal of vaporised particles.
- In women with suspected or confirmed COVID-19 infection (including those who attend with symptoms which may be indicative): defer colposcopy assessment until symptoms resolve or the woman has tested negative.
- If women have significant symptoms suggestive of cervical cancer and are symptomatic of COVID-19, then the whole colposcopy multi-disciplinary team should wear full personal protective equipment (PPE) during consultation and examination.
- Given the likely prevalence of asymptomatic carriers of SAR-COV-2, all staff should wear appropriate PPE (gloves, apron, surgical mask) during consultations.

RCOG guidance for Early Pregnancy



Guidance for management of early pregnancy complications during COVID 19 pandemic



The full guidance for early pregnancy can be found here:
https://www.rcog.org.uk/globalassets/documents/guidelines/2020-04-03-guidance-for-rationalising-early-pregnancy-services-in-the-evolving-coronavirus-covid-19-pandemic.pdf

20.Surgery and COVID-19

Dr Arifa Siddika, Dr Shakil Farid, Dr Md Zaker Ullah, Dr Shahriar Sadek, Dr. Jhumur Pati, Dr. Samia Mubin, Prof Tipu Aziz

Consider the possibility of COVID-19 infection in every patient. Follow national guidelines and apply clinical judgement at high risk clinical environments.

The following advice is essential:

- For your own safety
- To protect your patients and family
- To allow you to continue to treat patients during this crisis

Key recommendations:

1. Patients with acute surgical conditions are our priority. COVID-19 should be sought in any patient presenting acutely or needing emergency surgery. History, COVID-19 testing, and CXR can assist. Any patient undergoing an abdominal CT scan for acute pain as an emergency presentation should have a CT chest at the same time (unless CT chest previously performed within 24 hours). The current tests for COVID-19, including CXR and chest CT, may be false negative. Many patients in Bangladesh may not have access to CT scan service, in these circumstances, X-ray chest may be considered for COVID screening.

2. Any patient prioritised who has undergone surgical intervention should self-isolate at least 14 days post operatively after discharge from hospital. Patient who has to undergo routine/planned (i.e cancer) surgery must have to self-isolated prior to surgical intervention as well (for at least 7 days, if living alone. However, 14 days is recommended if living with Family) and be assessed for COVID-19 as above. Swab tests for Corona Virus should be conducted 24-48 hours prior to admission wherever possible (routine/planned surgery). For emergency/urgent cases treat as COVID positive until a negative COVID swab has come back.

3. Consider stoma formation rather than primary anastomosis to reduce need for unplanned post- operative critical care for complications like anastomosis leakage.

4. Operating theatres where Aerosol Generating Procedures (AGPs) are regularly performed are considered a higher risk clinical area and full PPE is advised where COVID-19 is possible or confirmed. General anaesthesia is an AGP. Full PPE consists of disposable gloves and fluid repellent gown, eye/face protection and FFP2/3 or N95 mask.

Laparoscopy and all endoscopic procedures are considered to carry some risks of aerosol-type formation and infection and considerable caution is advised. The level of risk has not been clearly defined and the level of PPE deployed may be important. The smoke plume at laparotomy from coagulating instruments may carry some risk.

5. Consider laparoscopic and endoscopic procedures only in selected individual cases where clinical benefit to the patient substantially exceeds the risk of potential viral transmission to surgical and theatre teams in that situation.

6. Where non-operative management is possible and reasonable (such as for early appendicitis and acute cholecystitis) this should be implemented. Appropriate non- operative treatment of appendicitis or open appendicectomy can be alternatives. Some gall bladder operations can be reasonably deferred for several weeks.

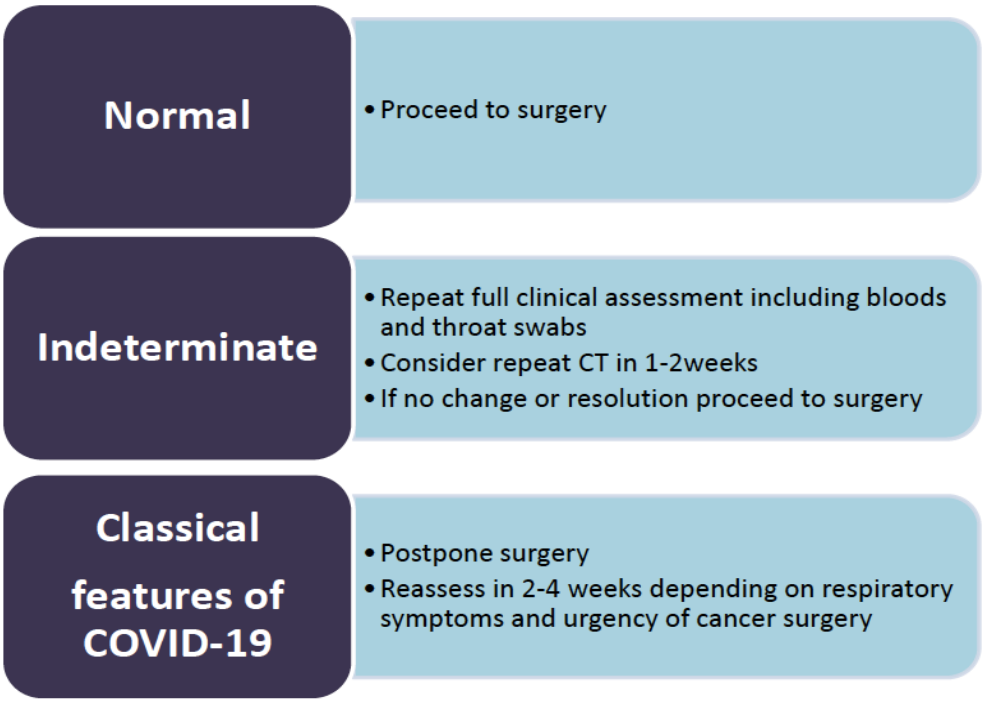
7. Ward round: Use of white coat is not recommended due to infection risk. Use of automated machine is recommended for pulse/BP monitoring in order to avoid close patient contact. Single clinician should examine the patient and rest of the team should stay 2 meters (6 ft) away. Preferably wear short sleeve clothes and avoid wearing tie/wristwatch/ring/bangles because of risk of transmission.

8. In theatre:

- Minimum number of staff in theatre
- Appropriate PPE for all staff in theatre depending on role and risk
- Smoke evacuation for diathermy / other energy sources, if necessary hold suction device close to the diathermy point in order to minimise aerosol generation.
- Team changes will be needed for prolonged procedures in full PPE

9. Endoscopy:
    - Only emergency endoscopic procedures should be performed.
    - Routine diagnostic work should be avoided.
    - Upper GI and lower GI procedures are high risk AGPs and full PPE must be used.
10. Consider the diagnosis and risk of COVID-19 in other situations in Emergency General Surgery and act and use PPE accordingly. Patients of COVID-19 may present with intestinal symptoms and may also present initially as an apparent post-operative complication. Naso-gastric tube placement is an aerosol generating procedure (AGP).
11. CT Chest is the investigation of choice for screening. If CT is not available, then at least a CXR should be done.

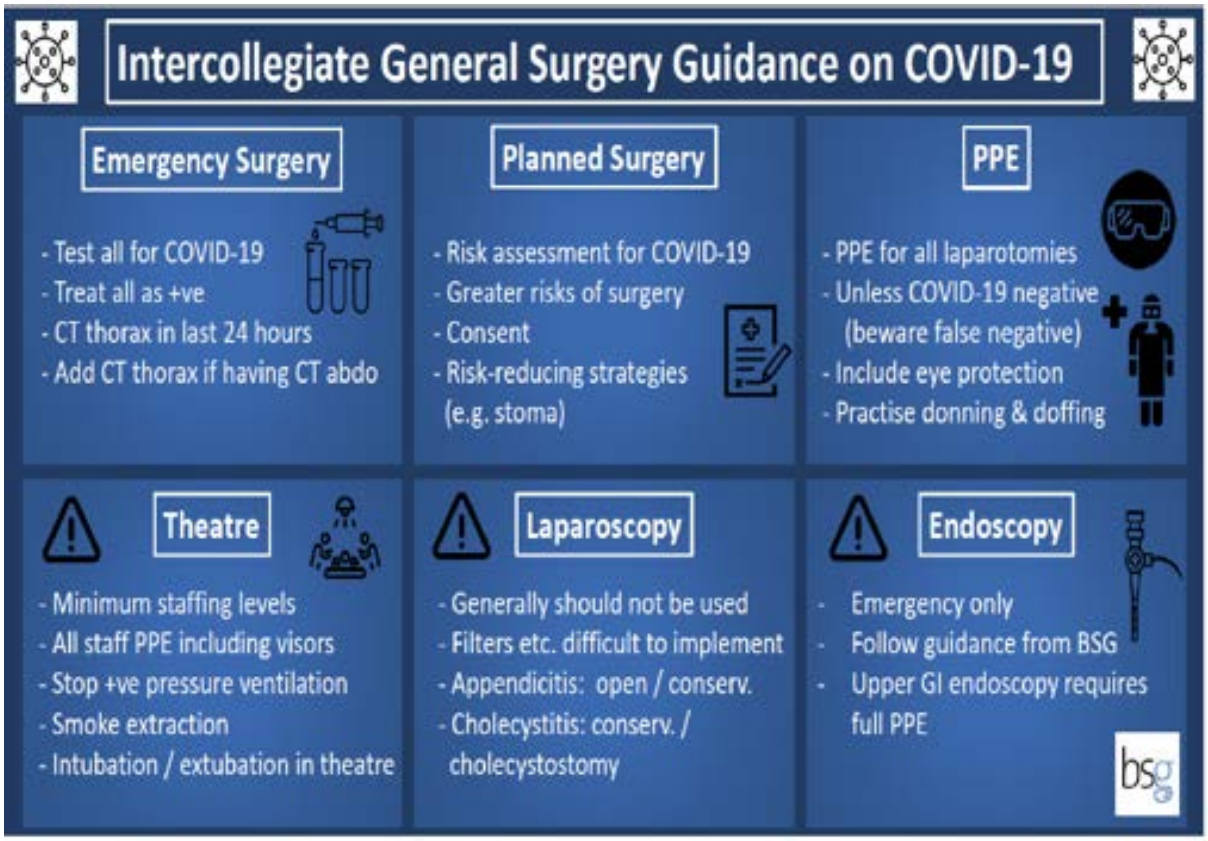
CT Findings Pathway



PPE recommendation at different stages of patient management

Theatre/ AGP* in any area	Ward/ Non AGP*	OPD
• FULL PPE • FFP3/N95 mask • Eye protection • Long-sleeved gown Or Surgical gown (nonpermeable) • Double Gloves	• Close contact (<2m) • Surgical mask • Eye protection • Disposable plastic Apron • Gloves • Non close contact (>2m) • Surgical mask	• Patient with COVID symptoms • Surgical mask • Eye protection • Disposable plastic Apron • Gloves • Patient with no COVID symptoms • Surgical mask

AGP: Aerosol Generating procedures Intubation/Extubation, CPAP, High flow 02, NG tube insertion/removal/endoscopy, bronchoscopy, diathermy, gas insufflation during Laparoscopy, NIV



Summary of Guidance for General Surgery

Clinical guide to surgical prioritisation during the coronavirus pandemic (Royal College of Surgeons)

This guidance by the Royal College of Surgeons describes levels of surgical priority, covering all surgical.

Patients requiring surgery during the COVID-19 crisis have been classified in the following groups:

Priority level 1a Emergency - operation needed within 24 hours

Priority level 1b Urgent - operation needed with 72 hours

Priority level 2 Surgery that can be deferred for up to 4 weeks

Priority level 3 Surgery that can be delayed for up to 3 months

Priority level 4 Surgery that can be delayed for more than 3 months

Clinical guide to surgical prioritisation during the coronavirus pandemic: (modified for Bangladesh)
General Surgery and Urology

Priority Level		Procedure
1a	**<24h**	• Emergency laparotomy (peritonitis/ perforation/ ischaemia/ Necrotising fasciitis) • Emergency laparotomy - bleeding not responding to endoscopic/ interventional radiology • Appendicectomy - complicated/ unresponsive to conservative Rx appendicitis • Intra-abdominal trauma which cannot be managed conservatively • Laparotomy for post operative complications (eg anastomotic leaks/ bleeding) • Drainage of localised sepsis/ necrosis if not responding to conservative Rx (antibiotics/ Interventional radiology) • Benign Perforated oesophagus/ stomach - with survivable mediastinitis/ peritonitis • Acute airway obstruction - thyroid • Acute Scrotal Exploration (suspected Testicular Torsion) • Renal Obstruction with infection - not responding to Conservative Rx
1b	**<72h**	• Laparotomy - small bowel obstruction not responding to conservative Rx • Laparotomy - colectomy for acute severe ulcerative colitis not responding to conservative Rx • Laparotomy - bowel obstruction not suitable for stenting. • Perianal abscess/ other infection - not responding to conservative Rx. • Urgent enteral nutrition access • Failed conservative management of localised intra peritoneal infection • Breast sepsis - without necrosis unresponsive to conservative Rx • Upper GI endoscopy for foreign body removal • Drainage of obstructed renal tract • Malignant tumour or Lymph node biopsy • Pyloromyotomy • Resection of Posterior Urethral Valves • Peritoneal Dialysis Catheter Insertion
2	< 4 weeks	• Crohn's disease - stricture/fistula/ optimise medication/nutrition. • MDT Directed hepatobiliary/ pancreatic/ oesophagogastric cancer causing obstruction (biliary/ bowel). • Goitre - mild moderate stridor • MDT Directed thyroid/parathyroid cancer surgery • Thyrotoxicosis - Not responding to conservative Rx. (including orbital surgery for impending sight loss) • Parathroidectomy - calcium >3.0mmol/l and/or not responding to conservative Rx, especially pregnancy/post- transplant/repeated admission. • MDT Directed breast cancer resection - ER negative/Her2+/ pre-menopausal ER+ with adverse biology • Circumcision for severe BXO • Renal transplant • Renal Stent Removal/Exchange

Priority Level		Procedure
3	<3 months	• MDT directed resection of colon cancer • MDT directed resection of rectal cancer • Hepatobiliary/ pancreatic/ oesophagogastric/ GI Stromal tumour cancer causing obstruction (biliary/bowel) • MDT Directed thyroid cancer surgery - including diagnostic lobectomy. • Renal stones - symptomatic, including sepsis not responding to conservative Rx • MDT directed adrenal resections - intermediate masses • a) >4cm<6cm) with hypersecretion (Cortisol/androgen) • b) metastases - progressing on scan at 3/12. • MDT directed breast cancer resection - pre-menopausal ER+ without adverse biology • Cholecystectomy - post acute pancreatitis • Hernia - presenting with complications that have settled with conservative Rx • Parathroidectomy - - symptomatic renal stones/Sepsis not responding to conservative Rx
4	>3 months	• All uncomplicated hernias including hiatus/incisional hernia. • Abdominal wall reconstruction • Hartmann's reversal • Ileostomy closure • Rectal prolapse • Other proctology procedures • Transanal/resection of benign rectal polyps. • Salvage surgery for recurrent anal cancer • Pelvic exenteration • Multi-visceral/liver resection - not responding to conservative Rx • Cholecystectomy - after biliary colic/ cholecystitis. • Oesophagogastric reflux surgery • Other benign upper UGI conditions (eg gallstones/other Benign disease). • Other benign thyroid/parathyroid disease - uncomplicated • Other adrenal disease - uncomplicated • MDT directed breast cancer resection (post-menopausal ER+) • All benign breast surgery including risk reducing surgery. • Orchidopexy for Un- Descended Testis • Hypospadias repair • Pyeloplasty for Pelvi-Ureteric Junction obstruction • Surgical treatment of Vesico-ureteric reflux • Bladder Augmentation

Orthopaedic, ENT, Neurosurgery and Plastic surgery guideline

Priority Level		Procedure: Orthopaedic
1a	**<24h**	• Fractures - Open/ Neurovascular compromise/Sk in compromise/ Long Bone/Pelvis/Spi ne/Hip • Septic arthritis- natural/prosthetic joint • Dislocated joints • Compartment syndrome
1b	**<72h**	• Unstable articular fractures that will result in severe disability with conservative Rx • Pelvis fractures- unstable • Tibial fracture - high energy/displaced, unstable shaft. • Pathological fracture • Lower limb frailty fractures (non-hip) - requiring fixation for early mobilization
2	< 4 weeks	• MDT Directed Sarcoma surgery - any site • Solitary metastasis surgery - any site. • MDT Directed destructive bone lesion surgery with risk of fracture (e.g Giant cell tumour) • Fractures - displaced, intra- articular/peri- prosthetic/ osteochondral defect/Ankle/Foot/ olecranon/Not Otherwise Specified • Knee extensor disruption (including fractured, displaced patella) • Tendon rupture - hamstring/displaced Achilles/rotator cuff • Locked joints - any site • Nerve Decompression - any site (pain not responding to conservative Rx) • Arthroplasty - lower limb (where delay will prejudice outcome)
3	<3 months	• Hip Avascular Necrosis (night pain/ collapse of the joint/ going off their feet) • Frozen shoulder - severe and not responding to conservative Rx • Tendon reconstruction/ tenodesis - biceps/ hamstring • Revision surgery for loosening/impending fracture. • MDT Directed Benign bone/soft tissue lesion excision biopsy - not otherwise specified • MDT Directed primary sarcoma plus metastases surgery • Arthroscopic removal of joint loose body (Reversible symptoms preventing work) • Locked Knee - ACL/ other reconstruction
4	>3 months	• Arthroplasty/ arthrodesis - not otherwise specified, • Hand and Upper limb surgery - Not otherwise specified • Metal ware removal

Priority Level		Procedure: ENT
1a	**<24h**	• Airway obstruction - Cancer/Foreign body/Sepsis • Neck trauma with vascular/visce ral/ airway injury • Nasal/ear button battery removal • Life threatening middle ear conditions • Orbital cellulitis
1b	**<72h**	• Uncontrolled epistaxis • Sinus surgery for impending catastrophe • Acute mastoiditis and other middle ear conditions not responding to conservative Rx (eg Cholesteatoma- complicated) • Traumatic/ cholesteotoma related facial nervc palsy • Traumatic injury to the pinna • Lymph node biopsy- lymphoma where core biopsy inadequate. • Head and neck sepsis - not responding to conservative Rx.
2	< 4 weeks	• EUA/biopsy for malignancy - hypopharynx/ larynx • MDT directed nasopharyngeal surgery for • MDT directed oropharyngeal surgery for malignancy • Cochlear implantation post meningitis. • Baro-trauma perilymph fistula • Organic foreign bodies in the ear. • MDT directed treatment of small, high grade salivary cancers. • MDT directed treatment of sinus cancers. - threatening sight
3	<3 months	• CSF fistula repair • Symptomatic mucocoele (eg diplopia/recurrent infection) • Cochlear implant in pre-verbal profound hearing loss where delay will impact on long term outcome. • MDT directed otological cancer surgery.
4	>3 months	• All other Rhinology • Cholesteatoma - uncomplicated. • Chronic suppurative otitis media • All Ossicular Surgery/Middle ear implants • Tympanopasty • Grommets • Meatoplasty • Vestibular Surgery • Non-organic foreign body (except button batteries) • Cochlear Implants - other • Uncomplicated nasal fracture

Priority Level		Procedure: Neurosurgery
1a	**<24h**	• Traumatic Brain injury - unsuitable for conservative RX • Traumatic spinal injury - unsuitable for conservative RX • Intra-cranial haemorrhage - not responding to conservative RX • Acute raised Intra cranial pressure/ hydrocephalus (recoverable stroke/ tumour) - not suitable for conservative Rx • Cauda Equina Syndrome - not suitable for conservative Rx • Acute spinal cord compression - not suitable for conservative Rx
1b	**<72h**	• Traumatic brain injury - not responding to conservative Rx • Traumatic brain injury - not responding to conservative Rx - neurological compromise • Intracranial haemorrhage - no longer responding to conservative Rx • Acute raised Intra cranial pressure/ hydrocephalus (recoverable stroke/ tumour) - no longer responding to conservative Rx • Cauda Equina Syndrome - no longer responding to conservative Rx • Acute spinal cord compression - no longer responding to conservative Rx • Battery change for spinal/deep brain/ epilepsy stimulators/pumps
2	< 4 weeks	• MDT directed brain tumour surgery (including gamma knife for metasases) • MDT directed spinal tumour surgery • Spinal surgery - degenerative/ progressive spinal syndromes with impending neurological compromise. • Acute/chronic pain syndromes - (e.g.trigeminal neuralgia) - unresponsive to conservative Rx
3	<3 months	• None
4	>3 months	• Degenerative spinal disease - no neurological compromise/ refractory pain • Movement disorder implants • Lesioning/epilepsy surgery • Normal pressure hydrocephalus • Slow growing brain tumours - no neurological compromise • Slow growing spinal tumours - no neurological compromise • Gamma knife radiosurgery (benign intracranial arteriovenous malformations/ tumours) - no neurological compromise

Priority Level		Procedure: Plastic surgery
1a	**<24h**	• Major burns - Airway management/ resuscitation/ escharotomies/ amputations/ Toxic Shock • Chemical burns - especially Eye/ Hydrofluoric • acid >2% • Necrotising Fasciitis- any site • Soft tissue infection- any site (especially closed compartments/ joints) not responding to conservative Rx • Revascularisation/ re- implantation/ failing free flap - any site • Washout open wound/fractures/ infected/grossly contaminated (human/animal/ contaminated) wounds - any site • Removal of prosthesis/expander for fulminant infection
1b	**<72h**	• Burns - requiring resuscitation. • Burns- full thickness/deep dermal requiring debridement and closure • Burns- mid/deep dermal with exposure of deep structures likely/ infection • Soft tissue infection- any site (especially closed compartments/ joints) not responding to conservative Rx • Delayed primary closure of open wound/fracture- any site • Primary tendon/ nerve repair -all sites. • Unstable closed fractures or joint injuries - unsuitable for conservative Rx • Secondary closure of washed out open wound/ fracture- any site • Finger-tip/nail bed repair / terminalisation • Major limb trauma reconstruction unsuitable for conservative Rx
2	< 4 weeks	• Burns- Mid/deep dermal/otherwise unhealed. • Removal of prosthesis - unresponsive to conservative Rx. • Burns- reconstruction for severe eyelid closure problems/ microstomia/joint and neck contracture • MDT Directed Major soft tissue tumour resection (all sites). • MDT Directed Skin cancer resection - All sites. Melanoma/ Poorly differentiated cancers/nodal disease/compromise of vital structures, including the eye, nose and ear.
3	<3 months	• Burns- reconstruction for eyelid closure/ microstomia/joint and neck contracture • Limb contractures
4	>3 months	• Burns- other contractures/scars • Limb trauma sequelae/scarring - other reconstruction • All breast reconstruction • All cleft lip and palate surgery • Basal Cell Carcinoma - any site not compromising vital structures • Excision of benign lesions

References:

- Public Health England – PPE guidance. Version 2nd April 2020 https://www.gov.uk/government/publications/wuhan-novel-coronavirus-infection-prevention-and-control
- https://www.rcseng.ac.uk/coronavirus/joint-guidance-for-surgeons-v1/
- https://www.england.nhs.uk/coronavirus/wp-content/uploads/sites/52/2020/03/specialty-guide-orthopaedic-trauma-and-coronavirus-v1-16-march-2020.pdf

21.Anaesthesia and COVID-19

Dr. Quazi Siddiqui, Prof AKM Akhtaruzzaman

As the number of people infected with SARS Cov-2 grows, more and more patients with active or suspected infection will attend the operating theatre for emergency and urgent operative procedures requiring anaesthesia. A well planned and rehearsed team is essential for these patients to ensure staff and patient safety. We endeavour to provide a framework by which anaesthesia departments in resource-limited countries could prepare themselves to provide safe anaesthesia service in this crisis. We strongly recommend regular rehearsal and training of the relevant staff for a smooth implementation of these measures.

The national and local health service authorities should consider stopping non-urgent surgeries before pandemic peak to enable physical distancing, to allow the departments to prepare and to conserve personal protective equipment.

Airborne Precautions vs Droplet Precautions and OT Room Management

Airway manoeuvres such as mask ventilation and intubation may generate aerosols increasing the risk of virus transmission[1]. Therefore, regional anaesthetic techniques should always be considered as the risk of transmission is relatively low and droplet precaution is adequate. This article is focused mainly on the general anaesthesia provision as airborne precaution is applicable. Depending on the anaesthetic technique used, specific team member may need standard, Droplet PPE or Airborne PPE as mentioned in the team section.

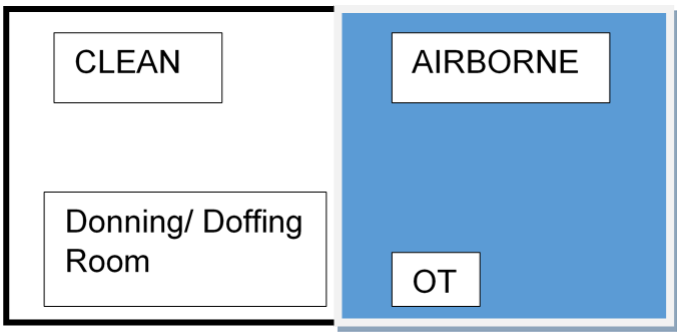
Standard OT precaution and hygiene: Disposable gloves, mask, hand hygiene

Droplet PPE: Disposable gloves, Disposable impervious gown, surgical mask, eye protection[2]

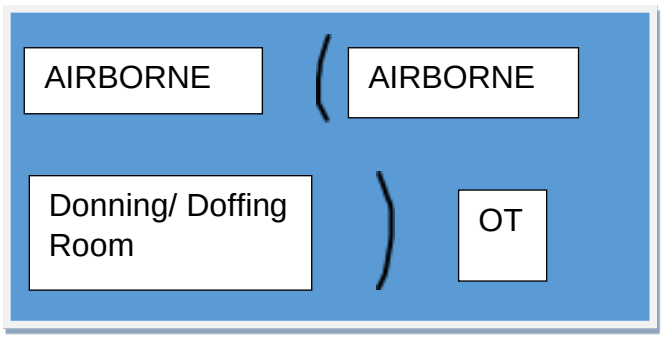
Airborne PPE: Disposable gloves, Disposable impervious gown, N95/P2 mask, eye protection

While donning of PPE could be done in a clean space or change room, doffing should be done in a closed room preferably adjacent to the OT room. Below are examples of room arrangements and requirements for specific precautions when doors are open or close. When OT room needs airborne precaution for aerosol generating procedures, opening door causes the same requirement in adjacent room which is different in droplet precaution.

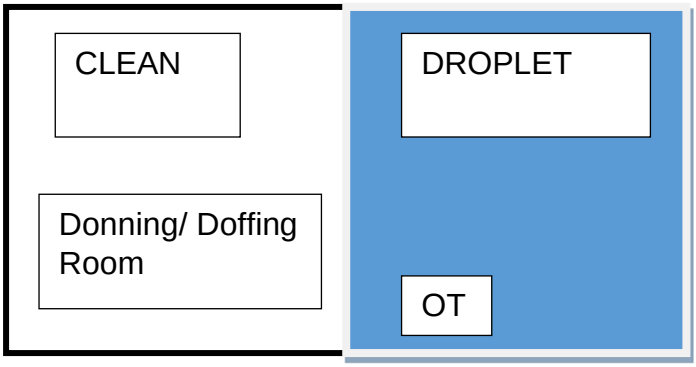
AIRBORNE PRECAUTIONS



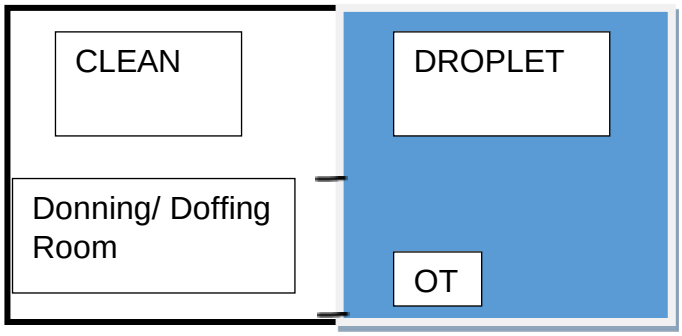
DOOR OPEN AIRBORNE PRECAUTIONS



DOOR CLOSED DROPLET PRECAUTIONS



DOOR OPEN DROPLET PRECAUTIONS



The Team

Theatre team should be comprised of minimum number of essential personnel. However, several associates are required standby outside while OT room doors are kept closed. One designated person should be looking through the glass window to take any signal from inside the room. The OT team should be self-sufficient with the equipment required before the start of the procedure and the door should only be opened in exceptional circumstances once the patient is inside. The requirement for PPE protection changes outside the room if the door is opened depending on the presence of aerosol generating procedure (AGP).Local infection control team should be consulted to determine the time required for the room to be downgraded from airborne to droplet precaution after AGP but generally, in the absence of negative pressure, a 10 minutes pause is deemed to be adequate.

Nursing Team:

Inside scout – airborne non-sterile PPE

Outside scout – standard precaution and hygiene

Scrub nurse – airborne sterile PPE

Anaesthetic Team:

Anaesthetist one – non-sterile airborne PPE

Anaesthetist two – non-sterile airborne PPE

Inside anaesthetic nurse – non-sterile airborne PPE

Outside anaesthetic nurse – standard precaution and hygiene

Surgical Team:

Surgeon – sterile airborne PPE

Surgical assistant (if required) – sterile airborne PPE

Recovery Team:

Recovery nurse – standard precaution and hygiene

Ward Team:

Ward nurse – non-sterile droplet PPE

Porter – non-sterile droplet PPE

Step 1 The Huddle (Nursing, anaesthetic, surgical and recovery teams, and the porter)

Goals

- To inform the case, urgency and rationale for proceeding with the case
- To introduce the team and assign roles of individuals
- To ensure availability of a complete list of equipment and drugs required
- To address concerns raised by the team
- Identify the spotter for donning and doffing

Tasks

- The team introduces themselves
- The four teams take turns to ensure availability of the equipment they need. Theatre nursing team then calls the ward to prepare the patient

STEP 2 Prior to going to OT room

Goals

- Get ready for theatre and for your shower afterwards

Tasks

- Visit the washroom
- Change into OT clothing

- Make up your own named shower bag containing a towel and a fresh OT dress

Step 3 Go to Operating Theatre (Nursing and anaesthetic team, and the porter)

Goals

- Get drugs and equipment ready for anaesthesia and surgery

Tasks

- Anaesthetic team: check machine, prepare drugs and airway Equipment
- Nursing team and the porter: prepare surgical and positioning equipment

Step 4 The First Donning

Goals

- Donning of the anaesthetic and nursing team observed by spotter

Tasks

- Outside scout or outside anaesthetic nurse to act as spotter
- Inside scout, scrub nurse, inside anaesthetic nurse, anaesthetist one and anaesthetist two to Don

Step 5 Calling and receiving the Patient

Goals

- Seamless transfer and reception of the patient in the OT

Tasks

- When the teams inside are ready, outside scout to call for Patient
- Any COVID-19 infected or suspected patient must always wear a surgical mask and patient records must always be covered in a plastic bag
- Inside anaesthetic nurse to go to OT main entrance to receive the patient after appropriate handover from the ward nurse
- Surgical team to stay outside the OT room for WHO Checklist

Step 6 Patient Arrival at the OT room

Operating Theatre is on Droplet Precautions

Goals

- Complete the WHO surgical safety checks
- Gain anaesthetic history and consent if not already done

Tasks

- Outside anaesthetic nurse collects patient notes to be kept outside the OT room
- After the patient is transferred on the OT table, inside Anaesthetic nurse calls outside team on speaker phone, and completes WHO surgical safety checklist
- Anaesthetist completes history and gains verbal consent

Step 7 Intubation

Operating Theatre is on Airborne Precautions

Goals

- To intubate the patient maintaining patient and staff safety

Tasks

- Ensure only inside anaesthetic team and inside scout in room. Outside anaesthetic nurse observes the proceedings through the window and standby for any emergency
- Intubation is performed with appropriate airborne precaution

Step 8 The Third Donning and 10 Minute Wait

Operating Theatre is on Airborne Precautions

Goals

- Wait for operating theatre to return to droplet precautions
- Sterile donning of surgeon and assistant

Tasks

- Surgical team to do sterile PPE donning with outside scout as spotter
- No further activity for10 minutes since the intubation to go to droplet precaution

Step 9 Surgical Team Arrival and Patient Preparation

Operating Theatre is on Droplet Precautions

Goals

- Confirmation of the surgical equipment by surgical team
- To prepare patient for surgery

Tasks

- Surgical team enters the operating theatre and reviews equipment with scrub nurse, outside scout standby to get any missing items
- Time out then to be initiated by inside scrub nurse with outside scrub being on the speaker phone to cross check the patient identity and consent in the notes
- Patient to be positioned, prepped and draped

Step 10 Surgery

Operating Theatre is on Droplet Precautions

Goals

- Proceed with surgery
- Complete Surgical Count
- Prepare Patient for Extubation
- Surgical Team to Exit

Tasks

- Surgery to proceed
- At the completion of procedure, surgical count and sign out check to be recorded via speaker phone with outside scout (equipment count list outside)
- Scrub nurse to clean equipment
- Surgeon or surgical assistant to assist with transferring intubated patient to bed
- Surgical team to then doff through doffing room spotted by outside scout

Step 11 Extubation

The Operating Theatre is on Airborne Precautions

Goals

- To safely extubate the patient
- To inform ward that recovery of patient has begun

Tasks

- Outside anaesthetic nurse to stay standby at the window for any emergency
- Extubation to commence when all team members standing behind the patient
- Anaesthetist to apply surgical face mask and Hudson mask over it after extubation
- From the time of mask application, the room remains airborne for 10 minutes
- Outside scout to inform recovery and the ward at this point.
- After 10 minutes from extubation, the room is on droplet precautions

Step 12 Patient Recovery

The Operating Theatre is on Droplet Precautions

Goals

- Safe doffing of anaesthetist one and anaesthetist two
- Recovery of patient
- Inform ward that transfer of care is required

Tasks

- Anaesthetist one and two to doff spotted by outside anaesthetic nurse
- Anaesthetist one finished tasks but should be available for recovery enquiries
- Recovery nurse and inside anaesthetic nurse stay for patient recovery
- When patient is ready for ward, recovery nurse to inform the ward

Step 13 Clean Up

Operating theatre is on Droplet precautions

Goals

- Clean and prepare OT for next case

Tasks

- Inside nurse team to doff via doffing room self-spotting
- Cleaner to don with droplet precaution in donning room
- Clean OT and doff afterwards with self-spotting

References:

- Ferioli M, Cisternino C, Leo V, et al. Protecting healthcare workers from SARS-CoV-2 infection: practical indications. Eur Respir Rev 2020; 29: 200068 [https://doi.org/10.1183/16000617.0068-2020]
- Bartoszko J, Farooqi M,Alhazzani W, Loeb M. Medical masks vs N95 respirators for preventing COVID-19 in healthcare workers: A systematic review and meta-analysis of randomized trials. Influenza Other Respir Viruses. 2020;00:1–9
- https://multimedia.3m.com/mws/media/1816576O/disinfection-of-disposable-respirators-technical-bulletin.pdf
- https://www.sages.org/n-95-re-use-instructions/
- Correspondence posted by Dr. Amanda Deskins on March 23, 2020 in the following JAMA Editorial: https://jamanetwork.com/journals/jama/fullarticle/2763590

22. Mental health and COVID-19

Dr Shama Parveen

During the current COVID 19 crisis, the whole world is facing an unprecedented situation. It means that life is changing for all of us for a while. It may cause you to feel anxious, stressed, worried, sad, bored, lonely, or frustrated. There are some simple things you can do to help you take care of your mental health and wellbeing.

1. **Look after your physical well-being -** Our physical health has a big impact on how we feel. At times like these, it can be easy to fall into unhealthy patterns of behaviour that end up making you feel worse. Eating regularly and keeping your blood sugar stable can help your mood and energy levels. Try to eat healthy well-balanced meals, drink enough water and exercise regularly. Also look after your sleep by maintaining a daily sleep routine and good sleep hygiene.
2. **Continue to have treatment:** If you are suffering from a mental illness, continue to have treatment and support unless your doctor has advised you otherwise. You may need to use alternative ways of accessing professional advice, for example, by telephone or video consultation.
3. **Stay connected with people:** Maintaining healthy relationships with people we trust is important for our mental wellbeing. You could try phone calls, video calls or social media instead of meeting in person
4. **Talk about your worries:** It is normal to feel a bit worried, scared or helpless about the current situation. Remember: it is OK to share your concerns with others you trust – and doing so may help them too.
5. **Support and help others:** Helping someone else can benefit you as well as them, so try to be a little more understanding of other people's concerns, worries or behaviours at this time. Try to think of things you can do to help those around you.

6. **Manage your media and information intake:** 24-hour news and constant social media updates can make you more worried. If it is affecting you, try to limit the time you spend watching, reading, or listening to media coverage of the outbreak. Gather high-quality information that will help you to accurately determine your own or other people’s risk of contracting coronavirus. Think about how possibly inaccurate information could affect others too. Try not to share information without fact-checking against credible sources.
7. **Think about your new daily routine:** Think about how you can adapt and create positive new routines – try to engage in useful activities (such as

cleaning, cooking or exercise) or meaningful activities (such as reading or calling a friend).

8. **Do things you enjoy:** Focussing on your favourite hobby or learning something new can give you some relief from anxious thoughts and feelings and can boost your mood.
9. **Set goals:** Setting goals and achieving them gives a sense of control and purpose. Think about things you want or need to do that you can still do at home. It could be watching a film, reading a book or learning something online.
10. **Keep your mind active:** Read, write, play games, do crossword puzzles, sudokus, jigsaws or drawing and painting. Find something that works for you.
11. **Take time to relax and focus on the present:** This can help with difficult emotions, worries about the future, and can improve wellbeing. Relaxation techniques can also help some people to deal with feelings of anxiety. For useful resources see Every Mind matters and NHS' Mindfulness page
12. **If you can, once a day get outside, or bring nature in:** Spending time in green spaces can benefit both your mental and physical wellbeing. Please follow your local guidance about going out of the house. If you cannot get outside much you can try to still get these positive effects by spending time with the windows open to let in fresh air and get some natural sunlight.
13. **People with learning disability, autism and other developmental disorders: It is important that people with learning disability, autism and other developmental disorders understand the change around them and supported appropriately during this difficult time.** Public Health England, Mencap and Learning Disability England websites has easy read guidance on coronavirus (COVID-19) and how it may affect you.

References:

- GOV.UK
- NHS Every Mind Matters
- NHS mental health and wellbeing
- Mind, UK

23.Mental health of health care professionals and COVID-19

Dr Tahmina Haque, Dr Sharmin Afroz Panna

It is natural for us to feel anxious, scared, confused, anxiety around the uncertainty, stress of exposing ourselves and family at risk during these unprecedented times. Many of us may have to face “moral dilemma” for not being able to help loved ones during their illness; the dilemma of putting family at risk vs not fulfilling “professional commitment”; the self-imposed critics of not being able to work in front line due to various circumstances; experiencing hurtful comment from media and lay people. Health care professionals are also at risk of suffering from “Moral Injury” for not being able to offer adequate treatment due to lack of resource. The feelings of “constantly losing the battle”; seeing unprecedented will have impact on us are severe than we usually acknowledge.

Moral trauma can lead to mental health problem such as Depression, PTSD.

The points mentioned below been developed following guidelines advised by WHO, Royal College of Psychiatrist UK, American Psychiatrist Association, WAPA and the practical support currently being used in various health organisation in UK.

Key points:

1) **Take care of yourself**

- Take regular breaks and find time to unwind between shifts.
- Get enough sleep (7-8 hours); Eat enough healthy to ensure adequate nutrition; Exercise regularly.
- Avoid using tobacco, alcohol and drugs to cope/self-medication

2) **Be kind to yourself**

- Make room for your feelings - feeling upset or worried is not a sign of weakness.
- Talk to people that you trust, try those strategies that helped you when you had stress in the past.
- Seek help proactively if you struggle. (this is extremely important!)

3) **Stay connected**

- Keep in touch with family and friends – by phone or social media if necessary.

- It would be likely that some of us will experience avoidance by some close ones, or the community due to stigma or fear. Stay connected with your loved ones including through digital methods. Check how your colleagues are doing and support each other. Recognise that different people will cope in different ways.
- If possible, consider setting up or joining a Balint Group to discuss difficult cases and find support from your peers. This may be operated virtually using e-mail, phone, Skype etc. whilst maintain social distancing. (We are happy to support/guide you in this aspect)

4) Manage information

- Too much information can be overwhelming. Keep work-related COVID updates to key times.
- Take breaks from watching, reading or listening to news.
- Obtain information from trusted sources and focus on facts not speculation

Reference:

- https://www.rcpsych.ac.uk/about-us/responding-to-covid-19/responding-to-covid-19-(guidance-for-clinicians/wellbeing-and-support/your-wellbeing).
- https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports/
- https://www.who.int/emergencies/diseases/novel-coronavirus-2019
- https://www.epi-win.com/
- https://www.epi-win.com/sites/epiwin/files/content/attachments/2020-02-
- https://interagencystandingcommittee.org/other/interim-briefing-note-addressing-mental-health-andpsychosocial-aspects-covid-19-outbreak

24. Cancer and COVID-19

Dr Zahed Khan

In the context of a pandemic outbreak cancer services and professionals need to respond with a prioritisation plan to minimise risks to cancer patients from the treatment-related complications as well as reduce exposure risk to COVID-19 for both patients and health care providers. There could be reduced capacity due to increased staff sickness/absence or supply limitations.

Key points in ensuring the safety of both cancer patients and health care providers. –

1. Prioritising treatments according to clinical benefit and offering those treatments with higher clinical benefit.
2. Modifications of treatment protocols.
3. Modification of provider-patients interactions.
4. Risk-stratification of the clinical areas.

Key point 1: Priority Category for chemotherapy

Priority level 1	Curative therapy with a high (>50%) chance of success. Adjuvant (or neo) therapy which adds at least 50% chance of cure to surgery or radiotherapy alone or treatment given at relapse
Priority level 2	Curative therapy with an intermediate (20- 50%) chance of success Adjuvant (or neo) therapy which adds 20 – 50% chance of cure to surgery or radiotherapy alone or treatment given at relapse
Priority level 3	Curative therapy of a low chance (10 – 20%) of success Adjuvant (or neo) therapy which adds 10 – 20% chance of cure to surgery or radiotherapy alone or treatment given at relapse Non-curative therapy with a high (>50%) chance of >1 year of life extension
Priority level 4	Curative therapy with a very low (< 10%) chance of success Adjuvant (or neo) therapy which adds less than 10% chance of cure to surgery or radiotherapy alone or treatment given at relapse Non-curative therapy with an intermediate (15-50%) chance of > 1 year life extension
Priority level 5	Non-curative therapy with a high (>50%) chance of palliation / temporary tumour control but < 1 yr life extension
Priority level 6	Non-curative therapy with an intermediate (15-50%) chance of palliation / temporary tumour control and < 1 yr life extension

Key Point 1: Care plans priorities according to cancer site.

Applying the above priority score the table below reflects the contribution of chemotherapy or radiotherapy in different cancer sites (taken from a UK cancer centre). This does not replace the clinical judgement of individual treating oncologist or a group of oncologists treating a cancer site.

Disease	Neo-adjuvant	Adjuvant	Locally advanced Chemo-RT	First line advanced	Second line advanced	Third and subsequent
Breast Her2+ / TNBC	2	2		3	3	6
Breast ER+ Her2-	3	3		3	4	6
Lung NSCLC			2	Pembro: 3 Doublet: 4 Gem: 6	Anti-PD1: 4 Doctetax: 6	6
Lung SCLC			2	3	5 / 6	6
GI – OG			2	FLOT 1 Other 3	6	6
GI Pancreatic		3		4	6	6
GI Biliary		3		4	6	6
GI HCC				4	6	6
GI NET				4	6	6
GI Colon / Rectum	2	3		4	6	6
GI Anus			1	4	6	6
Ovarian	4	4		4	6	6
Ovarian BRCA m	3	2		3	4	P sensitive 4 P reseistant 6
Ovarian HG serous / endometrioid	3	4		4	5	P sensitive 5 P resistant 6
Ovarian other	4	4		4	5	6
Uterine		4		6	6	6
Uterine	4	4		4	6	6
Cervix		4	1	3	6	6
Kidney				6	6	6
Bladder / Ureter	4	4		4	5	6
Prostate				4	6	6
Testis / GCT	2	2		1	4	6
Penile				6	6	6
Head and Neck	4		4	6	6	6
cSCC				5	6	6
Sarcoma STS	4			6	6	6
Sarcoma Bone + EFT	1	1		4	6	6
Sarcoma GIST	3	3		3	6	6
Melanoma	2			2	BRAF+ 2 BRAF -6	6
Non-melanoma skin				6	6	6
CNS				6	6	6
Lymphoma Hodgkin's				1	1	1
Lymphoma HG NHL				1	2	3
Lymphoma LG NHL				1	3	3
Haem – ALL, AML				1	4	4
Haem – CLL				3	3	4
CUP / MUO				6	6	6

Pembro – Pembrolizumab
Doublet- Doublet chemotherapy
Gem – Gemcitabine
FLOT – Flouropyrimidine, Oxaliplatin and Docetaxel
P sensitive/resistant – Platinum

Key point 2: Modifications to treatment protocols

Idea is to reduce the infection risk for patients, reduce interactions with healthcare providers and best use of resources. Please see reference 3. Examples include –

1. Consider prophylactic GCSF when not normally used with certain regimes (NS risk 10-20%)
2. Consider reducing the duration of adjuvant therapy or not offering adjuvant therapy in low recurrence risk situations (Breast, Colorectal, lung).
3. Rationalising peri-operative chemotherapy (choosing either neoadjuvant or adjuvant chemotherapy in OG cancer, CRC liver metastasectomy)
4. Using chemoradiotherapy options over resection surgery where possible (like in OG cancer).
5. Switching intravenous treatments to subcutaneous or oral alternatives (IV vs SC Herceptin)
6. Using shorter treatment regimens
7. Decreasing the frequency of immunotherapy regimens, i.e., moving to 4 or 6-weekly
8. Repeat prescriptions of oral medicines or other at-home treatments without patients needing to attend hospital
9. Deferring bone-targeted treatments
10. Using treatment breaks for long-term treatments (possibly for longer than 6 weeks).
11. Rationalising palliative radiotherapy when pain can be reasonably managed with analgesia.

Key point 3: Modification of provider-patients interactions.

1. Telephone/video consultation for all patients and only offer face to face consultation when clinically necessary.
2. Telephone helpline/triage for unwell patients before attending hospital.
3. Dedicated areas for face to face assessment for unwell patients (see key point 4).
4. Reduce family members attending/visiting the patient.
5. Using home delivery services for medicines
6. Introducing drive-through pick-up points for medicines

Key point 4: Risk-stratification of the clinical areas

1. Re-designating outpatients and in-patients into High risk, intermediate and low risk (Red, Amber, Green)
2. Redesigning and controlling the flow of patients and staff between different risk areas.
3. One way flow separating entry and exits.
4. Signposting of different areas with information on appropriate PPE according to risk

Reference:

1. NHS Clinical guide for the management of non-coronavirus patients requiring acute treatment: Cancer 23 March 2020 Version 2
2. COVID-19 rapid guideline: Delivery of Systemic Anticancer Treatments. Published: 20 March 2020. www.nice.org.uk/guidance/ng161
3. Interim treatment change options for the COVID-19 pandemic, endorsed by NHS England (27 April 2020)

25.Thoracic Surgery, Lung Cancer and COVID 19

Dr Taufiq Islam, Dr Zahed Khan, Dr Shakil Farid

Lung cancer is the most common cancer in men in Bangladesh. Because of the unprecedented pressure on the health system during COVID-19 crisis the management of lung cancer needs to be modified in order the prioritise the patients and offer appropriate treatment accordingly. In response to pressures on the NHS, the elective component of our work may be curtailed. However, the non-elective patients, emergency, urgent and trauma, will continue to need care.

Diagnosis and Assessment:

A. Avoid bronchoscopy and EBUS in patients with a low risk of cancer (Fig1)
B. When absolutely necessary consider interval imaging rather than sampling
C. When indicated, use PET-CT prior to any staging EBUS and to identify alternative biopsy target. Cases where there is a low risk of mediastinal disease, consider percutaneous lung biopsy or proceeding directly to treatment based on lung cancer probability.
D. Surveillance and Planning:

- Consider CT surveillance for likely indolent or benign lesions, including pure ground-glass nodules and smaller semisolid and solid nodules.
- Prioritize patients with likely aggressive disease or where a delay would result in the patient becoming unresectable.
- In patients with a never/light smoking history and clear radiological suggestion of advanced primary lung cancer, consider plasma test for EGFR mutation instead of biopsy (if available).

Surgical Treatment:

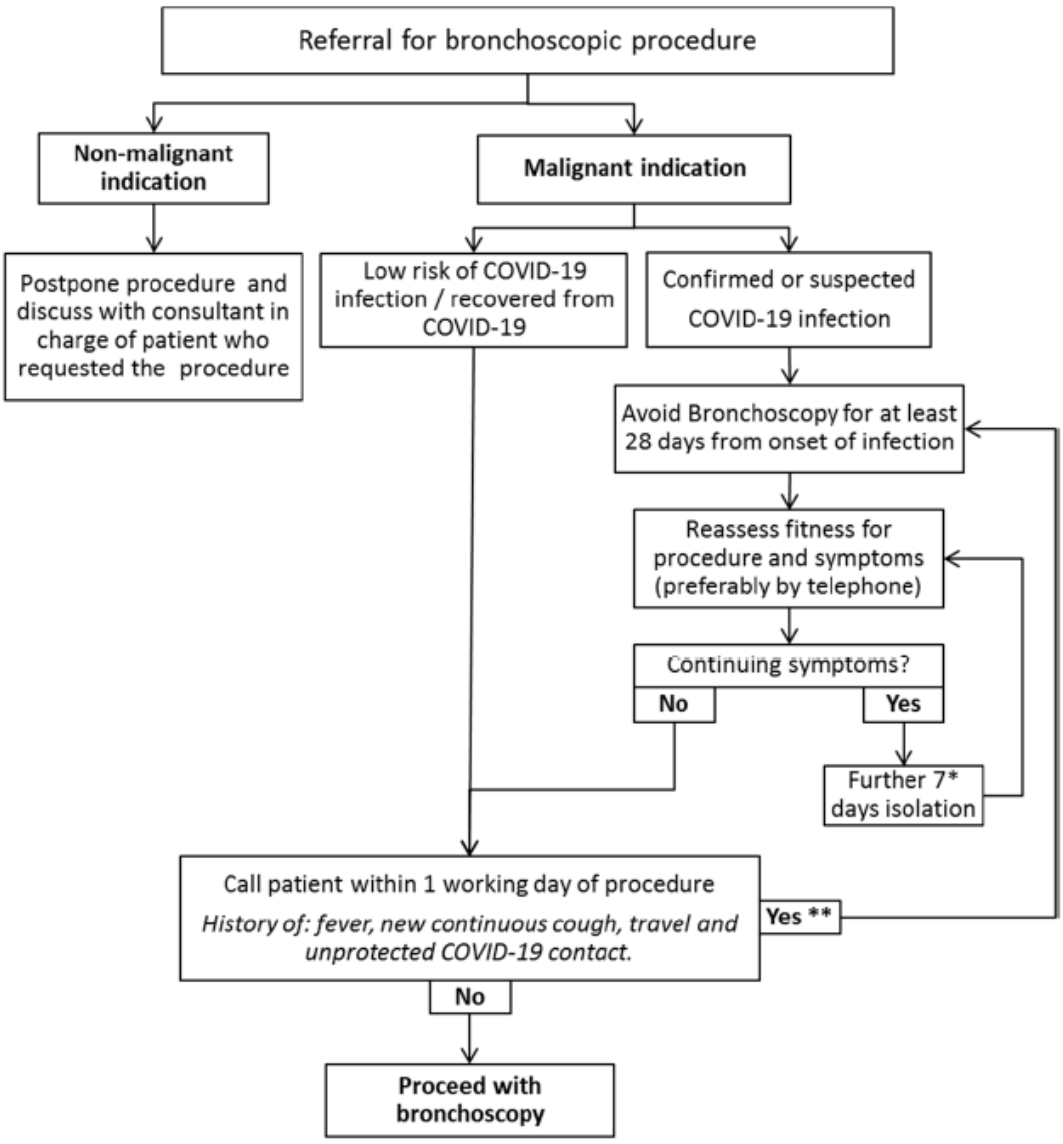
Surgery and Curative Intent Treatment:

Patients should be offered treatment according to the accepted standard of care until limitations of services require a progressive reduction in surgery. The MDT needs to discuss this and decide which patients are highest priorities.

- Consider deferring treatment in lesions likely to be indolent, with follow up CT to confirm growth rate.
- Prioritise referral and pathway to thoracic surgery for cases of:
  a. Symptomatic lung cancer (infection, pain, bleeding, breathlessness)
  b. Stage IIb/IIIa lung cancer at most risk of stage progression / becoming unresectable)
- Plan surgery to minimise length of stay, by using minimal access surgery, day case or day of surgery admission.
- The benefit of adjuvant chemotherapy may be outweighed by the risk so consider omitting this and stopping existing treatment early at 3 cycles.
- In higher risk patients, particularly those not fit for a lobectomy, consider direct referral for radiotherapy.

- Consider treatment without biopsy, as above, using frozen section for intraoperative confirmation.
- Suspend tri-modality treatment for N2 positive lung cancer.
- In patients suitable for SABR without nodal disease and tumours <2cm, consider SABR rather than surgery when surgical capacity is reduced.
- Consider delaying radiotherapy treatment until risk of exposure reduces in patients with stage I-II disease.
- Consider omitting induction component of chemoradiation and limiting to concurrent therapy.
- Consider temporarily stepping down routine post radical treatment surveillance.
- Pre- and post-operative clinical appointments should be remote (via secure video-link to telephone call) whenever possible.
-

Figure 1: Summary of Bronchoscopy Guidelines



Elective Case Triage Guidelines for Surgical Care

Phase I. Semi-Urgent Setting (Preparation Phase): Few COVID 19 patients, hospital resources not exhausted, institution still has ICU vent capacity, and COVID trajectory not in rapid escalation phase

Surgery restricted to patients likely to have survivorship compromised if surgery not performed within next 3 months

Cases that need to be done as soon as feasible	Cases that should be deferred	Alternative treatment approaches to be considered
• Solid or predominantly solid (>50%) lung cancer or presumed lung cancer >2cm, clinical node negative • Node positive lung cancer • Post induction therapy cancer • Chest wall tumors of high malignant potential not manageable by alternative therapy • Staging to start treatment (mediastinoscopy, diagnostic VATS for pleural dissemination) • Symptomatic mediastinal tumors – diagnosis not amenable to needle biopsy	• Predominantly ground glass (<50% solid) nodules or cancers • Solid nodule or lung cancer < 2 cm • Indolent histology (e.g. carcinoid, slowly enlarging nodule) • Thymoma (non-bulky, asymptomatic) • Pulmonary Oligometastases - unless clinically necessary for pressing therapeutic or diagnostic indications (i.e. surgery will impact treatment) • Patients unlikely to separate from mechanical ventilation or likely to have prolonged ICU needs (i.e. particularly high-risk patients) • Tracheal resection (unless aggressive histology) • Bronchoscopy • Tracheostomy	• If eligible for adjuvant therapy, then give neoadjuvant therapy (e.g. chemotherapy for 5cm lung cancer) • Stereotactic Ablative Radiotherapy (SABR) • Ablation (e.g. cryotherapy, radiofrequency ablation) • Stent for obstructing cancers then treat with chemoradiation • Debulking (endobronchial tumor) only in circumstance where alternative therapy is not an option due to increased risk of aerosolization (e.g. stridor post obstructive pneumonia not responsive to antibiotics) • Nonsurgical staging (EBUS, Imaging, Interventional Radiology biopsy) • Follow patients after their neoadjuvant for “local only failure” (i.e. salvage surgery) • Extending chemotherapy (additional cycles) for patients completing a planned neoadjuvant course.

Phase II. Urgent Setting: Many COVID 19 patients, ICU and ventilator capacity limited, OR supplies limited or COVID trajectory within hospital in rapidly escalating phase

Surgery restricted to patients likely to have survivorship compromised if surgery not performed within next few days

Cases that need to be done as soon as feasible (recognizing status of hospital likely to progress over next few days)	**Cases that should be deferred**	**Alternative treatment approaches RECOMMENDED (assuming resources permit)**
• Tumor associated infection – compromising, but not septic (e.g. debulking for post obstructive pneumonia) • Management of surgical complications (hemothorax, empyema, infected mesh) – in a hemodynamically stable patient	• All thoracic procedures typically scheduled as routine/elective (i.e. not add-ons)	• Transfer patient to hospital that is in Phase I • If eligible for adjuvant therapy, then give neoadjuvant therapy • Stereotactic Ablative Radiotherapy (SABR) • Ablation (e.g. cryotherapy, radiofrequency ablation) • Reconsider neoadjuvant as definitive chemo-radiation, and follow patients for "local only failure" (i.e. salvage surgery)

Phase III. Emergent settings: Hospital resources are all routed to COVID 19 patients, no ventilator or ICU capacity, OR supplies exhausted.

Surgery restricted to patients likely to have survivorship compromised if surgery not performed within next few hours

Cases that need to be done as soon as feasible (status of hospital likely to progress in hours)	**Cases that should be deferred**	**Alternate treatment recommended**
• Threatened airway • Tumor associated sepsis • Management of surgical complications – unstable patient (active bleeding not amenable to nonsurgical management, dehiscence of airway, anastomotic leak with sepsis)	All other cases deferred	All other cases deferred

Reference:

1. https://www.brit-thoracic.org.uk/document-library/quality-improvement/covid-19/lung-cancer-pathway-guidance-covid-19/

2. https://www.facs.org/covid-19/clinical-guidance/elective-case/thoracic-cancer

3.https://www.sts.org/sites/default/files/Pulmonary%20Testing%20Guide%20for%20Lung%20Rsxn%202020%20COVID.pdf

Chemotherapy contingency in relation to lung cancer

General –

1. Avoid adjuvant chemotherapy for low-risk patients.
2. Support with GCSF (in regimens the neutropenic sepsis rate is >10%).

Non Small Cell Lung Cancer –

1. Stop maintenance pemetrexed in combination with pembrolizumab to reduce treatment toxicity and risk of neutropenia.
2. Allow pembrolizumab to be given as a single agent as a first-line treatment for squamous or non-squamous non-small cell lung cancer and a PDL-1 score of less than 50% to reduce treatment toxicity and risk of neutropenia.
3. Allow durvalumab be given 4 weekly in patients eligible for durvalumab following treatment with chemo-radiotherapy to reduce the number of hospital visits.
4. Switch to carboplatin and paclitaxel from day 8 treatments such as gemcitabine and carboplatin and cisplatin and vinblastine.
5. Option to give osimertinib as first-line therapy to delay the need for subsequent chemotherapy.

Small Cell Lung Cancer –

1. Stop first-line chemotherapy for stage 4 small cell lung cancer after 4 cycles to reduce hospital admission and risk of neutropenia.

Reference:

Interim treatment change options for the COVID-19 pandemic, endorsed by NHS England

(27 April 2020)

26. Breast cancer and COVID-19

Dr Md Zaker Ullah

These are extremely difficult times for everyone in the health service around the world. Bangladesh has a different cohort of patients to the UK and thus, guidelines need to be modified to combine the principles of treatment of breast cancer, with the resources available in Bangladesh to create a workable framework for doctors during this pandemic.

We suggest the development of a plan now so that this can be implemented as the pandemic worsens. With the potential shortage of medical staff and theatres, we are all going to have to adapt and prioritise the order in which breast cancer patients receive surgical treatment.

The Association of Surgeons of Great Britain and Ireland has set up some guidelines to assist doctors in prioritising treatments for different sub-groups of breast cancer patients and we have adapted these guidelines, as follows.

Breast Service Provision

Triage of referrals and changes to treatment are likely to be necessary and we would recommend that you consider the following measures to include in your plan:

Tele conferencing with the patient: (already functional at the BSMMU)

If the patient has fever, cough or respiratory symptoms, then the OPD appointment should be rescheduled. The OPD appointment can be rescheduled following 7-8 days of isolation (the patient needs to be apyrexic for 72hours without antipyretics. They should also be advised that only one person may accompany them to the clinic, if required.

New Patients

Triage all patients

- Very frail, elderly patients referred with suspicious lumps should not be seen in clinic until the situation has changed. Older patients (especially those with co-morbidities) are at the highest risk of death from coronavirus and they should be seen once the pandemic is over. **Start on endocrine therapy empirically**.

Triage patients into following 3 categories:

Category 1: Patients likely to have **significant pathology**; we assume this group constitutes approximately 20-30% of referrals. This group will be seen in one-stop within two weeks for the time being. (e.g. Breast lump/ bloody or clear nipple discharge/ palpable lymph nodes/ ulcerated tumours)

Category 2: Patients likely to have "**insignificant" pathology** but should be assessed and can be deferred. The department will inform patients by telephone clinic, explain their specific situation in the context of the COVID-19 pandemic; appointments will be deferred until the COVID-19 pandemic stabilises. (e.g.-young patient <25 years old with mobile breast lump/ milky breast discharge)

Category 3: Patients are **unlikely** to have any **pathology**. A telephone call to the patient to explain the reasons and suggest that they return if their symptoms persist or worsen after the coronavirus crisis (e.g. Breast pain/ Family history of breast cancer)

Follow up cancer patients

- Try to minimise the number of patients attending breast clinics for routine review. Postpone appointments where appropriate and consider introducing telephone reviews for those where review is required.
    - This is especially important for frail elderly patients on primary endocrine treatment

Benign disease

- **No surgery for benign disease or risk-reduction to be performed**

MDT Meetings

- Maintain weekly MDT; can be done remotely if needed. Aim to minimise the number of staff present at the MDT. Perhaps 1 surgeon, 1 oncologist, 1 pathologist, 1 radiologist and one breast care nurse and maintain social distancing.
- Maintain a list of patients with surgical delay on primary endocrine therapy.

Surgery

It is essential that all surgeons operate with the appropriate PPE.

Need to consider:

- The **availability** of theatre space, taking into account collaboration with other specialties to prioritise patients who require surgery.
- **Urgency** of the procedure and risk to patients of attending hospital.

- **Co-morbidities** which may impact on outcomes if COVID-19 is contracted.
- **Complications** associated with a procedure and subsequent risks these may pose to patients and staff
- **Clip** put in all cancers when biopsy performed
- Aim for **day case surgery** in majority of patients
- If theatre space is limited, surgical **priority** given to **ER negative** patients first.
    - Then HER2+ patients
    - Then pre-menopausal ER+ patients
- For DCIS patients if theatre space available **prioritise high grade DCIS**
- **Neoadjuvant** chemotherapy **only** for **inoperable** disease, NOT to downstage from mastectomy to BCS or to perform axillary conservation in ER- or HER2+ patients.
- **No immediate breast reconstruction**. Mastectomy and delayed reconstruction being offered at a later date.
- If insufficient theatre capacity, **post-menopausal ER+** patients to be commenced on **primary endocrine**. If not enough theatre capacity pre-menopausal ER+ patients may also have to be commenced on primary endocrine therapy
- **Discuss** with oncology whether all grade 3 or node positive ER+ positive patients should have **genomic testing** performed on the core biopsy. If high score, consider surgery as would normally need adjuvant chemotherapy.
- **Clearly document** why these **decisions** have been made.

Benign breast surgery, prophylactic surgery and delayed reconstruction should still be on hold.

Surgeons should think very carefully before embarking on immediate breast reconstruction, in particular implant reconstruction with its relatively higher levels of post-operative infection and readmission rates. At present immediate breast reconstruction should still not be offered to the majority of patients.

Surgeons should continue to work in collaboration with oncology colleagues in selecting patients for neoadjuvant chemotherapy or endocrine therapy.

All patients should be discussed at the MDT with clear documentation of treatment plans and whether these have been changed due to COVID-19.

Benefits of the recommended treatment and risks associated with COVID-19 should be discussed clearly with patients.

References:

Barts Health NHS Trust, SBH Cancer Centre Protocol, COVID-19V4.0

Association of Breast Surgeons UK statements, 27/4/2020 & 15/3/2020

27. Diabetes Mellitus and COVID-19

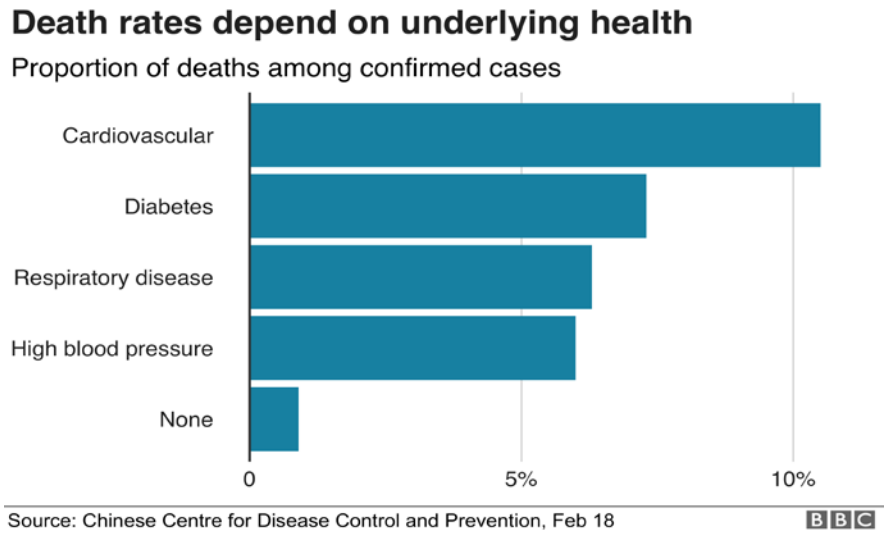
Dr. Tanjina Hossain, Dr Indrajit Prasad

Diabetes Mellitus (DM) is an important co-morbidity in Covid19 patients. 20-50% of patients in COVID 19 pandemic have diabetes.

DM contributed second to cardiovascular disease, 9.2% of case fatality.

Those with A1C ≥ 6.5% (chronic hyperglycemia) and had hyperglycemia throughout their stay had an in-hospital mortality rate of 29%, more than four times higher than patients without diabetes or hyperglycemia (6%).

42% of patients who had no evidence of diabetes prior to being admitted, and developed hyperglycemia during their stay, died in the hospital (acute hyperglycemia).



Glycemic management depends on the clinical category of the patient.

Target Stratification: (mmol/L)

	High	Medium	Low
FBG	4.4-6.1	6.1-7.8	7.8-10.0
2 h PPG	6.1-7.8	7.8-10.0	7.8-13.9

- **For Mild to moderate non elderly: strict high control**
- **For mild to moderate elderly, or on steroid: medium target**
- **For severe, critical, elderly, organ dysfunction, co morbidity: low target**
- **Hypoglycemia should be minimized**

For Home Isolation mild cases:

Following advice of diabetes care provider, sensitizing the patients for importance of optimal sugar control

Checking blood glucose more frequently and testing for ketones if possible

Contacting by telemedicine if blood sugar is too high or ketones present

Being aware of signs of hypoglycemia

Staying hydrated, maintain regular schedule

Getting medical help as soon as possible if vomiting or not able to drink or eat.

Consideration of potential metabolically interfering effects of drugs in suspected or COVID-19 positive patients with type 2 diabetes

Metformin

Dehydration and lactic acidosis will probably occur if patients are dehydrated, so patients should stop taking the drug and follow sick day rules

During illness, renal function should be carefully monitored because of the high risk of chronic kidney disease or acute kidney injury

Sodium-glucose-co-transporter 2 inhibitors

These include canagliflozin, dapagliflozin, and empagliflozin

Risk of dehydration and diabetic ketoacidosis during illness, so patients should stop taking the drugs and follow sick day rules

Patients should avoid initiating therapy during respiratory illness

Renal function should be carefully monitored for acute kidney injury

Glucagon-like peptide-1 receptor agonists

These include exenatide-extended release, liraglutide, semaglutide

Dehydration is likely to lead to a serious illness so patients should be closely monitored

Adequate fluid intake and regular meals should be encouraged

Dipeptidyl peptidase-4 inhibitors

These include vildagliptin, linagliptin, saxagliptin, and sitagliptin

These drugs are generally well tolerated and can be continued

Insulin

Insulin therapy should not be stopped

Regular self-monitoring of blood-glucose every 2–4 hours should be encouraged, or continuous glucose monitoring

Carefully adjust regular therapy if appropriate to reach therapeutic goals according to diabetes type, comorbidities, and health status

Connected Health models and Telemedicine should be used to continue regular reviews and self-management education programs virtually and ensure patients are adherent to therapy.

If drugs are discontinued, the alternative therapy is insulin.

In patient or Intensive care unit:

Monitoring for new onset Diabetes in hospitalized patients.

Plasma glucose, Electrolytes, Blood pH, ABG, Urine Ketones, Lactate monitoring.

Liberal indication for early intravenous insulin therapy in severe cases (ARDS, Hyerinflammation) and exact titration.

Multiple stresses associated with COVID19 infection, not only respiratory failure, but also defect in insulin secretion, diarrhea, sepsis etc, most patients will require insulin.

As many cases are reported with very high insulin consumption, this will need to be managed by intravenous infusion.

Care is required in fluid balance and potassium balance. Hypokalemia is a common feature in COVID-19 in the context of insulin infusion and possibly due to hyperaldosteronism induced by high concentration of angiotensin 2.

Key recommendations:

- Importance of optimal control and target stratification should be explained to all home isolation COVID 19 patients with Diabetes.
- Metformin and SGLT2 Inhibitors should be stopped as sick days rule.
- If drugs are discontinued, insulin is the choice.
- Close monitoring of blood glucose and careful adjustment needed.
- Early intravenous therapy in severe and critical cases will be needed.
- Maintaining careful fluid and electrolyte balance during intravenous insulin therapy is required.

References:

1. Bode B, Garrett V, Klonoff DC. Glycemic Characteristics and Clinical Outcomes of COVID-19 Patients Hospitalized in the United States. J Diabetes Sci Technol. 2020; In press.
2. Expert recommendation on Glucose Management Strategies of Diabetes combine with COVID19. J Clin Intern Med. 2020 Mar; 37(3):215-219
3. Practical recommendations for the management of diabetes in patients with COVID-19. Stefan R Bornstein, Francesco Rubino, Andreas Birkenfeld. April 23, 2020, The Lancet Diabetes and Endocrinology
4. Hartmann-Boyce J Morris E Goyder C et al. Managing diabetes during the COVID- 19 epidemic. https://www.cebm.net/covid-19/managing-diabetes-during-the-covid-19-pandemic/ Date: 2020 Date accessed: April 15, 2020
5. Dellinger RP Levy MM Rhodes A et al. Surviving sepsis campaign: international guidelines for management of severe sepsis and septic shock: 2012. *Critical Care Med.* 2013; 41: 580-637

28.Digestive and Liver Manifestations of COVID 19

Dr Basher M Atiquzzaman

Patients of COVID 19 typically present with flu like symptoms and a respiratory illness, mounting evidence indicates that patients might also report extrapulmonary manifestations, including those affecting the liver and gastrointestinal tract.
This involvement may have important implications to the disease management, transmission, and prognosis, especially in patients with pre-existing hepatic or digestive co-morbidities.

COVID-19 and Digestive system

46% (99/206) of patients had digestive symptoms: anorexia (83.8%), diarrhea (29.3%), vomiting (8.1%), and abdominal pain (4%). The diarrhea was described as “loose” and up to three times a day.
Those with GI symptoms had a longer time from disease onset to admission, and the cases were more severe than those without GI symptoms. This may have been related to the fact that diagnosis and treatment were delayed because GI symptoms were not being assessed. It may also be related to the gut–lung axis, suggesting that intestinal infection can promote a more severe respiratory response by activating ACE2 in the liver, creating dysbiosis of the microbiome, and promoting a more robust systemic inflammatory response.

- GI symptoms are more common than initially thought and should be included in the screening process.
- Diarrhea is the most specific GI symptom, but it is not severe until the disease progresses.
- Those COVID-19 cases that include GI symptoms are more severe, involve a longer hospital stay, and have a higher mortality rate.
- A small percentage of patients (3%) presented only with digestive symptoms.
- SARS-CoV-2 gastrointestinal infection causing acute hemorrhagic colitis and signaling COVID-19 disease which endoscopy confirmed colonic injury and helped exclude other etiologies of disease.
- In hospitalized patients, consider testing stool for viral nucleic acid.
- The overall concomitant viral RNA positivity rate of stool and respiratory samples was 48%. In studies reporting serial testing, 70% of patients had persistently positive stool RNA even after respiratory tests had become negative.
- During this pandemic, patients with IBD should continue IBD therapies including scheduled infusions.
  Having IBD does not appear to increase the risk of SARS-CoV-2 infection or the development of COVID-19.

Instructions for patients with IBD who develop COVID-19 (fever, respiratory symptoms, digestive symptoms, etc)

- a) Stop thiopurines, methotrexate, tofacitinib.
  b) Stop biological therapies (including anti-TNF, ustekinumab, vedolizumab).
  c) Can restart therapies after complete resolution of COVID-19 symptoms.

- Patients with cirrhosis (even Child A) and those with prior liver transplantation should be discouraged from visiting a clinic or hospital, unless absolutely essential.
- Patients with decompensated cirrhosis should be considered for inpatient treatment only if there is a pressing indication for admission e.g. acute GI bleed, hepatic encephalopathy, tense ascites causing respiratory distress, liver cancer requiring locoregional therapy, or liver transplantation.
- Endoscopic variceal ligation as primary prophylaxis should be postponed till 4–6 weeks later, or till threat of COVID-19 infection has passed and beta-blockers should be preferred till then.
- Routine liver biopsies should be postponed for at least 4–6 weeks unless it is being carried out for confirming malignancy or an illness such as autoimmune hepatitis or acute cellular rejection.
- Post Liver transplant patients should continue their standard immunosuppression till further data becomes available.
- Liver transplantation recipients with COVID-19 infection should be monitored for drug-drug interactions, if they are prescribed lopinavir/ritonavir antiviral therapy because ritonavir is a potent CYP 3A4 inhibitor and can increase the levels of calcineurin inhibitors. (American Society of Transplantation Guidance).

COVID-19 and the liver

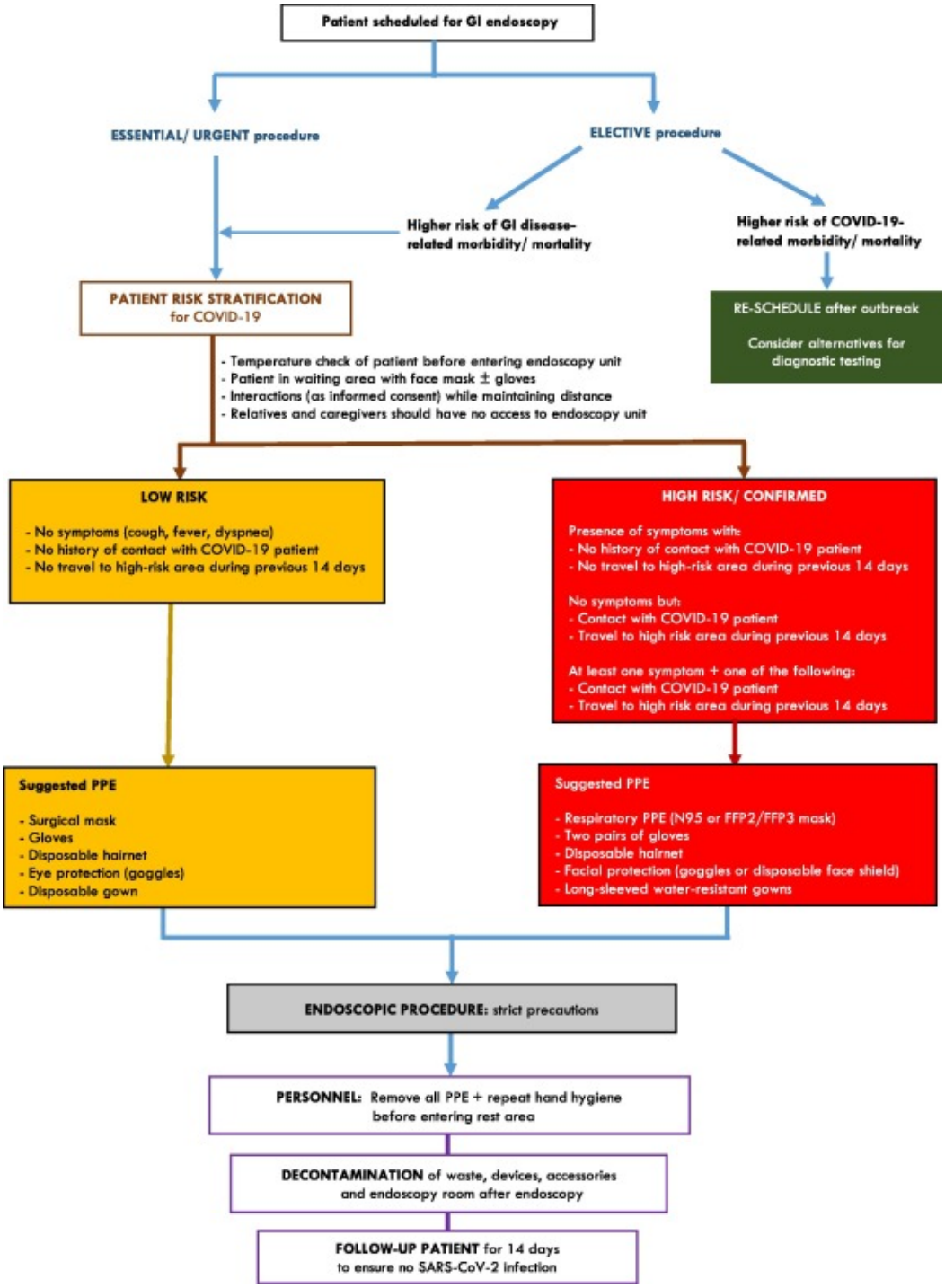
Liver involvement has been reported in patients infected with SARS-CoV and MERS-CoV . Likewise, published case studies reporting clinical features of patients with COVID-19 have shown that they may develop different degrees of liver dysfunction. The incidence of liver injury ranged from 14.8% to 78%, mainly presenting with abnormal levels of alanine aminotransferase (ALT) and aspartate aminotransferase (AST) accompanied by slightly elevated bilirubin levels. A deeper look at available data shows higher rates of abnormal levels in severe COVID-19, as high as 78% in one study.

Drug-induced liver injury during COVID-19 treatment should be carefully investigated. It might be caused by antiviral medications (lopinavir/ritonavir), antipyretics (acetaminophen), antibiotics (macrolides, quinolones) or steroids.

COVID-19 in the Endoscopy unit

Despite being not directly involved in management of COVID-19 patients, personnel working in endoscopy units are still at increased risk from inhalation of airborne droplets, conjunctival contact, and touch contamination. Human-to-human transmission occurs primarily via infected droplets. Airway suctioning, and other cough-inducing procedures pose an increased risk of transmission of SARS-CoV-2. It must be noted that the risk of exposure is not limited to upper endoscopy considering the potential transmission through faecal shedding.

1. Reduction of non-essential exposure to SARS-CoV-2: limit endoscopy during the current outbreak to emergency procedures to treat patients with conditions such as acute gastrointestinal bleeding, foreign bodies in the gastrointestinal tract and acute cholangitis secondary to biliary obstruction.
2. Risk assessment and stratification of patients prior to any endoscopic procedure: A high index of suspicion to diagnose SARS-CoV-2 infection, is crucial for prevention of transmission. Screening of patients for COVID-19 should be done. The assessment must include history of fever, respiratory symptoms, or diarrhea, history of contact with a suspected or confirmed case of COVID-19 and any recent travel to a high-risk area.
3. Negative-pressure room: Whenever possible, endoscopy should be performed in an isolated room with negative pressure. If not available, endoscopy should be performed in a dedicated room with adequate ventilation.
4. Staff protection: The minimal composition of personal protective equipment (PPE) for personnel in endoscopy units should include gloves, hairnet, protective eyewear (goggles or face shield), waterproof gowns, and respiratory protective equipment, modified on the basis of risk stratification. The surgical facial mask is effective in blocking splashes and large-particle droplets, whereas, filtering facepiece (FFP) respirator class 2 or 3 (FFP2/FFP3) achieves efficient filtration of airborne particles (up to 0.3 μm).
5. Reprocessing of endoscopes and endoscopic accessories: Enveloped viruses such as SARS-CoV-2 can be inactivated by disinfectants having virucidal activity. Whereas high-level disinfection is recommended for endoscopes, and other ‘‘semi-critical’’ instruments, sterilization is recommended for ‘‘critical’’ instruments, including biopsy forceps, polypectomy snares and papillotomes. Disposable accessories are an alternative to sterilization of reusable devices.
6. Decontamination of endoscopy rooms: This process should include cleaning all surfaces in the procedure room to remove all soil and biofilm, followed by proper disinfection. Chlorine-containing detergents are recommended for floor cleaning every day.



Ref
1) Clinical character of coronavirus disease in China W.j Guan and others, May 7,2020 NEJM 382:1859-1862
2) SARS associated viral hepatitis caused by a novel Coronavirus Hepatology, 39 (2)(2004) 302-310
3) Clinical Feature of COVID-19 related liver damage. Fan Z and others,MedRxiv, 2020, 02, 20026971
4) Hepatic and gastrointestinal involvement in COVID 19: what do we know till now, Sharif Musa Jajg: 2020: 03: 002
5) Joint GI society message: COVID 19, March 15, 2020, JACG: March 2020
6) COVID 19 outbreak: what the department of endoscopy should know. Repoci A and all. Gastrointestinal Endoscopy, March 2020/ 10.1016

29. Rheumatology and COVID-19

Dr Nihad Yasmin

The ACR (American College of Rheumatology) COVID-19 Clinical Guidance Task Force has developed clinical guidance for the management of adult rheumatologic patients in the setting of the current COVID-19 pandemic. However, due to the rapidly evolving nature of the pandemic and newly emerging data, these recommendations are subject to changes and need to be individualized depending on coexisting morbidities and availability of resources. This segment includes a summarization of the ACR recommendations and few useful links for management assistance.

ACR COVID-19 Task Force Recommendations:

- Patients need to be counselled on general preventive measures.
- Individualized decisions regarding lab monitoring, clinic visits, telehealth, and increased dosing intervals between intravenous medications to limit exposure.
- Use glucocorticoids at the lowest dose possible for disease control. Glucocorticoids should not be abruptly discontinued irrespective of exposure or infection status.
- Discontinue non-steroidal anti-inflammatory drugs (NSAIDs) for patients with severe respiratory illness.
- In newly diagnosed SLE patients hydroxycholorquine (HCQ) should be started at full dose. In pregnant women with SLE, HCQ should be continued. Belimumab can be started if needed in SLE patients.
- **Stable patients in the absence of infection or exposure**.
    - Continue hydroxychloroquine or chloroquine (HCQ/CQ), sulfasalazine (SSZ), methotrexate (MTX), leflunomide (LEF), immunosuppressants (e.g, tacrolimus, cyclosporine, mycophenolate mofetil, azathioprine), biologics, Janus kinase (JAK) inhibitors and non-steroidal anti-inflammatory drugs (NSAIDs).
    - Denosumab can be prescribed but the dosing intervals should not be extended longer than every 8 months.
    - IL-6 inhibitors should be continued in GCA patients if available.
    - Immunosuppressants doses should not be reduced in patients with a history of vital organ-threatening rheumatic disease.
- In cases of moderate to high disease activity despite optimal synthetic DMARDs, biologics may be started. The task force panel noted uncertainty regarding the use of JAK inhibitors in this situation.

- For active or newly diagnosed inflammatory arthritis, conventional synthetic DMARDs may be started or switched. If indicated, low-dose glucocorticoids (≤10 mg prednisone equivalent) or NSAIDs can be started.
- In systemic inflammatory or vital organ-threatening disease (e.g., lupus nephritis or vasculitis), high-dose glucocorticoids or immunosuppressants may be initiated.
- Do not start HCQ/CQ for newly diagnosed Sjögren's.
- Patients **with COVID-19 exposure but without symptoms** may continue HCQ, SSZ, and NSAIDs.
- Patients **with COVID-19 exposure** should stop immunosuppressants, non-IL-6 biologics, and JAK inhibitors temporarily. Resume medications if the test result is negative, or after 2 weeks of symptom-free observation.
- **Patients with COVID-19 infection** may be continued on the HCQ but should stop immunosuppressants (except glucocorticoids), non-IL-6 biologics, and JAK inhibitors.
- IL-6 inhibitors may be continued in presumed or documented COVID-19 infection, under certain circumstances.

For frequently asked questions by patients:

https://rheumatology.uw.edu/sites/rheumatology.uw.edu/files/UW%20RHEUMATOLOGY%20COVID%20FAQ%203-13-2020.pdf

Some useful resource links:

https://www.rheumatology.org/Announcements

https://www.england.nhs.uk/coronavirus/wp-content/uploads/sites/52/2020/03/clinical-guide-rheumatology-patients-v2-08-april-2020.pdf

COVID-19 Global Rheumatology Alliance. Please take part in this provider entered registry if you have patients with rheumatologic disease and COVID 19 infection.

https://rheum-covid.org/

Ref:

1. Mikuls, T.R., Johnson, S.R., Fraenkel, L., Arasaratnam, R.J., Baden, L.R., Bermas, B.L., Chatham, W., Cohen, S., Costenbader, K., Gravallese, E.M., Kalil, A.C., Weinblatt, M.E., Winthrop, K., Mudano, A.S., Turner, A. and Saag, K.G. (2020), American College of Rheumatology Guidance for the Management of Adult Patients with Rheumatic Disease During the COVID-19 Pandemic.
2. Arthritis Rheumatol. Accepted Author Manuscript. doi:10.1002/art.41301

30. Neurology and COVID-19

Dr Tasbirul Islam

Introduction:

While the initial focus of the COVID-19 pandemic has been on respiratory problems but now increasing number of COVID-19 patients are also developing neurological complications. As more and more data comes in from China, Italy and USA, we believe that COVID-19 virus can affect the nervous system. In a case series of 214 patients with coronavirus disease 2019, neurologic symptoms were seen in 36.4% of patients (78 patients) and more common in patients with more severe disease (30.2% in non severe patients and 45.5% in severe patients).

Possible mechanism:

1) Neuro-invasion by a coronavirus (and one similar another RNA virus, influenza A) are hematogenous spread and retrograde axonal transport.
2) Direct viral invasion of the brain leading to clinical encephalitis as evident by the presence of SARS-CoV-2 in the cerebrospinal fluid (CSF) of patients with COVID-19 by genome sequencing.
3) Cytokine storm, which is a well known immune reaction of this particular viral infection, may lead to inflammation and injury of the central nervous system (CNS) tissue.
4) The affinity of the viral particle towards angiotensin-converting enzyme-2 (ACE-2), a cardio-cerebral vascular protection factor.
5) Hypercoagulable state and presence of lupus anticoagulant.

Clinical manifestation:

Neurological symptoms have been reported in patients affected by COVID-19 ranging from milder symptoms like headache, dizziness, myalgia and anosmia to serious complications like encephalopathy, encephalitis, necrotizing hemorrhagic encephalopathy, stroke, epileptic seizures, rhabdomyolysis and Guillain-Barre syndrome.

In retrospective case series study from Wuhan, analyzed 221 participants, showed that 5.88% (13/221) cases had some sort of new-onset CVA. The majority of them presented acute ischemic stroke (11 patients), while hemorrhagic stroke (one patient) In addition, COVID-19 patients with CNS symptoms had higher CRP, higher D-dimer, lower lymphocyte levels, platelet counts and higher blood urea nitrogen levels compared to their counterparts without CNS symptoms.

Imaging findings:

- Non-contrast head CTs may reveal symmetric hypoattenuation within the bilateral medial thalami with a normal CT angiogram and CT venogram or evidence of CVA or demyelination.
- Brain MRI images may show hemorrhagic rim enhancing lesions with the bilateral thalami, medial temporal lobes, and subinsular regions or evidence of CVA or demyelination.

Caution!

a) Remember to communicate with CT technologists that the patient is COVID-19 positive or suspected.

b) COVID-19 rule-out and positive patients will be scanned wearing a surgical mask and covered with a sheet with adherence to standard PPE procedures.

Management:

1-Mostly supportive

2-General protocol for acute stroke work up and management regardless of COVID-19 status.

3- General seizure work-up and management regardless of COVID-19 status.

4-General GBS work up (CSF, EMG, NCS) and management.

5-General work up (CPK, myoglobin) for Rhamdomyolysis and management.

6- Convulsive seizure and agitated delirium should be considered aerosol-generating.

Conclusion:

The mortality rate was indeed found to be higher in COVID-19 stroke patients, with 38% indicating a worse prognosis in this group of patients. Data is insufficient at this point in time to conclude if chronic neurology patients are more predisposed to acquire infection or worse the pre existing neurological disease.

COVID 19 may have various neurological manifestations, and in many cases, neurological features may precede typical respiratory symptoms. Awareness and recognition of neurologic manifestations is essential to guide therapeutic decision-making as the current outbreak continues to unfold.

References:

- *JAMA Neurol.* Published online April 10, 2020. doi:10.1001/jamaneurol.2020.1127
- Poyiadji N, Shahin G, Noujaim D, Stone M, Patel S, Griffith B. COVID-19-associated Acute Hemorrhagic Necrotizing Encephalopathy: CT and MRI Features. Radiology. 2020;:201187. DOI: 10.1148/radiol.2020201187
- Cai JH, Wang XS, Ge YL, et al.: First case of 2019 novel coronavirus infection in children in Shanghai (in Chinese). Chin J Pediatr. 2020,58 002. 10.3760 /cma. j.issn.0578-1310.2020.0002.
- Filatov A, Sharma P, Hindi F, Espinosa PS: Neurological complications of coronavirus disease (COVID-19). Cureus. 2020, 12:e7352. 10.7759/cureus.7352.
- https://covidprotocols.org/protocols/11-neurology/

31. Guidance on CPR in COVID-19 in acute hospital settings

Dr Ashrafun Nessa

To asses any patients with a COVID-19 like illness or confirmed case clinician should be in at least Level 2 Personal Protective Equipment (PPE) which includes disposable gloves , disposable apron, Fluid resistant surgical mask, disposable eye protection. For Full Aerosol Generating Procedure (AGP) Personal Protective Equipment (PPE) must be worn by all members of the resuscitation/emergency team before entering the room which includes disposable gloves, disposable gown, filtering face piece (FFP3) respirator and disposable eye protection for CPR or airway intervention.

1. To recognise cardiac arrest look for the absence of signs of life and normal breathing. Feel for a carotid pulse. **Do not listen or feel for breathing by placing your ear and cheek close to the patient's mouth**.

2. When calling for help, state the risk of COVID-19.

3. If a defibrillator is readily available defibrillate shockable rhythms rapidly prior to starting chest compressions or the staff outside the room can pass on the defibrillator. Simple oxygen mask can be left on the patient's face. Restrict the number of staff in the room (if a single room). Allocate a gatekeeper to do this.

4. The cardiac arrest team should be in Level 3 PPE to start proper CPR. If first responder is in level 2 PPE, S/he should leave the room and don level 3 PPE before participating in CPR. **Do not do mouth-to-mouth ventilation or use a pocket mask**.

5. Airway interventions (e.g. supraglottic airway (SGA) insertion or tracheal intubation) must be carried out by experienced individuals. Advice to use video Laryngoscope.

6. Identify and treat any reversible causes (e.g. severe hypoxaemia) before considering stopping CPR.

7. Contact senior help and involve ICU colleagues as part of the planning.

8. Dispose of, or clean, all equipment used during CPR following the manufacturer's recommendations and local guidelines. Remove PPE safely to avoid self-contamination and dispose of clinical waste bags.
9. **Hand hygiene has an important role in decreasing transmission. Thoroughly wash hands with soap and water; alternatively, alcohol hand rub is also effective.**

10. Post resuscitation debrief is important and helps to identify room for improvements.

Patients with a COVID-19 like illness, who are at risk of acute deterioration or cardiac arrest, should be identified early. Patients for whom a ‘do not attempt cardiopulmonary resuscitation’ (DNACPR) and/or other similar decision is appropriate should also be identified early.

For more information, please view the info graphic and flowchart on the resuscitation

https://www.resus.org.uk/_resources/assets/attachment/full/0/36100.pdf

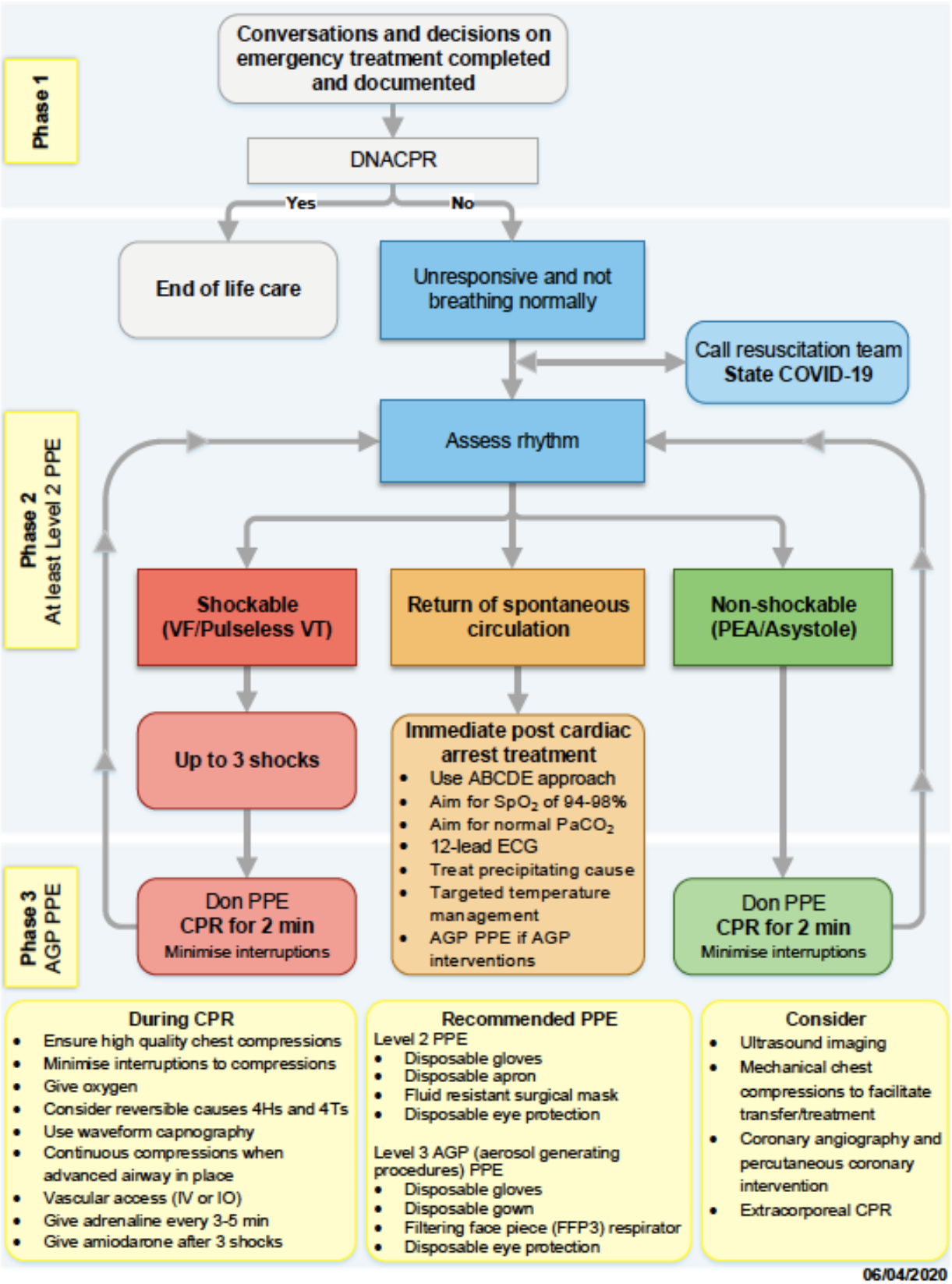
https://www.resus.org.uk/_resources/assets/attachment/full/0/36193.pdf

Reference:

- https://www.resus.org.uk/media/statements/resuscitation-council-uk-statements-on-covid-19-coronavirus-cpr-and-resuscitation/covid-healthcare/

Resuscitation Council UK

Adult Advanced Life Support for COVID-19 patients – Acute hospital settings



32. Relocation of resources

Prof Shafi Ahmed

● Design ward space and beds effectively with designated COVID and NON-COVID wards

● Task-shifting. As intensivist manpower becomes scarce, consider enlisting other specialists will help to manage critical patients while intensivists focus on procedures and ventilator management.

● As elective surgery is cancelled, and ward work is reduced consider redeploying staff. Junior staff should cross cover and consultants should be flexible.

● Develop staff absence policy. Establish when to test, when safe to return to work and paid sick leave.

● Monitor morale. Recognize that low morale may occur in situations where staff feel.

unsafe or have little or no control. These feelings of helplessness may increase the risk of error.

● Plan for wellness and sustainability. Recognize signs of acute stress disorder.

● Sleeping quarters. Consider sleeping arrangements for staff wanting to protect families and isolate.

● Deploy quarantined staff. Consider using staff isolating at home for telephone follow ups, communications, journal research, etc.

● High risk staff. Identify staff at higher risk of severe illness from COVID19. Develop

policies to mitigate exposure.

● Manage stigmatization. Recognize that staff and patients' families are being stigmatized in the community.

● Burn rate on PPE supply. Your facility will use greater quantities of personal protective equipment (PPE), oxygen equipment, and isolation rooms than initially thought.

● Based on your current protocols, determine the daily use for a patient in isolation for the following: gloves, surgical masks, N-95 masks, and gowns. A spreadsheet to help with this calculation is here: https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/burn-calculator.html

● Training and communication is crucial for all staff and should have full time staff employed for this.

● N95 fit. Fit-test all staff as far ahead as possible. A proper fitting can take 30 minutes.

● Conserving supplies. Be prepared to reuse N95 and CAPR/PAPR equipment. Create cleaning protocols for reuse of masks and hoods. Understand what solutions adequately kill coronavirus. Alcohol solution may not be adequate.

● Increased length of stay. Hospital length of stay will increase due to slow recovery from respiratory issues and disposition issues when COVID+ patients are ready for discharge.

● Staffing concerns. Staff will become ill, quarantined, and may have difficulty getting to work. Childcare for staff families is a consideration. Solicit additional manpower. Have a process ready for emergency credentialing. Develop policy on sick leave. Some departments may shoulder more workload than others: critical care nursing, respiratory therapy, housekeeping, intensivists, hospitalists.

● Workforce shortages. Expect critical care staffing to be impacted the most, especially nursing and respiratory therapy.

● Cleaning. Identify appropriate cleaning solutions. Establish cleaning protocols of the environment. Build in additional time to clean rooms and radiology facilities.

● Telemedicine and video capabilities. Consider virtual clinical services to reduce exposure and PPE use.

● Rapidly changing guidelines. Guidelines may evolve more quickly in response to the environment on the ground.

- Make provision of oxygen supply. The treatment of this condition is mostly supportive. Most of the patients will improve with oxygen therapy and supportive management.

33. Practical problems in Bangladesh that needs addressing:

Dr. Sabyasachi Roy, Dr. Shakil Farid

1. Observation and vital signs scoring system: Developing scoring system (based on observations of vital signs) will enable early interventions on deteriorating patient. In UK widely used National Early Warning Score (NEWS) incorporating important parameters such as heart rate, blood pressure, temperature, oxygen saturation, respiratory rate, conscious level is a good example. A simplified score can be established for Bangladesh which will be easier to establish.

2. Automatic Vital Parameter Machine: Junior doctors in most government hospitals spend their morning ward job by manually measuring BP, pulse, respiratory rate. This not only increases the exposure to COVID 19 but also delays patient management. Using automated vital parameter machine reduces the work load of the junior doctors and frequency patient contact in the current COVID situation.

3. Triage system: Development of triage system in the emergency department will enable better patient flow through the hospital and also enable identification of potential COVID patients at the front door. This will prevent the non COVID ward areas of the hospitals from becoming populated by undiagnosed COVID cases.

4.Intercom phone in on-call room: Provision on intercom phone/ bleep systems in essential to the proper functioning of a hospital. This will make the front line doctors in the hospital more accessible to the area of need and enable early review of deteriorating patients by improving the communication system.

5. ECG machines should be available at emergency departments.

6. Blood Gas machine is essential in the ward management of deteriorating patients and should be easily available in every hospital.

7. Proper disposal of clinical waste is essential for infection control. There should be provision of sharp bins and proper place for disposal of contaminated PPE after use.

8. **Avoiding white coat, long sleeve shirts/jackets/coats, wrist watches, ties, bangles, rings (bare below the elbow)** etc. These should be avoid in clinical areas because of risk of transmission of infection.

34. Some frequently asked questions

Dr Snehashish Banik, Dr Shakil Farid, Dr. Tasbirul Islam, Dr. Zahed Ikram

Q: Who would need oxygen therapy?

A: The following situations will warrant immediate supplemental oxygen therapy:

1. Severe acute respiratory infection and *respiratory distress*
2. Hypoxaemia: SpO_2 <92%
3. Shock

Q. What are the essential tools required in relation to oxygen therapy?

A: Clinical areas providing care for COVID-19 should have the following equipment:

1. *Pulse oximeters* 2. Functioning oxygen systems 3. Disposable, single-use, oxygen-delivery interfaces eg: nasal cannula, simple face mask & mask with reservoir bag

Q: How to start Oxygen and how to titrate?

A: Start Oxygen at the rate of 2 L/minute. Titrate flow rates to reach a target SpO_2 ≥90% during resuscitation. Use a face mask with a reservoir bag (10-15 L/minute) if the patient is in critical condition.

Q: How to monitor patients with Oxygen Requirement?

A: Once the patient is stable, target SpO2 is 88-96% for all patients; (Caution: COPD). If patient is hypoxic (<88%) despite having Oxygen at 15L/min (FiO2>60%). A trial of high-flow nasal oxygen or non-invasive ventilation (e.g. CPAP or BiPAP) in patients with hypoxaemic respiratory failure may avoid the need for intubation and mechanical ventilation.

Q. Does a health care worker (HCW) need to self-isolate if inadvertently exposed to a COVID patient?

A. Unless the HCW develop symptoms no need to isolate. Carry on doing normal work using appropriate PPE.

Q. When should HCW return to work following a diagnosis of COVID?

A. 8 days following diagnosis or a positive test/ 3 days of no temp without any antipyretics / 14 days following severe disease or in case of severe immunosuppression.

Q. Does the patient need anticoagulation?

A. Anticoagulation is indicated in case of moderate to severe disease needing hospitalization. Extended anticoagulation should be considered following discharge for severely or critically ill patients.

Q. How long should a patient self-isolate following diagnosis of COVID?

A. See **6.COVID-19 isolation and discharge pathways**

Q. Does asymptomatic COVID positive patient require any treatment?

A. No. However please following the isolation guidelines **6.COVID-19 isolation and discharge pathways**

Q. Is there any evidence that hydroxychloroquine works as a specific therapy in COVID-19?

A. So far there is no evidence to show that it is effective in COVID-19. On the contrary there are evidences of increased mortality with the use of **hydroxycholorquine** see**15.Heart disease and COVID-19**.

Q. What level of PPE should be used for what zones?

A: See **12.Current recommendations for Personal Protective Equipment (PPE) in COVID-19:**

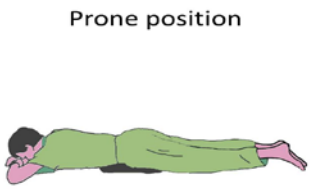
Q. What are the Aerosol Generating Procedures?

A: Extubation/ Intubation/ Ambu bagging/ NG tube insertion/ Bronchoscopy/ Endoscopy/ Operating theatre with diathermy use, CO2 insufflation/ High flow O2/ Nebulisation etc.

Q. How to define mild, moderate, severe and critical disease?

A. See **4.COVID-19 severity scoring tools and Non-ICU Management**

Q. What is awake proning?



Q. When should awake proning be started?

A: As soon as the oxygen therapy has been commenced.

Q. Is the patient COVID negative despite having COVID symptoms and a negative test?

A. No. The patient should be treated as COVID positive (and test repeated if possible) based on clinical suspicion.

Q. Is there any role of prophylactic chemoprophylaxis (such as HCQ, Ivermectin etc.) for preventing COVID?

A. No.

Q. Should steroid be used for mild/moderate COVID cases?

A. No. Steroid should only be used for severe/critical cases unless the patient was previously on steroids in which case dose increment may be required.

References

- WHO. Clinical management of Severe Acute Respiratory Infection when COVID-19 disease is suspected: Interim guidance. https://www.who.int/docs/default-source/coronaviruse/clinical-management-of-novel-cov.pdf?sfvrsn=bc7da517_2. March 2020
- BMJ Best Practice. Corona virus disease 2019. https://bestpractice.bmj.com/topics/en-gb/3000168/management-approach. April 2020
- Oxygen Targets in COVID-19 With ARDS: What's Optimal? Aaron B. Holley, MD. Medscape Pulmonary Medicine. https://www.medscape.com/viewarticle/928601. April 2020.

35. Future directions

Dr Tasbirul Islam

1-Specific therapy:

- **CONVALESCENT PLASMA:** Convalescent plasma was used with success in SARS and MERS but didn't show any benefit in Ebola. Small Chinese study showed all 5 critically ill patient who received convalescent plasma improved and extubated. Another Chinese study on 10 critically ill patients showed improvement in all parameters (clinical, laboratory and imaging). FDA has given EUA for the use of convalescent plasma.

  References:
  - *JAMA.* 2020;323(16):1582-1589. doi:10.1001/jama.2020.4783
  - PNAS April 28, 2020 117 (17) 9490-9496; first published April 6, 2020

- **TOCILIZUMAB: COVACTA** trial involving 330 patients started in April'20 and expected to finish in Sept'20. **RECOVERY** trial (6770 patients) in UK is also going on.

- **CYTOSORB:** is a European Union-approved extracorporeal cytokine absorber, designed to broadly reduce cytokine storm and other inflammatory mediators in the blood. In April 10th FDA has granted Emergency Use Authorization (EUA) of Cytosorb for treatment of cytokine storm syndrome. To date, more than 500 critically ill patients with COVID-19 infection have been treated with CytoSorb in various centers in Italy, China and Germany. The positive results in more severe COVID-19 patients with severe respiratory syndromes, ARDS and/or multi-organ dysfunction in Italy have led to the formal recommendation by the Italy Brescia Renal COVID Task Force and Italian Society of Nephrology. CytoSorb therapy can only be considered as adjuvant therapy for cytokine modulation and not as primary therapy for virus removal. Recommend the use of CytoSorb adsorbent cartridge if the patient has not already been treated with tocilizumab. The maximum duration of treatment for each sorbent is 24 hours and in the most critical patients, therapy should be maintained for at least 3-4 days from the start of treatment.

  Reference:
  - https://www.aferetica.com/wp-content/uploads/2020/04/Secondo-Aggiornamento_Cytosorb-_Coronavirus_eng.pdf

- **MESENCHYMAL STEM CELLS:** Multipotent cells thought to have immunomodulatory capacities, indicates that the intervention was safe, and that the approach may improve patient outcomes. In April, The FDA has approved a clinical trial to study COVID-19 patients administered with umbilical cord-derived mesenchymal stem cells (UC-MSCs), known as remestemcel-L which should prevent lung inflammation. Recent pilot study in China in which seven COVID-19 patients received intravenous infusions of

donor mesenchymal stem cells and all seven patients recovered. Mount Sinai Health System is the first in the country to use an innovative allogeneic stem cell therapy in COVID-19 patients. A team of South Florida doctors have successfully treated three critically ill COVID-19 patients with an experimental stem cell treatment.

References:

- Z. Leng et al., "Transplantation of ACE2- mesenchymal stem cells improves the outcome of patients with COVID-19 pneumonia," *Aging and Disease*, 11:216–28, 2020.

3-Vaccine Trial:

- Generally, vaccines must go through three progressively more stringent human trial before considered to be safe and effective.
- 102 teams working on vaccine.
- 8 have permission to do human trial.
- US based MODERNA biotechnology has started human trial on March 16th. They are using a genetic platform called mRNA. 45 participants.
- Prof Sarah Gilbert, Oxford based vaccinologist has started trial in late April'20. She is using a harmless chimpanzee virus to carry the fragment of SARS-CoV-2. More than 500 participants.

RECOVERY TRIAL

Dr Sarkar Haider

There are currently no approved anti-viral or host-directed treatments for COVID -19. Several possible treatment options have been evaluated. UK hospitals are participating in RECOVERY (Randomised Evaluation of Covid-19 Therapy) trial. Following are the medications with trial protocol (doses not given as not recommended for clinical use at present outside clinical trial).

Eligibility

Patients are eligible for the study if all of the following are true:

(i) Aged at least 18 years

(ii) Hospitalised

(iii) SARS-CoV-2 infection (clinically suspected or laboratory confirmed)

(iv) No medical history that might, in the opinion of the attending clinician, put the patient at significant risk if he/she were to participate in the trial.

1. **Lopinavir -Ritonavir**
2. **Hydroxychloroquine**
3. **Azithromycin**
4. **Corticosteroid:**
5. **Tocilizumab (an anti-inflammatory treatment given by injection)**

Placebo arm: No Additional Treatment as there are currently no approved anti-viral or host directed treatments for COVID-19.

The patients are randomised in a ratio of 2:1 between the placebo arm (no additional treatment) and each of the other arms.

Second randomisation for patients with progressive COVID-19 and extensive lesions in the lungs: Immunotherapy

Tocilizumab by intravenous infusion

Outcomes: Death/discharge/need for ventilation/need for renal replacement therapy

Reference: https://www.recoverytrial.net/

Useful online resources

- https://www.cebm.net/oxford-covid-19-evidence-service/ (most useful for latest updates on medical therapy. This is maintained by the Oxford COVID-19 evidence service)
- https://www.england.nhs.uk/coronavirus/
- https://www.gov.uk/government/organisations/public-health-england
- https://www.rcseng.ac.uk/coronavirus/ (most useful for surgeons)
- https://covid.medicalrealities.com/
- https://www.cdc.gov/coronavirus/2019-ncov/index.html
- https://www.england.nhs.uk/coronavirus/wcontent/uploads/sites/52/2020/04/C0256-specialty-guide-oxygen-therapy-and-coronavirus-9-april-2020.pdf
- WHO guidance masks https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public/when-and-how-to-use-masks
- https://www.rcog.org.uk/en/guidelines-research-services/coronavirus-covid-19-pregnancy-and-womens-health/coronavirus-covid-19-and-gynaecological-services/
- https://www.resus.org.uk/media/statements/resuscitation-council-uk-statements-on-covid-19-coronavirus-cpr-and-resuscitation/covid-healthcare/