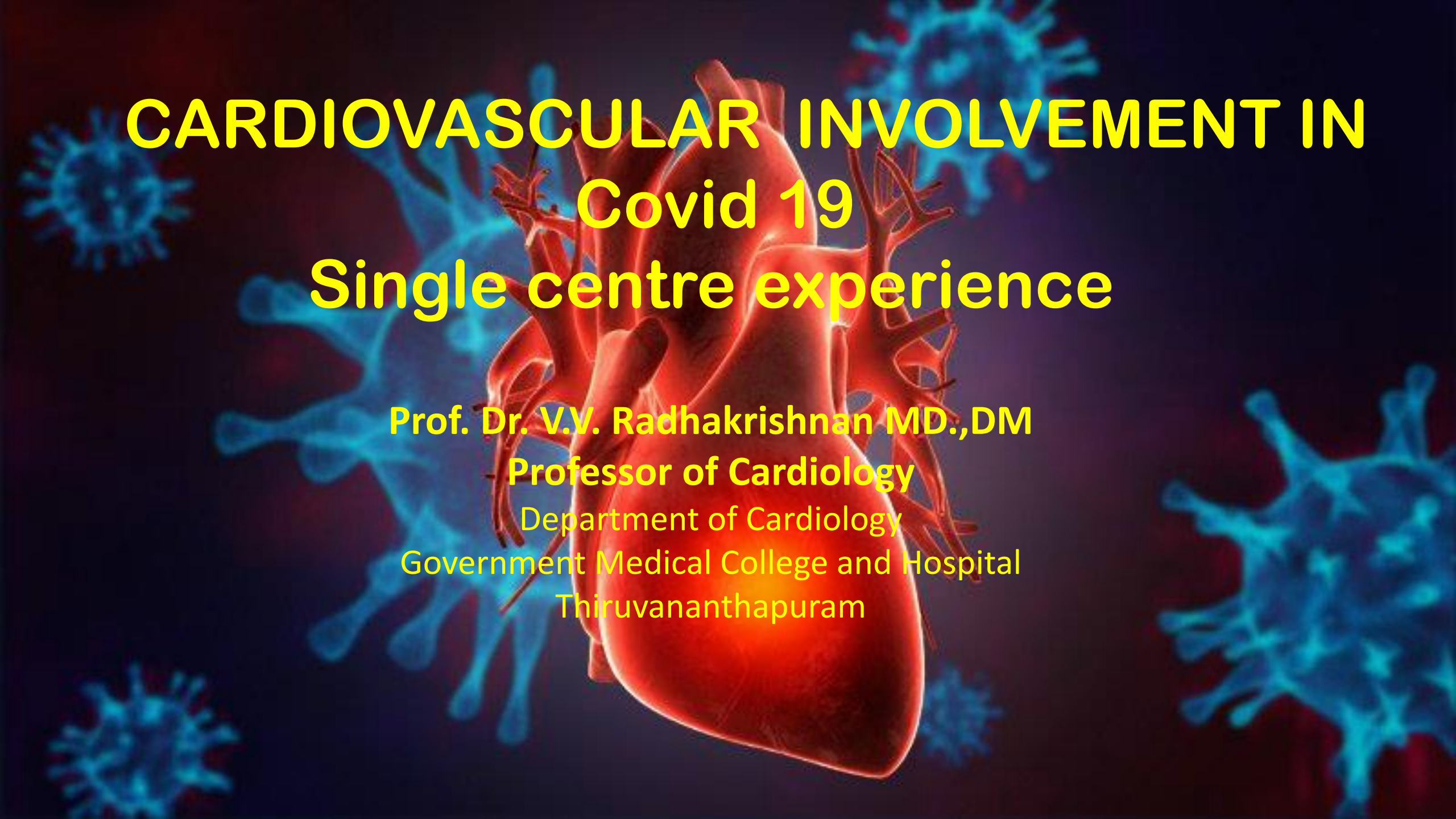
CARDIOVASCULAR INVOLVEMENT IN Covid 19
Single centre experience



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Introduction

- **S**evere acute respiratory syndrome coronavirus 2 (SARS-CoV-2) causing coronavirus disease 2019 (COVID-19) has reached pandemic levels ,WHO -March 11 2020

- SARS-CoV-2 not only causes viral pneumonia but has major implications for the CV system

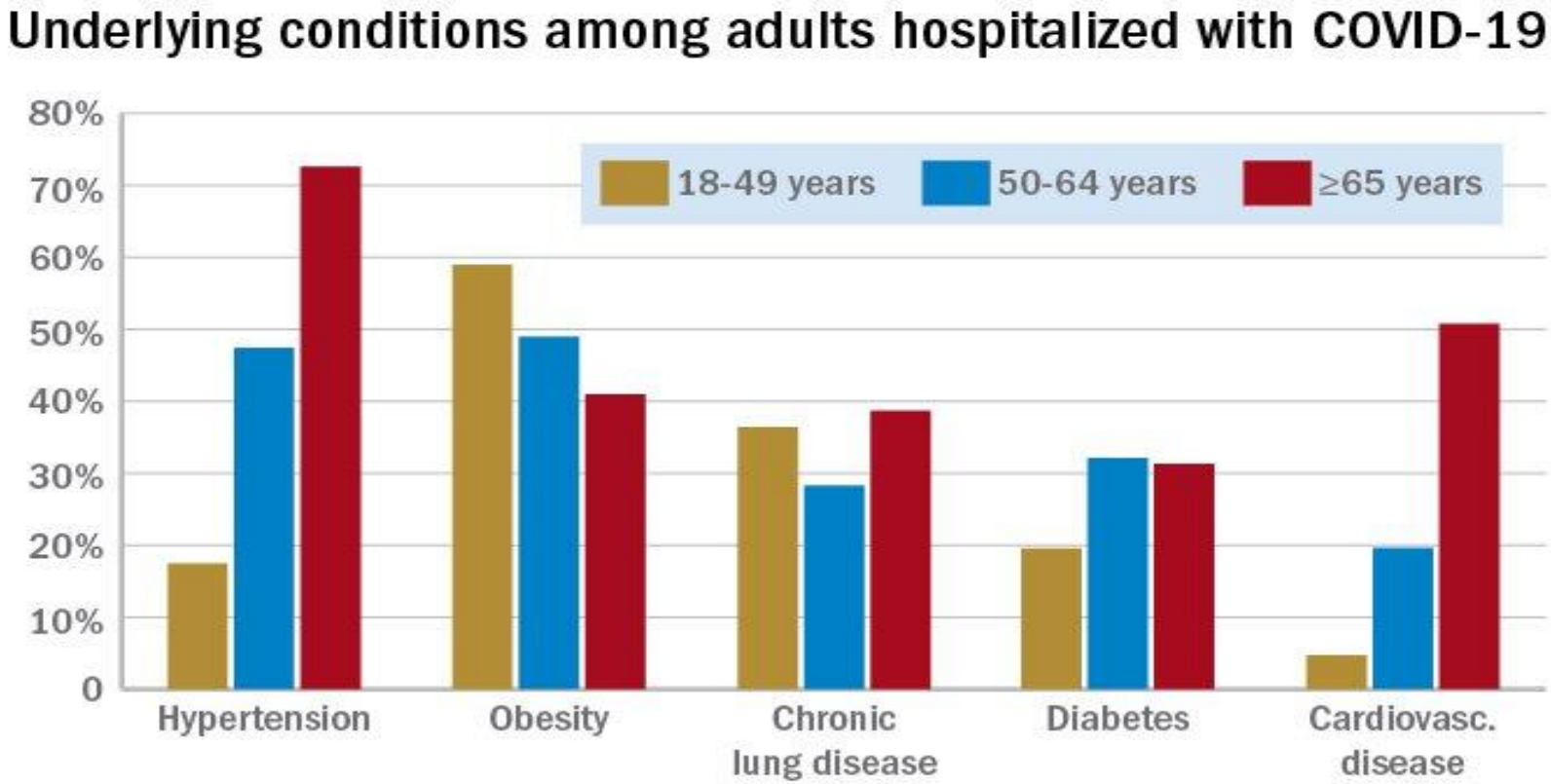
- Patients with cardiovascular (CV) risk factors and established cardiovascular disease (CVD) represent a vulnerable population predisposes to COVID - 19 infection

- Patients with cardiac injury in the context of COVID-19 have an increased risk of morbidity and mortality.

COVID-19 and Mortality

- Infectivity is more than Influenza
- Seasonal Flu mortality <0.1%
- in 2002-2003 SARS epidemic - Mortality 9.6%
- MERS- Mortality 34.4%
- Overall case fatality in COVID-19 is 2.3%
- More death in COVID-19 - Greater infectivity & Higher attack rates

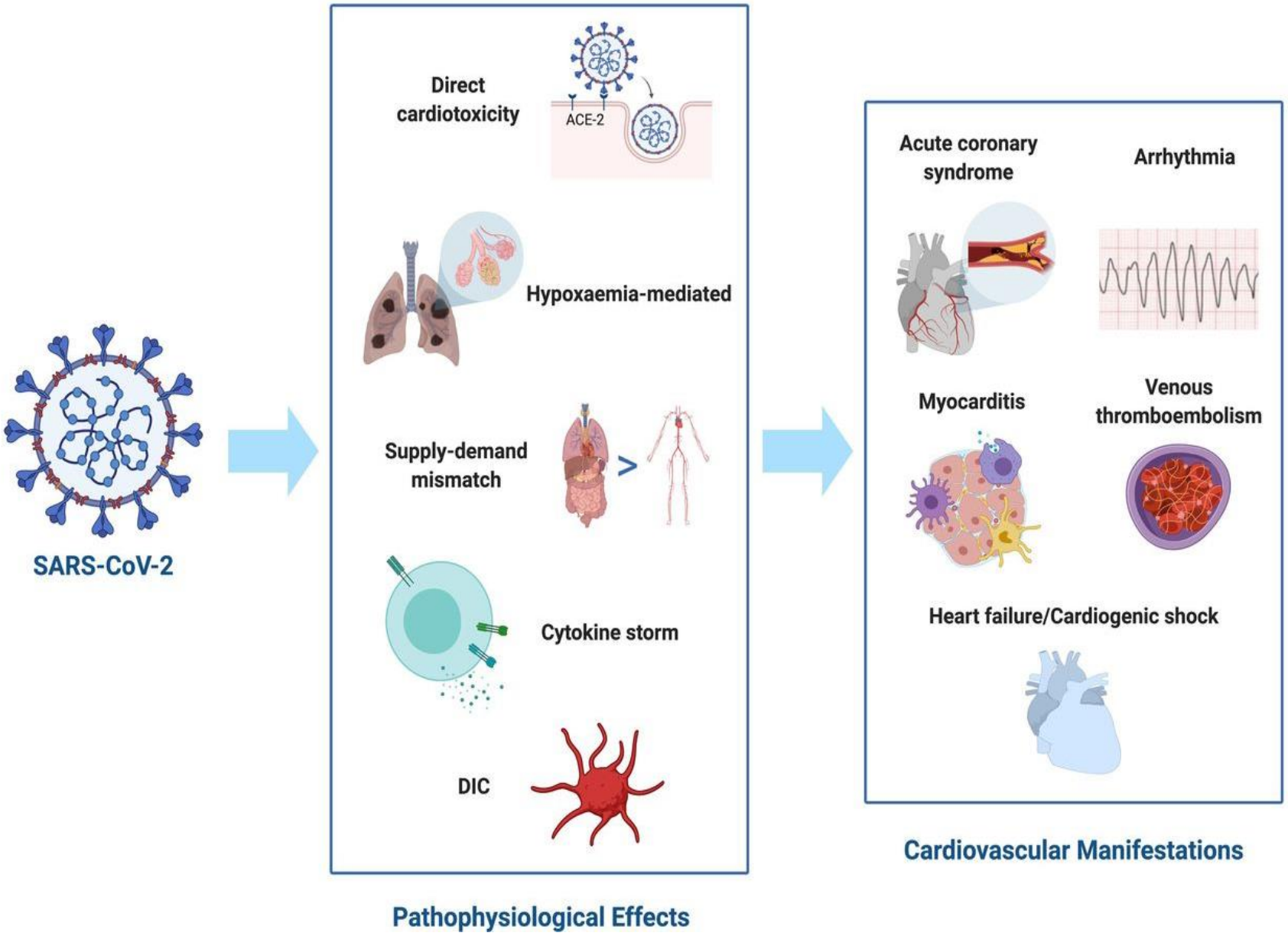
Epidemiology



Note: Based on data from the COVID-19–Associated Hospitalization Surveillance Network for patients hospitalized in 99 counties in 14 states from March 1-30, 2020.

Source: MMWR. 2020 Apr 8:69(early release):1-7

POTENTIAL MECHANISMS OF MYOCARDIAL INJURY IN COVID19



Clinical Presentation

- Chest pain and breathlessness is a frequent symptom in COVID-19 infection
- Acute coronary syndrome presentations can be associated with respiratory symptoms
- Dyspnea, Cough, Respiratory distress (ARDS)
- Cardiogenic Shock

  Acute MI,Myocarditis,HF

Sudden Cardiac Death - Tachyarrhythmias, Bradyarrhythmias

* In a study of 138 hospitalized patients with COVID-19 in Wuhan, arrhythmia was reported in 16.7% of total patients - ventricular tachycardia (VT)/ventricular fibrillation (VF) (5.9%),
*Higher incidence in patients with elevated troponin T
* Cardiac arrhythmias in ICU patients- 44.4%
*HF in 23%
* Thromboembolic complications- 31% in critically ill patients

Acute Coronary Syndromes

- The immune response to acute viral infection and the accompanying surge of cytokines and inflammatory mediators - rupture of plaque
- Dysregulation of coronary vascular endothelial function by infection and inflammation
- Epidemiologic studies have shown that hospitalization for pneumonia is associated with a higher risk for atherosclerotic events
- Periods of severe physiologic stress in the setting of sepsis and respiratory failure can be associated to a mismatch between oxygen supply and demand (Type 2 MI)

Myocarditis

- Myocarditis should be suspected in patients with COVID-19 - Acute-onset chest pain, ST segment changes, cardiac arrhythmias and haemodynamic instability.
- Suspicion of myocarditis should be raised in COVID-19 patients with acute HF/CS without pre existing CV disorder
- ECHO- LV dilatation, global/multi-segmental LV hypocontractility
- Biomarkers - significant increase in cardiac troponin and BNP/NTproBNP levels, without significant CAD
- CCTA should be the preferred approach to rule out concomitant CAD
- CMR (if available) may be used for further diagnostic assessment
- Endomyocardial biopsy is not recommended in COVID-19 patients with suspected myocarditis
- Elevated Troponins in 7-17% in hospitalised patients, 22% ICU patients

Heart Failure

- Myocarditis or due to acute large MI
- Acute on chronic heart failure - in patients with preexisting HF
- Stress cardiomyopathy
- Right-side heart failure - secondary to pulmonary hypertension and ARDS

Thrombosis

- COVID-19 causes disarray of the coagulation and fibrinolytic system
- Prolonged prothrombin time, elevated D dimer, and APTT
- Increased D dimer >1gm/L- strongly associated with increased hospital death, DIC
- Microthrombi seen in the pulmonary vasculature
- Due to prolonged immobilisation, hypercoagulable status, active inflammation & propensity for DIC, patients with covid-19 are at increased risk of VTE-Anticoagulation

Electrocardiogram

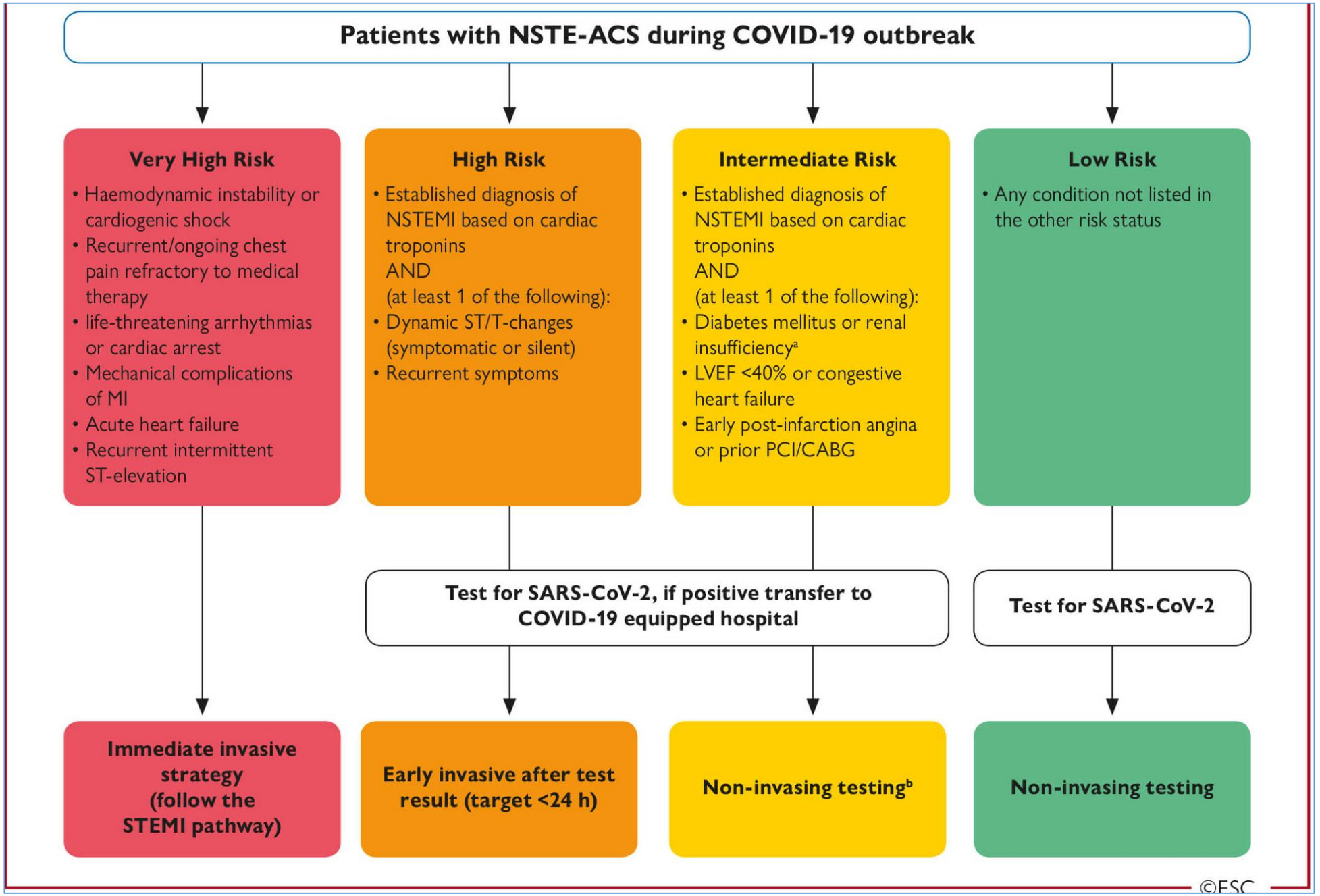
- No specific ECG changes have been described in patients with COVID 19
- ST-segment changes and sinus tachycardia - Myocarditis
- ECG mimicking AMI
- Brady and tachyarrhythmias
- Prolongation of QT interval

Biomarkers

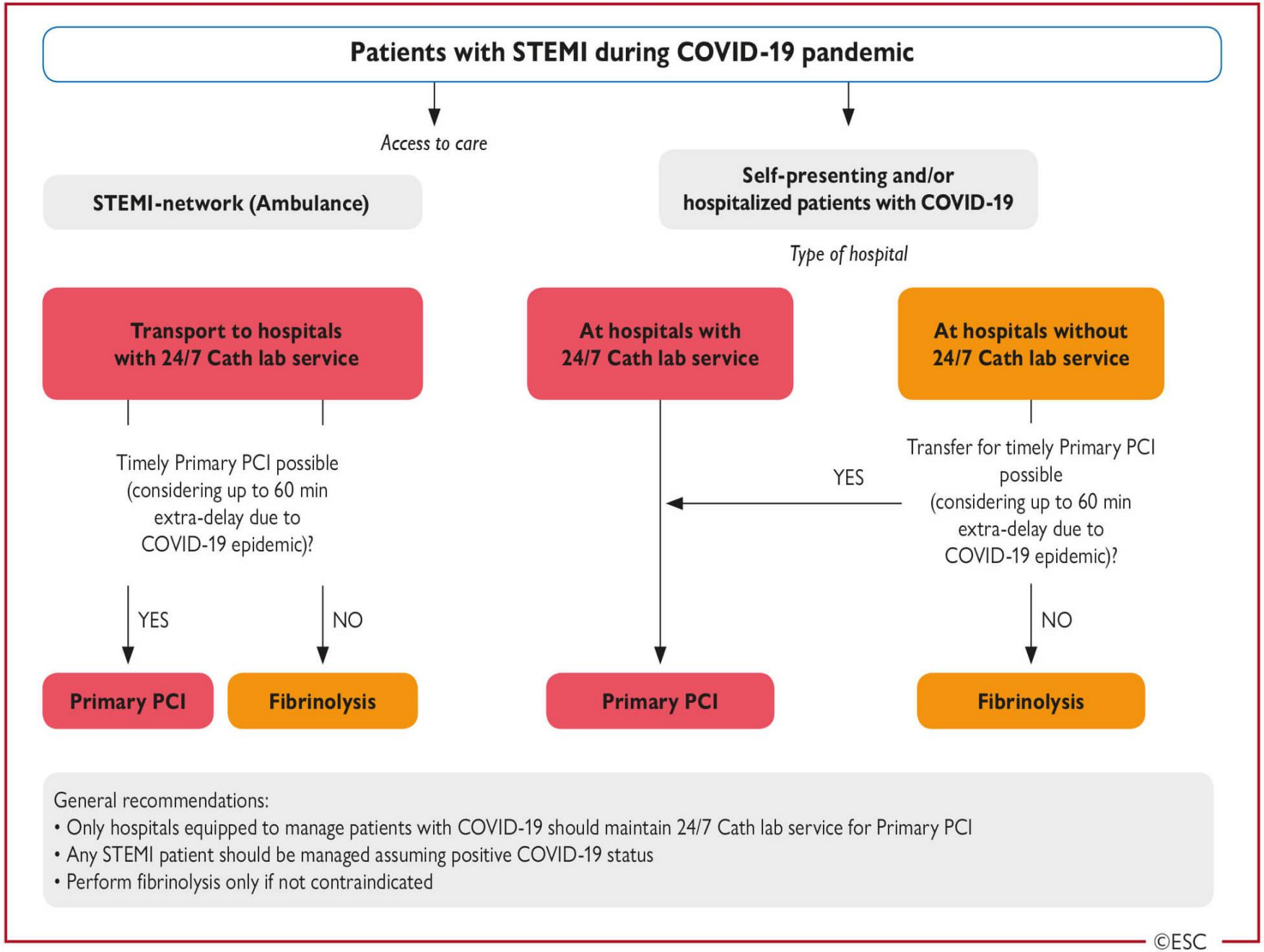
- Cardiomyocyte injury - cardiac troponin T/I
- Hemodynamic stress – BNP & NT- proBNP
- The level of those biomarkers correlate with disease severity and mortality
- In the absence of typical angina chest pain and/or ischemic ECG changes, patients with mild elevations DO NOT require work-up and/or treatment
- If marked elevations in cardiac troponin T/I concentrations (e.g. > 5 times the ULN)

  indicates ACS or acute myocarditis
- D-Dimers quantify activated coagulation – signifies poor outcome

Recommendations for NSTE-ACS management in COVID-19 outbreak



Management of patients with STEMI during COVID-19 pandemic



Covid-19 associated arrhythmias

Atrioventricular block

- Consider using chronotropic pharmacologic agents instead of transvenous temporary pacing to minimize PPE use and HCW risk

-Defer permanent pacemaker implantation given potential for improvement in bradyarrhythmia

Atrial fibrillation

- To assess for left atrial appendage thrombus, consider using computed tomography angiography instead of TEE due to risk of viral aerosolization; however feasibility may be challenging due to mechanical ventilation

- Unclear if and how long systemic anticoagulation should be used for prothrombotic state associated with severe viral infection

Polymorphic ventricular tachycardia

- Monitor QTc prolongation and avoid QT prolonging agents, including azithromycin/hydroxychloroquine

-Monitor and replete potassium and magnesium deficiencies closely

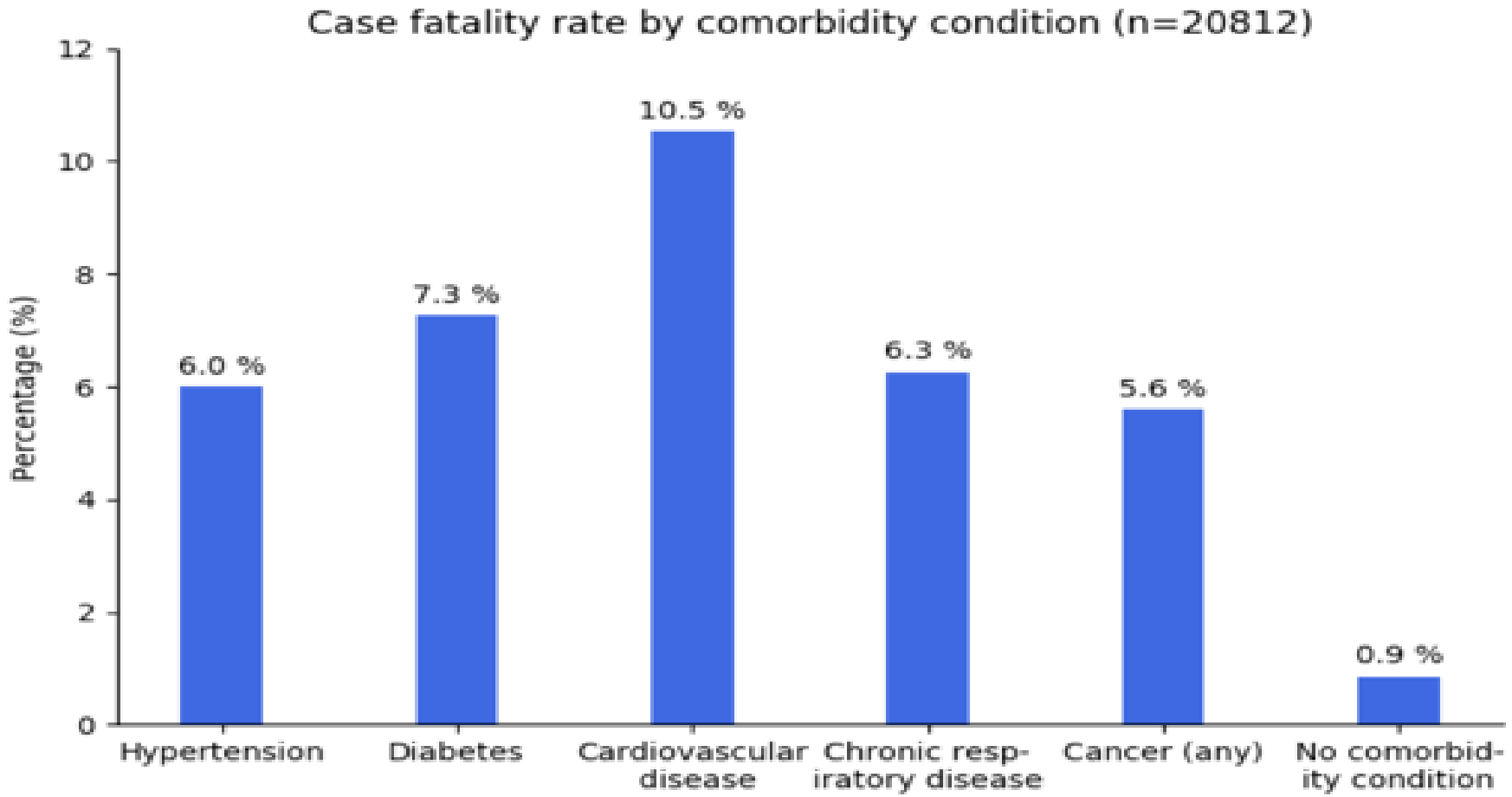
Pulseless electrical activity

-Treat any reversible etiologies, particularly hypoxemia and acidosis

- Consider telemetry monitoring for all patients with COVID-19 infection and elevated cardiac biomarkers, which may represent myocarditis and increased risk of malignant arrhythmias

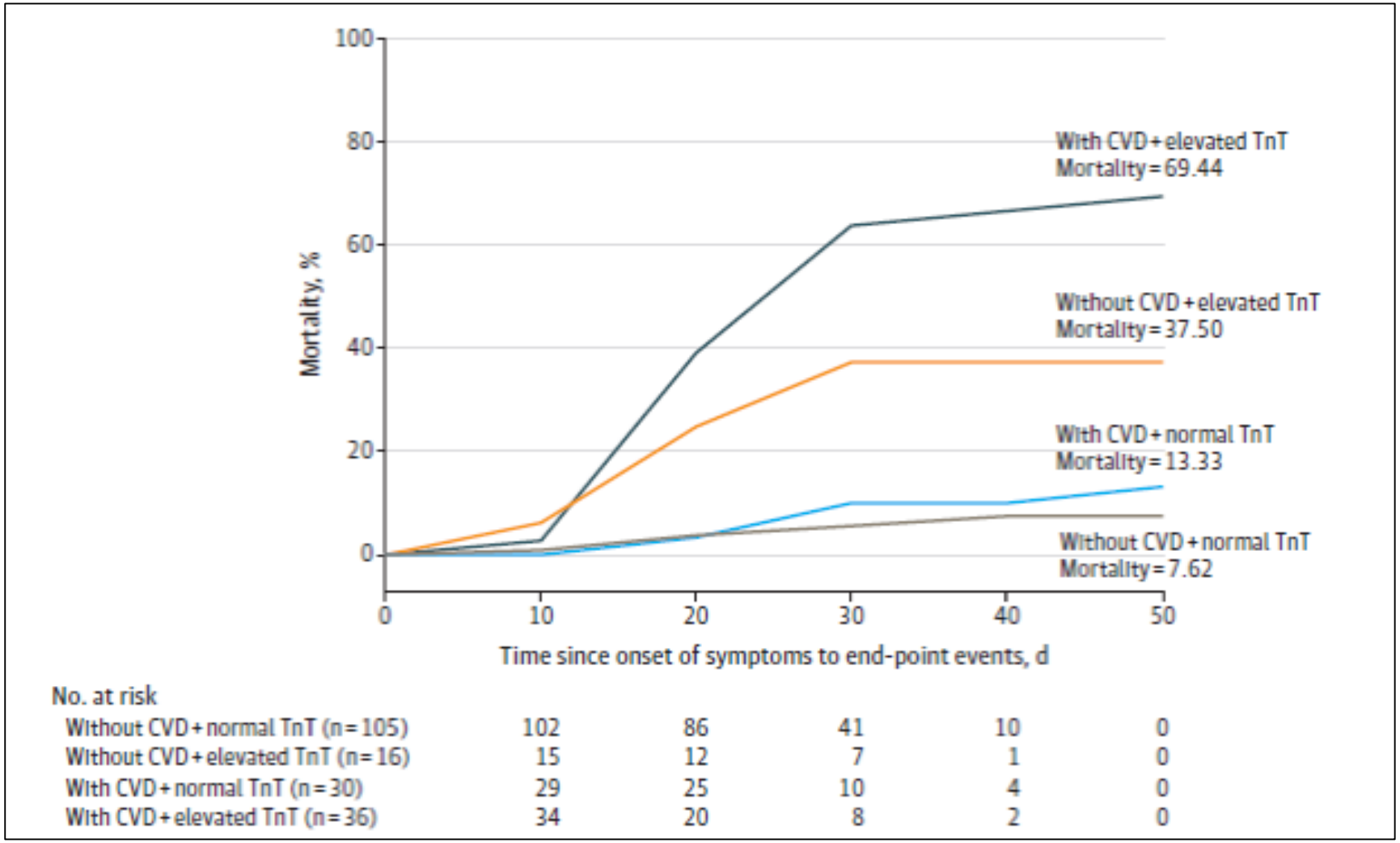
- Monitor and replete potassium and magnesium deficiencies

MORTALITY



Data source: The Novel Coronavirus Pneumonia Emergency Response Epidemiology Team. The Epidemiological Characteristics of an Outbreak of 2019 Novel Coronavirus Diseases (COVID-19) — China, 2020. China CDC Weekly, 2020, 2(8): 113-122. Accessible at http://bit.ly/3aR80fH.

Mortality of Patients With Coronavirus Disease 2019 (COVID-19) With/Without Cardiovascular Disease (CVD) and With/Without Elevated Troponin T (TnT) Levels



No. at risk

Without CVD + normal TnT (n = 105)	102	86	41	10	0
Without CVD + elevated TnT (n = 16)	15	12	7	1	0
With CVD + normal TnT (n = 30)	29	25	10	4	0
With CVD + elevated TnT (n = 36)	34	20	8	2	0

JAMA Cardiol. doi:10.1001/jamacardio.2020.1017 Published online March 27, 2020.

SUMMARY

- Although COVID-19 is predominantly a respiratory illness, a large number of patients with COVID-19 present with pre-existing CVD or develop new-onset cardiac dysfunction during the course of the illness
- Myocardial injury is common in COVID-19 and portends a worse prognosis.
- Differentiating between the various causes of myocardial injury is crucial to determining the treatment course.

“COMPARATIVE STUDY OF ACUTE STEMI PCI OUTCOMES IN A PROSPECTIVE COHORT DURING THE COVID PERIOD VERSUS RETROSPECTIVE COHORT OF EQUIVALENT PRE-COVID PERIOD IN A MAJOR TERTIARY CARE CENTER IN SOUTH INDIA”

Investigator: Dr. Arya S

Under the guidance of Prof. Dr. Sunitha Viswanathan

CONCLUSION

- **STEMI Admissions undergoing Primary PCI during COVID period reduced (N= 872) compared to PRE COVID period(N=1152)**

- **No significant difference in In-Hospital mortality and in In-Hospital Stent thrombosis.**

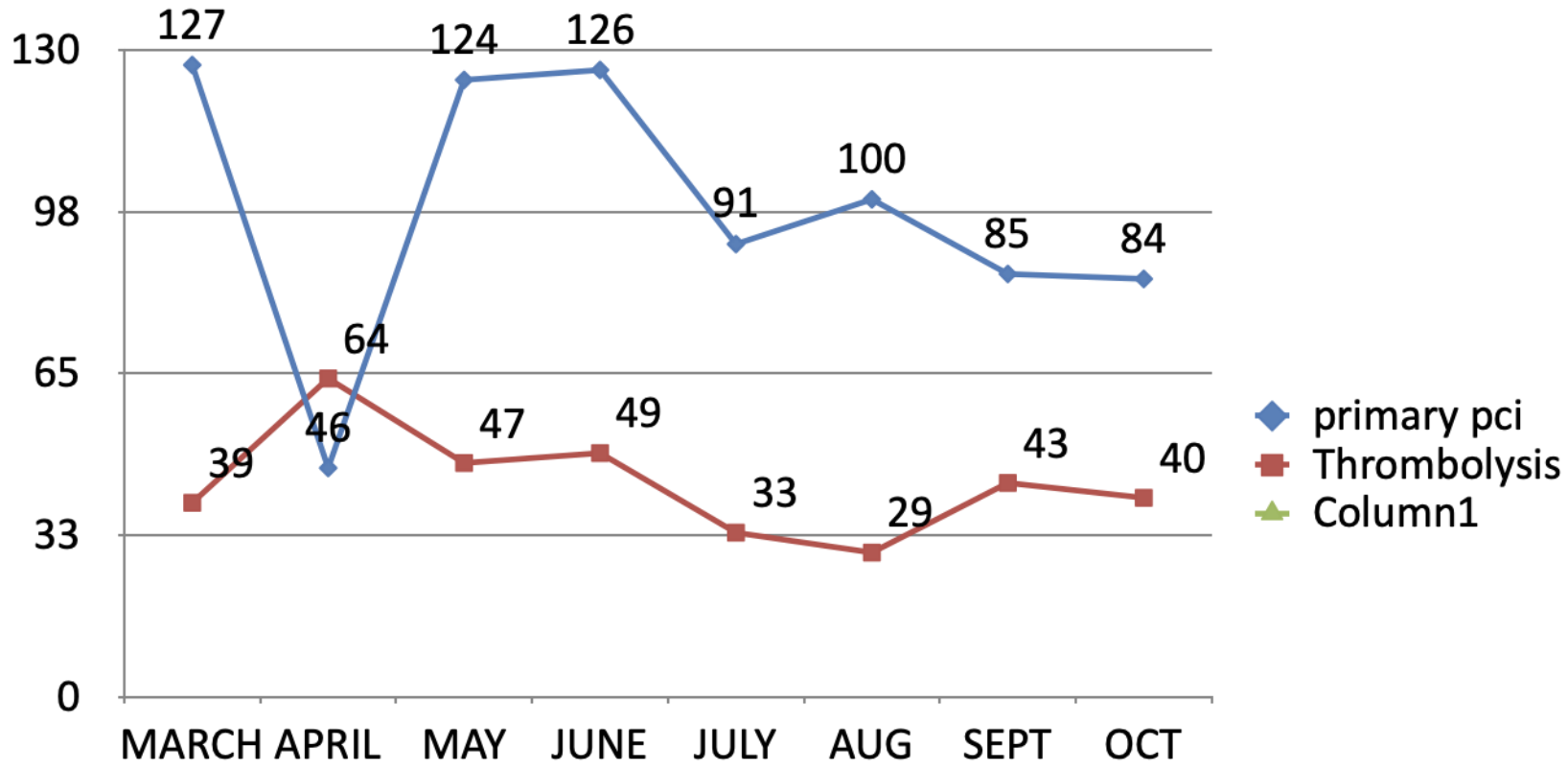
- **However, the In-Hospital adverse events such as In-Hospital heart failure, Cardiogenic Shock, and Stroke were found to be significantly more during the COVID period than those during the PRE-COVID period.**

- **Significant increase in 'Door to Balloon Time' and 'Total Ischemic Period' during the COVID period.**

- **Both these variables are predictors of In-Hospital mortality and Adverse Cardiovascular events,and the increase in both can be the reasons for the increased In Hospital Adverse Events(Except Mortality) observed during COVID period.**

- **Delivery of high-quality medical services related to STEMI systems of care especially during the COVID-19 pandemic is important in reducing the 'Door To Balloon Time' and 'Total Ischemic Time' for better STEMI PCI outcomes and reduced Major Cardiovascular Adverse Events**

Primary PCI & Thrombolysis data
March to October 2020



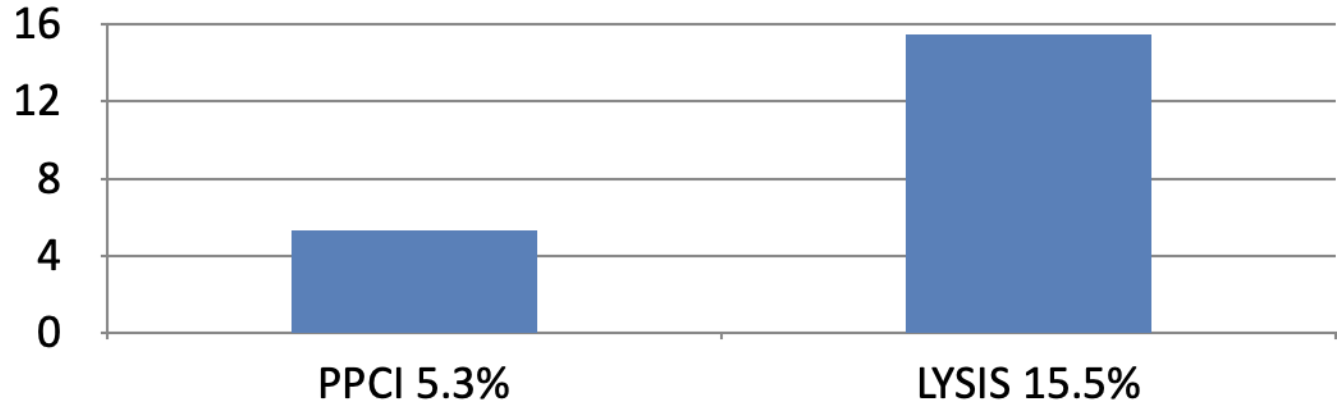
Primary PCI Mortality

In hospital deaths=35

AWMI	20
IW,RV MI	14
IW,PW	4
VSR	1
• **39/733**	
• **5.3% Mortality**	

Thrombolysis mortality

51/329
15.5%



Covid Positive cases

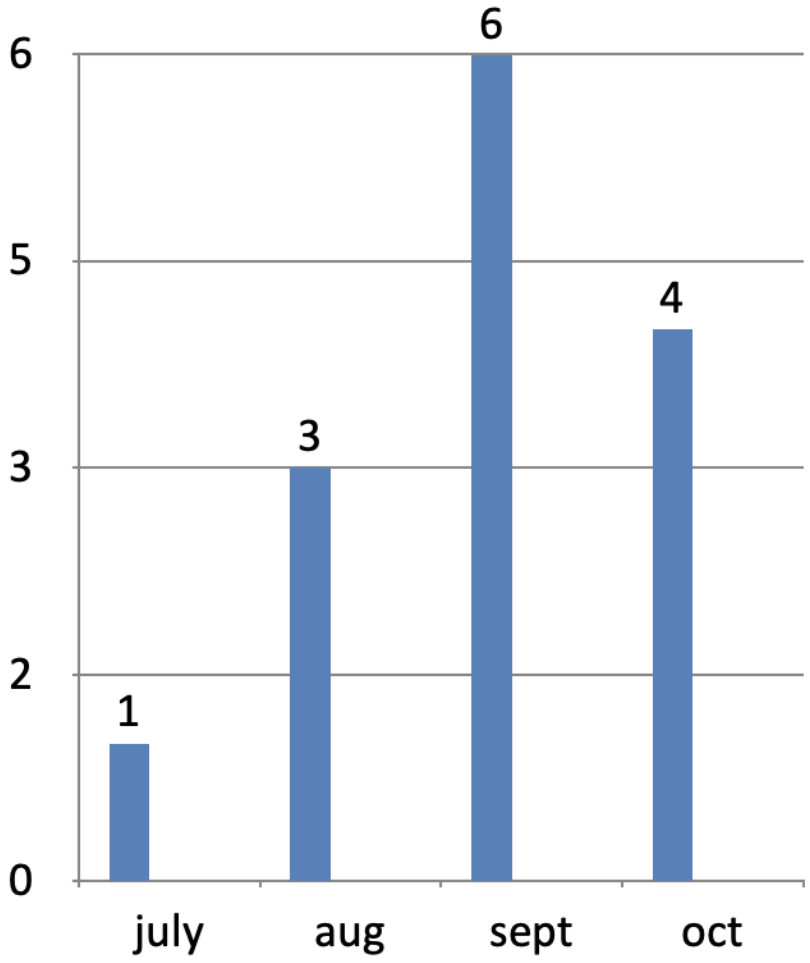
Total 14

PCI 11

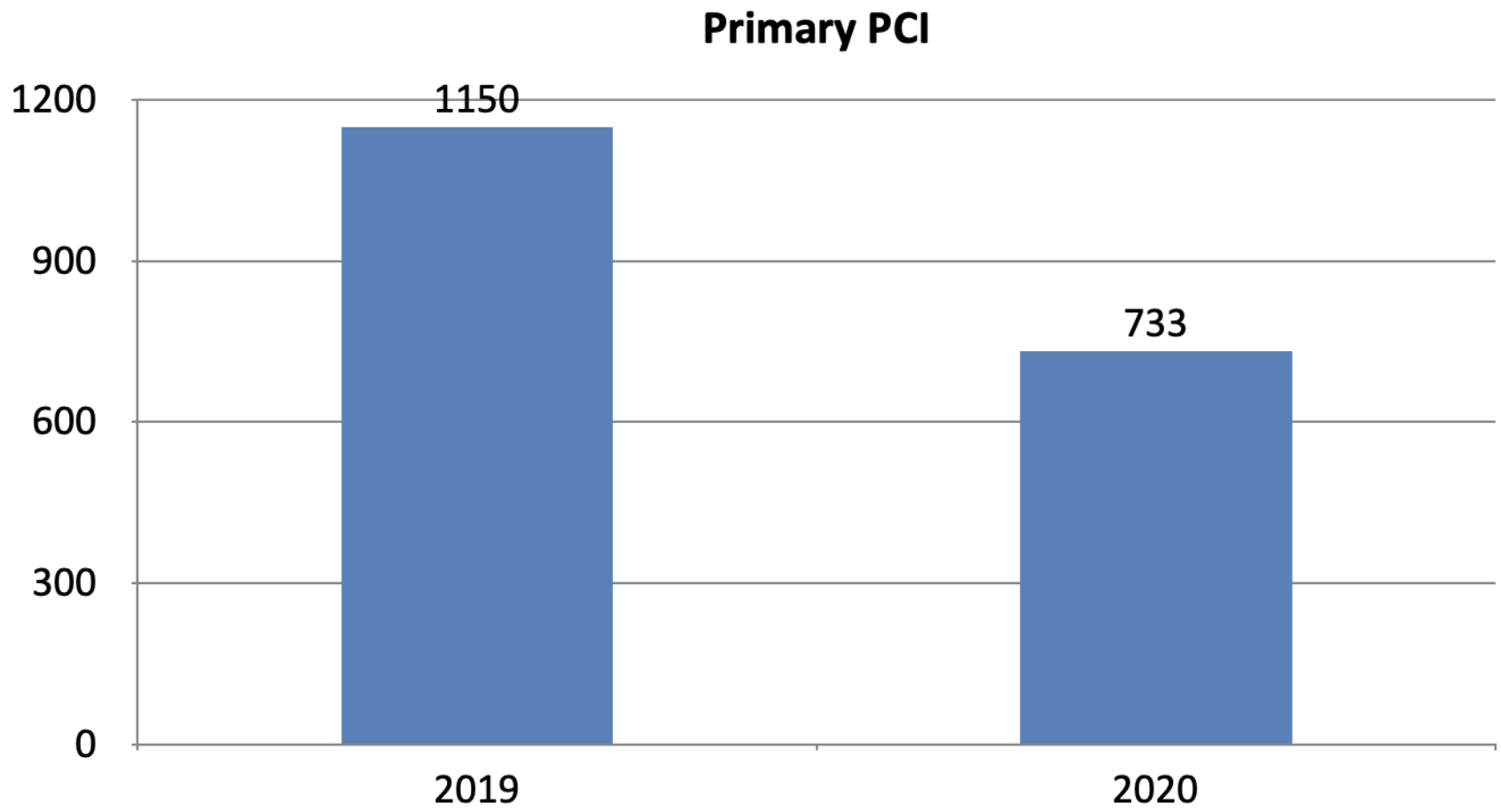
Lysis 3

Normal Coronaries 1

Super spreader primary contacts- 4



2019 vs 2020
March to October



Summary

- Primary PCI has got 10.2% reduction in in-hospital mortality compared to thrombolysis (5.3 vs 15.5)

2019→2020 : Covid

- Number of Primary PCIs reduced by 36%
- DTB increased by 11%
- TIP reduced by 10%
- In hospital mortality reduced by 1% (5.3 vs 6.3)

MANAGEMENT DURING COVID TIMES

Dept of Cardiology, MCH Trivandrum

➢ First case of COVID 19 pandemic was reported in KERALA on 30 th Jan 2020.

➢The efforts of Kerala Government was appreciated both nationally and internationally during the initial stages of the COVID pandemic,

➢Let us have a glimpse of our Department Strategies and Protocols which we observed and experienced during that difficult times.

➢The Govt Of Kerala declared high alert on 8th March 2020.

➢During the interim period itself(month of February),we started thinking of ways of handling upcoming situation, which we were not heard of and not seen till then and had to face it with very limited resources.

DEPARTMENT OF CARDIOLOGY:
PLAN OF ACTION

CONCERNS:

➢The first and the foremost: Protection of our Frontline Workers-
The “COVID Warriors”

➢Streamlining our ICU’s (established two fully equipped 12+27 bedded ICU’s)

➢We were tasked to provide STEMI care and emergency intervention services to patients at a time when the protective armamentarium which we need to prepare was not yet fully understood or devised.

➢We still had to handle crowded OPD’s having about 600 patients and their bystanders and also to carryout their Echo.

➢In the month of February, we procured adequate numbers of N95 masks,sanitizers, sanitizer stands, shoe covers, Sterile Gowns, Gloves for our department.

➢Procurecement of PPE was cumbersome,we managed to get some

ICCU care

From March 8th we had COVID first wave

➢2 beds of ICCU 2 were kept aside with adequate distancing as receiving beds where we tested patients of COVID antigen,and if positive shifted to covid ICU

➢“RED CHANNEL” was created

➢SECURITY PERSONNEL cleared off all patients and bystanders from the receiving ICU to the COVID ICUs.

➢Long waiting time for shifting patient ,the next patient has to wait till the corridor was cleaned.

ICCU 2 cleaned and fumigated- Cleaning in process after fumigation

ICU staff were working this way

Idea of Screening & Triaging

- We were asked to leave the MULTISPECIALITY ICCU 1 on 30.9.2020 ,and given a 6 bedded ICU,
- We were also we asked to leave General Wards

➢Ward 22 was given to us we had total of 33 beds.

THE MAKING OF TRIAGE ICU

➢Of the 33 BEDS initially given to us IN WARD 22, 6 beds were set apart as Triage ICCU.

➢We arranged 6 monitors, 3 Defibrillators , 3 ventillators and we set the triage ICU

➢Screening of all STEMI patients were done from this ICU with Rapid Anitgen Tests,RTPCR tests.

➢Irrespective of the RAPID antigen results,they were taken up for Reperfusion therapy as per Department Protocol.

➢COVID positive patients were send to COVID Icus after initial treatment.


15
13

HAZARDS IN TRIAGE ICU s

- Amidst the lack of central oxygen supply we worked all 3 ventillators with large oxygen cylinders, supply was ensured even when there was shortage of oxygen supply in hospital
- All our staff working there was in full PPE ,even when the climatic situations were hostile
- Long duty hours in PPE kit was seen making staff fatigued, but we stayed on and moved on….

IN OPD s…

- Separate OPDs were set apart for people from containment zones, near the new casualty where a separate doctor was send from OP Unit to see them in fully equipped PPE.

- Later, OPD registration time was cut down to 11.30 am

ECHO ROOM

To Conclude…

- The state government has stopped daily reporting of cases following a fall in the number of active cases.
- No lockdown restrictions
- We have resumed our OPDs in full swing
- PrimaryPCIs are entertained within a Door to Balloon Time of around 75 mins
- Both the ICCU s are fully functioning….AND we are Back to normal function


Thank
you