



华中科技大学同济医学院附属

TONGJI HOSPITAL

TONGJI MEDICAL COLLEGE HUAZHONG UNIVERSITY OF SCIENCE & TECHNOLOGY

同济医院



The application of ECMO in critically severe Covid-19 patients

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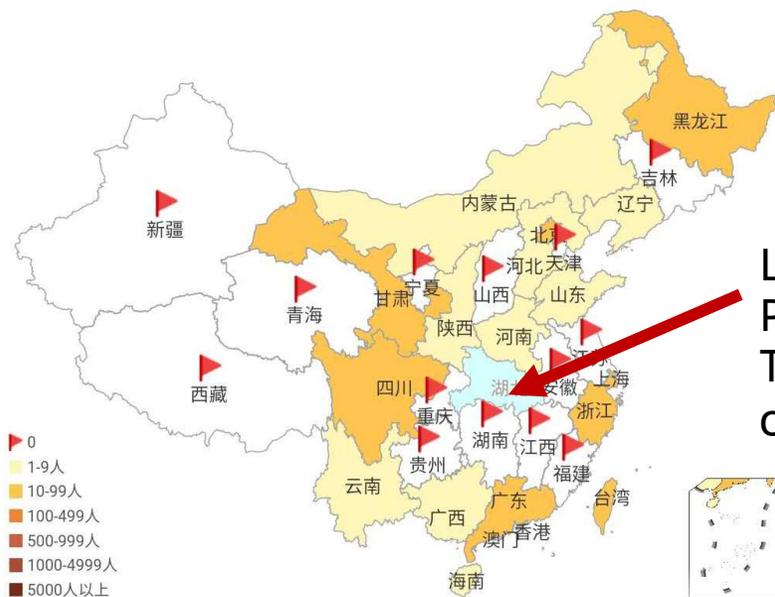
Division of Cardiology
Tongji Hospital HUST





Wuhan-Epicenter

Lockdown due to COVID-19 epidemic on **January 23, 2020**

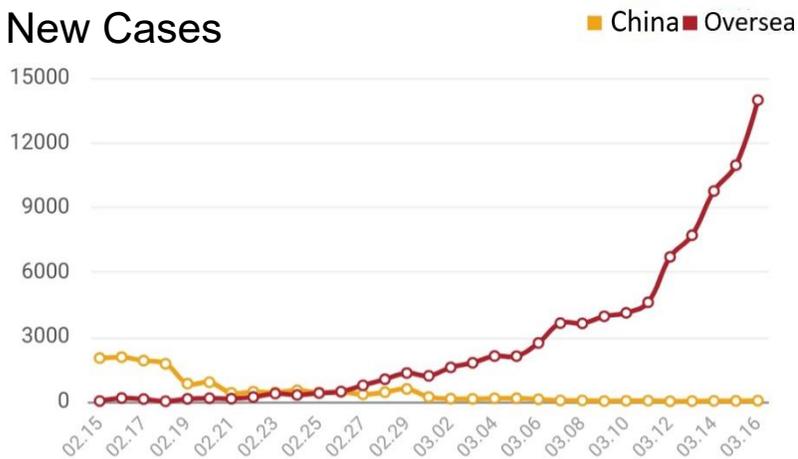


Wuhan

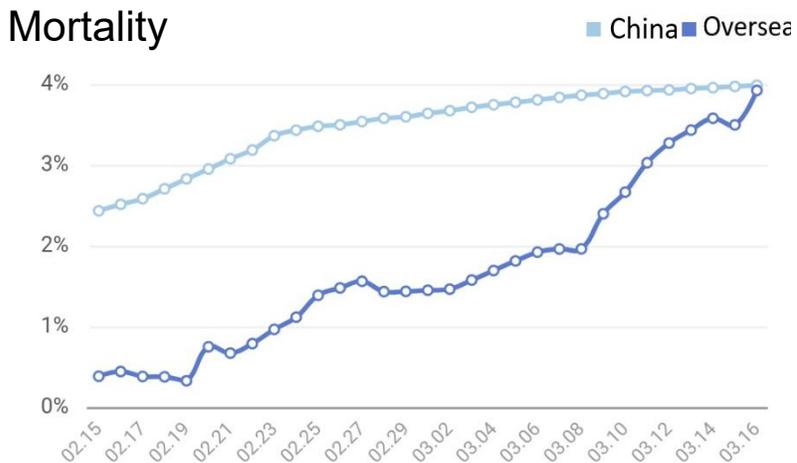
Location: central China
Population: ≈ 12 M
Transmission: commuter area

Lessons and experiences from the front-line of fighting against Covid-19 in China should be shared globally

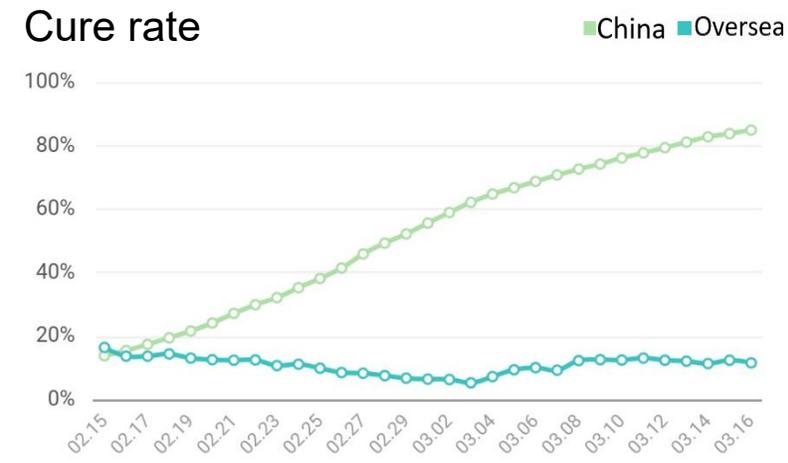
New Cases



Mortality



Cure rate





≈20% Covid-19 developed into severe or critically severe type

Critically severe type

Patients meet any of the following conditions:

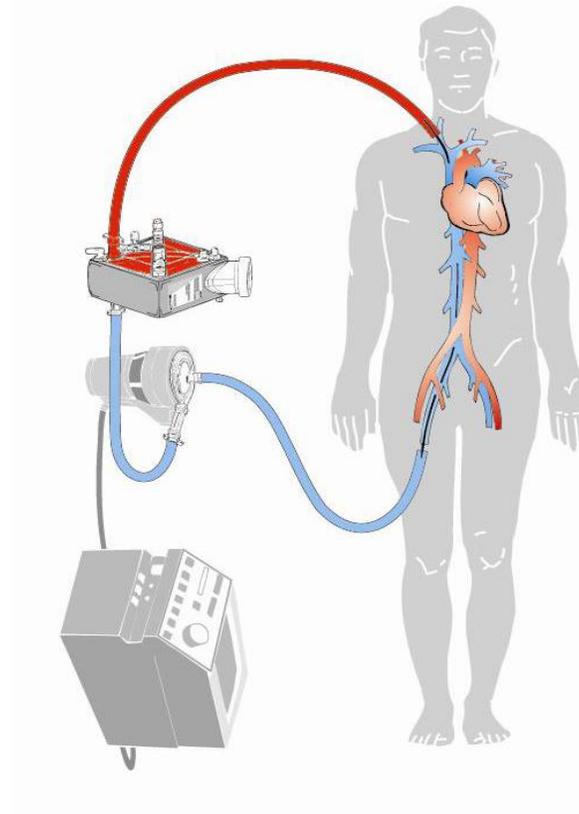
- (1) Respiratory failure requiring mechanical ventilation;
- (2) Shock;
- (3) Patients combined with other organ failure needed ICU monitoring and treatment.

What if the patients still have severe hypoxemia on ventilation?

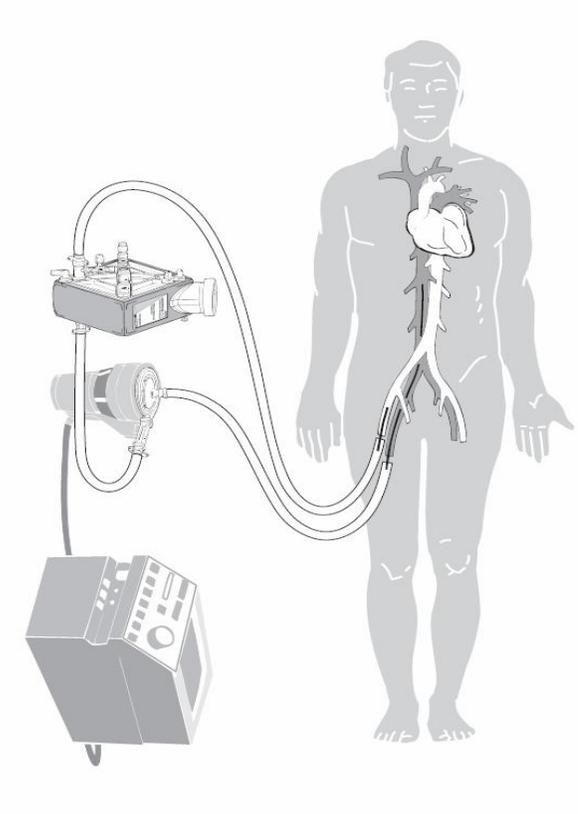
Extracorporeal membrane oxygenation (ECMO)



Mode: VV



VA





Typical ECMO case



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- **Patient:** Mr. Cheng, 50 yrs, admitted on 11 Feb, 2020
- **Chief complaint:** Fever for 11 days, short of breath for 2 days
- **Present medical history:** intermittent fever, Max T 39°C, shortness of breath in recent 2 days
- **Past medical history:** No special history
- **Epidemiological history:** Confirmed patients in the residential area.



• Physical examination:

- SpO2 75%, HR92bpm, BP 132 / 86mmhg, RR 24bpm, t 36.4 °C; clear mind, passive position; No other positive signs.

Auxiliary examination:

Chest CT showed infectious diseases, considering the possibility of virus

2019-ncov virus test: positive





Lab test

- hsCRP: 70.4 mg/L, Cr 67 umol/L,
- ALT 54 U/L↑, AST 62 U/L↑, ALB 33.9 g/L↓,
- WBC $7.07 \times 10^9/L$, N 81.6 %↑, L $0.81 \times 10^9/L$ ↓(11.5%), HB 125.0 g/L↓.
- **ABG**: PH 7.43, PO₂ 51mmHg, PCO₂ 30.8mmHg, SB 22.0 mmol / L, BE - 2.40 mmol / L, SPO₂ 81.8% ↓(BiPAP);
- **NT-proBNP 1077 pg/mL↑; cTnI 217.1 pg/mL**, Myo 67.6 ng/mL, CK-MB1.6 ng/mL; LDH 413 U/L↑;
- **Echocardiography: EF 45%;**

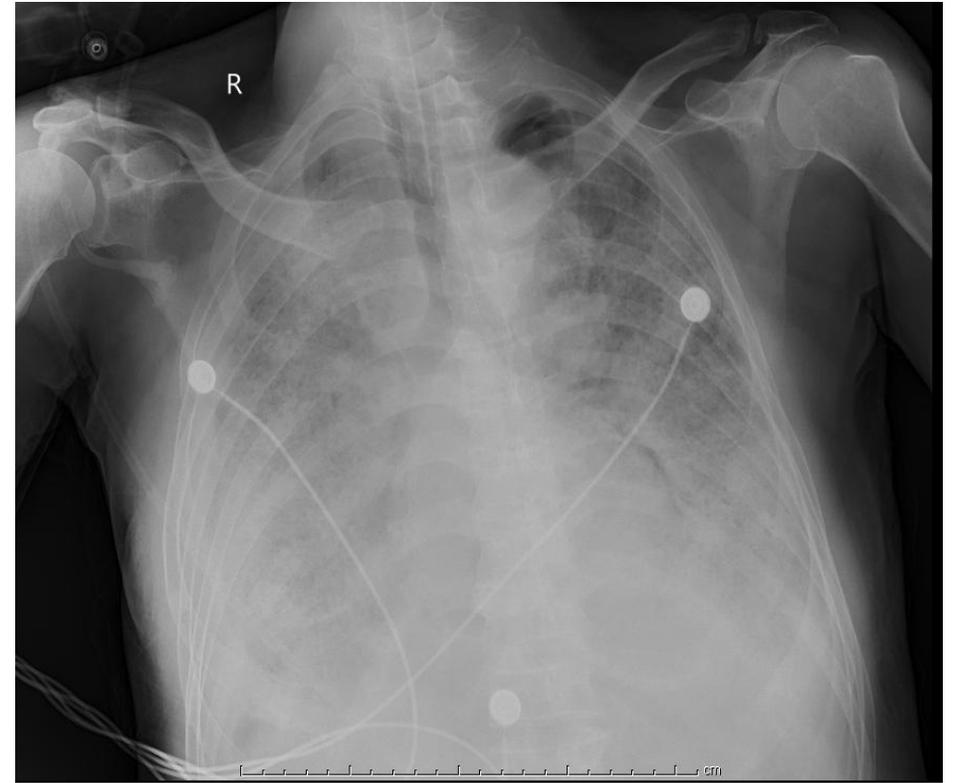


Treatment

- Anti-bacteria
- antiviral: arbidol and Chinese traditional medicine
- Relieving asthma and resolving phlegm
- Enteral nutrition

Hypoxemia was getting worse.

He was transferred to ICU.





Additional treatment in ICU



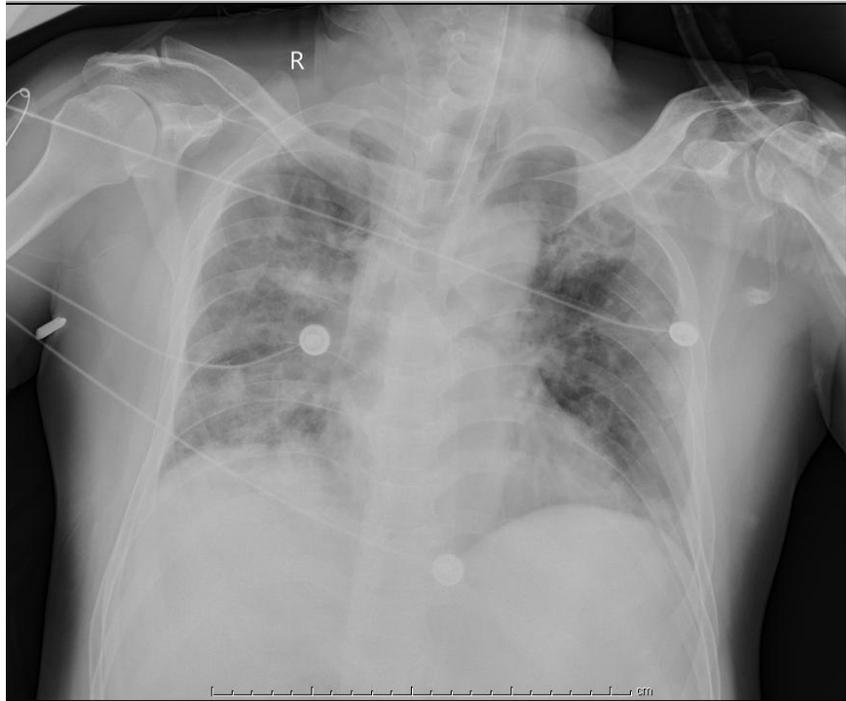
- Endotracheal intubation
- Prone position ventilation: **Oxygenation Index 95mmHg.**
- **ABG:** PH 7.13, PO₂ 61mmHg, PCO₂ 42mmHg, SB 19.0 mmol / L, BE 4.40 mmol / L, SPO₂ 88% -90%↓;
- LAC 2.42 mmol/L↑



A choice that has to be considered:
ECMO

Date: Feb 18, 2020.
Initial Parameters:
Speed:3000rpm
Flow: 3.2L /min
Oxygen: 4 L/min
Concentration:40%





Feb 26

tracheal intubation+
ECMO+CRRT for 10 days
From Feb 18 to 28.



Feb 28



Mar 5

●HR 62, BP138/84mmHg.

●**ABG:** PH 7.40, PO₂ 91mmHg, PCO₂ 39mmHg, SPO₂ 99% -100%↓;

●LAC 1.42 mmol/L, D-D 0.73 ug/mL ; CTnl <1.9 pg/mL; CRP 0.7 mg/L; NT-proBNP 43 pg/mL;

●PCT 0.06 ng/mL; TNFα 10.8 pg/mL, IL1β <5.0 pg/mL;

● 2019-ncov: (-) for three times

●Total antibody for Covid-19: (+)



Feb. 13



Feb. 28

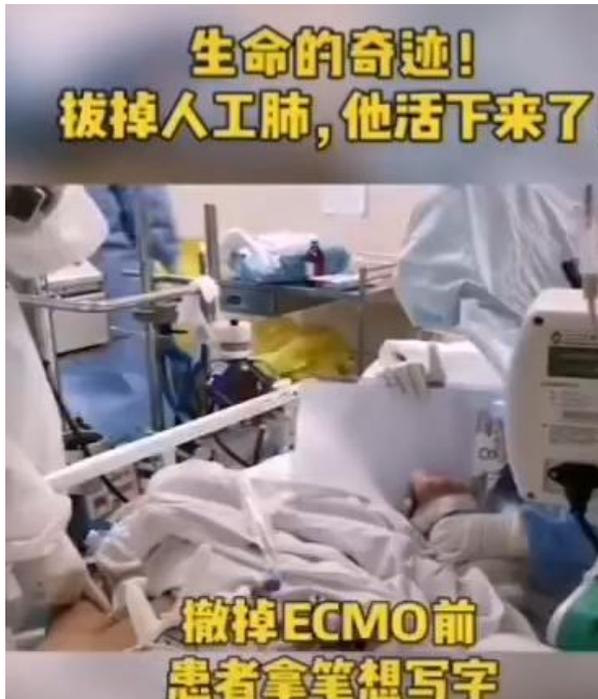
Remove ECMO date: Feb 27



In recovery, Mar 19



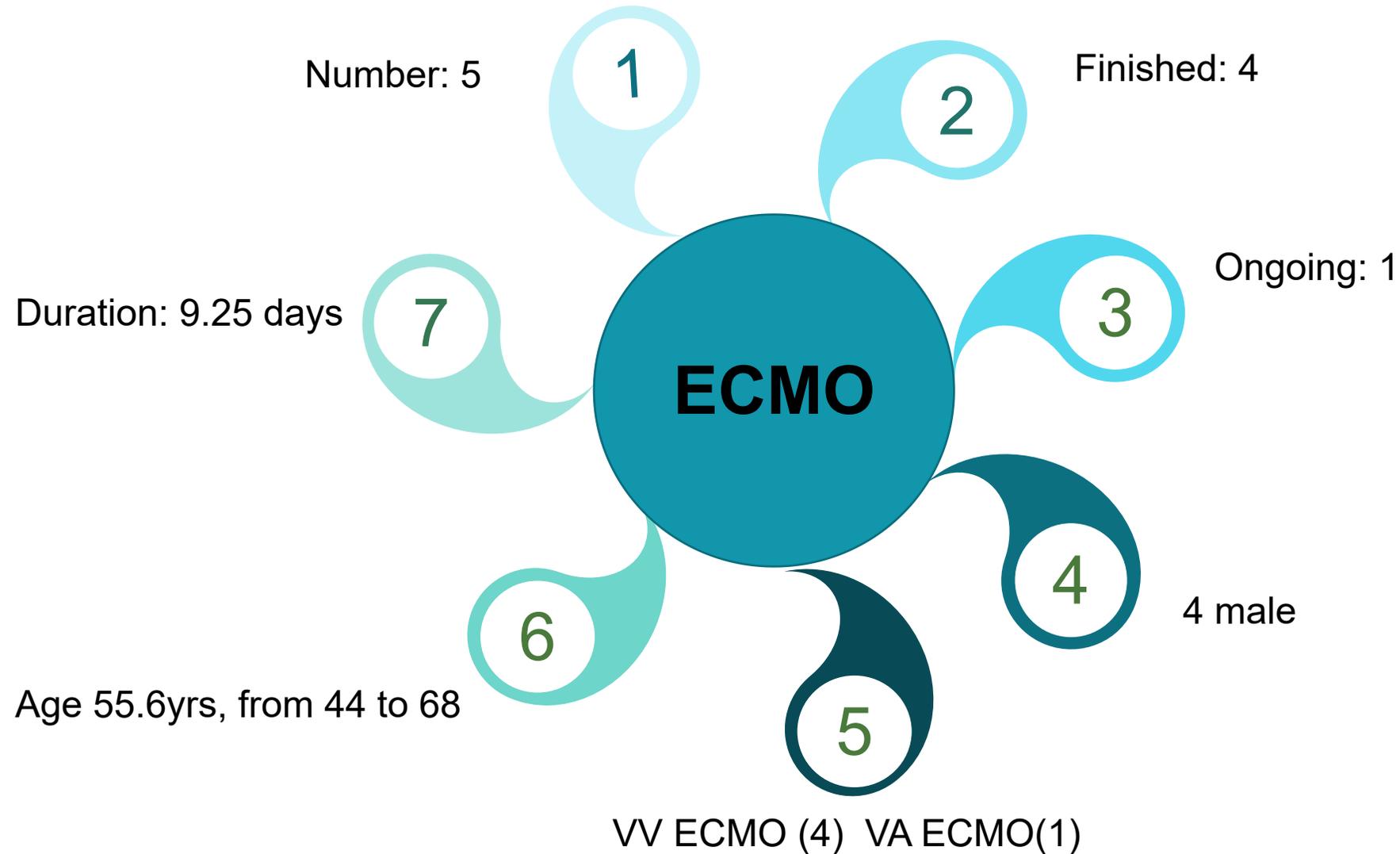
Will be discharged, Mar 20



So far.....



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Lessons and experiences

01

Indication

Critically severe respiratory failure and hypoxemia

OI < 100

Not always



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Lessons and experiences

02

Contraindication

MODS(HF/DIC/LF)

Bleeding

Irreversible severe brain injury

elder (>70 yrs???)

Not always



Lessons and experiences

03

Opportunity

*The earlier, the better
The later, the worse*

*ECMO is not for prolonging life for days.
Its an opportunity for patients to survive.*



Lessons and experiences

04

Mode

First: VV ECMO

Second: VAV ECMO, if pts have HF.

Last, VA ECMO for pts with both heart and respiratory failure.



Lessons and experiences

05

Consciousness

*Traditional: Intubation first, then ECMO.
Remove ECMO first then Intubation.*

*How about ECMO first, or even further
ECMO without intubation?*



Acknowledgement

Thanks to my patients, heroes of this city



No.1



No.2



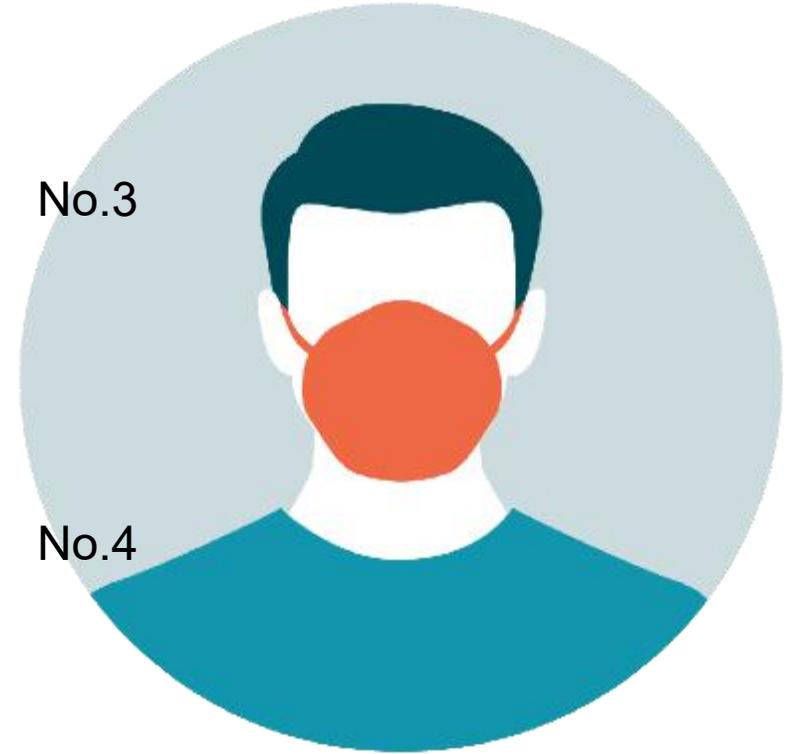
No.3



No.4



No.5
ongoing



Acknowledgement



Appreciate for guidance from Dr.Ge Junbo and CCA.
Appreciate for helps from friends and organs overseas.
Appreciate for supports from my hospital, Tongji Hospital.
Appreciate for forgiveness from my family for not staying with them in this special period.





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Thanks for your attention!

