

# COVID-19 疫情下針對流感 等呼吸道重症之照護

謝宗達

成大醫院 重症加護科 / 感染管制中心

Aug 05, 2023

I have no conflict of interest.

# 重症照護 = 嚴謹的支持性治療



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Supportive care is much less exciting than the idea of a single magic bullet to “cure” covid-19, but such a panacea has never existed in critical illness. #COVID19 will not be different. Steroids & #Remdesivir may be helpful, but they’ll be useless w/o meticulous supportive care.

<https://twitter.com/NidaQadirMD/status/1287443875167051776>

- 密切監測
  - 心律 / 血壓 / 血氧
  - 動脈導管 / 心輸出
  - 隨時有人看
- 器官支持
  - 氧氣 / 呼吸器 / 俯臥
  - 升壓劑 / 強心劑
  - IABP / ECMO
  - 腎臟替代療法

# 呼吸道病毒感染的症狀

- Respiratory symptoms
  - Cough
  - Sputum production
  - Nasal discharge
  - Sore throat
- Systemic symptoms
  - Fever / chills
  - Headache
  - Myalgia
  - Malaise / anorexia
  - Dyspnea
  - Altered mental status
- Other symptoms
  - Photophobia
  - Conjunctivitis
  - Anosmia (COVID-19)

Paules C. *Lancet*. 2017;390:697-708.

<https://www.cdc.gov/flu/about/qa/coldflu.htm>

新型冠狀病毒 (SARS-CoV-2) 感染臨床處置指引 . 第 24 版 . 2023-07-28.

# 呼吸道病毒的診斷工具

**TABLE 3** Sensitivity of respiratory viral detection from different specimen types<sup>a</sup>

Specimen type	Sensitivity of detection <sup>b</sup> of:						
	FLUA/B <sup>c</sup>	RSV	RV/EV	ADV	hMPV	PIVs	CoVs <sup>c</sup>
NPS	++	++	++	++	++	+++	++
NPA	+++	+++	+++	+++	+++	+++	+++
OPS	++(+) <sup>d</sup>	++	+	++	+	+	+
TS	++	++	+	++	+	++	++
Sputum <sup>f</sup>	+++	+++	+++	+++	++	+(+)	++(+) <sup>e</sup>
BAL fluid	+++	+++	++	++	++	+(+)	++
Lung biopsy specimen	++	++	+	+	+	o	+++

- **Nucleic acid detection**
- Rapid antigen tests
- DFA/IFA assays
- Cell culture

Rapid antigen test 敏感度 60-90% ，  
如陰性但臨床有仍有懷疑請驗核酸。

# 只採檢鼻咽或下呼吸道 會漏掉 20-30% 的呼吸道病毒感染

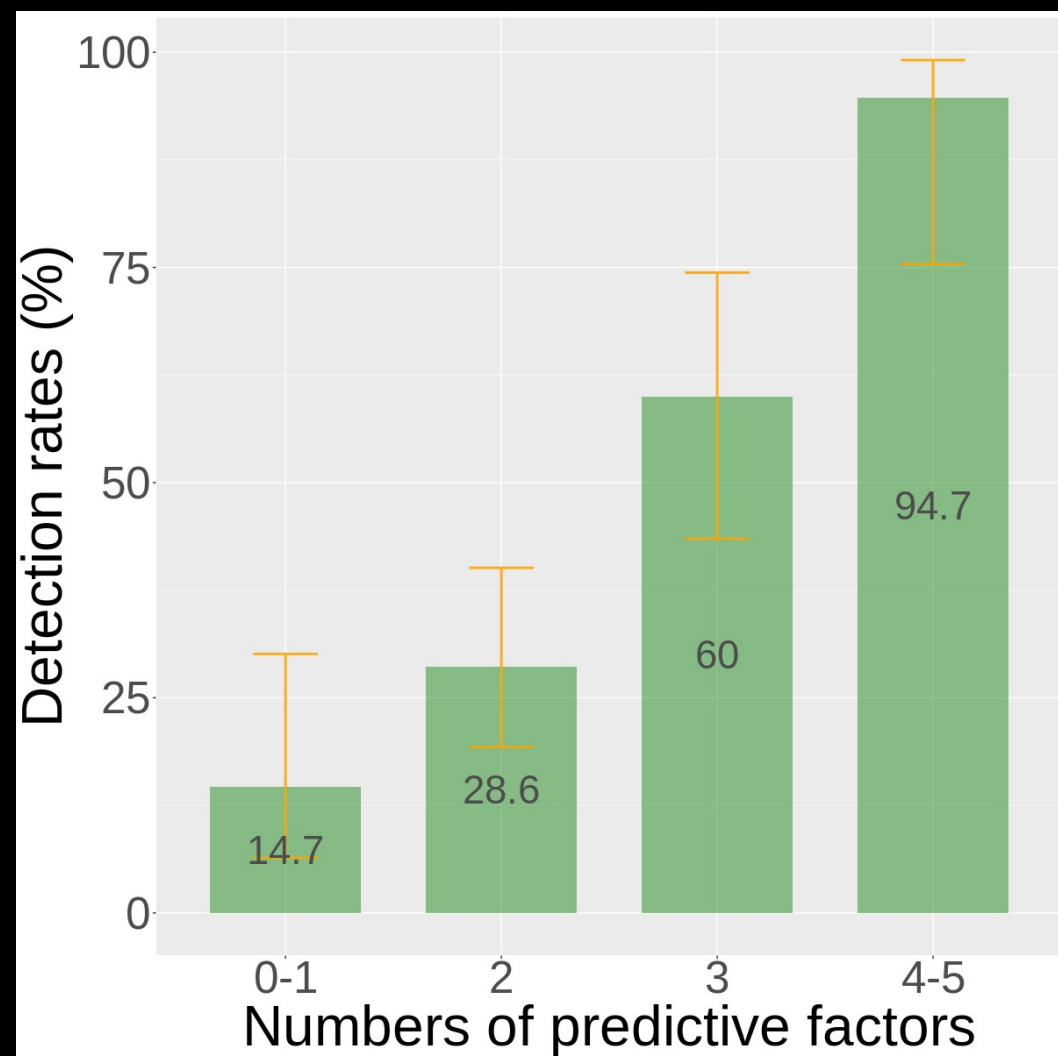
**TABLE 2. Site of Virus Detection**

Site of Virus Detection	SARI, <i>n</i> = 45 (%)	Non-SARI, <i>n</i> = 213 (%)
Nasopharyngeal swab	32 (71)	133 (62)
TA	36 (80)	136 (64)
Exclusive nasopharyngeal	9 (20)	77 (36)
Both nasopharyngeal/TA	23 (51)	56 (26)
Exclusive TA	13 (29)	80 (38)

SARI = severe acute respiratory infection (at ICU admission), TA = tracheobronchial aspirate.

# 哪些重症病人比較驗得到呼吸道病毒？

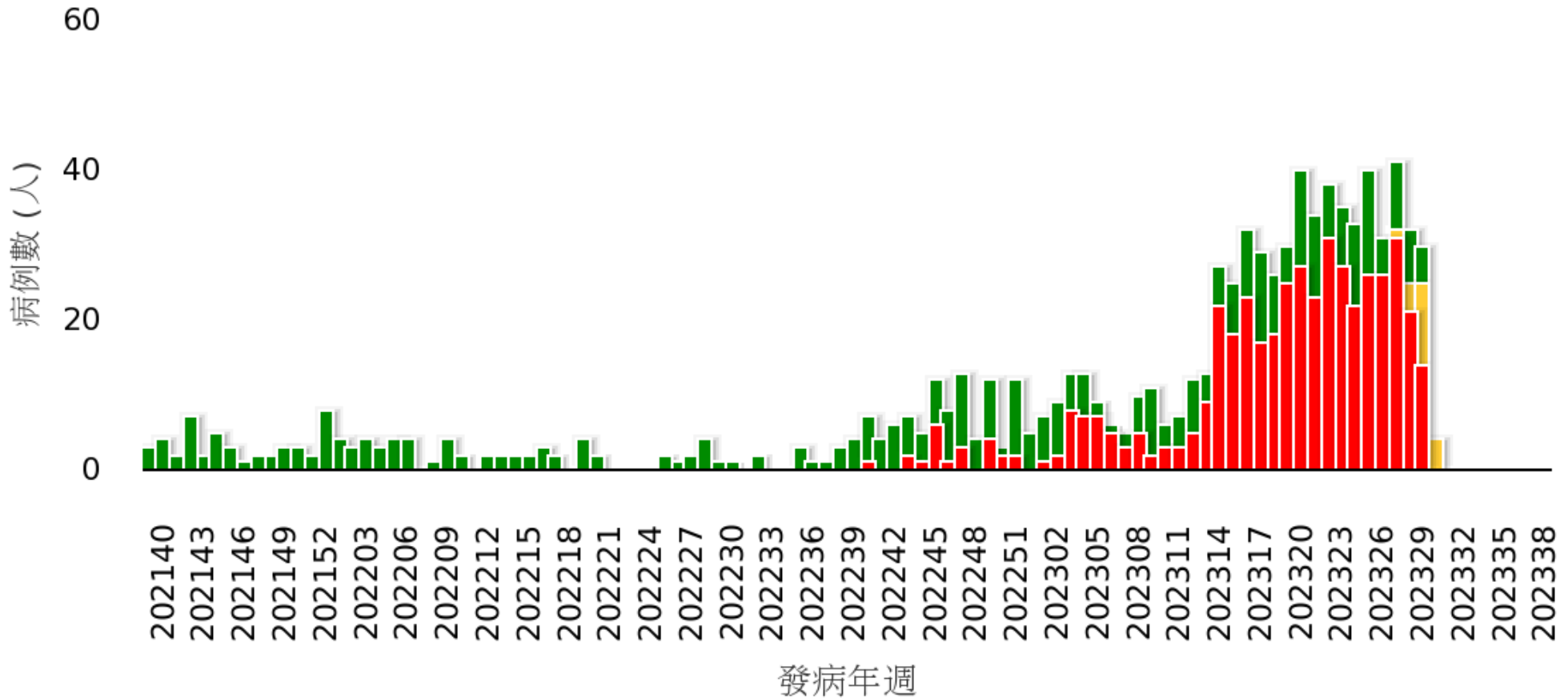
Predictive factor	Odds Ratio
Age < 65 years	3.98
Clustered URI	3.93
Fever	2.89
Cough and sputum production	3.24
Sore throat	3.70



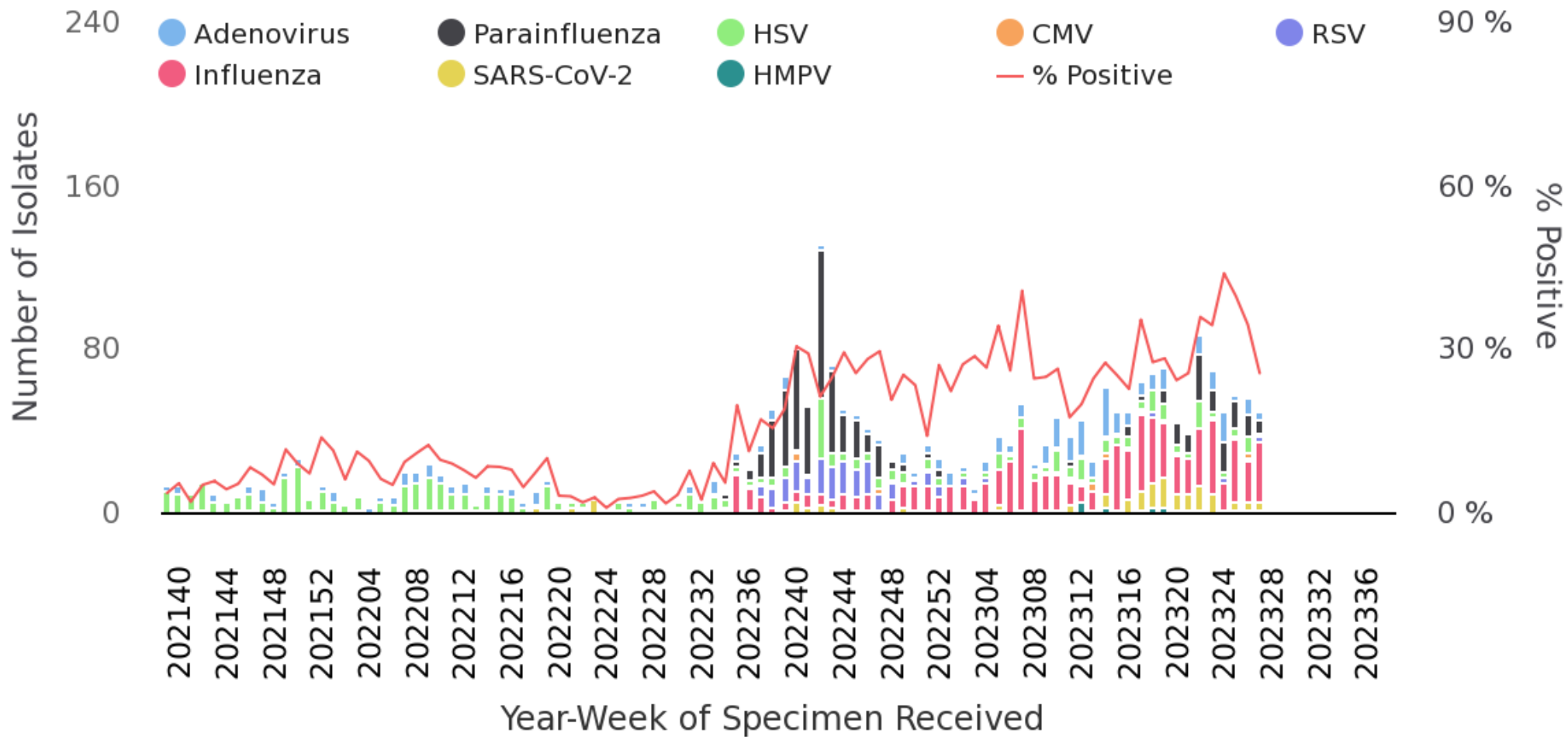
感染症：流行什麼很重要



# 流感併發重症今年已經不少



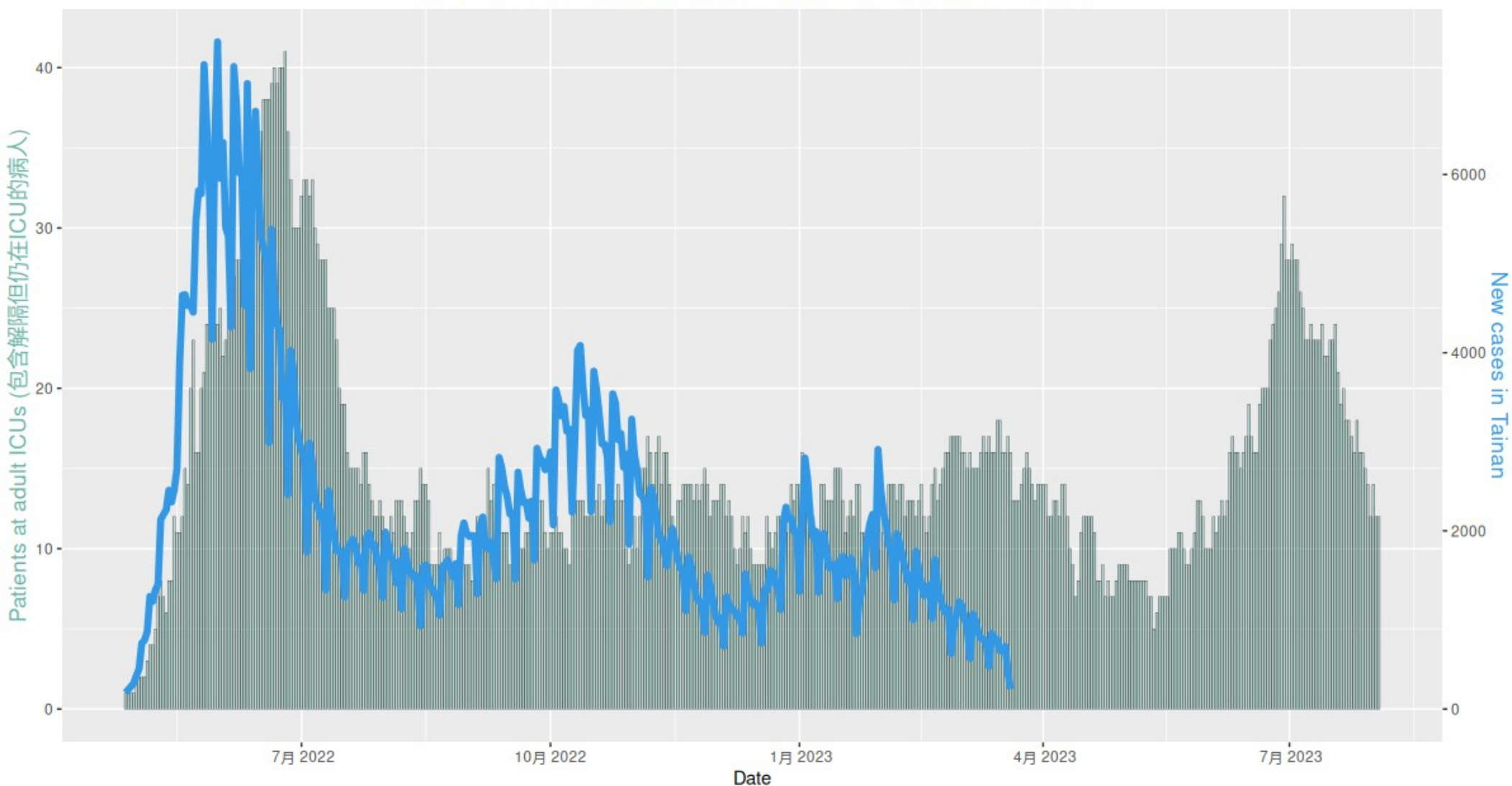
Taiwan CDC 2023



Taiwan CDC 2023/07/28

# 台南與成大醫院 ICU COVID-19 人數

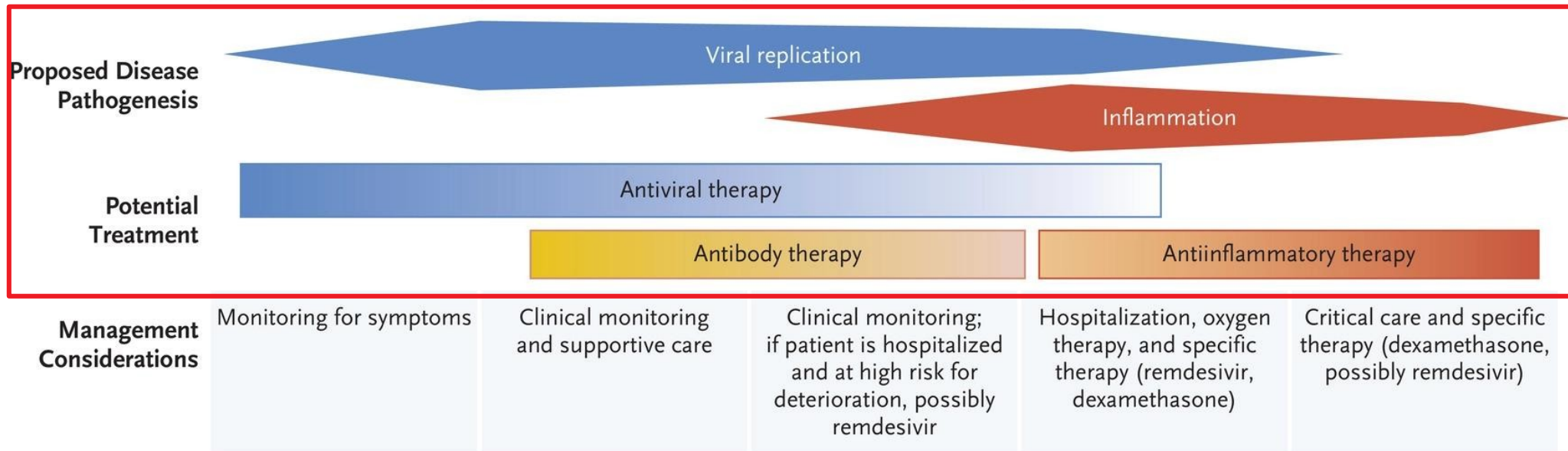
New cases in Tainan AND COVID-19 patients at NCKUH adult ICUs



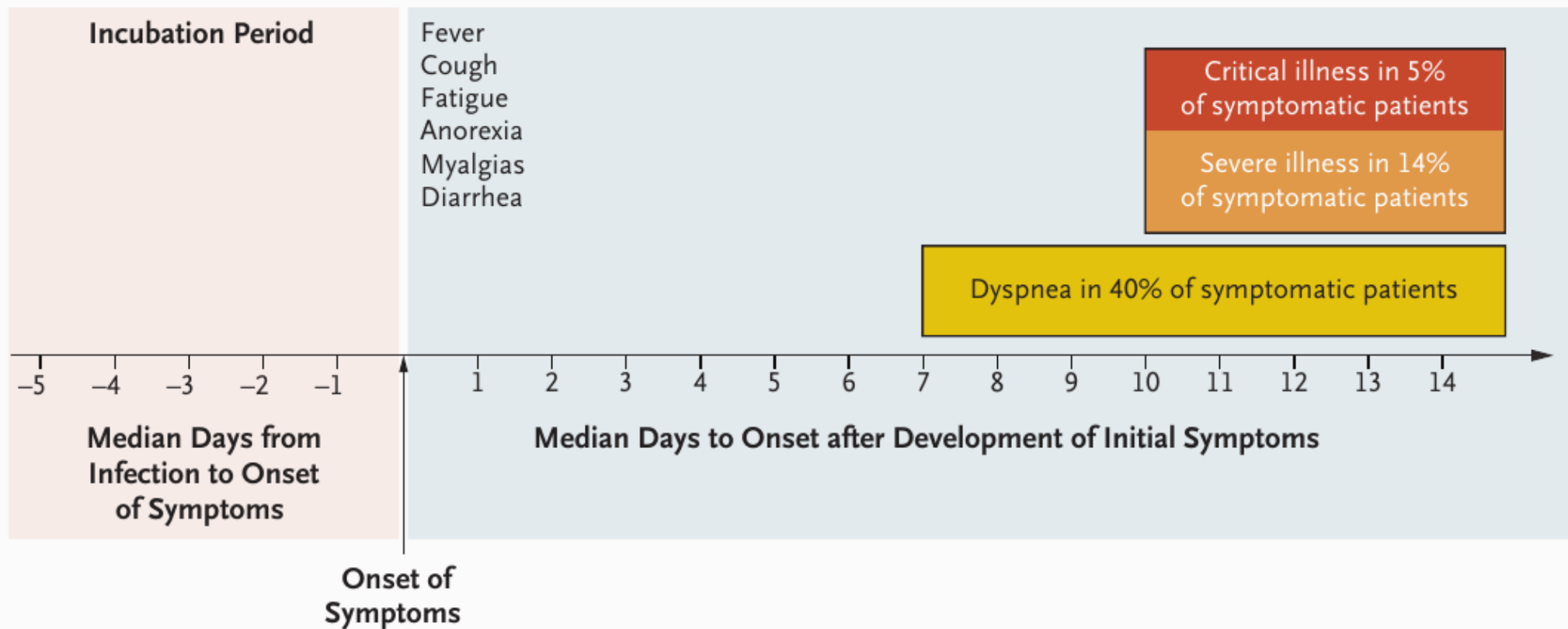
# COVID-19 重症和 其他呼吸道病毒重症 不同的地方

# Stages / severities of COVID-19

	Asymptomatic or Presymptomatic	Mild Illness	Moderate Illness	Severe Illness	Critical Illness
Features	Positive SARS-CoV-2 test; no symptoms	Mild symptoms (e.g., fever, cough, or change in taste or smell); no dyspnea	Clinical or radiographic evidence of lower respiratory tract disease; oxygen saturation $\geq 94\%$	Oxygen saturation $< 94\%$ ; respiratory rate $\geq 30$ breaths/min; lung infiltrates $> 50\%$	Respiratory failure, shock, and multiorgan dysfunction or failure
Testing	Screening testing; if patient has known exposure, diagnostic testing	Diagnostic testing	Diagnostic testing	Diagnostic testing	Diagnostic testing
Isolation	Yes	Yes	Yes	Yes	Yes



# Critical COVID-19 (before omicron)



**Figure 1.** Timeline of Symptoms of Severe Coronavirus Disease 2019 (Covid-19).

**~10 days** after symptom onset  
**Inflammation >> viral replication**



69 y/o M. Lung SqCC on chemotherapy.  
DM. CKD. HTN. Independent ADL.  
COVID-19 Ag+ on 7/20. Cough with sputum  
Dyspnea 7/29-. Respiratory failure on 8/05

# RV study at NCKUH ICU 2017-2018

## From symptom onset to ICU admission

Median: **3 days**

(1<sup>st</sup> & 3<sup>rd</sup> quartile: 2 & 5 days)



# 2020 COVID-19 重症病人樣態

- 平均年齡 62.6 歲
- 男性佔 65.6%
- HTN 49.5%
- DM 26.6%
- 使用升壓劑 65.9%
- 腎臟替代療法 16.9%
- ARDS 比率 76.1%
- 侵入式呼吸器 67.6%
- EMCO 6.4%
- ICU 停留 10.8 天
- 住院天數 19.1 天
- 院內死亡率 28.1%

# 2021 台灣插管重症病人樣態

## TSCCC study – 24 間醫院, n=609

- Mean age 66.8 y
- Male sex 66%
- DM 35.7%
- HTN 54.0%
- Vasopressor 62.7%
- RRT 12.4%
- Prone position 23.5%
- ECMO 2.3%
- ARDS 77%
- AKI 36.1%
- Pul. embolism 2.8%
- Myocarditis 0.5%
- 28-d mortality 26.9%
- In-hospital mortality 36.8%
- MV duration 17.3 d

# A study at 20 French ICUs, 2021-2022 Omicron variant, n = 148 (Delta n = 111)

- Mean age **63.9 y\***
- Male sex 71.6%
- DM 34.7%
- HTN 51.4%
- Immunosuppression **43.2%\***
- Bacterial co-infection 12.5%
- Pulmonary embolism 4.8%
- Vasopressor 40.4%
- RRT 16.9%
- Invasive MV 46.62%
- Prone positioning 36.8%
- ECMO 6.08%
- MV duration **12.5 d\***
- D-28 mortality 35.1%
- ICU stay 11 d

# ICUs of the APHP, France, 2021-2022

## Omicron variant n=229 (Delta n = 400)

- Median age 63 y; Male sex 67.2%
- Immunocompromised 34.5%\*
- Onset to ICU < 5d 22.7%
- Pneumonia 67.2%\*
  - Vaccinated 62.1%
  - Unvaccinated 80.7%
- Invasive MV 41.0%\*
- In-ICU mortality 20%

# OVID-19 omicron variant 重症病人死亡率

法國 AP-HP ICUs

n = 229

Median age 63 y

Mechanical ventilatoin 41%

ICU mortality

20.0%

成大醫院 2022.05-2023.04

n = 357

Median age 74 y

Mechanical venilation 64%

ICU mortality

17.1%

# 插管使用侵入式呼吸器 (IMV) 病人 Alpha v.s. Omicron variant in Taiwan

台灣 TSCCC 2021

Alpha variant

Mean age 66.8 y

In-hospital mortality

36.8%

成大醫院 2022.04-2023.05

Omicron variant

Mean age 72.4 y

In-hospital mortality

33.9%

# Characters of critically ill adults with COVID-19 at NCKUH, Apr-Aug 2022, n = 204

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Pneumonia upon ICU admission 108 (52.9%)

    Typical COVID-19 pneumonia 40 (19.6%)

Acute decompensated heart failure 49 (24.0%)

Acute coronary syndrome 16 (7.8%)

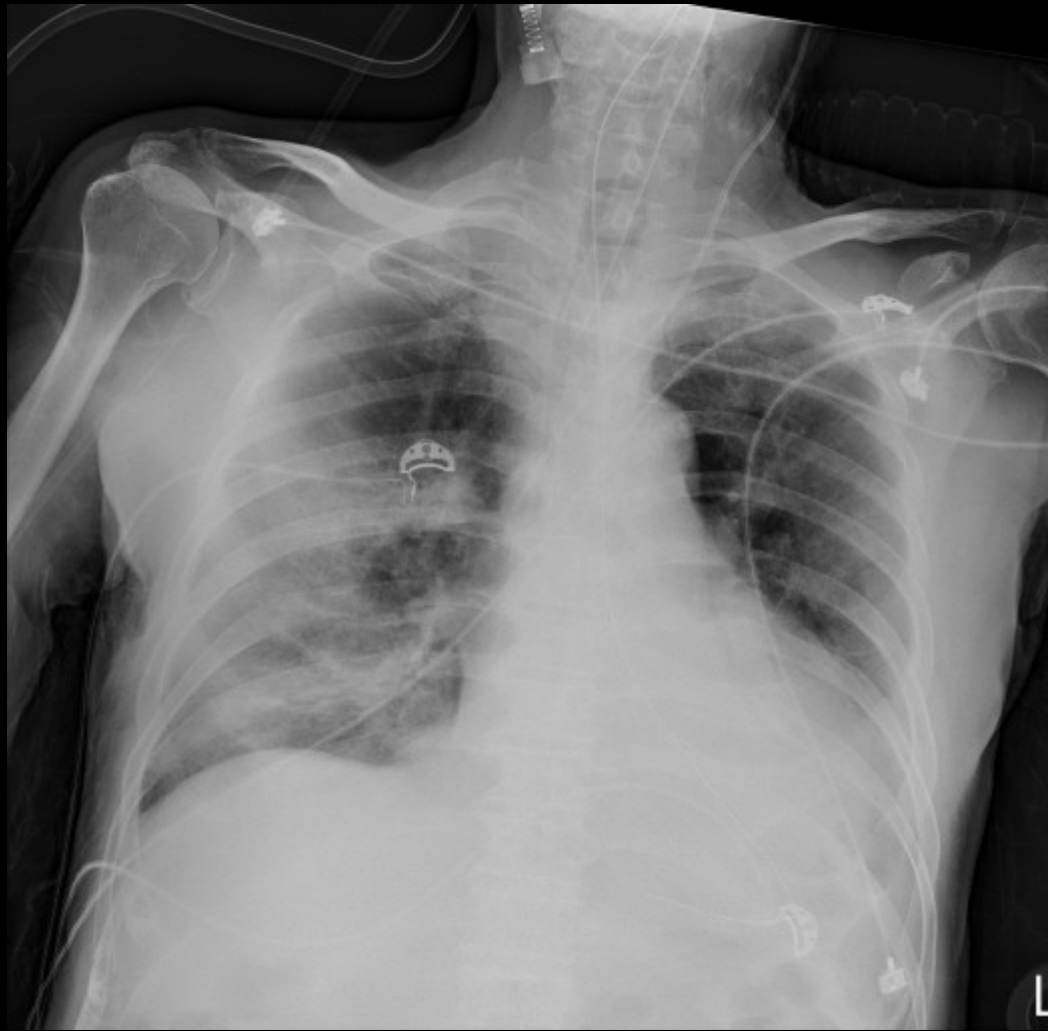
Acute exacerbation of COPD or asthma 9 (4.4%)

ICU admission due to other causes 52 (25.5%)

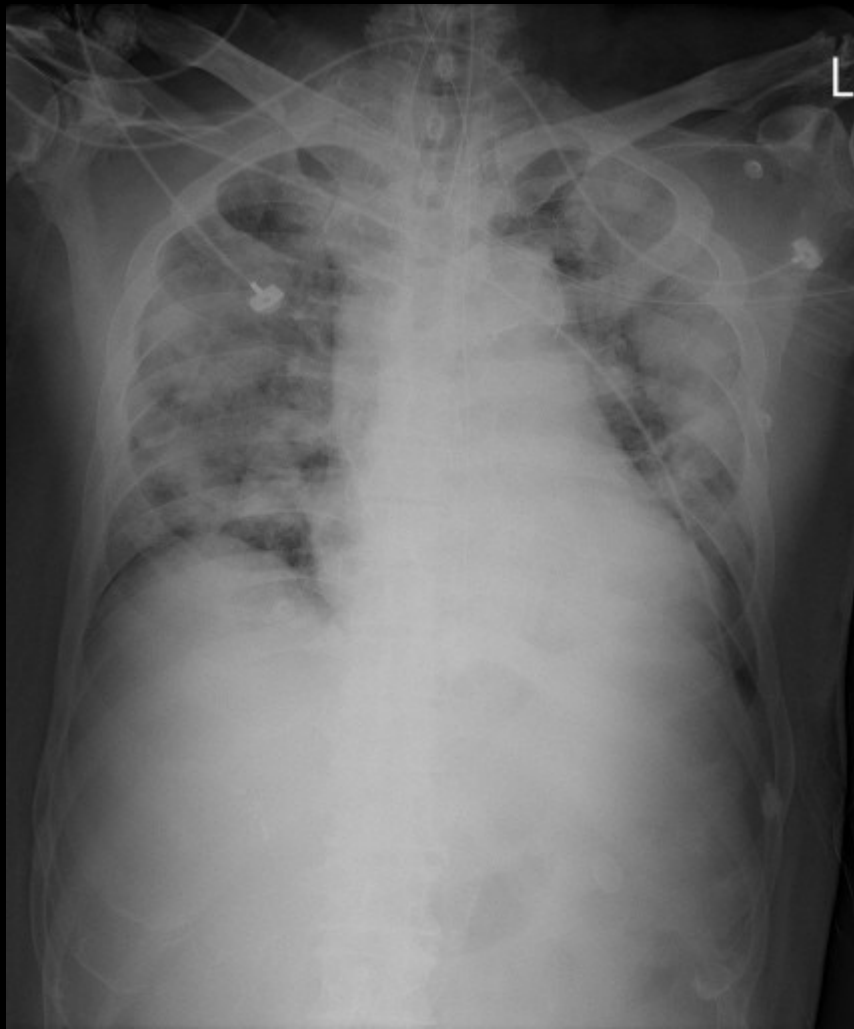
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# 典型的武汉肺炎

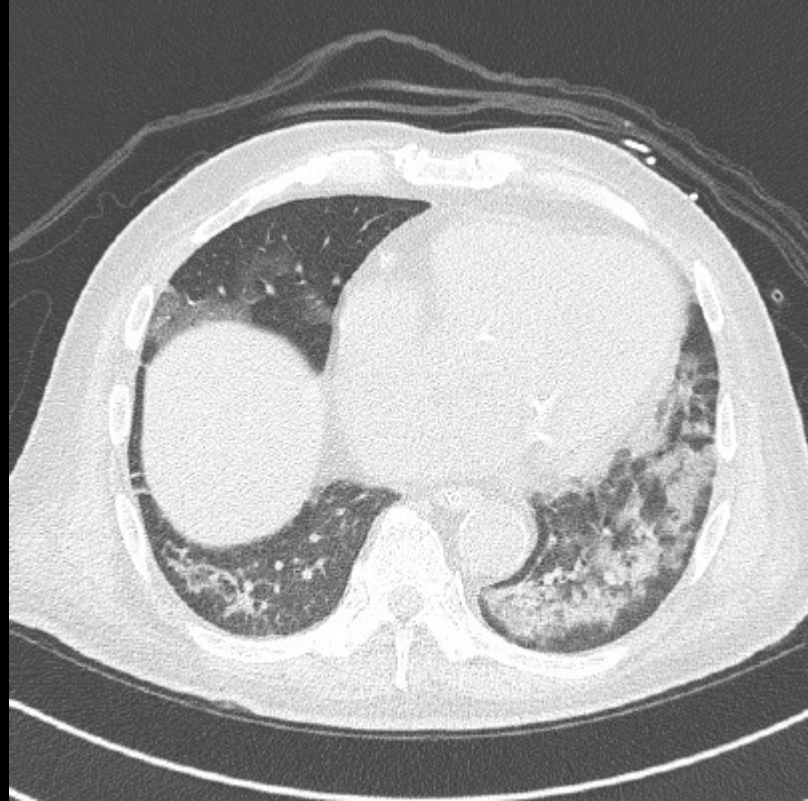
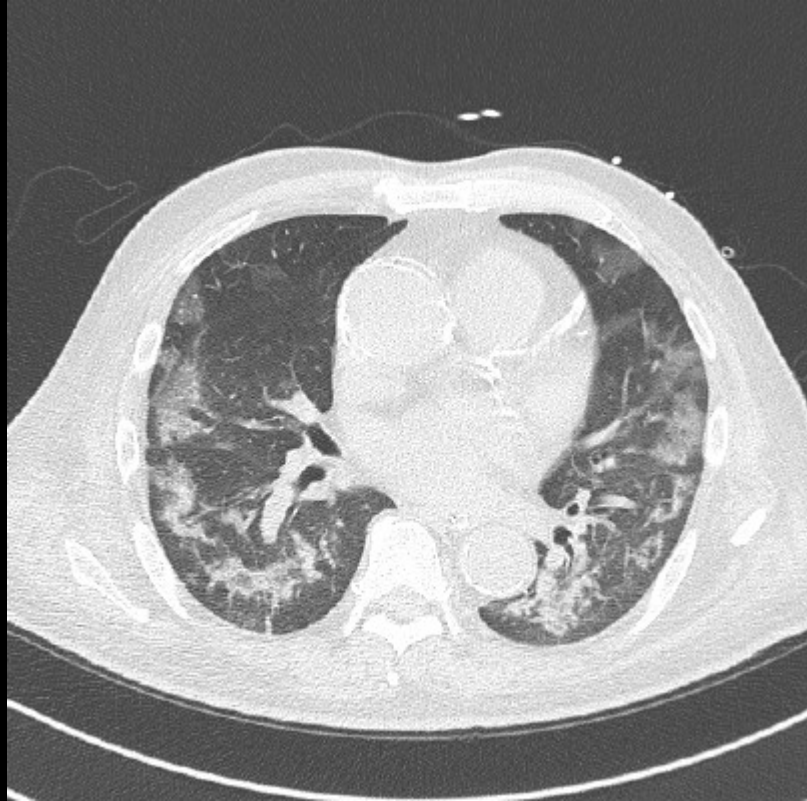
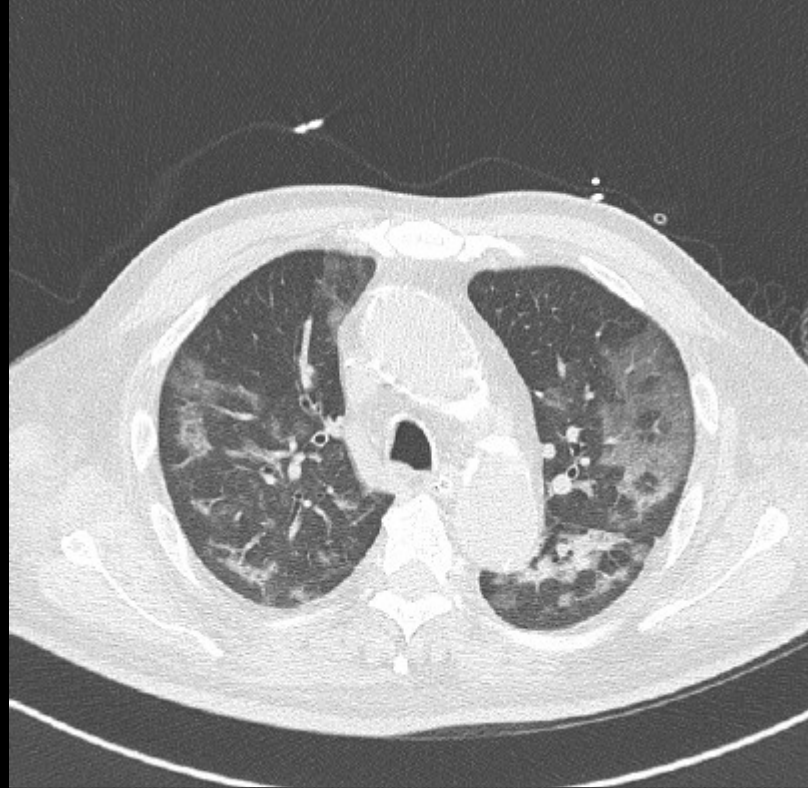
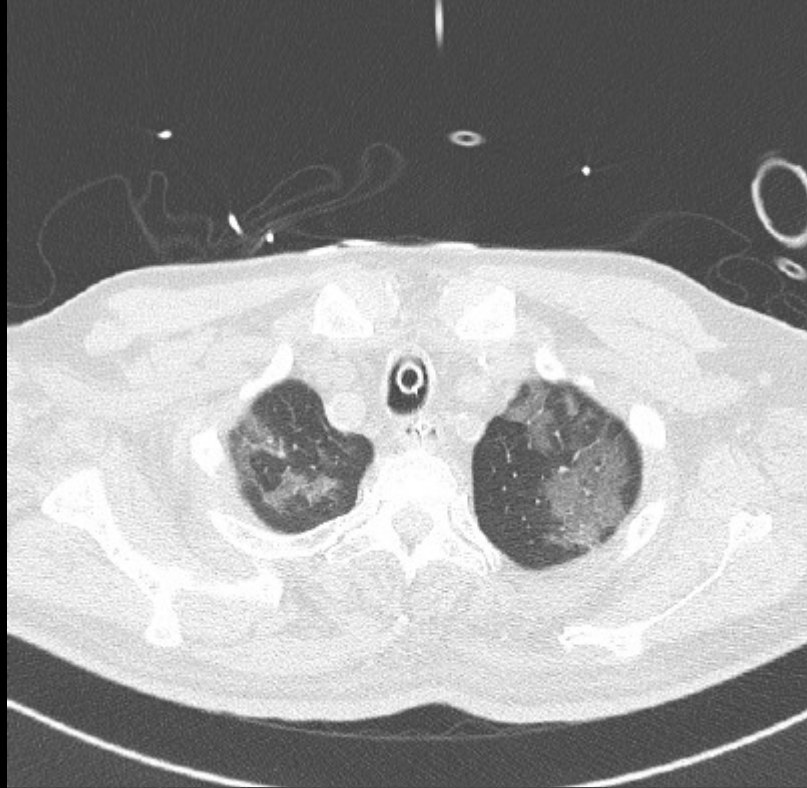


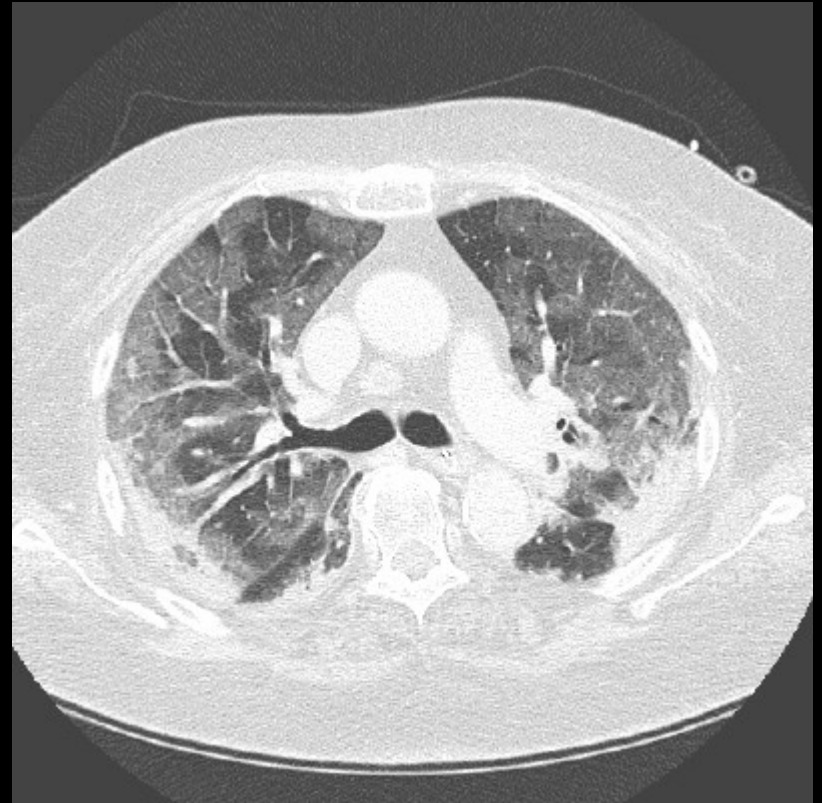


78M. HTN. CKD. Old SAH. Vaccine x0  
SARS-CoV-2 Ag+ on 5/21. Dyspnea on 5/29.



69M. ESRD on HD. HTN. DM. Vaccine x0  
Chest tightness. Dyspnea. STEMI.  
COVID-19 pneumonia.



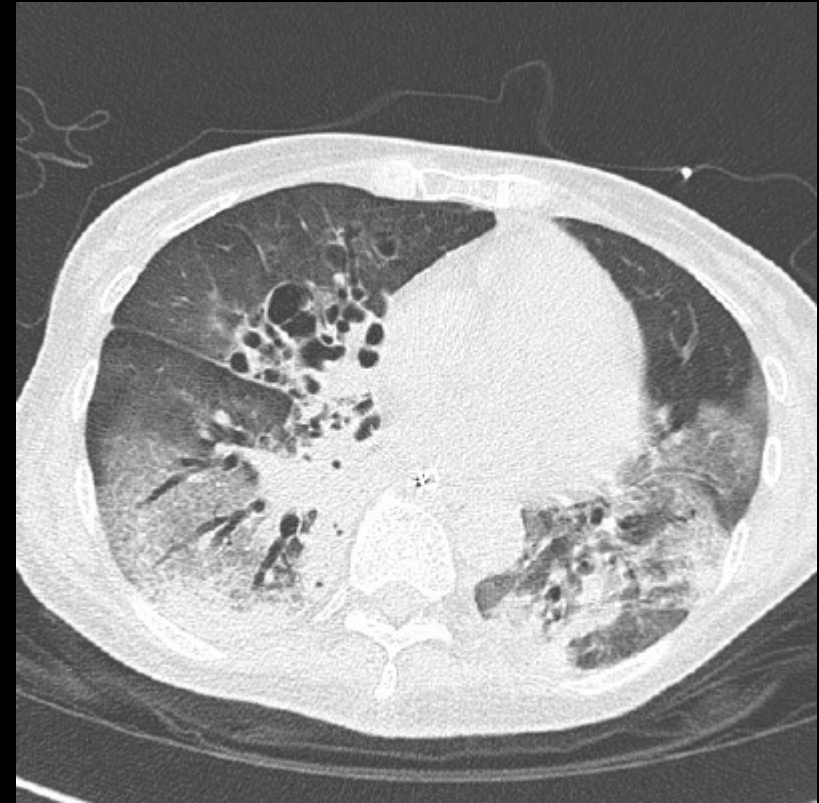


76F. CKD. HTN. DM. Dyslipidemia. Vaccine x1.  
Sore throat initially. Dyspnea & weakness one  
week later. Worse respiration for two days.  
SARS-Cov-2 Ag-, ETA Ct 27.5

# Typical presentation of COVID-19 pneumonia on CXR

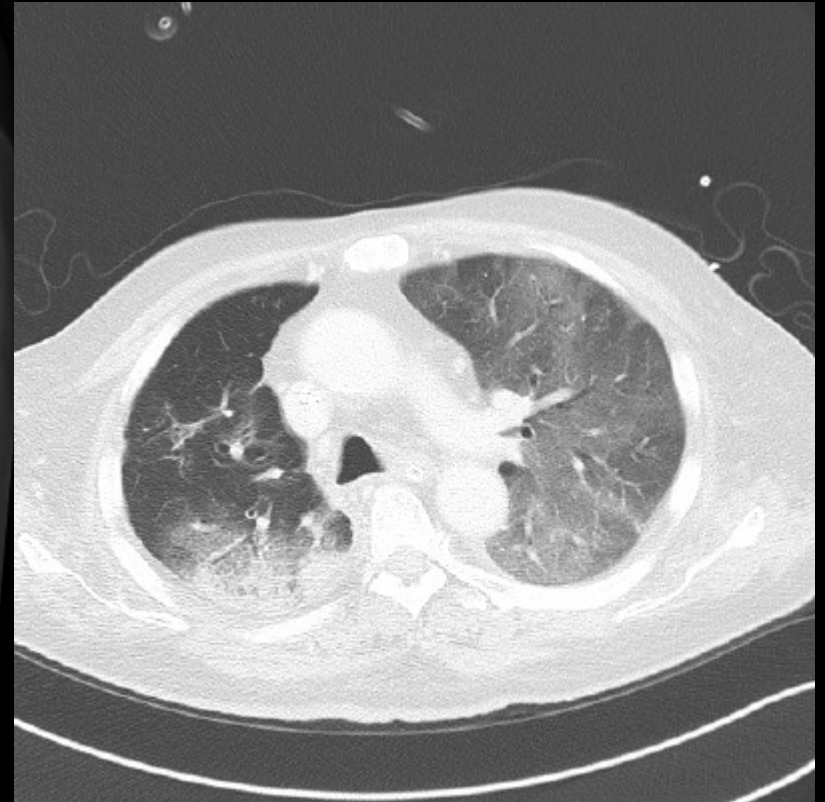
- airspace opacities, whether described as consolidation or, less commonly, GGO.
- Distribution: often **bilateral**, **peripheral**, and lower zone predominant.
- In contrast to parenchymal abnormalities, pleural effusion is rare (3%).

COVID-19 合并其他肺部感染



60 F. Cervical ca. DM. Depression.  
Fever. Dyspnea.  
*SARS-CoV-2 & Streptococcus pneumoniae*  
pneumonia





60 F. Lung ca. CKD. HTN.  
Dyspnea for 2 days.  
*SARS-CoV-2, Staphylococcus aureus, and  
Pneumocystis jiroveci pneumonia*



COVID-19 引起慢性疾病惡化



68 M. CAD. HFrEF. DM. Dyslipidemia. CKD.  
Fever and altered mental status.  
**Acute decompensated heart failure related to  
COVID-19**

# Prevalence of cardiovascular manifestations among patients with COVID-19

- Myocardial injury
  - 住院病人 15-42%
  - Associated with death
- Arrhythmias
  - 住院病人 10-30%
  - ICU 病人 30-50%
- Acute coronary syndrome
  - Case series
  - Cohort study including 924 patients with STEMI
  - 3% in pts having TTE
- Cardiomyopathy / AHDF
  - 住院病人 23-25%
  - TTE: LV 39%, RV 33%, myocarditis 3%, takotsubo 2%

Fauvel C. *Respir Med Res.* 2022;81:100904.

Maitz T. *Curr Probl Cardiol.* 2022;101186.

Dweck MR. *Eur Heart J Cardiovasc Imaging.* 2020;21(9):949-958.

# COVID-19 重症病人處置

# COVID-19 藥物治療：預防重症 需在發病後 5 天內給予

- Nirmatrelvir/ritonavir (Paxlovid®)
  - 口服 5 天
  - 腎臟不好不可用，藥物交互作用多
- Molnupiravir (Lagevrio®)
  - 口服 5 天，效果較差
  - 腎臟不好可用
- Remdesivir (Veklury®)
  - 靜脈注射 x3 天
  - 腎臟不好可用
- 單株抗體：新變種出來就沒效了

# COVID-19 肺炎住院病人藥物治療

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住院不用氧氣      不需要給類固醇或抗病毒藥

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使用一般氧氣  
設備      Dexamethasone + remdesivir  
+/- tocilizumab OR baricitinib

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使用 HFNC  
或是 NIV      Dexamethasone + remdesivir  
+ baricitinib OR tocilizumab

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插管 IMV      Dexamethasone  
+ baricitinib OR tocilizumab

# 請先確定真的是武漢肺炎

- 典型的 COVID-19 pneumonia 發生在開始有症狀之後的第 2 週，所以剛發病沒幾天就來住 ICU 的，不是 COVID-19 pneumonia 。
- COVID-19 pneumonia 專屬的治療 (dexamethasone, tocilizumab, baricitinib) ，都真的是在處理第 2 週以發炎為主的 COVID-19 pneumonia ，還沒發生或根本沒有 COVID-19 pneumonia 就用，只是讓病人增加併發症的風險而沒有好處。

# COVID-19 重症病人 Bacterial co-infection rate

## 5.5 – 28%

研究多為 2020-2021, omicron 未出現

- Lansbury L. *J Infect.* 2020;81(2):266-275.  
Kreitmann L. *Intensive Care Med.* 2020;46(9):1787-1789.  
Contou D. *Ann Intensive Care.* 2020;10(1):119.  
Elabbadi A. *Infection.* 2021;49(3):559-562.  
Saade A. *Ann Intensive Care.* 2021;11(1):83.  
Baskaran V. *J Med Microbiol.* 2021;70(4):001350.  
Musuuza JS. *PLoS One.* 2021;16(5):e0251170.  
Morris AC. *Crit Care.* 2022;26(1):236.



# COVID-19 重症病人 要不要用抗生素？個人作法

## 不用

- 典型 COVID-19 肺炎
  - 發病後 7-14 天呼吸喘
  - 沒有黃痰
  - 影像典型 ( 週邊 GGO )
- 單純 COVID-19 引起  
慢性病急性惡化

## 用

- 肺炎但不像武漢肺炎
  - 太早 ( 5 日內 ) 出現
  - 黃痰
  - 影像不典型
- 休克需使用高劑量生  
壓劑，須懷疑非呼吸  
道感染

# COVID-19 重症病人靜脈血栓發生率高 如無出血，建議給抗凝血劑

All VTE

Pulmonary embolism

14.3 – 27.9%

8.6 – 24.7%

Suh YJ. *Radiology*. 2021;298(2):E70-E80.

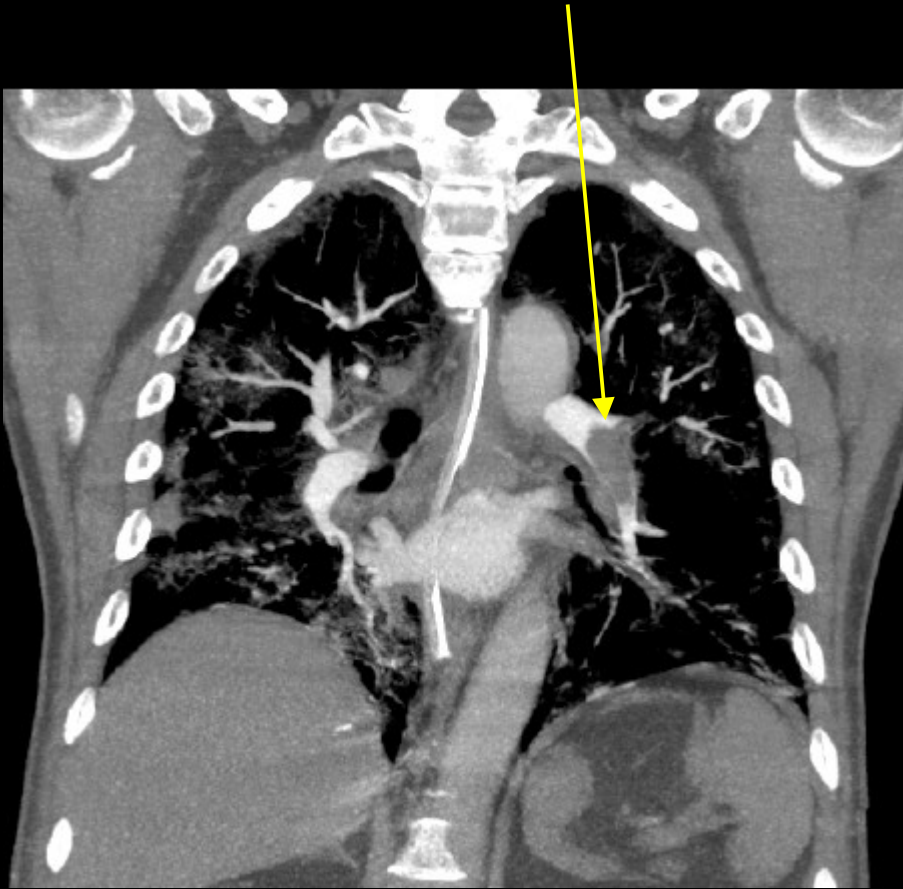
Porfidia A. *Thromb Res*. 2020;196:67-74.

Tan BK. *Thorax*. 2021;76(10):970-979.

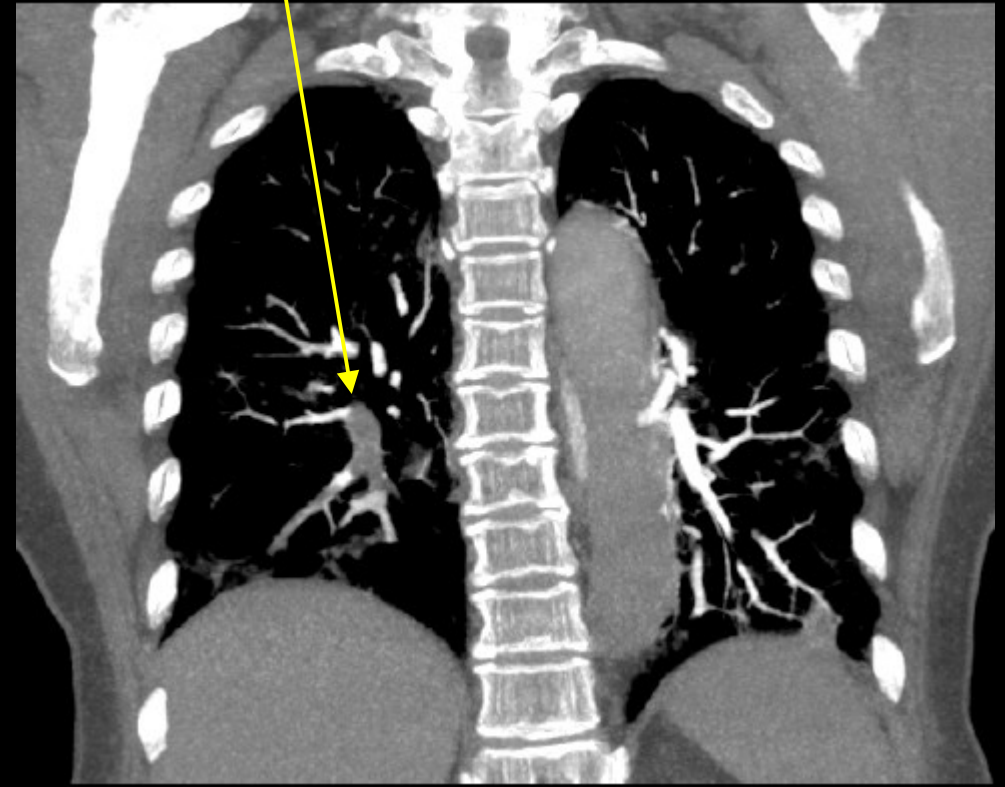
Ng JJ. *J Intensive Care*. 2021;9(1):20.

Fujiwara S. *J Infect Chemother*. 2021;27(6):869-875.

# COVID-19 with pulmonary embolism



66M. HTN.  
CAPA+



70F. HTN.  
CAPA+

如果要**做 chest CT**，就**直接排 CT angiogram** 吧

# COVID-19 重症病人院內感染機會大 住院過程需小心處理

呼吸器相關肺炎

血流感染

26 – 50%

15 – 26%

Rouzé A. *Intensive Care Med.* 2021;47(2):188-198.

Ferreira FC. *Ann Intensive Care.* 2021;11(1):92.

Giacobbe DR. *J Clin Med.* 2021;10(4):555.

Ferrando C. *Rev Esp Anesthesiol Reanim (Engl Ed).* 2020;67(8):425-437.

Buetti N. *Intensive Care Med.* 2021;47(2):180-187.

Grasselli G. *Chest.* 2021;160(2):454-465.

# VAP after COVID-19 is very common in french ICUs

Number of VAP episodes	All patients (n=259)	Delta (n=111)	Omicron (n=148)
0	42 (33.07%)	16 (26.67%)	26 (38.81%)
1	42 (33.07%)	22 (36.67%)	20 (29.85%)
2	28 (22.05%)	10 (16.67%)	18 (26.8%)
3	15 (11.81%)	11 (10.09%)	3 (4.48%)
CAPA	18 (7.06%)	11 (10.09%)	7 (4.79%)

CAPA: COVID-19 associated pulmonary aspergillosis

de Prost N. *Nat Commun.* 2022;13(1):6025.

# COVID-19 病人使用 HFNC 及 NIV

- For adults with COVID-19 and acute hypoxemic respiratory **failure despite conventional oxygen therapy, the Panel recommends starting therapy with HFNC oxygen**; if patients fail to respond, NIV or intubation and mechanical ventilation should be initiated (BIIa).
- For adults with COVID-19 and acute hypoxemic respiratory failure who **do not have an indication for endotracheal intubation and for whom HFNC oxygen is not available**, the Panel recommends performing a **closely monitored trial of NIV** (BIIa).

# A systematic review & meta-analysis before the COVID-19 era

- HFNC decreased tracheal intubation
  - OR 0.62 (compared to conventional O2 therapy)
  - OR 0.48 (compared to NIV)
- HFNC decreased ICU mortality
  - OR 0.47 (compared to conventional O2 therapy)
  - OR 0.36 (compared to NIV)
- No effect on ICU length of stay (LOS)

# NIV v.s. HFNC v.s. 一般給氧 (COVID-19)

JAMA<sup>®</sup>

**QUESTION** What is the effect of continuous positive airway pressure (CPAP) or high-flow nasal oxygen (HFNO) vs conventional oxygen therapy on the risk of tracheal intubation or mortality in patients with acute hypoxemic respiratory failure due to COVID-19?

**CONCLUSION** Among patients with acute hypoxemic respiratory failure and COVID-19, an initial strategy of CPAP significantly reduced the risk of tracheal intubation or mortality vs conventional oxygen therapy but there was no significant difference with HFNO.

## POPULATION

844 Men  
429 Women



Adults with  
COVID-19-related  
acute hypoxemic  
respiratory failure

Mean age: 57 years

## LOCATIONS

48 Acute care  
hospitals in the  
UK and Jersey



## INTERVENTION



380

### CPAP

Administered  
per local  
protocols

1273 Patients randomized  
1260 Patients analyzed

418

### HFNO

Administered  
per local  
protocols



475

### Conventional oxygen therapy

Standard of care;  
oxygen via  
nasal cannula

## PRIMARY OUTCOME

A composite of tracheal intubation or mortality within 30 days

## FINDINGS

Tracheal intubation or mortality within 30 days

**CPAP: 36.3%** (137 of 377 patients)

**HFNO: 44.3%** (184 of 415 patients)

### Conventional oxygen therapy

**vs CPAP: 44.4%** (158 of 356 patients)

**vs HFNO: 45.1%** (166 of 368 patients)

CPAP vs conventional therapy was significant.  
Absolute difference, **-8%** (95% CI, -15% to -1%)

HFNO vs conventional therapy was not significant.  
Absolute difference, **-1%** (95% CI, -8% to 6%)



# HFNC v.s. 一般給氧 (COVID-19)

- A RCT including 220 patients with P/F < 200.
  - Lower intubation rate in the HFNC group  
34.3% v.s. 51.0%, HR 0.62 (0.39 – 0.96)
  - Shorter median time to recovery  
11 days v.s. 14 days, HR 1.39 (1.00 – 1.92)
- A RCT including 364 patients with SpO<sub>2</sub> ≤ 92%
  - No significant difference in escalation of oxygen device, clinical recovery, ICU admission, LOS.

Ospina-Tascón GA. *JAMA*. 2021;326(21):2161-2171.

Crimi C. *Thorax*. 2023;78(4):354-361.

# 清醒俯臥 (awake self proning)

2020 年起 COVID-19 疫情時開始流行

血氧會上升

可以減少一點插管 (↓6%)

死亡率沒差

**NIH 建議：還沒面臨插管的病人可嘗試**

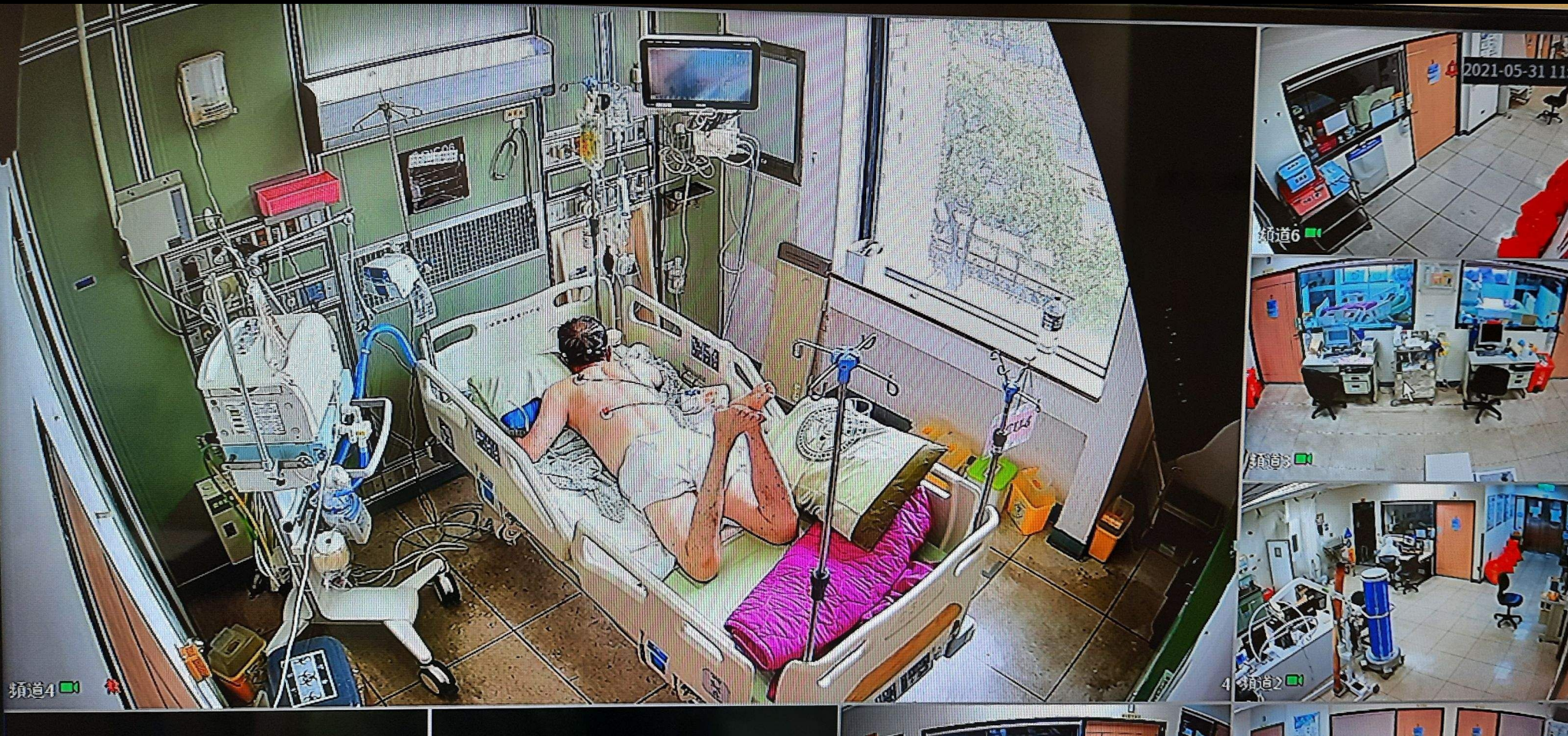
Ehrmann S. *Lancet Respir Med.* 2021;9(12):1387-1395.

Alhazzani W. *JAMA.* 2022;327(21):2104-2113.

NIH. COVID-19 Treatment Guidelines. <https://www.covid19treatmentguidelines.nih.gov/>



# A patient on HFNC, awake prone positioning, up to 13.5 hr/d





# COVID-19 病人通氣策略 和一般重症病人相同

- 使用較低的潮氣量 (4–8 ml / kg PBW) 和較低的吸氣高原壓力 (plateau pressure < 30 cmH<sub>2</sub>O)
- 對於重度 ARDS 的成人患者，建議每天應進行至少 12-16 小時俯臥式通氣 (prone ventilation)
- 對沒有組織灌注不足的 ARDS 患者使用保守性的液體管理策略。
- 中度或重度 ARDS 患者，建議使用較高的 PEEP，不建議常規使用 NMBA 持續輸注。
- 肺部保護性通氣後仍有低血氧症的患者，是否需使用 ECMO，應由具有相關醫療專業的團隊評估。

# 之前的 PPE



2021



2022

# 2023 的 COVID-19 PPE

一般接觸病人的醫療照護<sup>註2</sup>

口罩、手套



接觸血體液/分泌物風險之醫療照護

、呼吸道檢體採檢、環境清潔

口罩、手套、防水隔離衣



引發飛沫微粒醫療處置

N95、手套、防水隔離衣、護目裝備





# Tracheal intubation

- 防水隔離衣
- 面罩 + N95 or PAPR
- 負壓環境（如有）
- 儘量避免手動通氣（請成功率最高者上場）
- Paralytics
- 影像式喉頭鏡
- 使用 EtCO<sub>2</sub> 偵測器確認位置
- 備妥 SGA 及 FONA





# 流感併發重症

# Severe influenza in Taiwan, 2016

Taiwan Severe Influenza Research Consortium

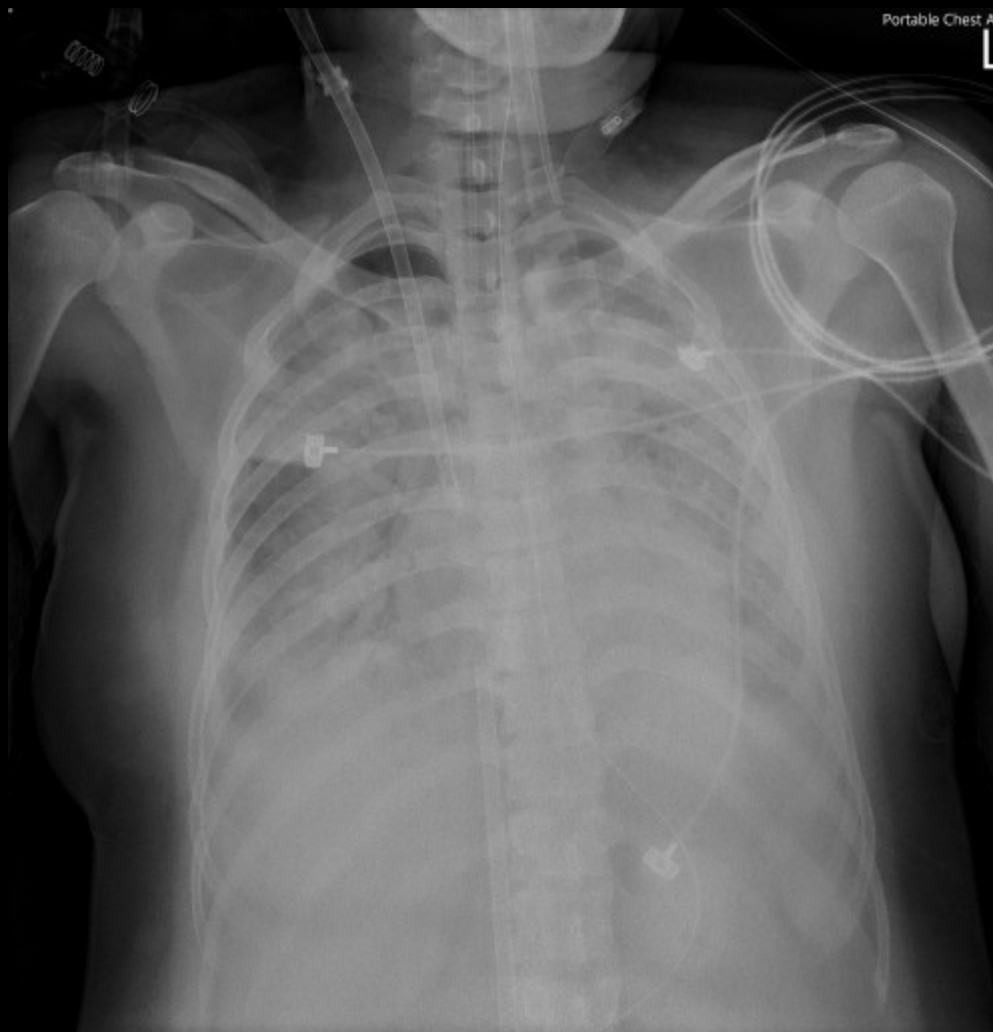
- 336 patients admitted to ICUs in 8 hospitals
  - Age 61.4 y; Male 62.8%
  - IMV 288 (85.7%); ARDS in 263; ECMO in 50 pts
- Mortality ~ 18.6%
- Predictors of better survival
  - negative day 1-4 cumulative fluid balance
- Associated with worse survival
  - high driving pressure; high tidal volume
  - Earlier treatment and higher dose corticosteroid

Chao WC. PLoS One. 2018;13(1):e0190952.

Chan MC. J Formos Med Assoc. 2019;118:378-385.

Tsai MJ. Ann Intensive Care. 2020;10(1):26.

Kao KC. Ann Intensive Care. 2018;8(1):94.



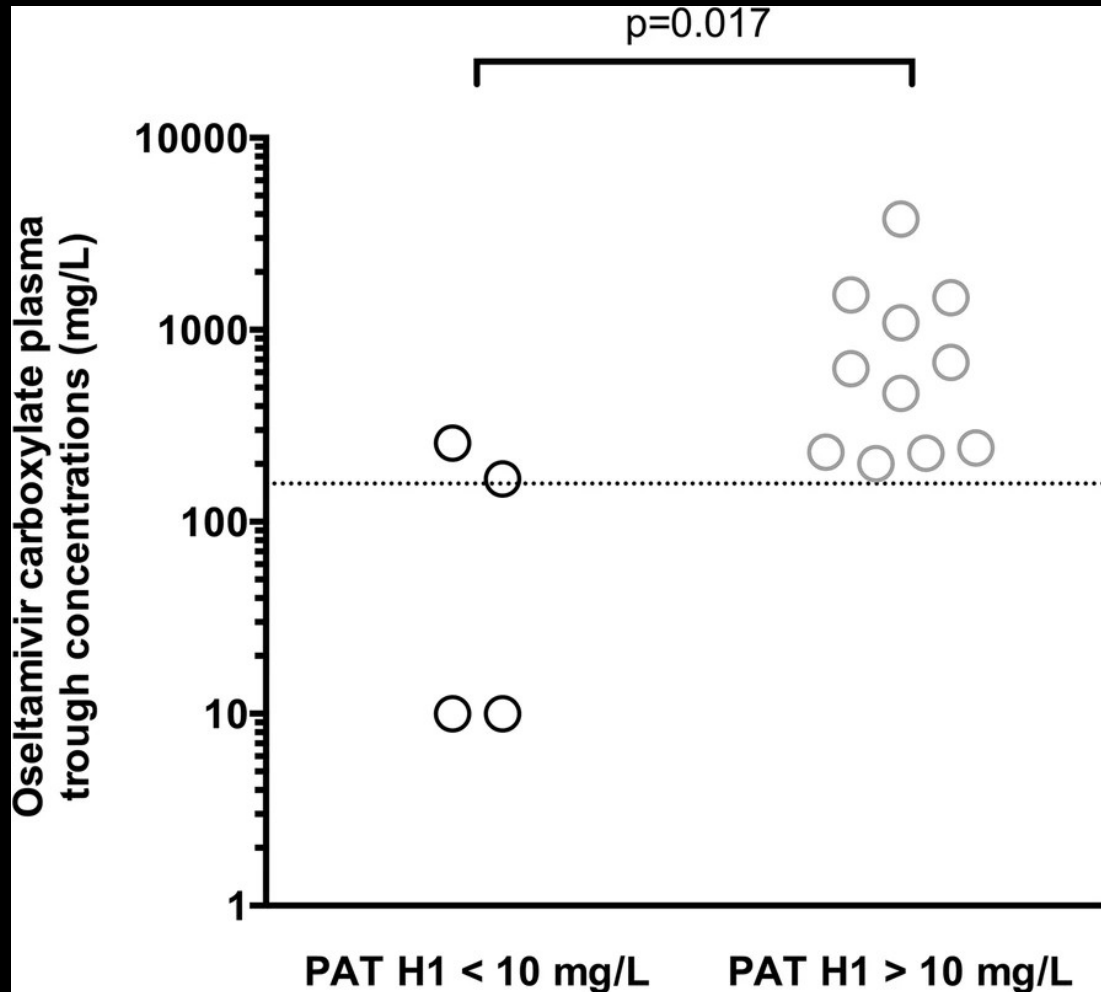
42 F. no known chronic disease.  
Productive cough and rhinorrhea for one week.  
Fever and chills for 4 days.  
Severe Influenza A (H1).  
Severe ARDS. s/p V-V ECMO

# Influenza 重症病人處置

# 流感重症病人使用抗病毒藥物

- 首選：口服 oseltamivir
  - 資料最多（但無 v.s. placebo 的 RCT）
  - meta-analysis 顯示住院及重症病人死亡率下降  
OR 0.81 (0.70-0.93) 及 0.72 (0.56-0.94)
  - 多數重症病人腸道吸收血中藥物濃度和一般病人接近
- 消化功能明顯不良的病人：peramivir (IV)
  - 療效和副作用與口服 oseltamivir 無差異

# 用 acetaminophen 來測 oseltamivir 吸收效果



口服 acetaminophen  
一小時後抽血中濃度  
超過 10 mg/L

oseltamivir 血中濃度  
就會達到治療標準

# No routine corticosteroid use for critically ill patients with influenza

- IDSA guideline 2018: Clinicians **should not administer corticosteroid** adjunctive therapy for the treatment of adults or children with suspected or confirmed seasonal influenza, influenza-associated pneumonia, respiratory failure, or ARDS, **unless clinically indicated** for other reasons (A-III).
- No RCT, but nearly all observational study show possible harm.

# Bacterial co-infections in influenza

- 0.5% in young healthy individuals
- At least 2.5% in older individuals and those with predisposing conditions
- 34% of ICU patients
- High risk patients
  - Age  $\geq 65$  y or  $< 5$  y
  - Pregnant woman
  - Morbid obesity
  - Pre-existing medical conditions





# Co-pathogens in the US

- 2003-04

- 959 adults with influenza
- 125 needed intubation
- 97 with co-infection
  - *S. aureus* 31
  - MRSA 24
  - *S. pneumoniae* 16
  - *S. pyogenes* 2
  - Other 4

- 2009-10

- Bacterial infection in 13 – 55% fatal cases
- 77 lung tissue specimens
  - *S. pneumoniae* 10
  - *S. aureus* 7
  - MRSA 5
  - *S. pyogenes* 6
  - *S. mitis* 2
  - Other 5



# Co-pathogens in Spanish ICUs

- 2009 – 2015, 184 ICUs in Spain, 2901 patients
- Patients with co-infections: 482 (16.6%)

<i>Streptococcus pneumoniae</i>	246	51.0%
<i>Pseudomonas aeruginosa</i>	55	11.4%
MSSA	42	8.7%
<i>Aspergillus spp</i>	35	7.2%
<i>Haemophilus influenzae</i>	17	3.5%
<i>Acinetobacter baumannii</i>	14	2.9%
MRSA	12	2.4%
<i>Klebsiella pneumoniae</i>	12	2.4%

# Co-pathogens in Taiwan

- 7 centers, 2016/01 – 03: 39%
  - Methicillin-sensitive *Staphylococcus aureus* 12
- Chi-Mei H 2015/01 – 2016/03: 31% within 48h
  - *Klebsiella pneumoniae* 14 *Pseudomonas aeruginosa* 12
  - *Staphylococcus aureus* 12 (MRSA: 9)
  - *Aspergillus* spp 21 (beyond 48 h)
- NCKUH 2017/01 – 2018/06: 43% within 7 days.
  - *Klebsiella pneumoniae* 12 *Aspergillus* spp 8
  - *Staphylococcus aureus* 8 (MRSA: 4)
  - *Pseudomonas aeruginosa* 5

# Influenza-associated pulmonary aspergillosis

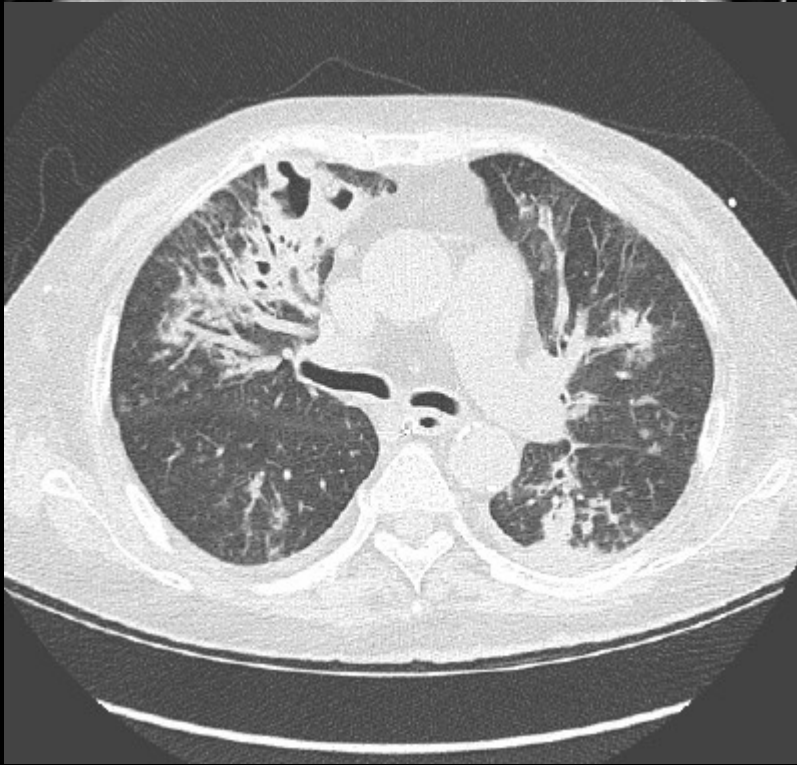
- Prevalence 5-19% among critically ill patients with influenza
- Short interval from diagnosis of influenza to pulmonary aspergillosis
  - Prophylaxis not practicable
- Associated with high mortality: 49-61%



endotracheal aspirate, Gram stain. 1,000x



- 76-year-old woman
- ESRD s/p kidney transplantation, DM
- Influenza A (H1)
- Concurrent infections
  - *Staphylococcus aureus*
  - *Klebsiella pneumoniae*
  - *Aspergillus terreus* complex
  - *Cunninghamella* spp.
  - Cytomegalovirus



# 流感病人有肺炎 建議經驗性抗生素需涵蓋

Methicillin-sensitive *Staphylococcus aureus*

*Streptococcus pneumoniae*

*Klebsiella pneumoniae*

部份病人需考慮，應努力尋找相關證據

MRSA, *P. aeruginosa*, *Aspergillus* spp

通氣策略

同 COVID-19

# Extrapulmonary complications of influenza

- Cardiac
  - Myocarditis and cardiomyopathy
  - Heart failure
  - Pericardial effusion
  - Myopericarditis
  - Arrhythmia
- Neurologic
  - Encephalopathy, encephalitis, meningitis
  - Seizure
  - Guillains–Barre syndrome
- Other
  - Rhabdomyolysis
  - Acute kidney injury
  - Miscellaneous



# 其他呼吸道病毒

- Respiratory syncytial virus (RSV)
  - A & B
- Human metapneumovirus
  - A & B
- Enterovirus
- Rhinovirus
- Adenovirus
- Parainfluenza virus
  - 1-4
- Coronavirus
  - SARS, MERS
  - NL63, OC43, HKU1, 229E
- Bocavirus

# 在國外的 ICU 比 influenza 多

*Clin Infect Dis.* 2014;59:62-70.

rhinovirus



adenovirus

coronavirus

*Critical Care.* 2016;20:375

influenza virus



rhinovirus

coronavirus

*Chest.* 2018;154:84-90.

rhinovirus



influenza A

RSV

*Crit Care Med* 2018;46:29–36

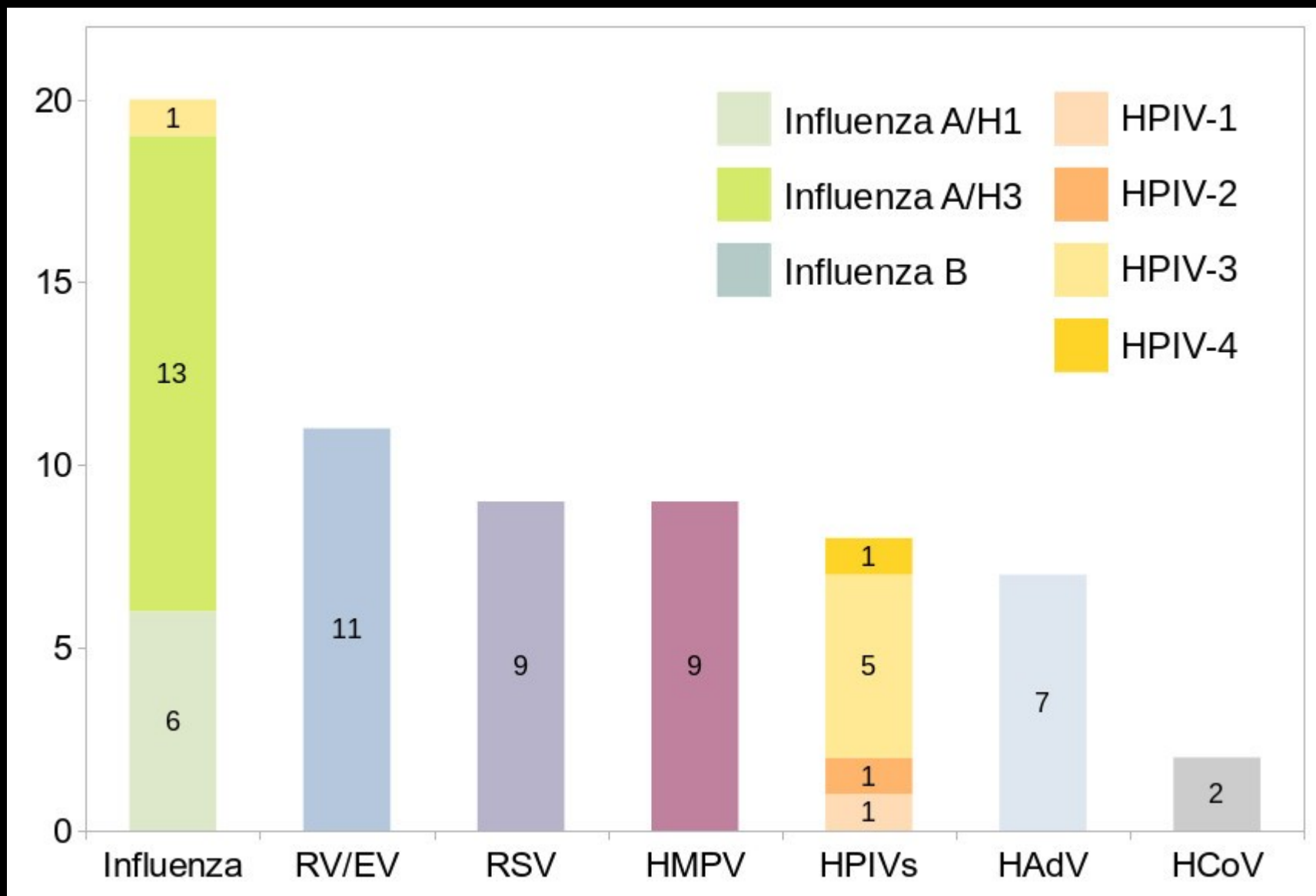
parainfluenza virus 3

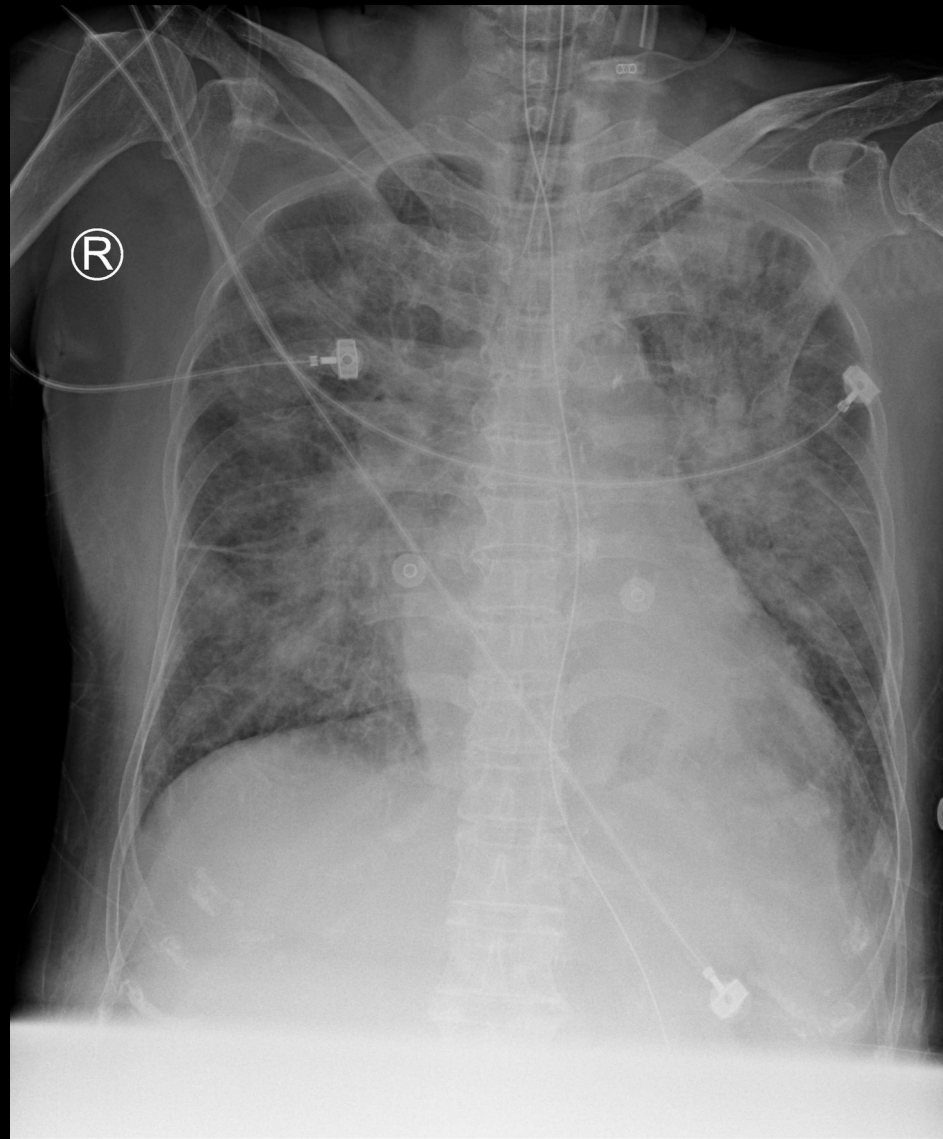


rhinovirus

coronavirus

# 在台灣 ICU 也不少見

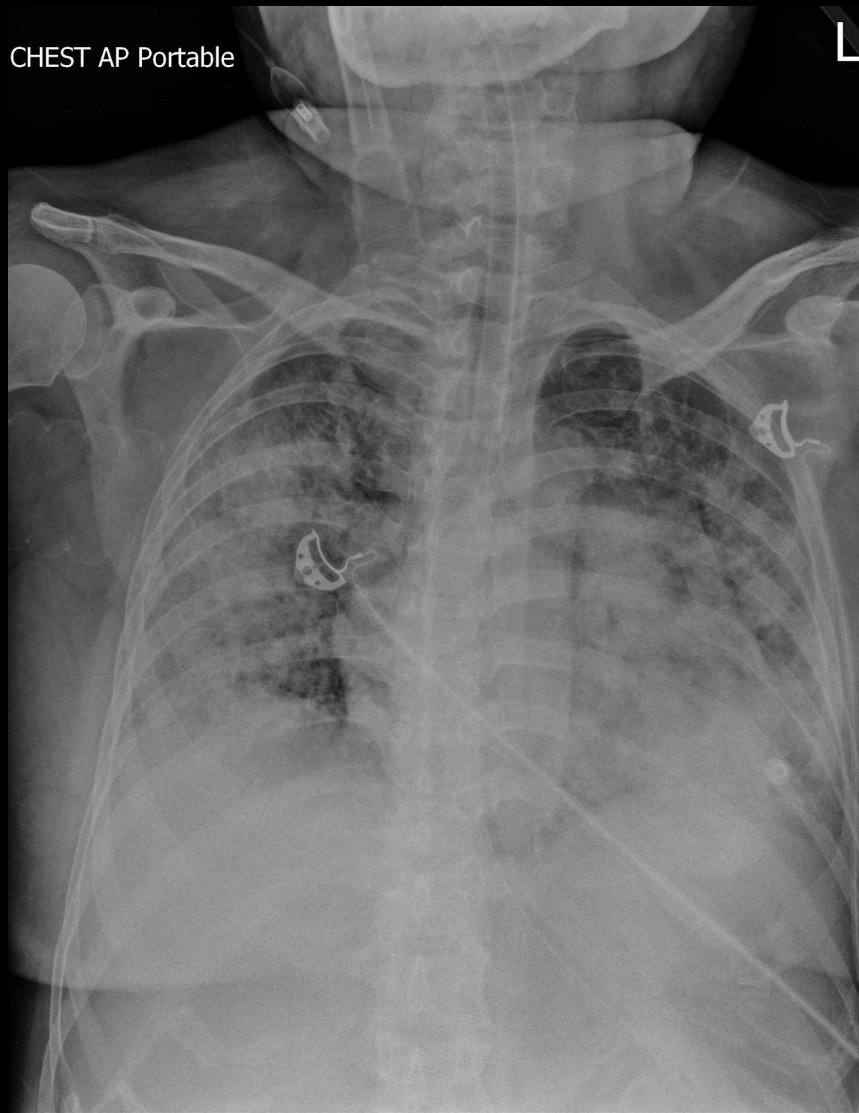




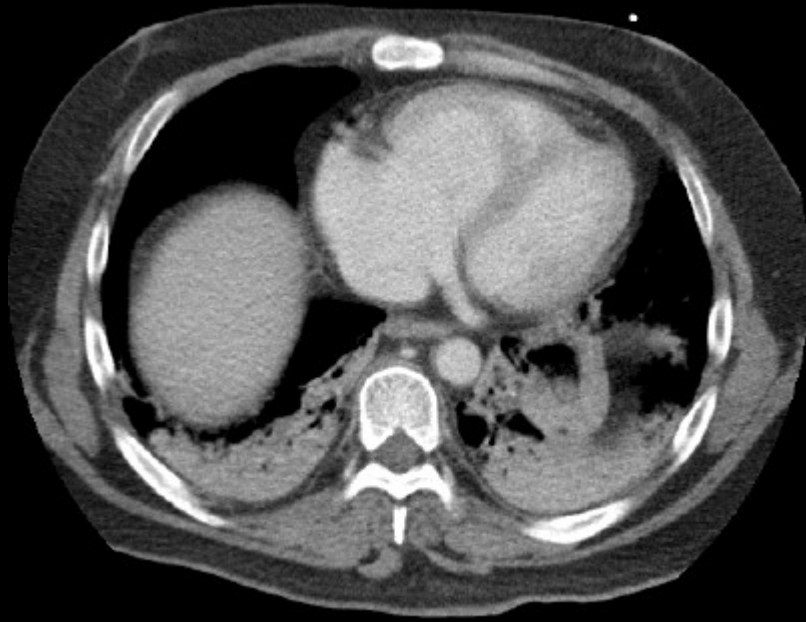
63 F. HTN. HFpEF. Dyslipidemia  
Upper airway symptom for 3 days. Dyspnea.  
**Parainfluenza virus 3 pneumonia**

CHEST AP Portable

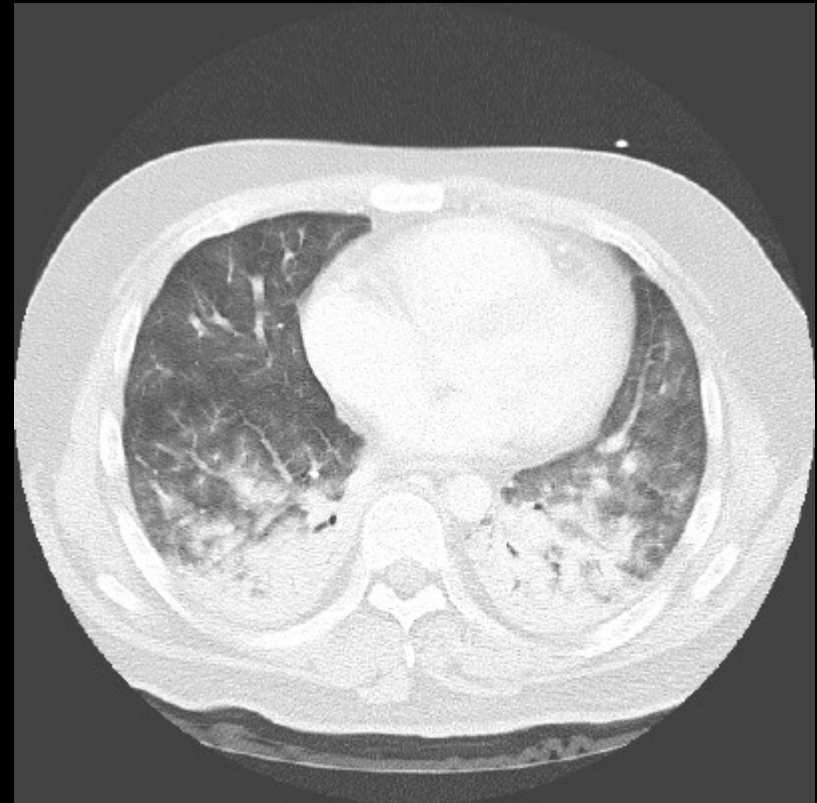
L



55 F. DM. IDA. Dyslipidemia.  
Fever and URI symptom for 5 days. Dyspnea.  
**Human metapneumovirus pneumonia**



Dilated RA, RV



Bilateral GGOs  
BLL consolidatoin

30 M. No chronic disease.  
URI symptom for 4 days. Dyspnea.  
IHCA at ED. Withdrawal of ECMO on D9.  
**RSV pneumonia**

# 其他呼吸道病毒感染也可以很嚴重

## Human metapneumovirus

- Shock 60.7%, IMV 50% MV, ICU mortality 14.3%



Vidaur L. *Ann Intensive Care*. 2019;9(1):86.

- Pressor use 23%, IMV 55%, mortality 18%



Hasvold J. *J Crit Care*. 2016;31(1):233-7.

- 402 patients, 26 admitted to ICU
- in-hospital mortality 30.8%




Kapandji N. *Ann Intensive Care*. 2023;13(1):21.

# 其他呼吸道病毒感染也可以很嚴重

## RSV

- IMV 36.6%, In-hospital mortality 23.9% 
- No difference from severe influenza in ICUs

Coussement J. *Chest*. 2022;161(6):1475-1484.

- Septic shock 51%, IMV 89% 
- Bacterial co-infection 28.3%
- 30d mortality 26.1%, in-hospital mortality 43.5%
- comparable to influenza-associated pneumonia.

Kim T. *Open Forum Infect Dis*. 2023;10(4):ofad131.



# 其他呼吸道病毒感染 抗病毒藥物有限，資料也少

RSV

ribavirin

adenovirus

cidofovir

RNA viruses

Favipiravir

血液動力  
呼吸照護  
俯臥通氣  
ECMO 時機  
與一般重症及 COVID-19 相同

# 重症照護 = 嚴謹的支持性治療



Nida Qadir, MD   
@NidaQadirMD

Supportive care is much less exciting than the idea of a single magic bullet to “cure” covid-19, but such a panacea has never existed in critical illness. #COVID19 will not be different. Steroids & #Remdesivir may be helpful, but they’ll be useless w/o meticulous supportive care.

<https://twitter.com/NidaQadirMD/status/1287443875167051776>

- 密切監測
  - 心律 / 血壓 / 血氧
  - 動脈導管 / 心輸出
  - 隨時有人看
- 器官支持
  - 氧氣 / 呼吸器 / 俯臥
  - 升壓劑 / 強心劑
  - IABP / ECMO
  - 腎臟替代療法

# Take Home Messages

- 呼吸道病毒感染的重症照護，最重要的是嚴謹的支持性療法
- 流行季、接觸史、上呼吸道症狀是重要線索，查不到原因的呼吸道重症也該檢驗呼吸道病毒
- 典型 COVID-19 肺炎是在發病後第二週出現，發炎成份明顯，除了抗病毒藥之外也需使用類固醇 /tocilizumab / bacricinitib 等免疫抑制劑
- 其他呼吸道病毒感染目前不建議常規使用類固醇
- 要小心 co-infection ，也不要因此濫用抗生素