



社團法人台灣感染管制學會

COVID-19的前瞻與反思

陳柏齡

成大醫院 感染管制中心

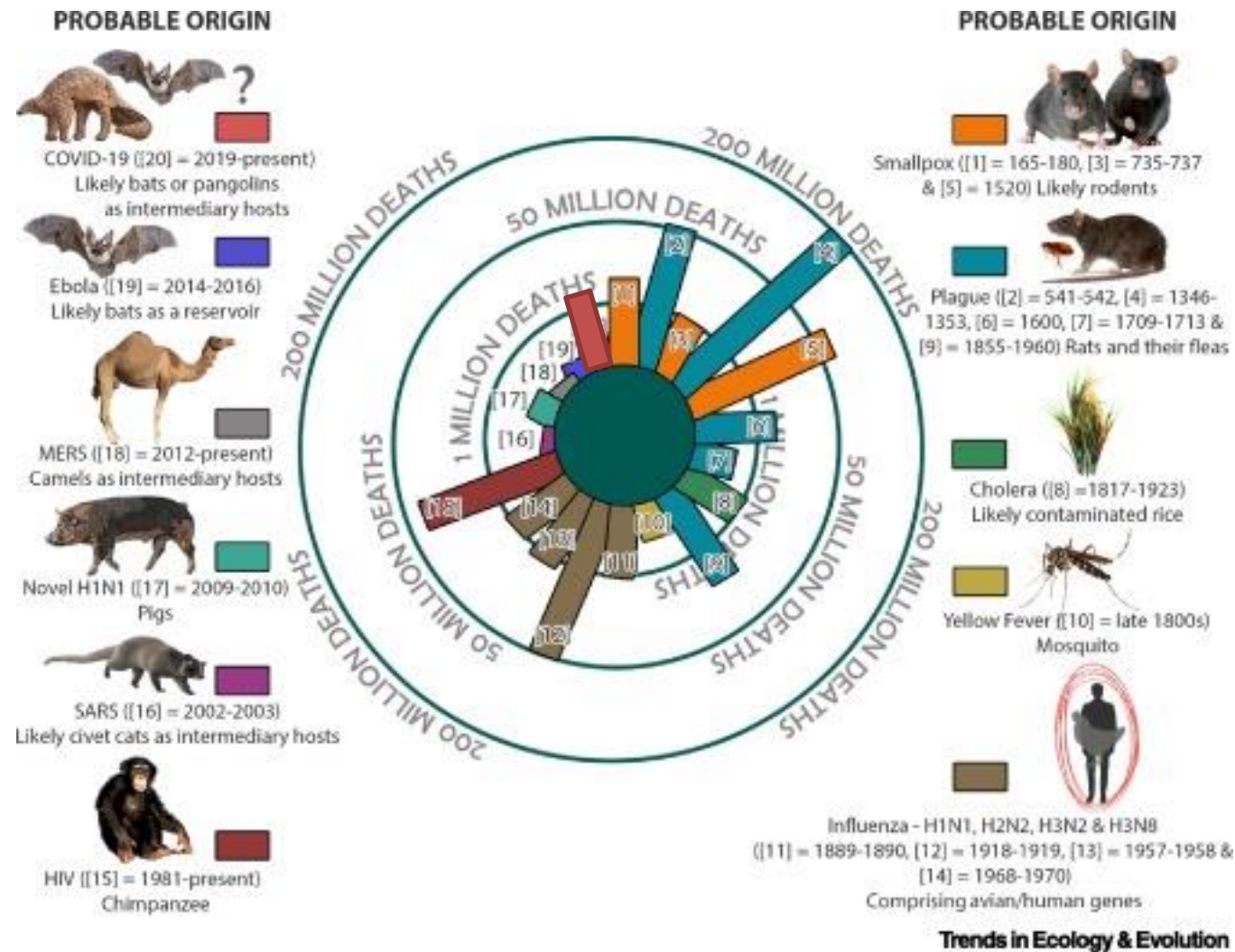
成大醫院 感染科



演講大綱

- 病毒演化
- 疫情現況
- 病毒檢驗
- 藥物治療
- 疫苗預防
- 未來展望

引起全世界大流行的人畜共通感染症



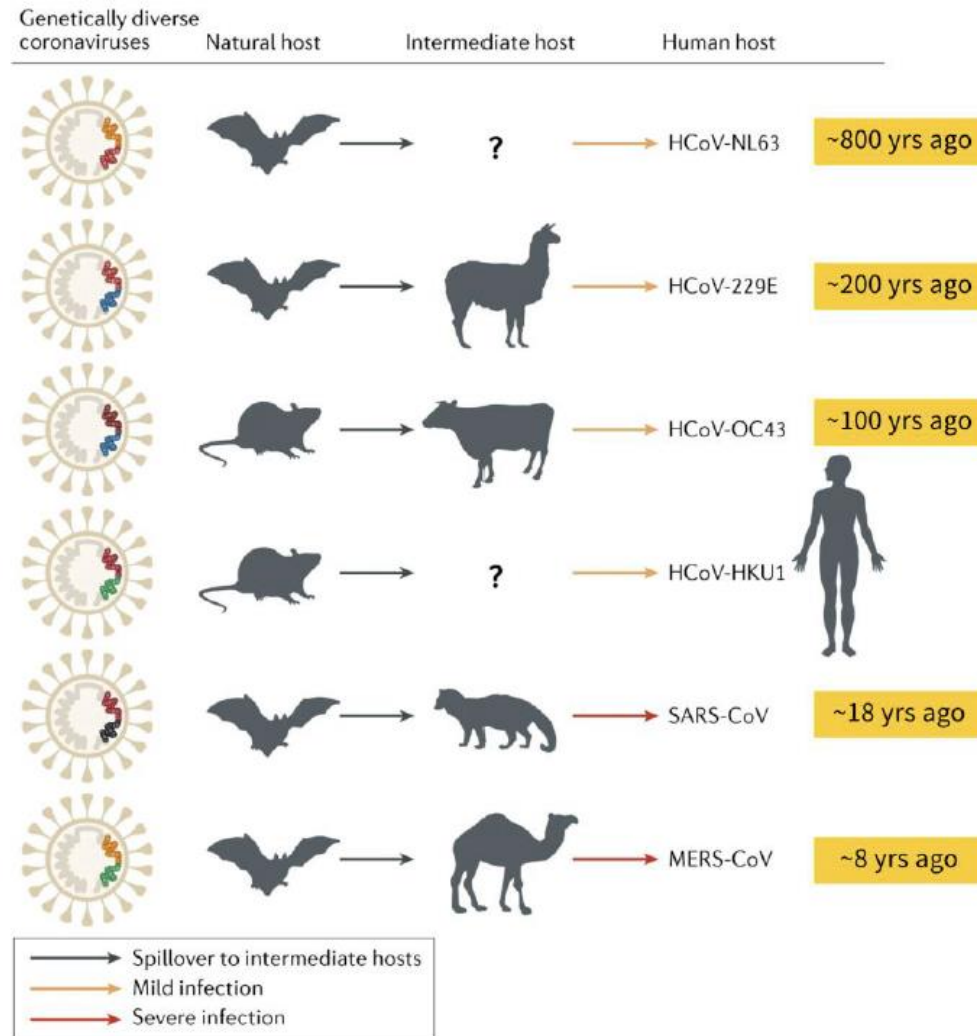
Modified figure originally from Trends in Ecology & Evolution, 2020, 35(9): 748-750

To Prevent Next Coronavirus, Stop the Wildlife Trade

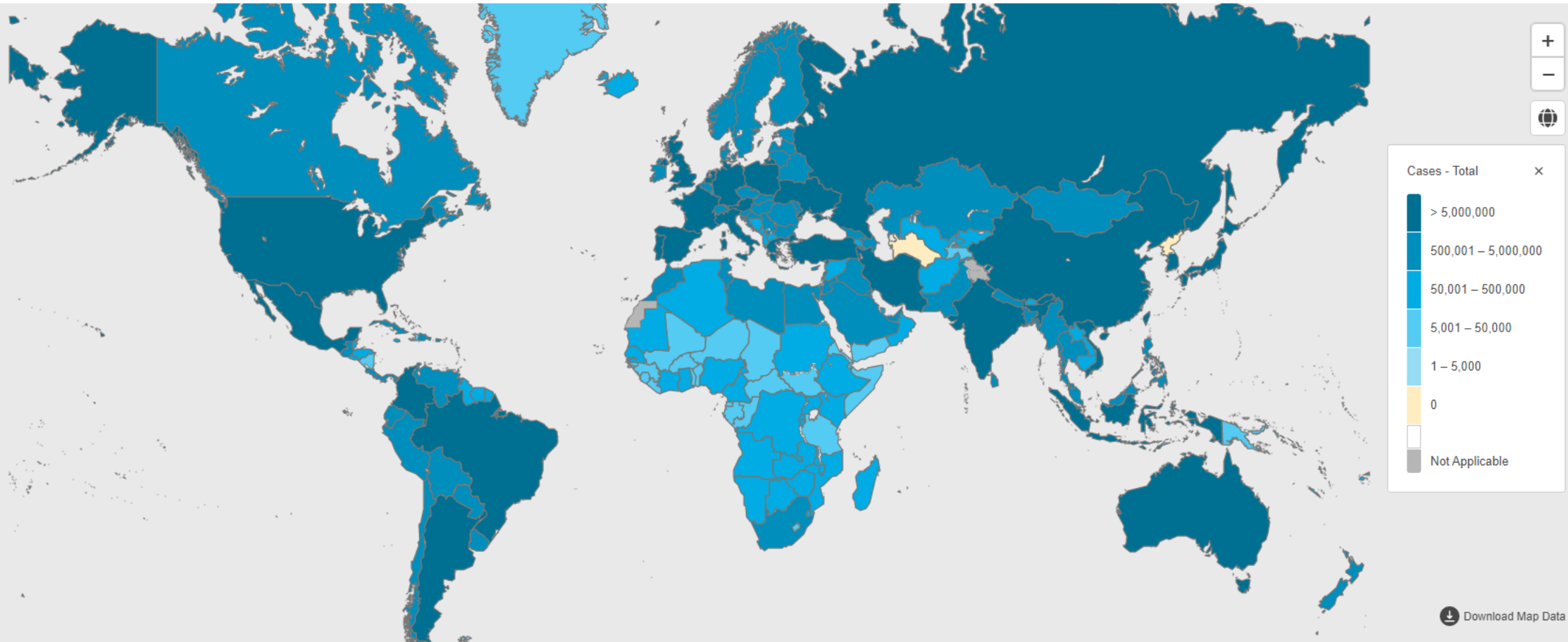




冠狀病毒的天然宿主與中間宿主



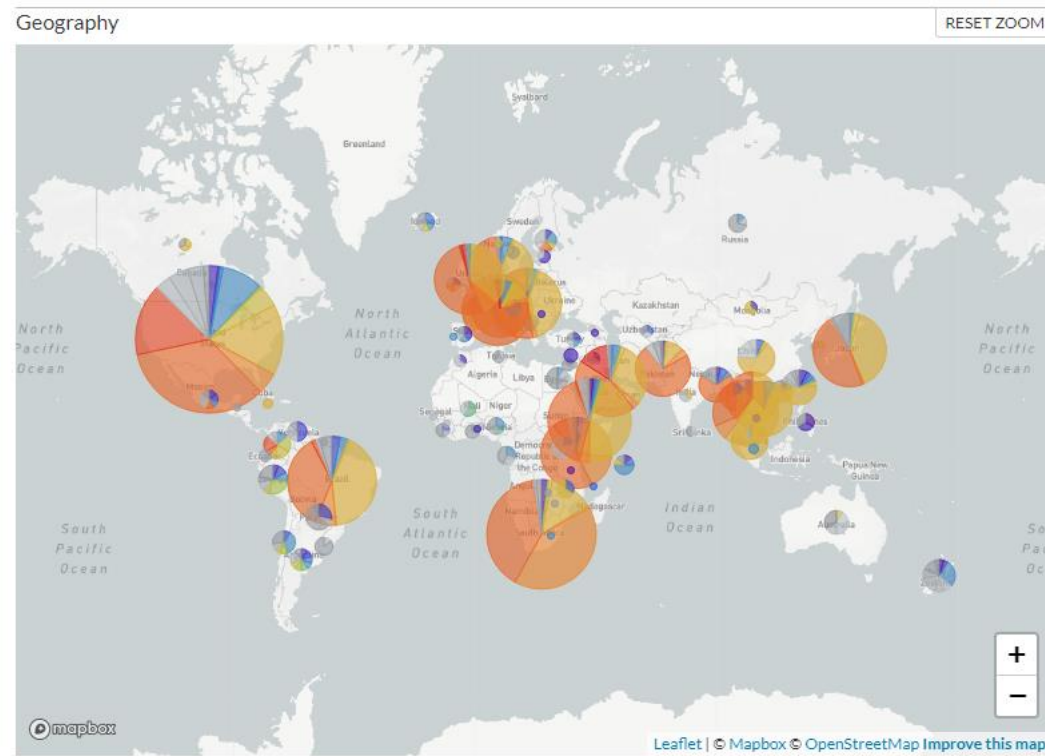
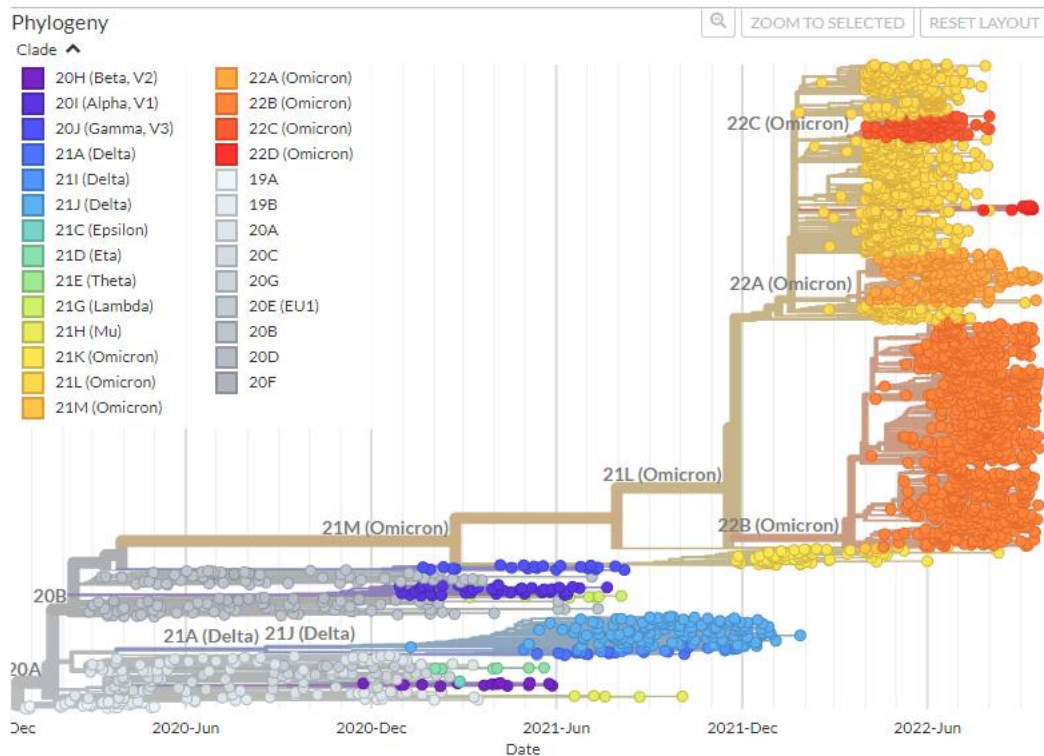
WHO Coronavirus (COVID-19) Dashboard

[Overview](#)[Measures](#)[Table View](#)[Data](#)[More Resources](#)

Globally, as of 5:38pm CEST, 24 October 2022, there have been 624,235,272 confirmed cases of COVID-19, including 6,555,270 deaths,

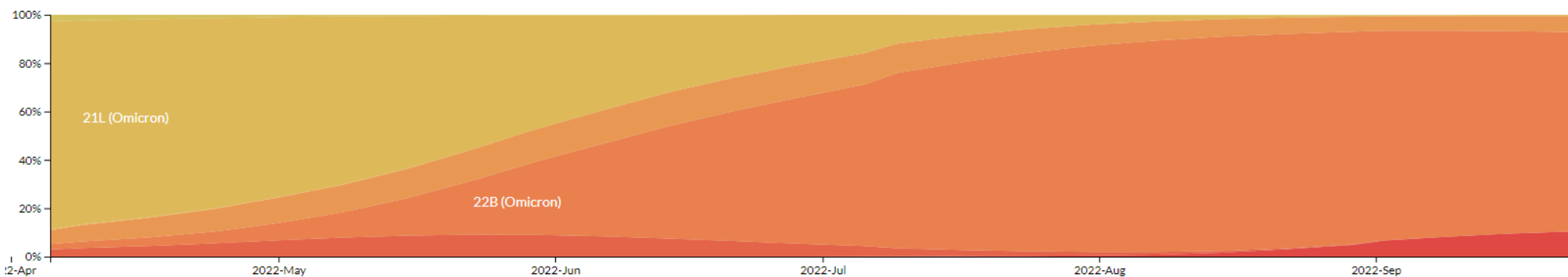
25 October 2022

<https://covid19.who.int/>



4 Oct 2022

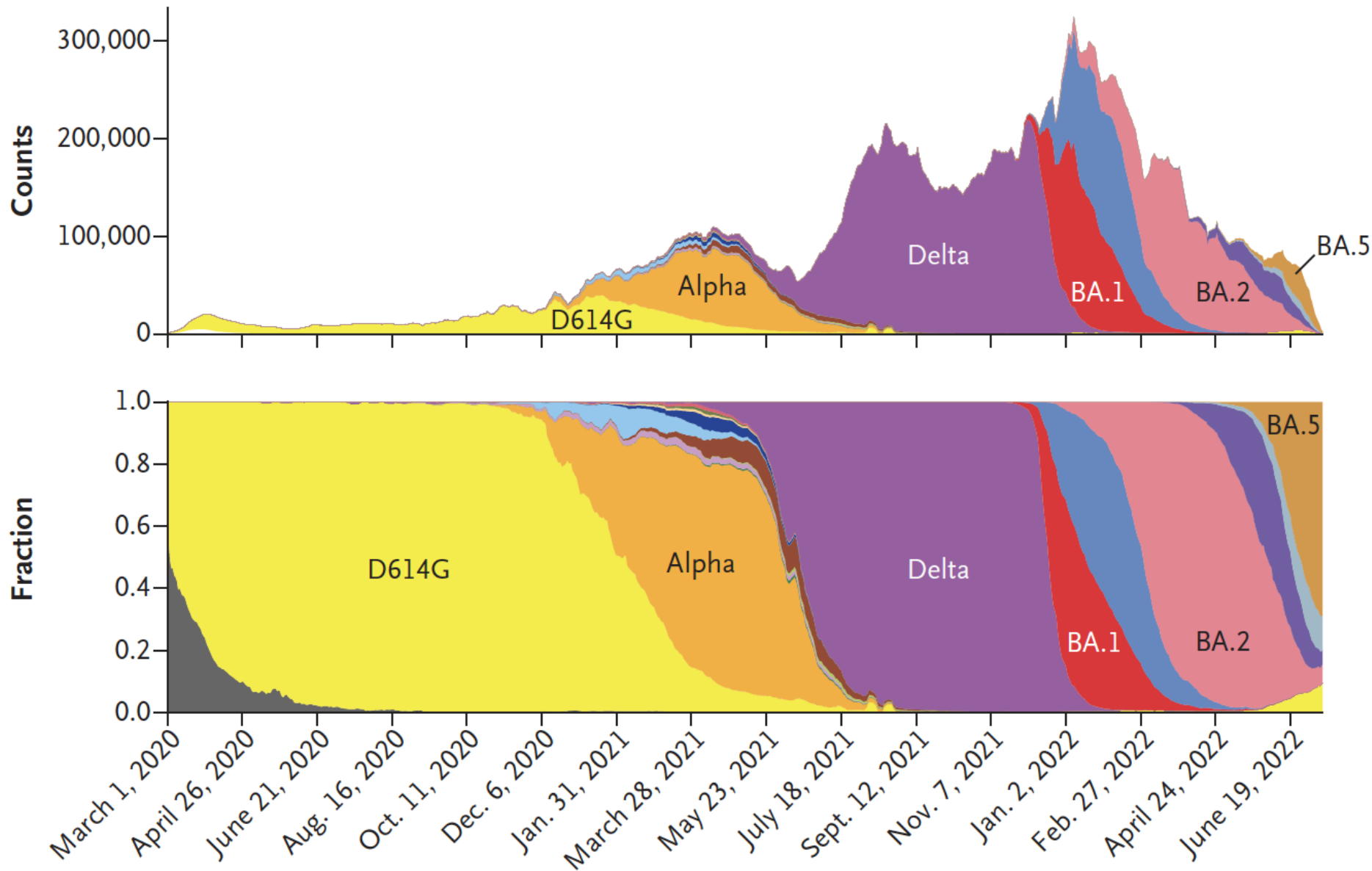
Frequencies (colored by Clade)



21L: BA.2
22B: BA.5

<https://nextstrain.org/ncov/open/global/6m?animate=2019-12-15,2022-09-25,0,0,30000>

Global: 11,494,650 Sequences





BA.4/BA.5 show similar severity to the BA.1 lineage

住院

	Hospital admission ^b n/N (%)	Odds ratio (95% CI)	Adjusted odds ratio (95% CI)	P value
SARS-CoV-2 variant/lineage ^c	N = 98,710			
Delta	172/1273 (14)	3.77 (3.19–4.44)	3.41 (2.86–4.07)	<0.001
BA.1	3010/75,763 (4)	Ref	Ref	–
BA.2	663/20,068 (3)	0.82 (0.76–0.90)	0.90 (0.82–0.98)	0.021
BA.4/BA.5	87/1806 (5)	1.22 (0.98–1.52)	1.24 (0.98–1.55)	0.070

嚴重疾病

	Severe disease ^b n/N (%)	Odds ratio (95% CI)	Adjusted odds ratio (95% CI)	P value
SARS-CoV-2 variant/lineage ^c	N = 3825			
Delta	97/168 (58)	2.69 (1.96–3.69)	2.47 (1.73–3.52)	<0.001
BA.1	990/2940 (34)	Ref	Ref	–
BA.2	167/637 (26)	0.70 (0.58–0.85)	0.78 (0.63–0.97)	0.029
BA.4/BA.5	22/80 (28)	0.75 (0.45–1.23)	0.72 (0.41–1.26)	0.252



2021 delta病毒株印度大流行

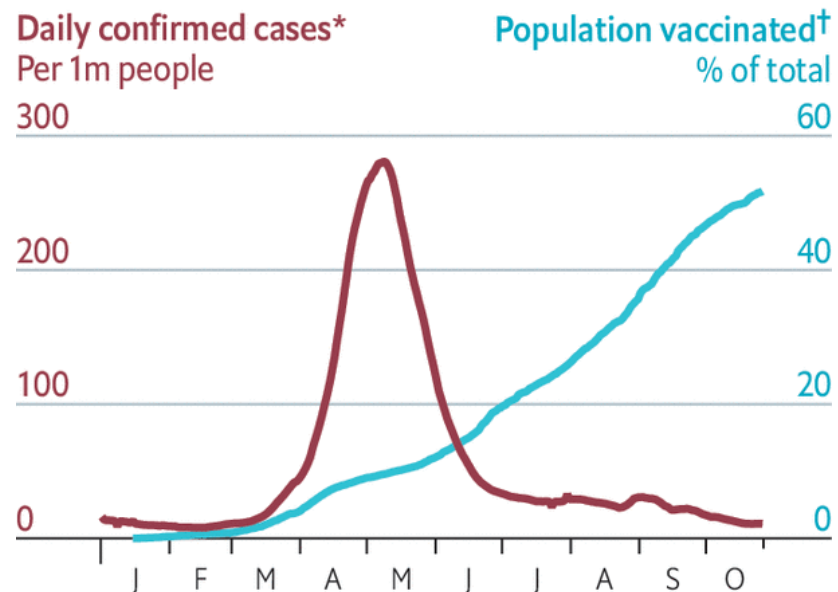


***As Covid-19 Devastates India,
Deaths Go Undercounted---New
York Times***

<https://www.nytimes.com/2021/04/24/world/asia/india-coronavirus-deaths.html>

First the peak and then the climb

India, covid-19, 2021



*Seven-day moving average †At least one dose

Source: Our World in Data

The Economist

印度代表處再新增2人確診、累計8例 佔全館近5分之1比例



2名確診的駐印人員昨晚搭醫療專機返抵桃機，由救護車後送至醫院進行治療。（資料照）

2021/05/09 15:19



新突變株持續出現

and Center

福利部疾病管制
AIWAN CD

新興Omicron變異株監測結果

變異株	今年累計檢出病例數		
	本土	境外移入	境外移入國家/地區
BF.7	0	4	美國(2)、法國(1)、荷蘭(1) 8/4-10/2入境陽性
BQ.1/ BQ.1.1	0	5	德國(2)、荷蘭(1)、英國(1)、美國(1) 9/25-10/11入境陽性
XBB	0	1	香港(1) 9/23入境陽性

*上週檢出1例BQ.1(美國)及2例BQ.1.1(德國、英國)，無檢出BF.7或XBB病例

2022/10/24

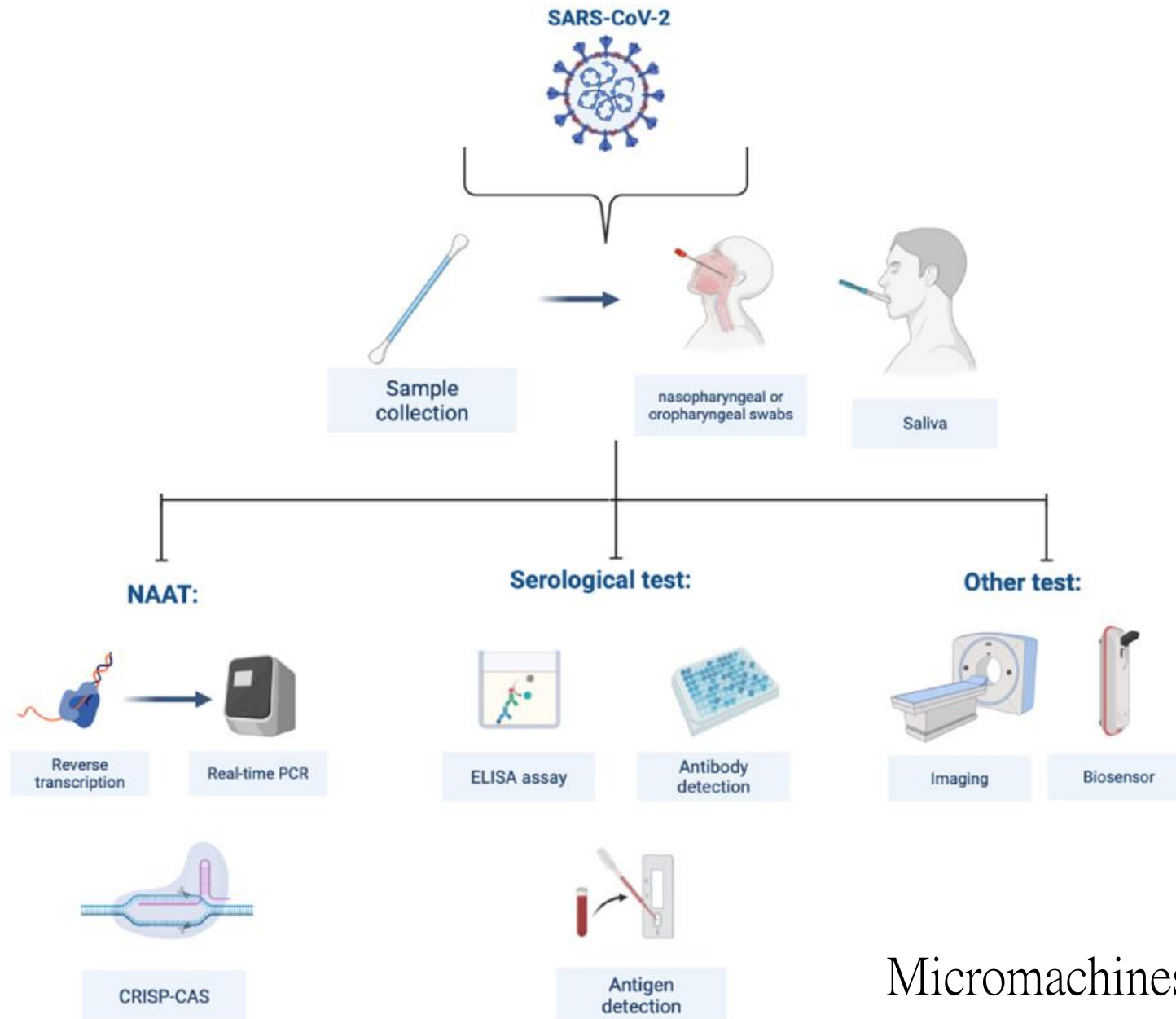
中央流行疫情
羅一

B.Q. 1.1

XBB

指揮中心提供照片

SARS-CoV-2 的檢驗





Rapid vs. Standard laboratory NAAT

- Standard laboratory NAAT (Laboratory developed test, LDT)
- Rapid NAAT is defined as assays generating results in approximately one hour or less of instrument run time
 - Rapid PCR test
 - Rapid isothermal NAAT

NAAT: Nucleic Acid Amplification Test



Point-of-care(POC) 快速PCR

SARS-CoV-2 & Influenza A/B test



LIAT Cobas[®]



Xpert[®] Xpress SARS-CoV-2



ID NOW Abbott[®]



不同部位檢體PCR的敏感性/特異性

Table 2. GRADE Summary of Findings of Test Accuracy Results for Prevalence/Pre-Test Probability of 10% for different Specimen Types

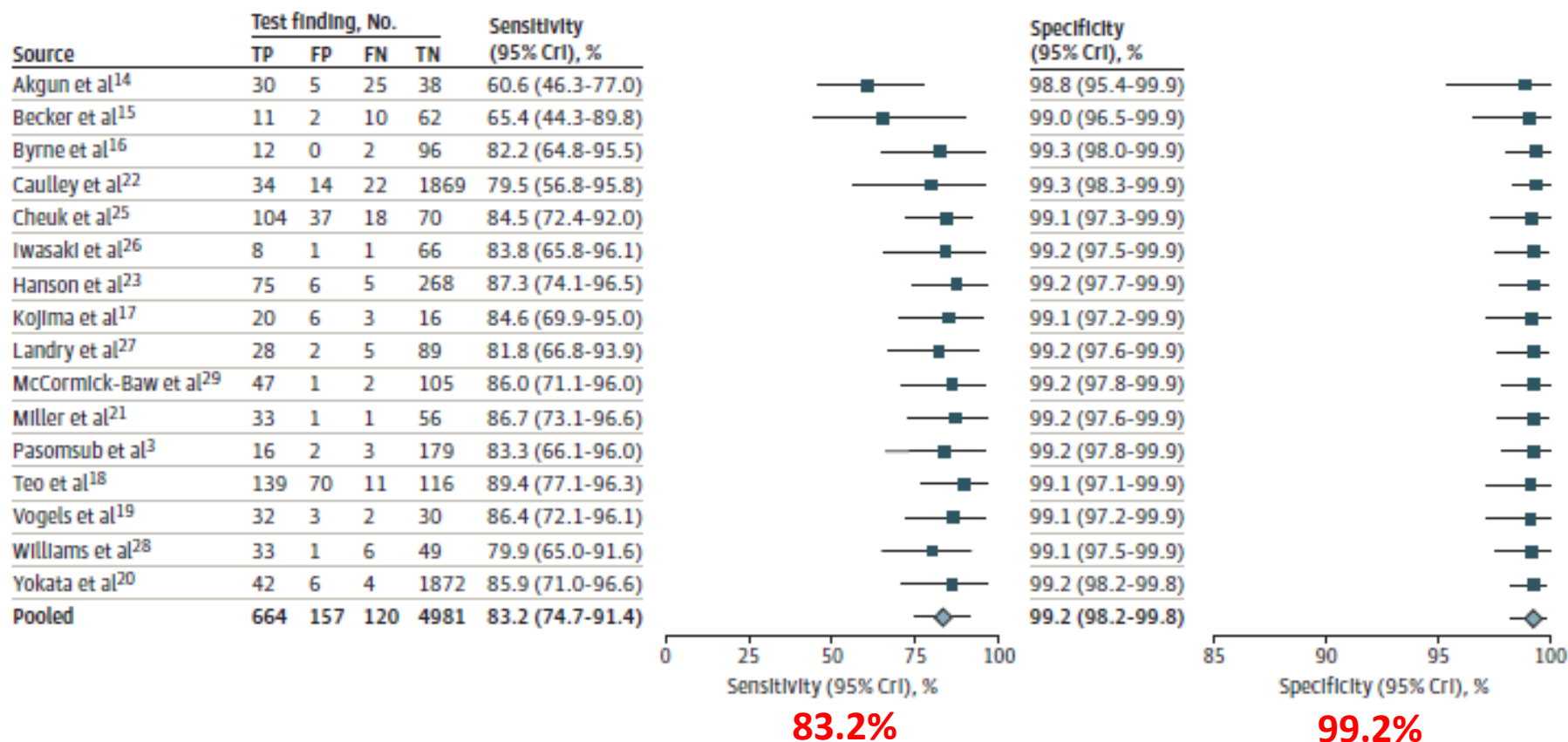
Sample site	口咽		肛門		鼻咽	
	Saliva without coughing	Saliva with coughing	OP swab	AN swab	MT swab	Combined AN/OP swab
Sensitivity	0.90 (95% CI: 0.85 to 0.93)	0.99 (95% CI: 0.94 to 1.00)	0.76 (95% CI: 0.58 to 0.88)	0.89 (95% CI: 0.83 to 0.94)	0.95 (95% CI: 0.83 to 0.99)	0.95 (95% CI: 0.69 to 0.99)
Specificity	0.98 (95% CI: 0.93 to 1.00)	0.96 (95% CI: 0.83 to 0.99)	0.98 (95% CI: 0.96 to 0.99)	1.00 (95% CI: 0.99 to 1.00)	1.00 (95% CI: 0.89 to 1.00)	0.99 (95% CI: 0.92 to 1.00)

Upper respiratory tract sample (e.g., nasopharyngeal swab) rather than a lower respiratory sample for SARS-CoV-2 RNA testing

IDSA Guidelines on the Diagnosis of COVID-19: Molecular Diagnostic Testing



唾篩PCR敏感性/特異性



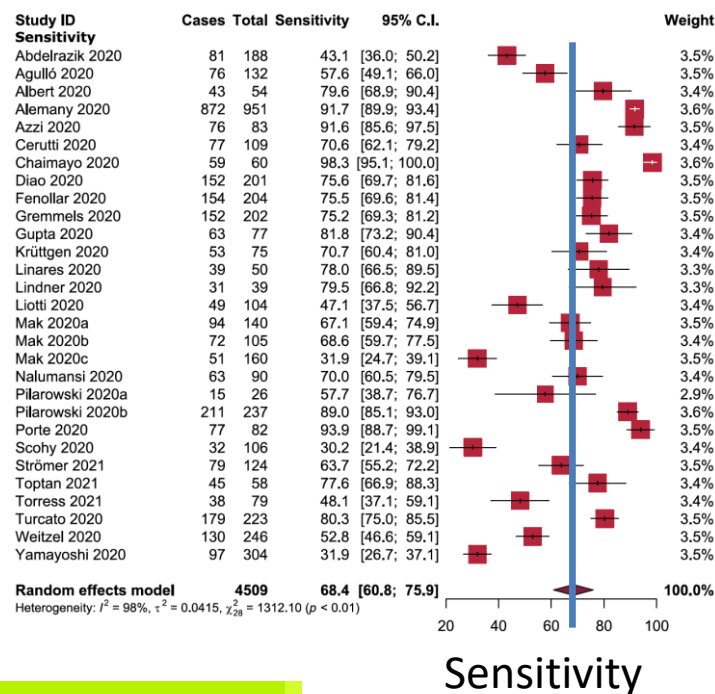
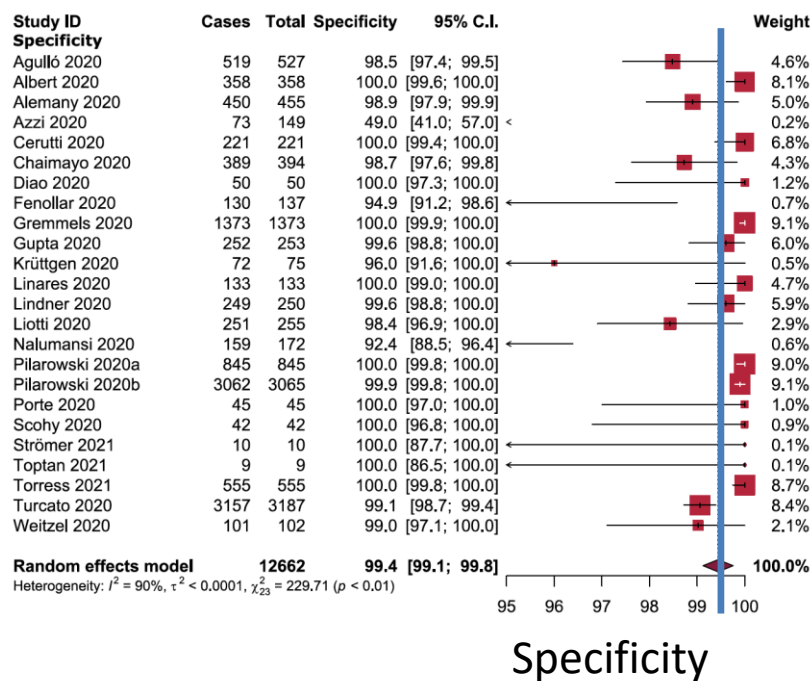


桃園機場入境旅客唾液採檢 中央社照片 <https://www.cna.com.tw/news/ahel/202206010395.aspx>



COVID-19 快篩

- Sensitivity 68.4%, Specificity 99.4%
- NP specimens and symptomatic patient' s samples more sensitive



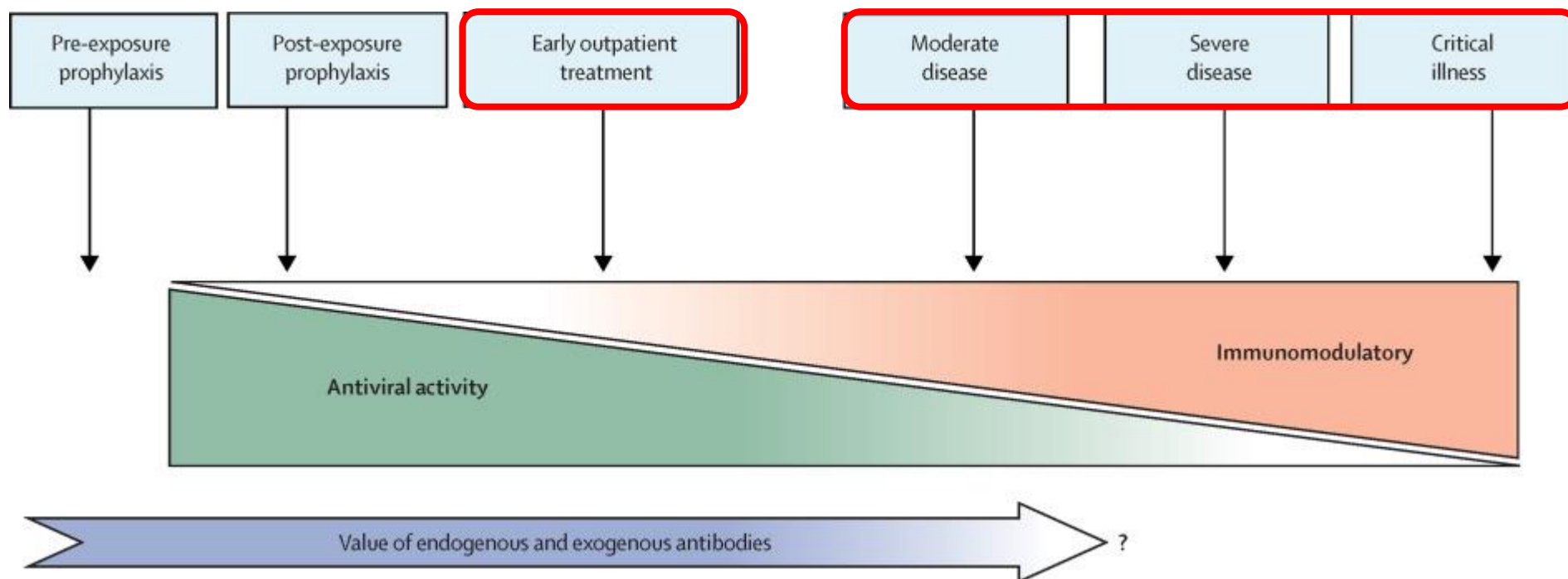


Sensitivity for RAT based on Ct values

	Sensitivity (%)	95% CIs
Ct values		
<=20	98.8	96.1-100
21-25	89.6	80.1-99.0
26-30	55.4	24.0-86.7
31-35	15.1	4.5-25.7
36-40	16.5	0.0-34.0



COVID-19治療策略





SARS-CoV-2預防與治療

作用機轉	預防/治療
Spike protein	疫苗
Spike protein	單株抗體
Spike protein、anti-inflammation	清冠一、二號
RdRp inhibition	Molnupiravir
RdRp inhibition	Remdesivir
Protease inhibitor	Nirmetralivir/ritonavir
Anti-Inflammation	Dexamethasone
IL-6 inhibitor	Tocilizumab
Jak inhibitor	Baricitinib



我國診治指引對SARS-CoV-2確診病患用藥建議

	不需用氧且具重症風險因子者	需吸氧治療	高流量氧或NIV	插管
可降低死亡率， 建議使用	下列藥物任一 Remdesivir、Nirmatrelvir + ritonavir Casirivimab+imdevimab*、 Bamlanivimab+etesevimab*、 Molnupiravir#	Dexamethasone	Dexamethasone	Dexamethasone
		+Tocilizumab	+ Baricitinib或tocilizumab	+Tocilizumab
加速臨床改善， 考慮使用		+ Remdesivir		

* 體外試驗顯示對 Omicron 變異株中和能力大幅下降，可能影響臨床效果

新型冠狀病毒（**SARS-CoV-2**）感染臨床處置指引

行政院衛生福利部疾病管制署編

2022年5月11日第十八版



預防性單株抗體Evusheld

2/2

預防性單株抗體Evusheld說明

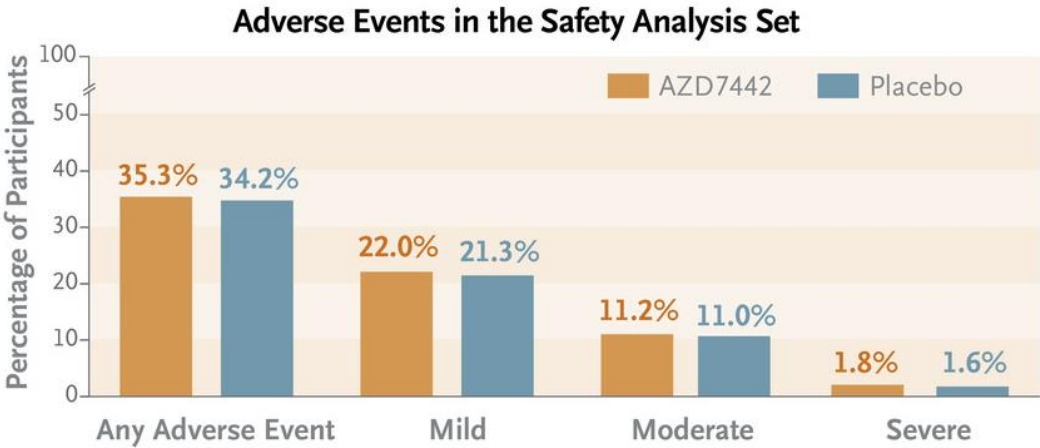
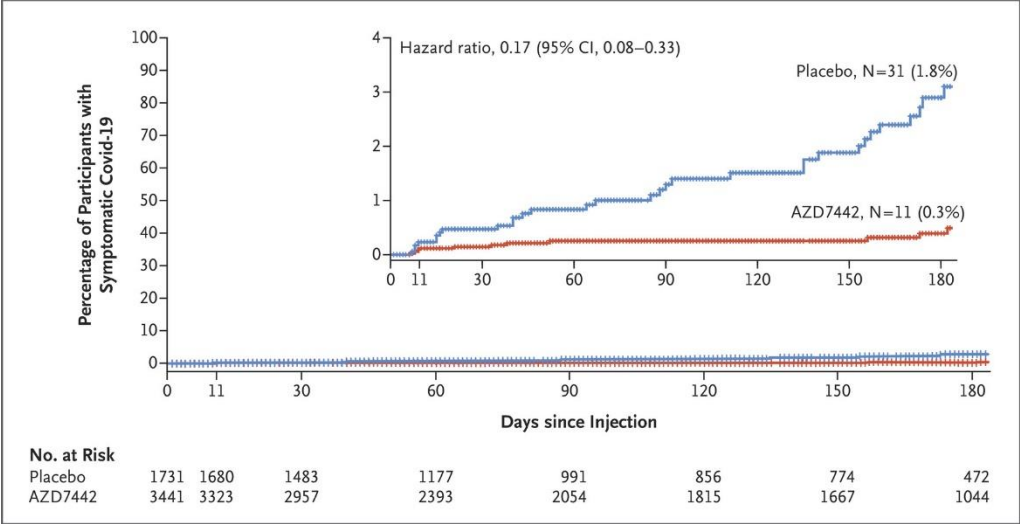
- ① **可預防免疫低下族群SARS-CoV-2感染**，並已取得我國食品藥物管理署核准專案輸入。
- ② 經專家諮詢會討論後，建議若經主治醫師評估藥物的效益與風險並充分告知後，**可考慮對同時符合下列條件之對象給予複合式抗SARS-CoV-2單株抗體Tixagevimab+Cilgavimab (Evusheld)作為暴露前預防**：
 - 成人或 ≥ 12 歲且體重 ≥ 40 公斤，且；
 - 六個月內無感染SARS-CoV-2，且；
 - 一週內與SARS-CoV-2感染者無已知的接觸史，且；
 - 符合下列條件任一者：曾在一年內接受實體器官移植、血液幹細胞移植或CAR-T治療*，具有有效重大傷病卡之嚴重先天性免疫不全病患。

*嵌合抗原受體T細胞療法，Chimeric antigen receptor T-cell therapy

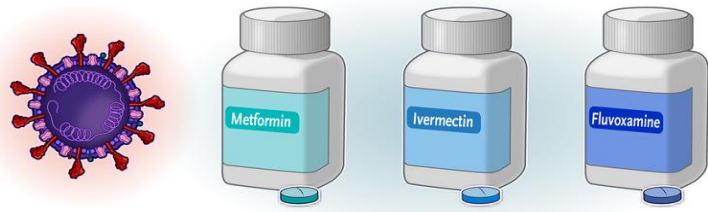
2022/09/08

中央流行疫情指揮中心

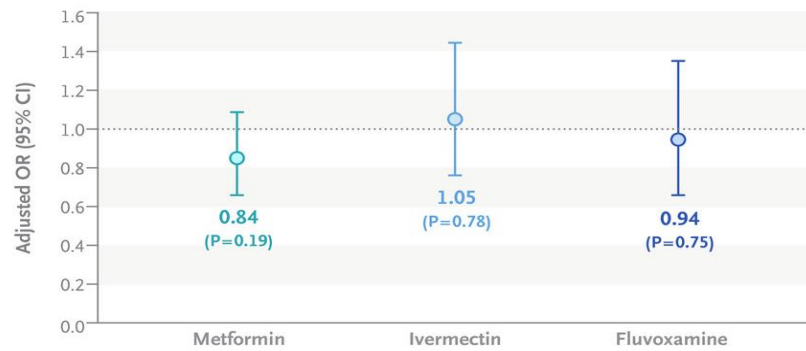
Evusheld單株抗體預防COVID-19的效果



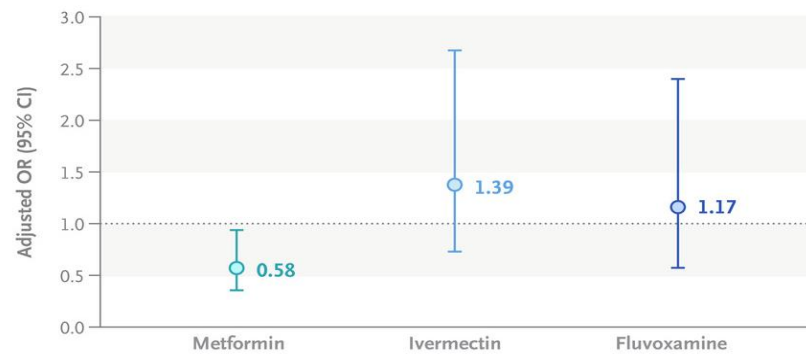
Drugs Repurposed as Covid-19 Therapies



Adjusted OR for Primary Composite End Point at 14 Days



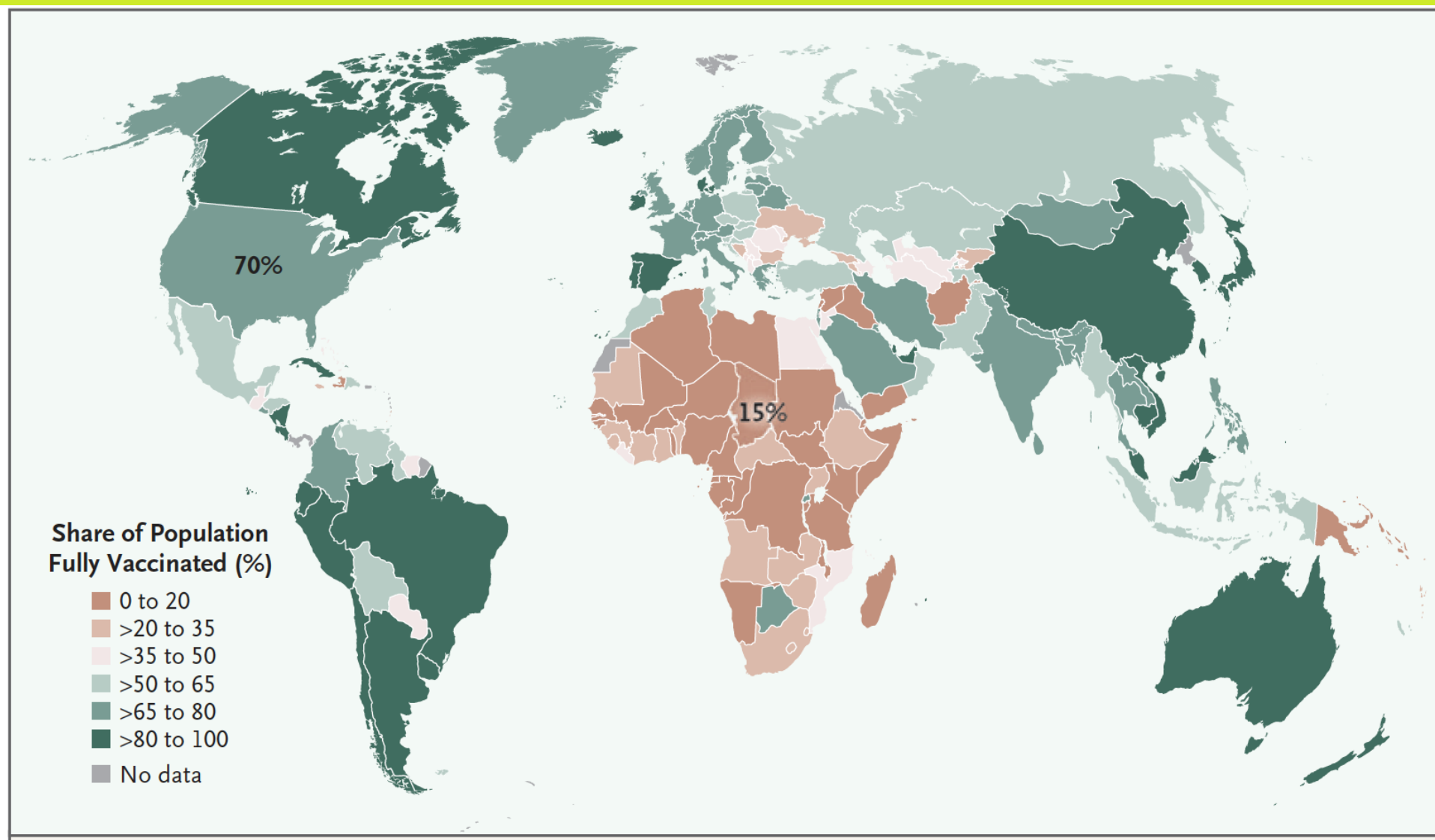
Adjusted OR for Emergency Department Visit, Hospitalization, or Death



Metformin, Ivermectin, Fluvoxamine
對於避免COVID-19病人急診就醫、住院、死亡沒有預防效果



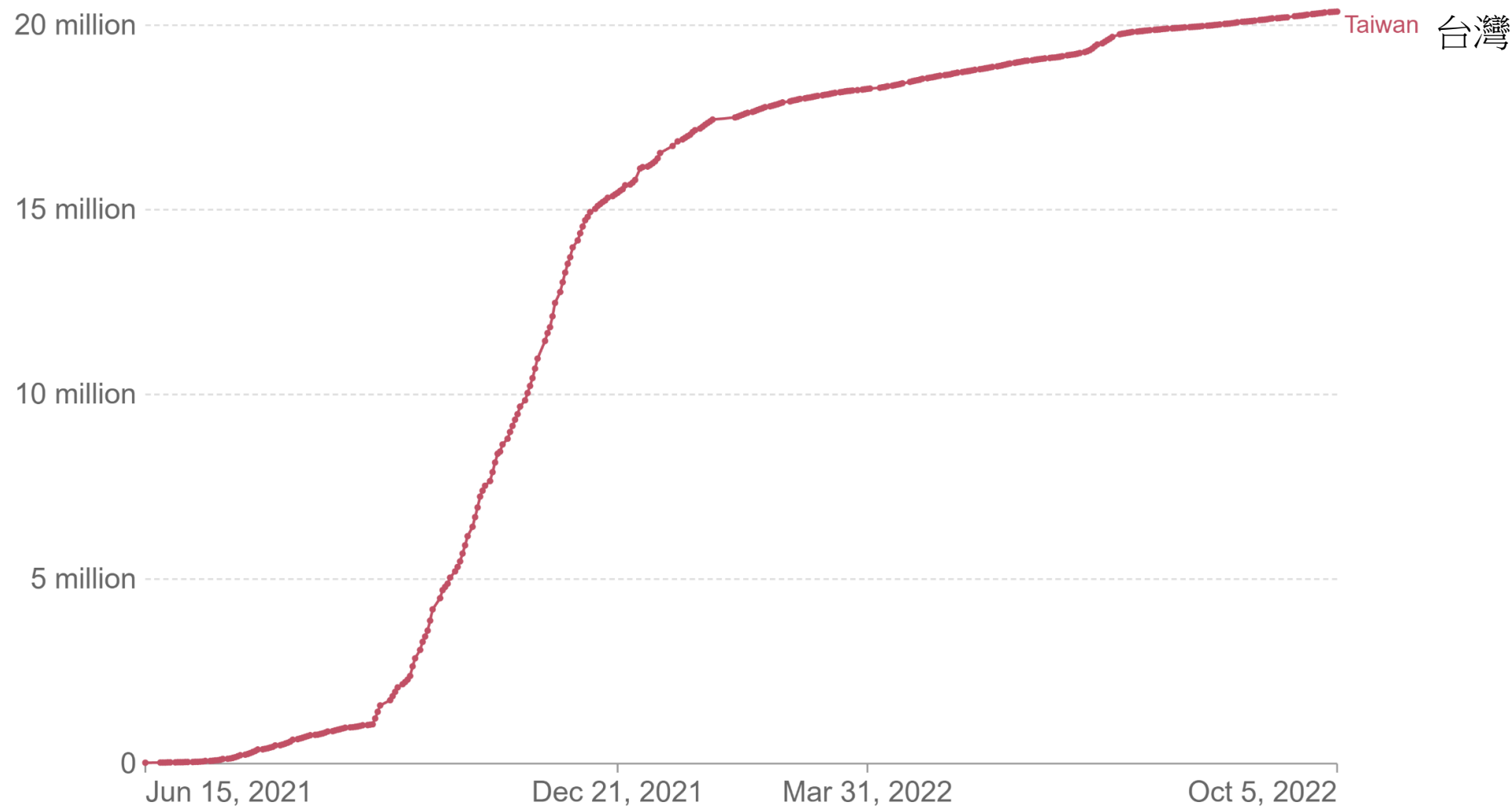
全球Covid-19 疫苗接種現況



Number of people who completed the initial COVID-19 vaccination protocol

Our World
in Data

Total number of people who received all doses prescribed by the initial vaccination protocol.



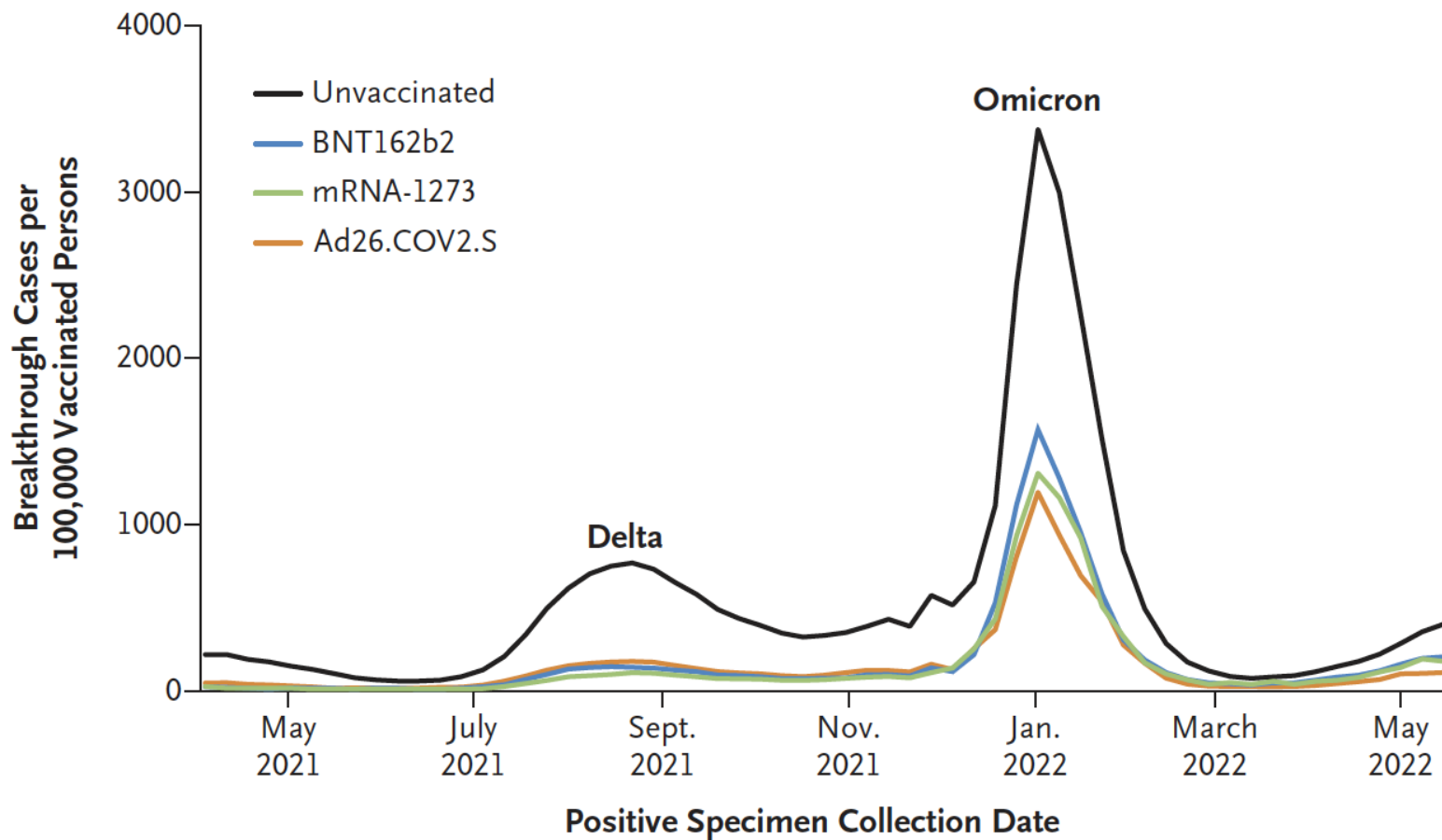
Source: Official data collated by Our World in Data

CC BY

Note: Alternative definitions of a full vaccination, e.g. having been infected with SARS-CoV-2 and having 1 dose of a 2-dose protocol, are ignored to maximize comparability between countries.

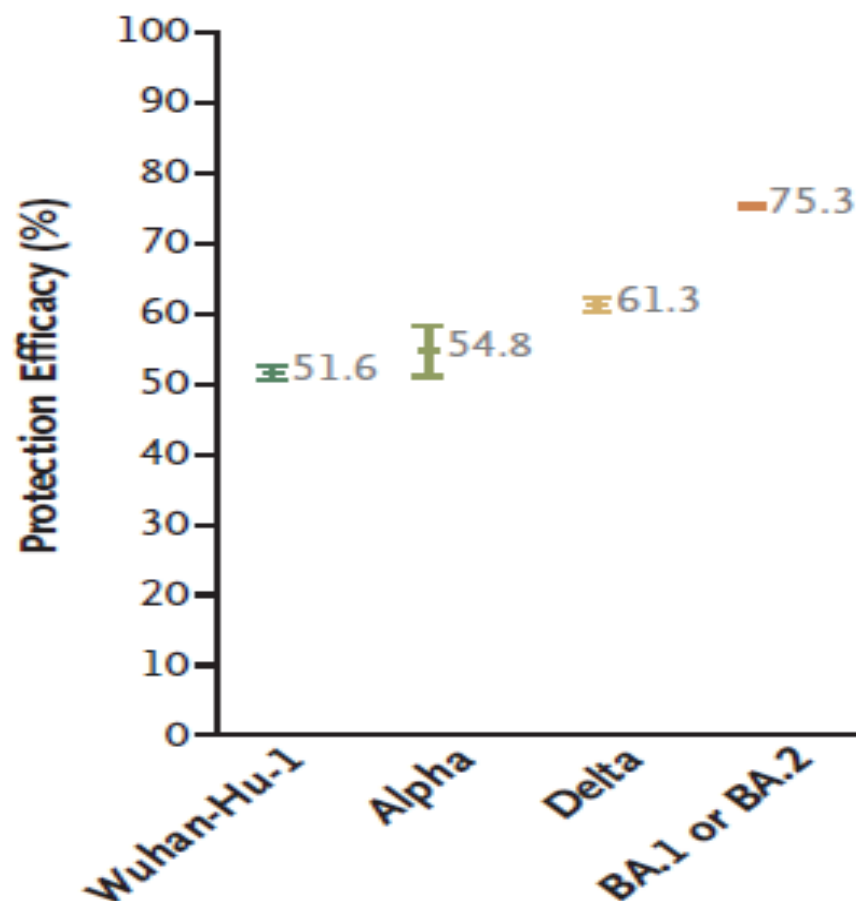


疫苗保護力





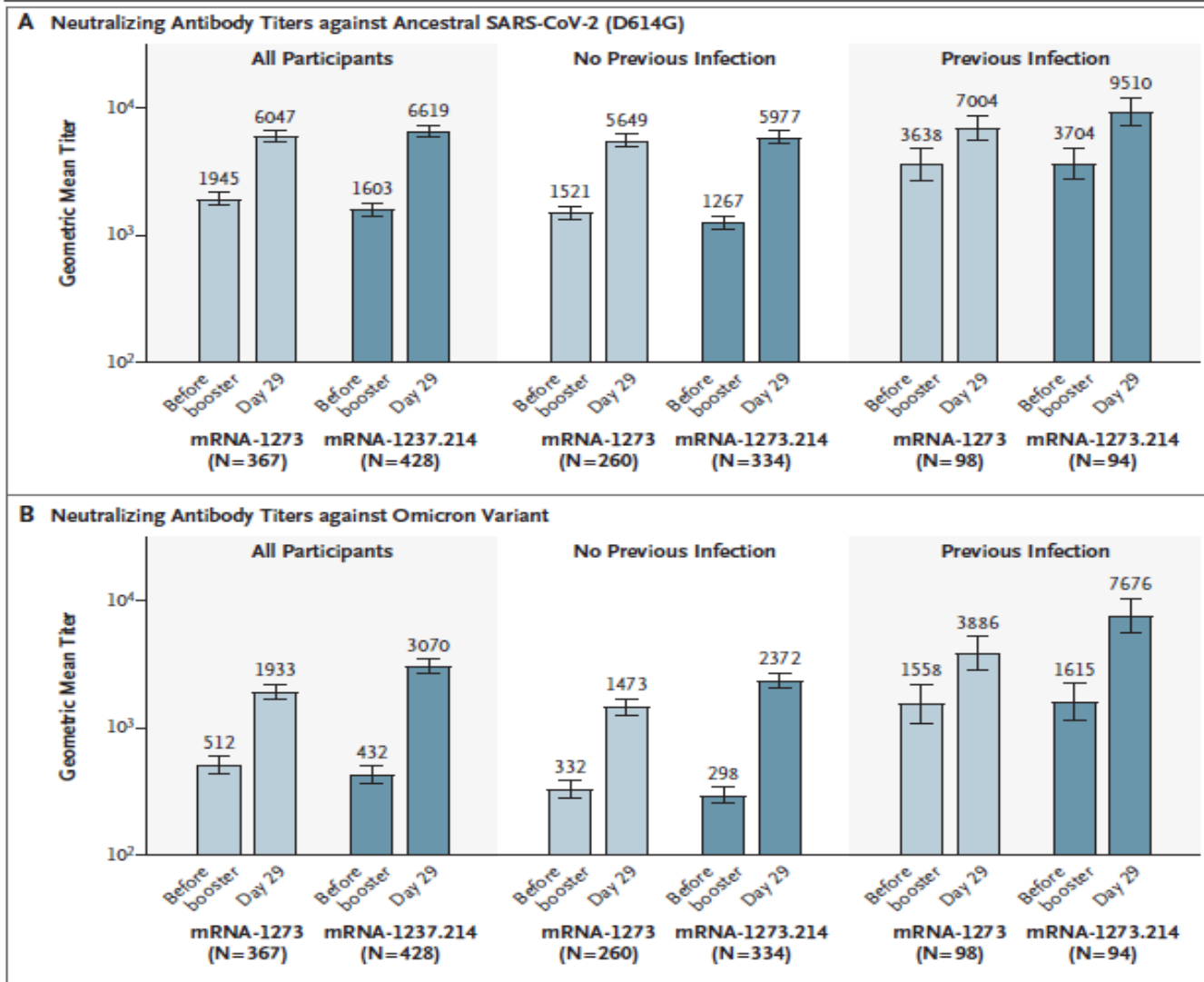
過去不同VOCs感染對於BA.5的保護效果





A Bivalent Omicron-Containing Booster Vaccine against Covid-19

免疫橋接數據





17 Sep 2022



<https://focustaiwan.tw/society/202209170005>



Taiwan Centers for Disease Control
衛生福利部疾病管制署

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About CDC Diseases & Conditions Programs & Campaigns Data & Statistics International Cooperation

Home > Press Releases

Starting on October 3, Moderna's next-generation bivalent vaccine available to eligible persons in second phase

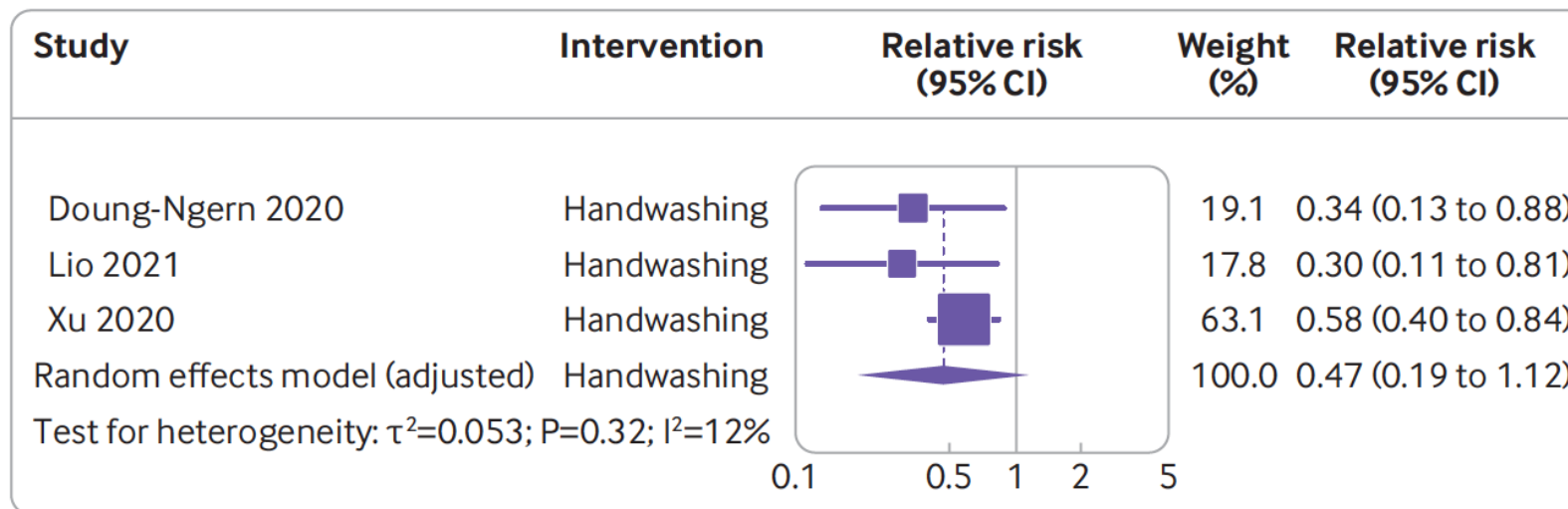


10月3日開始接種

mRNA-1273.214
Spikevax®



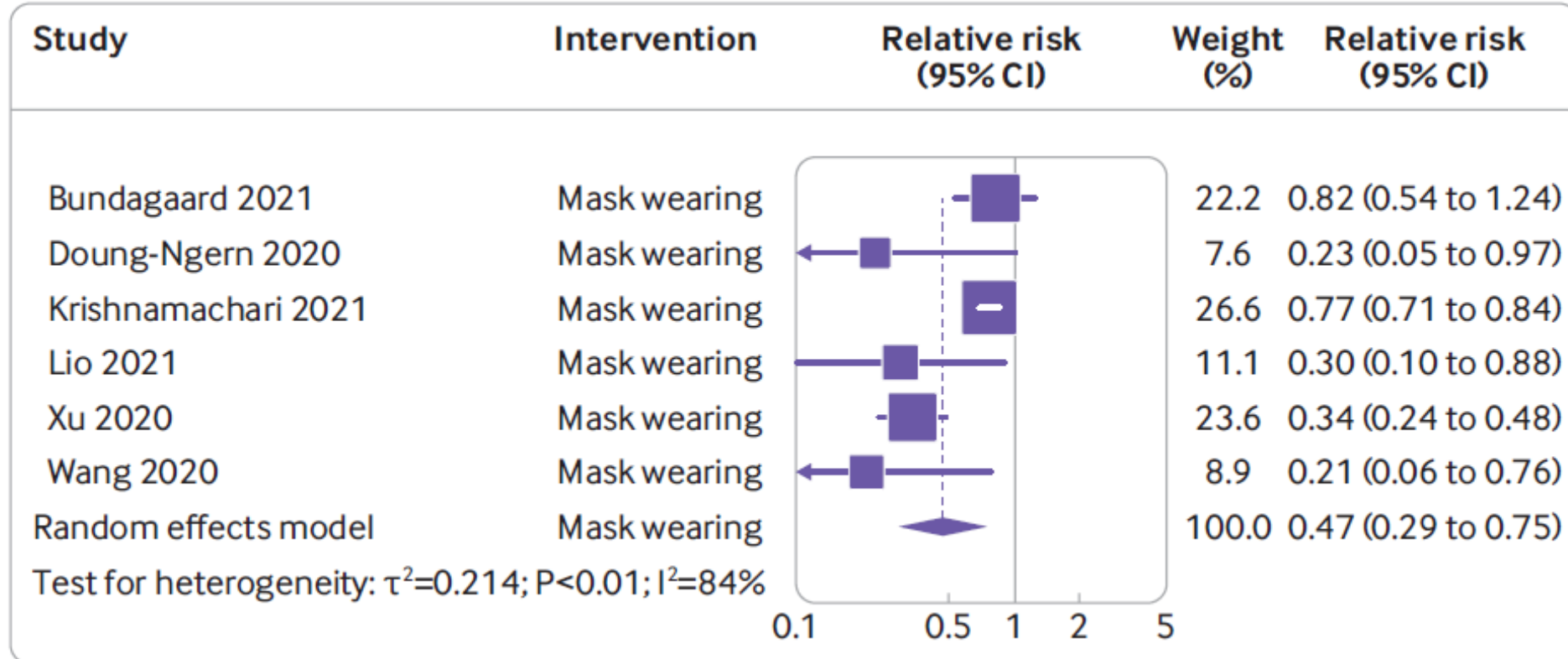
洗手預防COVID-19



RR 0.47, 95% CI 0.19-1.12



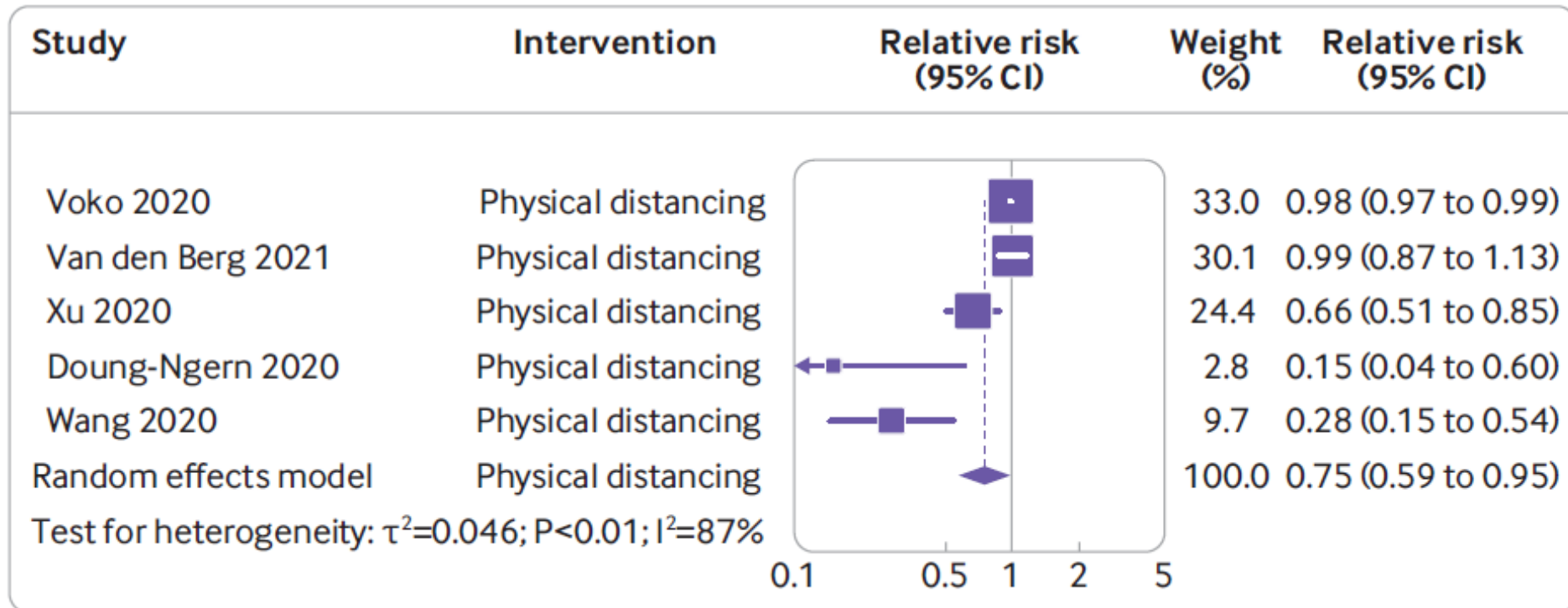
口罩預防COVID-19



RR 0.47, 95% CI 0.29-0.75



社交距離預防COVID-19



RR 0.75, 95% CI 0.59-0.95



COVID-19 疫情發展圖





防疫策略的演變

2020

超前部署
阻隔境外

2021

分艙分流
防堵清零

2022

應變減災
守護台灣

成大醫院COVID-19專責防疫區塊

成醫新冠肺炎居家照護中心

自費採檢區

門診大樓

住院大樓

醫護大樓

婦幼專區

專責病房12A-35

臨時專責12B-5

專責病房7A-44

專責病房7C-35

專責病房4A-39

專責病房DR-15

專責嬰兒室-BR

專責ICU-NI4+PI4

專責ICU-RI-8

專責ICU-MIC-15

專責ICU-SIC-8

急診

急診負壓區

小兒防疫急門診

專責照護、綜合病房

住院、陪病者
採檢區

防疫急門診區
風險個案採檢區

衛福部通知應配合事項/本院應變執行作為

(一)擴大開設專責病房

(二)設置戶外採檢站

(三)服務降載

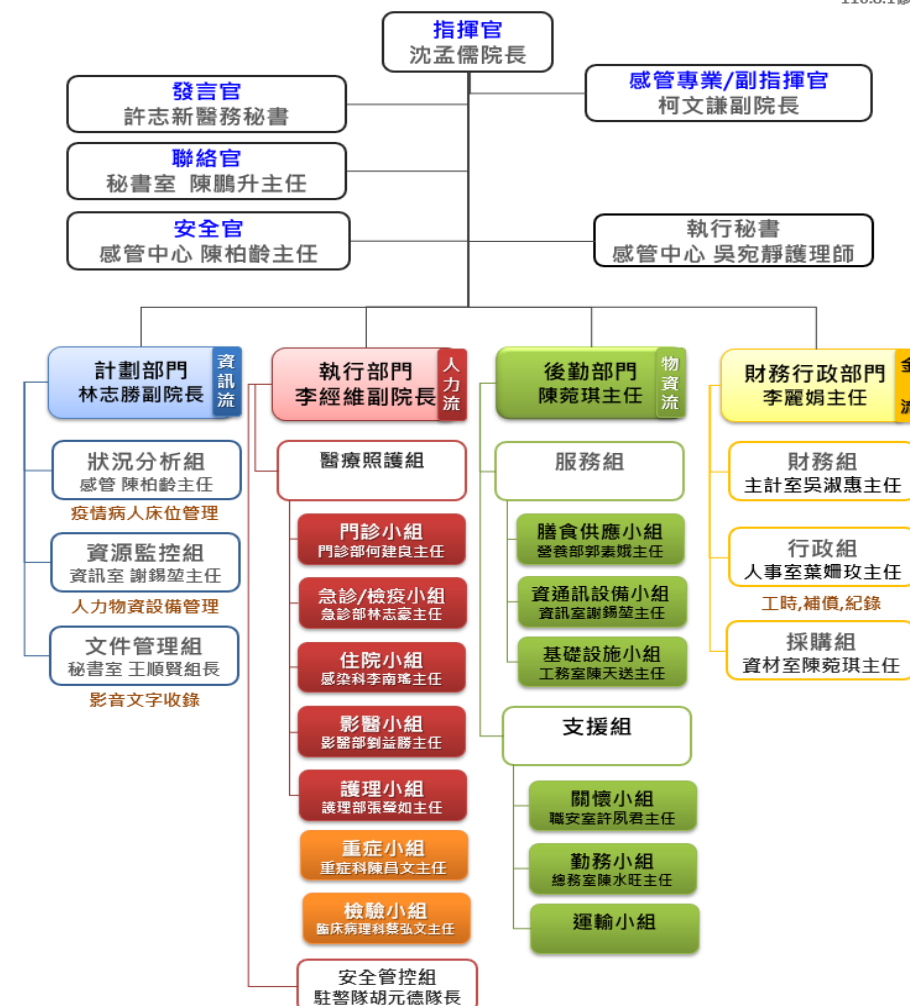
(四)住院病人全面檢視

(五)廣泛運用遠距醫療

(六)加強門禁管制及環境消毒

國立成功大學醫學院附設醫院 武漢肺炎緊急應變中心組織架構圖 (武漢肺炎應變指揮系統)

110.8.1修訂



2020.1.21成立



台南市急重症確診病患轉診空床平台

< 急重症確診病患... (107) 🔍 📞 ☰

奕萱

醫院 專責病房滿床，急診病患
患有轉院需求
10/10 COVID確診
1.年齡：80
2.性別：男
3.慢性疾病：DM、HTN
4.診斷：Acute renal failure、
Acute pulmonary edema、
Acute Pleural effusion
5.vital signs：37.3、86、20、
120/68
6.O2使用情況：SaO2:95-96%
under N/C 3L/min
6.需ICU加護病房:不用
8.是否需洗腎：不用
9.是否有DNR：無
10.是否有家屬/陪病者照護，無
謝謝

上午9:28

許以霖

奕萱

醫院 專責病房滿
床，急診病患轉院...

請問郭綜合？

上午9:28

2020.1.21
台灣首例

2020.2.27
中央流行疫情指揮中心提升為一級開設，衛福部陳時中部長擔任指揮官

2020.5.8
「防疫新生活運動」4大要點

2020.7.1
弱勢民眾領取振興三倍券1000元補助

2020.12.1
秋冬防疫專案

2020.3.5
首批AstraZeneca COVID-19疫苗抵臺

2021.3.22
正式開打**COVID-19**疫苗
Taiwan V-Watch系統上線

2021.5.11
全國疫情警戒至第二級

2021.5.19
全國疫情警戒至第三級

2021.6.2
首例**AZ**疫苗引發 **TTS**之案例

2022.5.18
65歲以上及居隔/居檢/自主防疫者快篩陽性時
進行口服抗病毒藥物用藥
評估治療流程

2022.7.15
國內檢驗出1例**Omicron**
BA.5本土社區感染個案

重大事件

2020.2.23

限制醫院醫事人員及社工出國
與相關補償規定

2020.2.26

「加強醫院進出人員之管制」

2020.4.3

醫院實施門禁管制，除有特殊
事由，禁止探病

2021.5.4

北北桃地區醫院及長照機構自
除例外情形，停止開放探病及
探視，陪病及陪伴者仍為1人

2021.5.11

全國醫院及長照機構停止開放
探病及探視

2021.6.5

指揮中心開辦新冠病毒重症個
案臨床處置線上課程

2021.10.11

指揮中心有條件開放全國醫院慢性病房探病

2021.5.13

開設學齡前兒童就醫綠色通道

民眾探病習慣改變

醫療院所管控

2020.1.27

將**2週**內具「湖北省旅遊史」入出境名單提示
於健保醫療資訊雲端查詢系統

2020.2.2

高中職以下學校延後**2週**開學

2020.2.3

大專校院延至**2/25**以後開學

2021.1.6

電子圍籬**2.0**運作

2021.5.16

因應國內疫情進入社區流行階段，為保全醫療
量能，指揮中心宣布四大醫療應變策略

2021.5.25

全國各級學校延長停止到校上課期間採居家線
上學習

2021.6.5

苗栗縣**2**家電子廠發生群聚感染案件，前進指揮所啟動
相關防疫措施

2021.6.23

因應臺北農產運銷公司群聚感染事件，指揮中心啟動
「市場專案」

2022.5.26

指揮中心修訂病例定義，民眾使用家用抗原快篩試劑
檢測結果陽性，經醫事人員確認即為確診

2022.5.31

指揮中心修訂 **COVID-19**中重症個案之解除隔離治療條
件

2022.7.19

適度放寬戴口罩等防疫措施

社區防疫

11/7起 實施0+7免居家隔離 同住接觸者須7天自主防疫

匡列為接觸者當天快篩1次

外出時，需有2日內快篩陰性結果

最後接觸日—

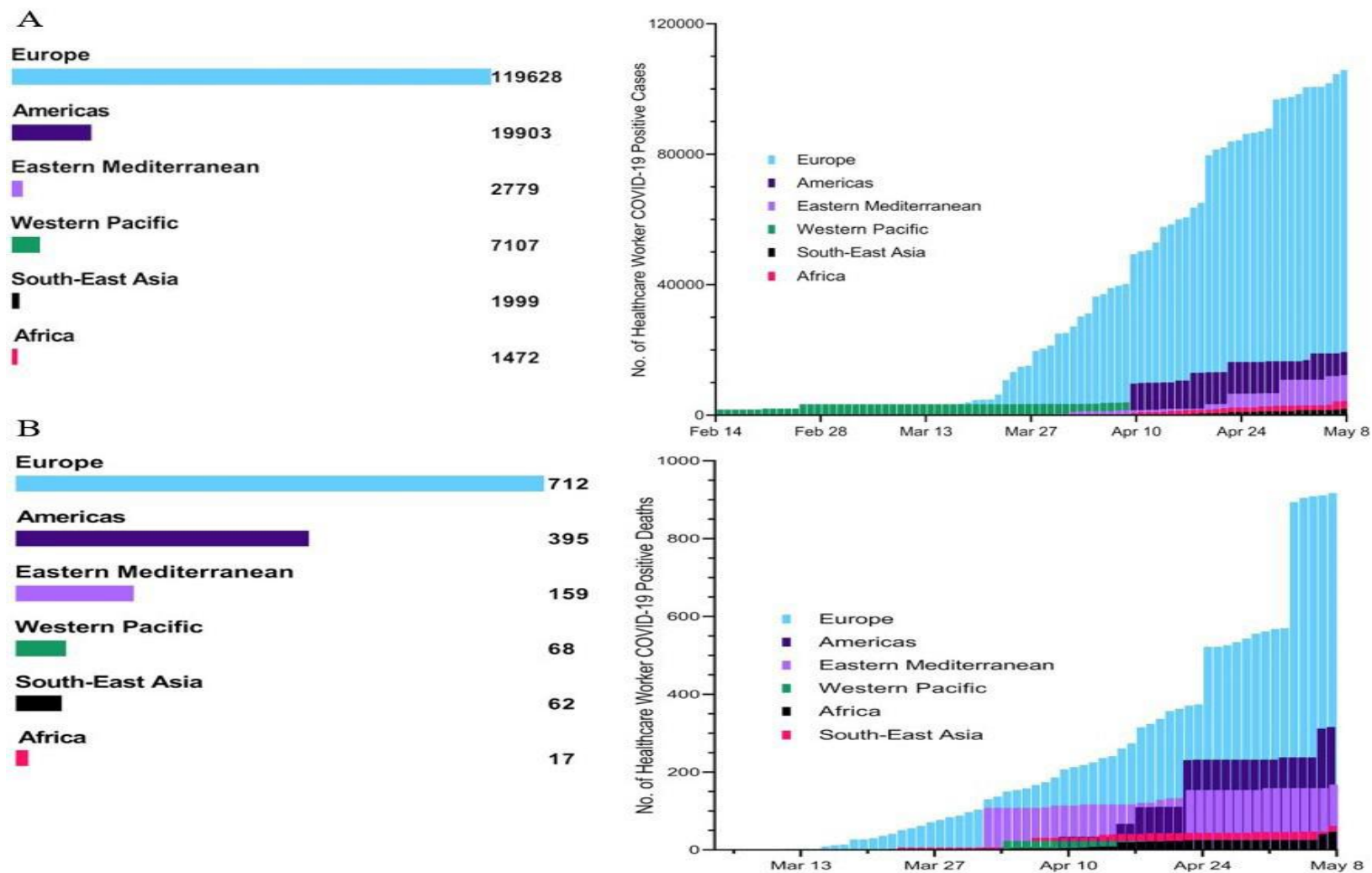


自主防疫

- ◆無論是否完成疫苗追加劑均採「0+7自主防疫」
- ◆最後接觸日為第0天，隔日為自主防疫第1天
- ◆家用快篩試劑檢測措施：由衛生單位提供2歲以上接觸者4劑家用快篩試劑。匡列為接觸者當天快篩1次；自主防疫期間有症狀應進行檢測；外出前須有2日內快篩檢測陰性結果
- ◆檢測結果：不追蹤，快篩陽性則依公布之自主防疫指引辦理



醫療人員的感染及死亡率



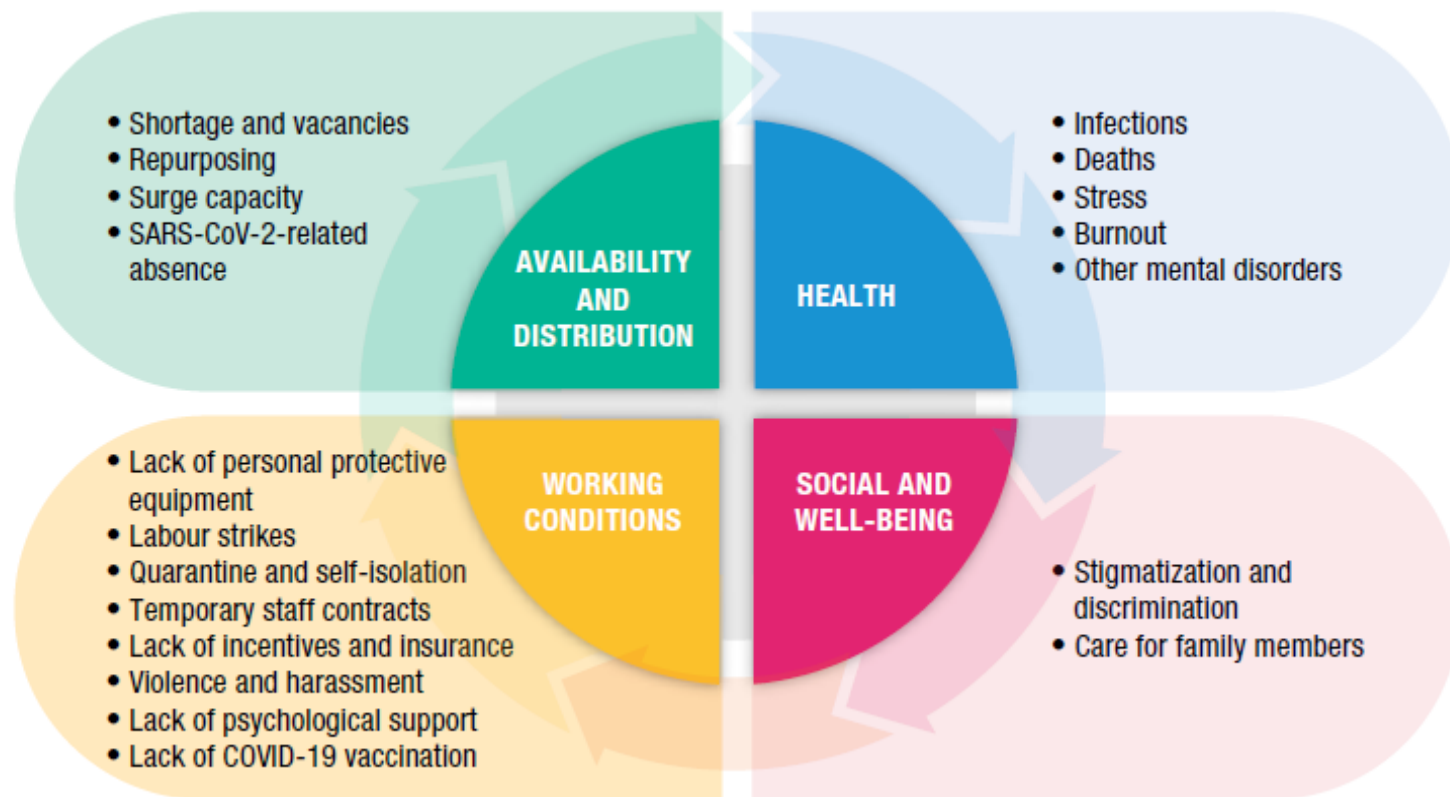


WHO region	WHO COVID-19 surveillance data ^a		Population-based estimate ^b	Triangulation B Meta-analysis based on PCR Testing (assuming 6.2% of infections are in HCWs)		
	Reported deaths	Reported HCW deaths		HCW deaths ^c		
				At 0.4%	At 0.8%	At 1.6%
African	84 376	0	1134	834	1663	3325
Americas	1 575 005	4858	60 380	15 953	31 902	63 808
South-East Asia	335 603	0	1512	6882	13 766	27 531
European	1 116 828	1395	49 374	13 232	26 454	52 912
Eastern Mediterranean	189 532	302	1804	2308	4610	9220
Western Pacific	40 393	78	1289	666	1332	2658
Global	3 341 737	6633	115 493	39 875	79 727	159 454

WHO統計，自2020年1月至2021年5月，至少有39,900名HCWs因COVID-19死亡



COVID-19對於醫療工作人員的健康影響





"New Normal" with COVID-19

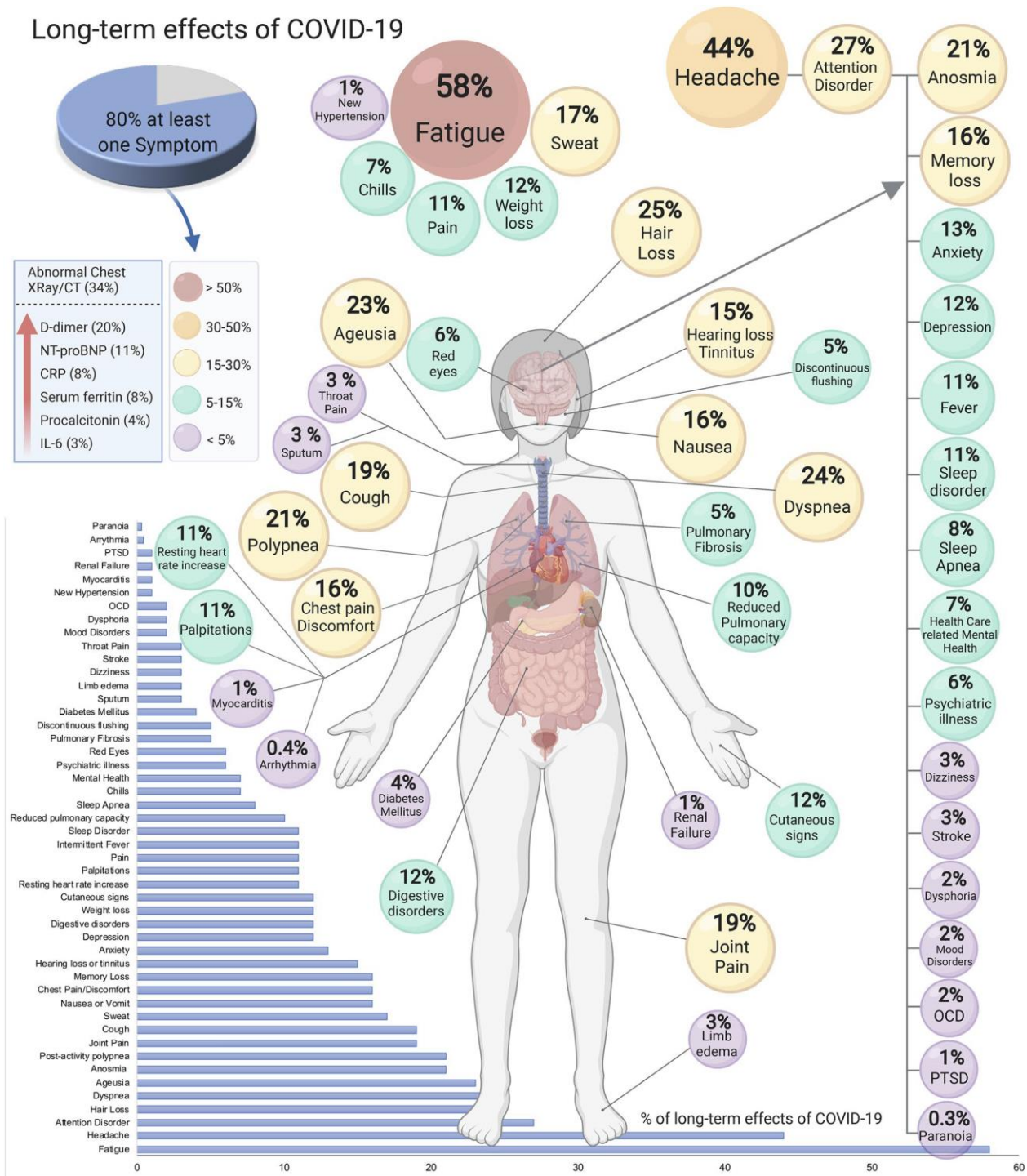
- ~~"Zero COVID" strategy~~
- Current vaccines do not offer sterilizing immunity against SARS-CoV-2 infection
- The majority of SARS-CoV-2 infections are asymptomatic or mildly symptomatic
- SARS-CoV-2 incubation period is short
- SARS-CoV-2 is but one of several circulating respiratory viruses (eg. Influenza, RSV)
- Establish appropriate risk threshold



COVID-19共存下的生活

- 世界已經不同
- 病毒今後數年內將持續演化
- 建立相應的監測和防疫系統
- 重構生活方式
- 免疫低下族群，新冠重症/死亡的風險仍高
- 長期併發症的監控

長新冠的影響





COVID-19併發症: MIS-C and MIS-A

Multisystem Inflammatory Syndrome in Children (MIS-C)

A Delayed Immune Response Related to COVID-19

Children, adolescents, or young adults who develop certain symptoms after having COVID-19 might have MIS-C. They should see a doctor if they had COVID-19, or have been in close contact with someone who had COVID-19, within the past 6 weeks and now have the following:



Ongoing
Fever

PLUS more than one
of the following:



Stomach Pain



Diarrhea



Vomiting



Skin Rash



Blood Shot
Eyes



Dizziness or
Lightheadedness

Go to the nearest hospital Emergency Room if your child is showing
any severe MIS-C warning signs such as:

Trouble breathing | Pain or pressure in the chest that does not go away
Confusion or unusual behavior | Severe abdominal pain | Inability to wake or stay awake
Pale, gray, or blue-colored skin, lips, or nail beds; depending on skin tone



Centers for Disease
Control and Prevention
National Center for Immunization
and Respiratory Diseases

For More Information
www.cdc.gov/mis/mis-c.html



美國疾病控制及預防中心(CDC)的MIS-A病例定義

年齡≥21歲且住院≥24小時或因疾病而死亡，並符合以下臨床和實驗室標準的患者。
病人應無其他更可能解釋病程的疾病診斷(例如細菌性敗血症、慢性疾病惡化)。

臨床標準

住院前、或住院起三天內有主觀發燒或客觀發燒記錄(≥38.0度)
達至少24小時，並且住院前、或住院起三天內符合以下臨床標
準至少三項。**至少一項必須是主要臨床標準。**

主要臨床標準



嚴重心臟疾病：
包括心肌炎、心包炎、冠狀動脈擴張/
冠狀動脈瘤或新發的左右心室功能障
礙(LVEF<50%)、2或3度房室傳導阻
滯或室性心動過速。
(註：僅心臟驟停則不符合此標準)

或



皮疹合併非化膿性結膜炎

次要臨床標準



新發的神經系統病徵和症狀
包括過去無認知障礙病史患者的腦
病變、癲癇、腦膜炎病徵或周圍神
經病變(包括格林巴利症候群)



不能歸因於藥物治療
(例如鎮靜、透析)
的休克或低血壓



腹痛、嘔吐或腹瀉



血小板減少
(血小板計數低於
150,000/微升)

實驗室標準

同時具有發炎和新冠病毒感染的實驗室證據：

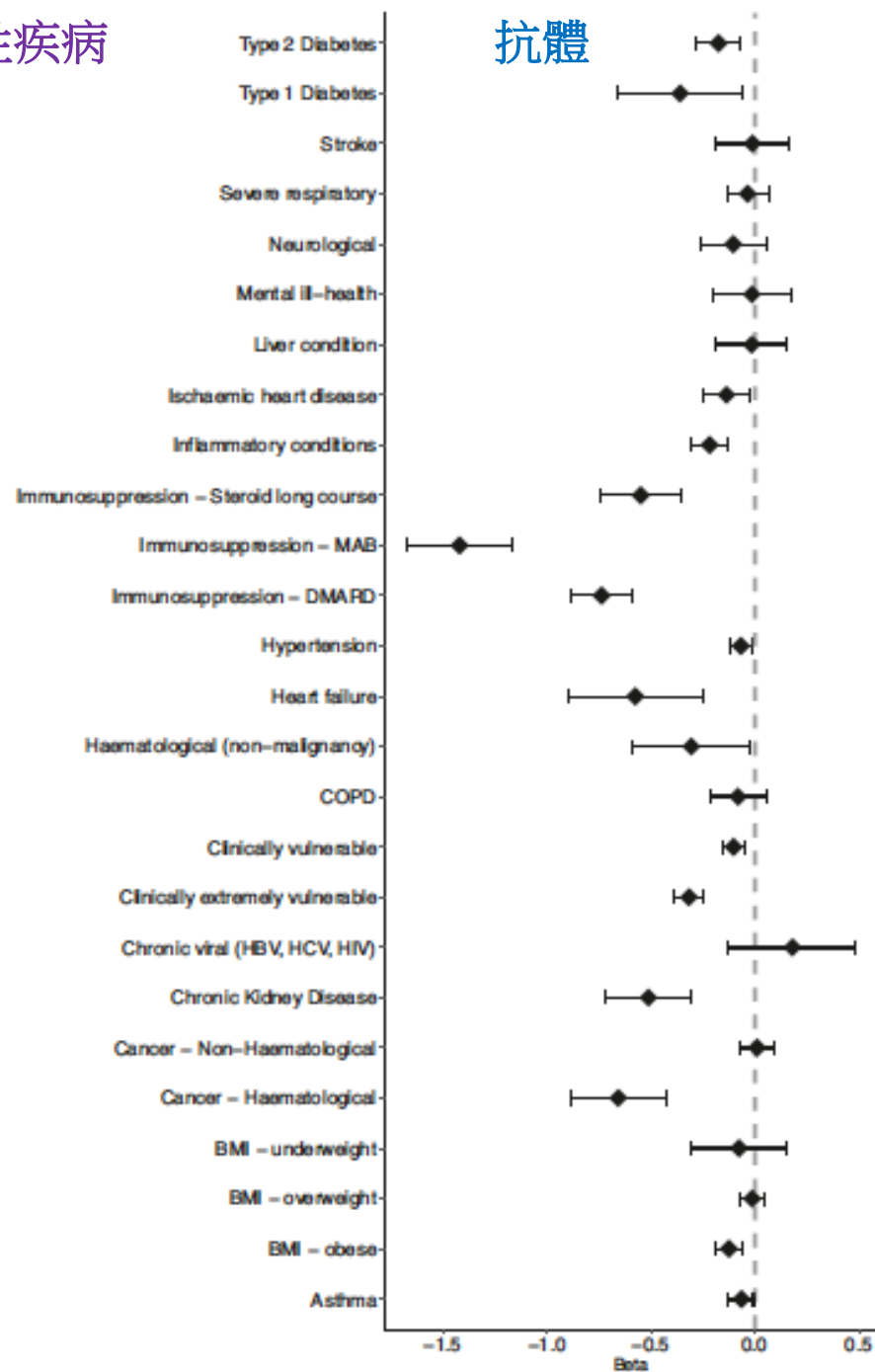
- 以下至少兩項指數升高：CRP, Ferritin, IL-6, ESR, procalcitonin
- SARS-CoV-2 RT-PCR、血清學或抗原檢測陽性

資料來源：美國CDC官網 (<https://www.cdc.gov/mis/mis-a/hcp.html>)

慢性疾病

抗體

疫苗優先保護脆弱族群

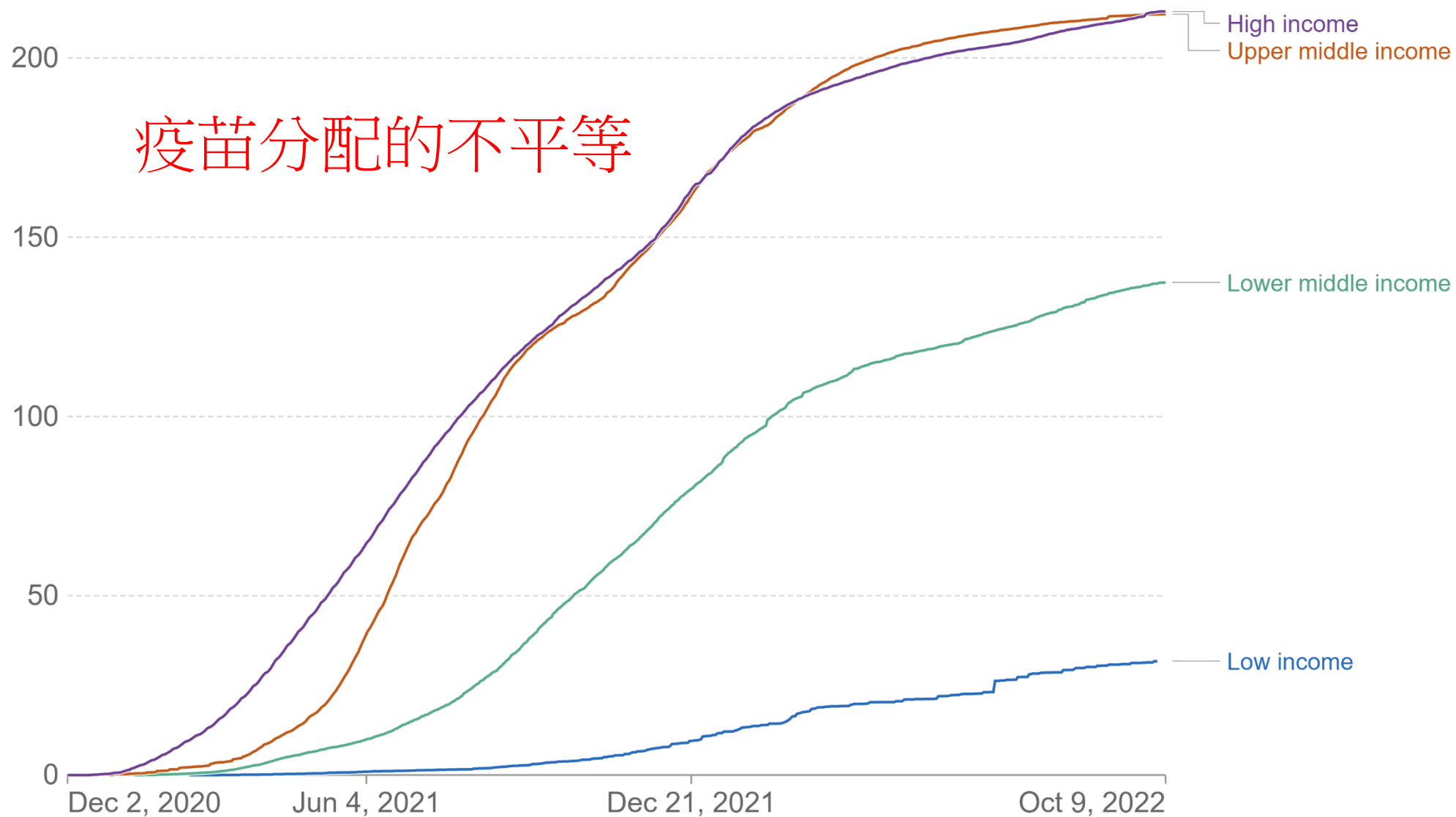


Nat Commun **13**, 5780 (2022).

COVID-19 vaccine doses administered per 100 people, by income group

Our World
in Data

All doses, including boosters, are counted individually.



Source: Official data collated by Our World in Data, World Bank

Note: Country income groups are based on the World Bank classification.

OurWorldInData.org/covid-vaccinations • CC BY



逐步回復醫療常態

疫苗、藥物、群體免疫、NPI、經驗



2022.5.21



2022.5.21

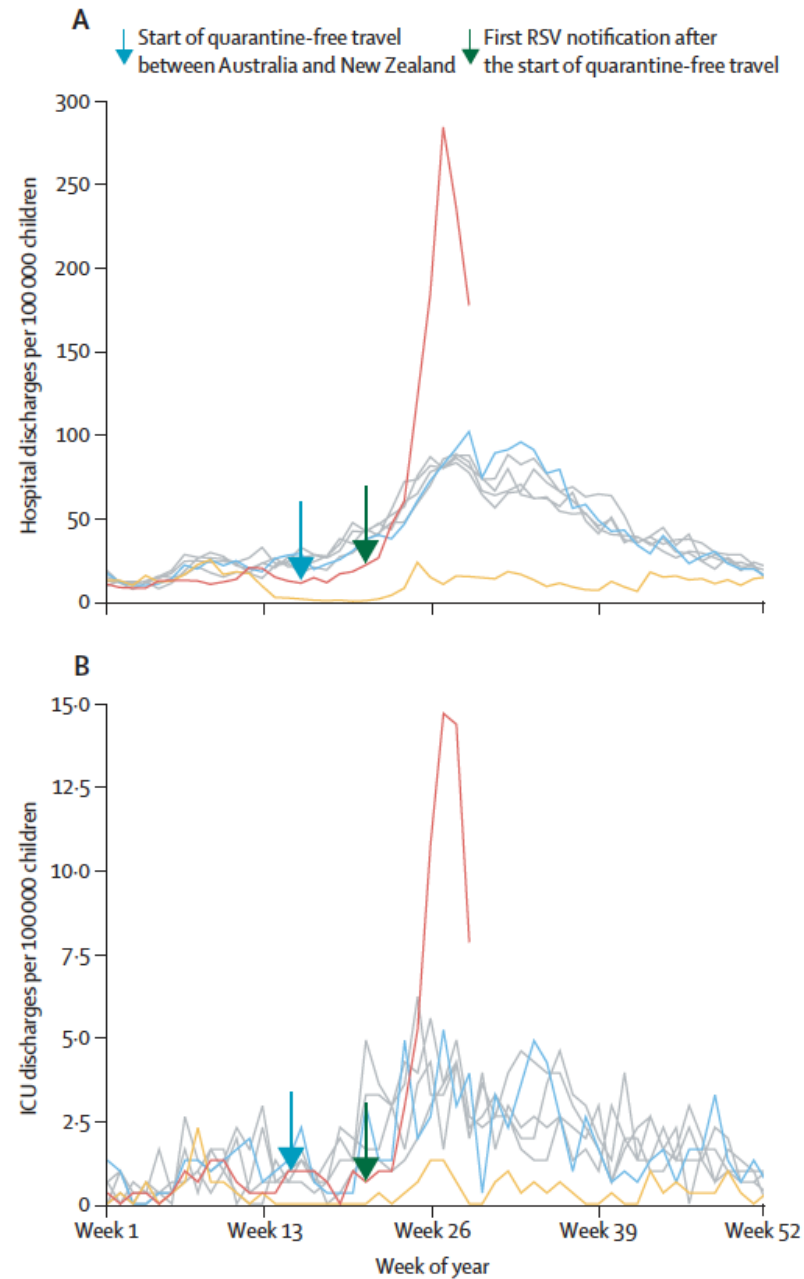


2022.10.4



免疫負債Immunity debt

- The lack of immune stimulation due to the reduced circulation of microbial agents and to reduced vaccine uptake induced an “immunity debt” with a growing proportion of susceptible people.
- Non-pharmaceutical interventions limited the transmission of SARS-CoV-2 and reduced the spread of other pathogens despite school re-opening



New Zealand children falling ill in high numbers due to Covid 'immunity debt'

Doctors say children haven't been exposed to range of bugs due to lockdowns, distancing and sanitiser and their immune systems are suffering



📷 The Wellington hospital in New Zealand. The city has 46 children hospitalised with respiratory illnesses. Photograph: Dave Lintott/REX/Shutterstock

<https://www.theguardian.com/world/2021/jul/08/new-zealand-children-falling-ill-in-high-numbers-due-to-covid-immunity-debt>



- 謝謝大家的聆聽