COVID-19 社區化後的感染管制與職場安全

盤松青
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臺大醫院感染管制中心

Oct. 6, 2023

COVID-19 2023年秋季演講系列
從新興傳染病到季節流行疾病的挑戰與因應

主持人：陳宜君主任、方啟泰教授

時　間	議　程	主講者
2023/09/01(五) 12:00-13:00	COVID-19 社區化醫療的因應	王振泰醫師 臺大醫院
2023/09/08(五) 12:00-13:00	COVID-19 社區化的診斷策略	林尚儀醫師 高雄醫學大學附設中和紀念醫院
2023/09/22(五) 12:00-13:00	COVID-19 社區化呼吸道治療的因應	郭耀文醫師 臺大醫院
2023/10/05(四) 12:00-13:00	醫療機構如何避免及處理 COVID-19 等病毒之群聚感染	黃伯諺醫師 林口長庚醫院
2023/10/6(五) 12:00-13:00	COVID-19 等傳染性疾病與職場安全	盤松青醫師 臺大醫院

Agenda

- COVID-19’s impact on individual patients
- COVID-19’s impact on healthcare associated infection (HCAI)
- COVID-19’s impact on antimicrobial prescription
- For the coming winter season in 2023

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Prior studies about the impact of COVID-19

- Existing assessment of the impact of the coronavirus disease 2019 (COVID-19) pandemic on healthcare-associated infections (HCAIs) has been limited to bacterial and fungal coinfections and secondary infections in hospitalized COVID-19 patients .
- Bacterial/fungal infections can be serious complications following influenza infection, with prevalence between 2% and 65% in influenza patients. (1)

1. Influenza Other Respir Virus. 2016;10:394–403.

Prior studies about the impact of COVID-19

- We extracted laboratory-confirmed cases of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection (1st January 2020 to 2nd June 2020) and blood and lower-respiratory specimens positive for 24 genera/species of clinical relevance (1st January 2020 to 30th June 2020) from Public Health England's national laboratory surveillance system
- 1% of persons with COVID-19 (2279/223413) in England had coinfection/secondary infection
- The most common causative organisms were

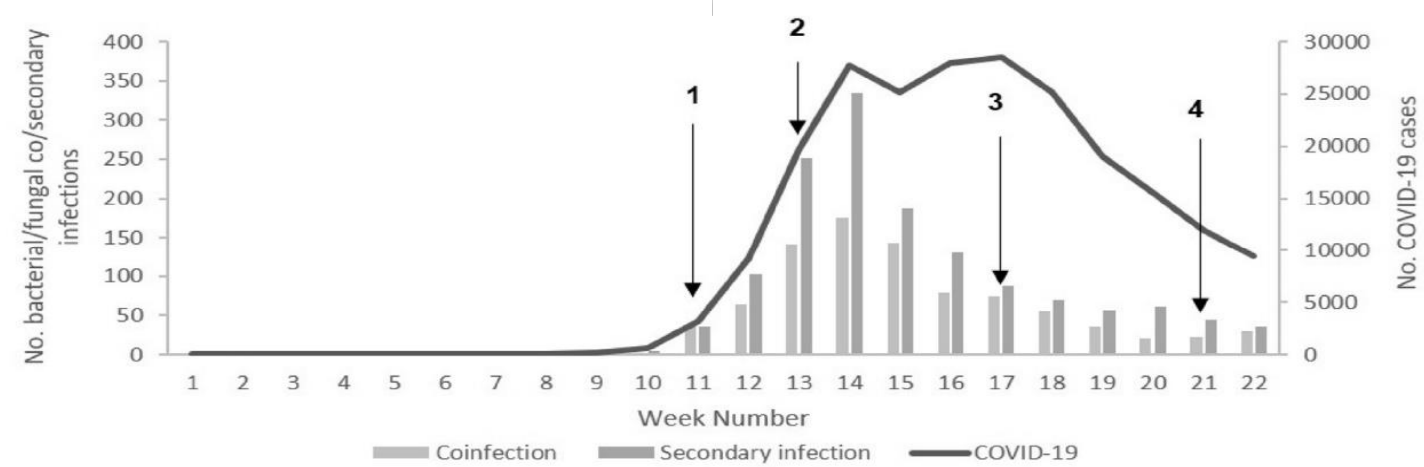
  Escherichia coli,

  Staphylococcus aureus,

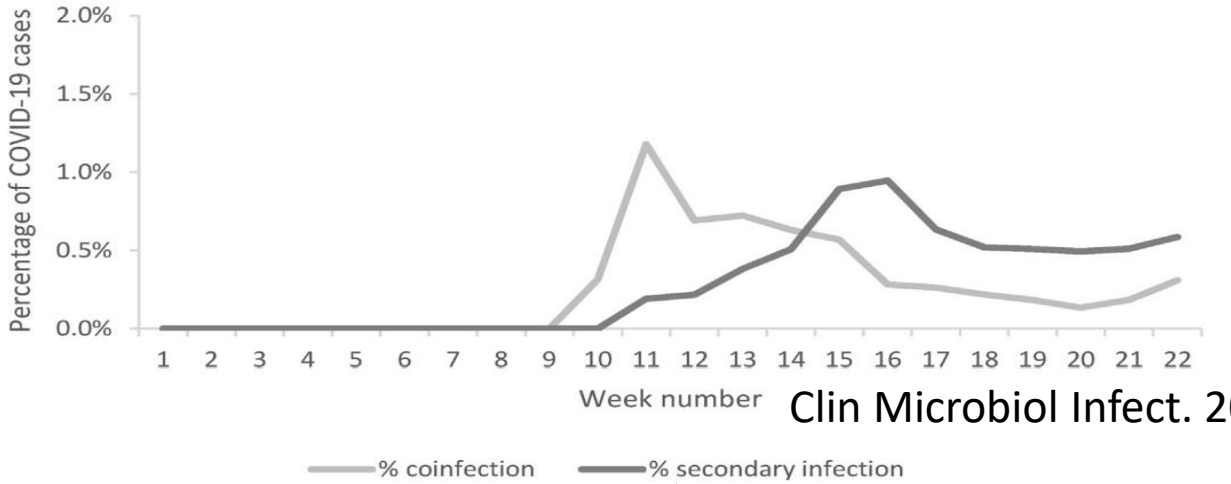
  Klebsiella pneumoniae

Clin Microbiol Infect. 2021 Nov; 27(11): 1658–1665.

Prior studies about the impact of COVID-19



(b)



Clin Microbiol Infect. 2021 Nov; 27(11): 1658–1665.

Meta-analysis

- Lansbury et al. co infections in patient with COVID-19
- eligible studies published from 1 January 2020 to 17 April 2020.
- 7% of hospitalized COVID-19 patients had a bacterial co-infection (95% CI 3-12%, n=2183)
- A higher proportion of ICU patients had bacterial co-infections than patients in mixed ward/ICU settings (14%, 95% CI 5-26, versus 4%, 95% CI 1-9)
- The commonest bacteria were
  - *Mycoplasma pneumonia,*
  - *Pseudomonas aeruginosa,*
  - *Haemophilus influenzae.*

J Infect. 2020 Aug;81(2):266-275. doi: 10.1016/j.jinf.2020.05.046.

Meta-analysis

- The pooled proportion with a viral co-infection was 3% (95% CI 1-6, n=1014)
- Three studies reported fungal co-infections.
  - *Aspergillus flavus*
  - *Aspergillus fumigatus*
  - *Candida glabrata*
- These findings do not support the routine use of antibiotics in the management of confirmed COVID-19 infection.

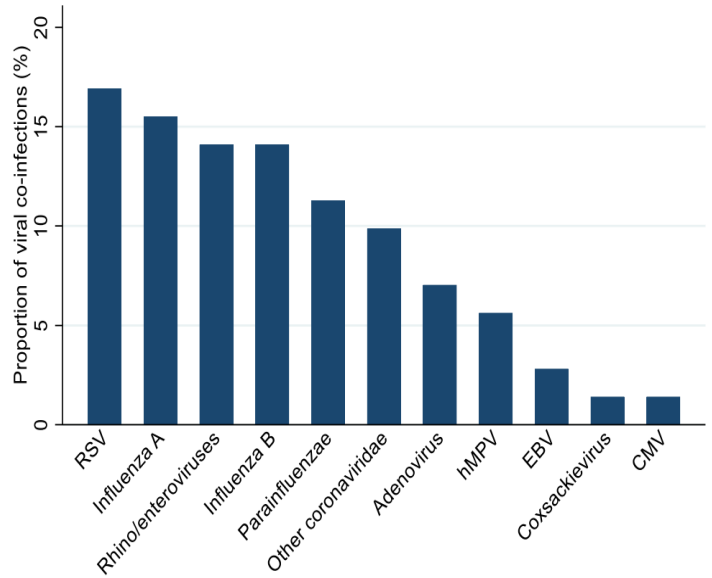


Figure 5. Viral pathogens as a proportion (%) of the total number of viral detections (n=71). Key: RSV – Respiratory Syncytial Virus, hMPV – human Metapneumovirus, EBV – Epstein-Barr Virus, CMV - Cytomegalovirus.

J Infect. 2020 Aug;81(2):266-275. doi: 10.1016/j.jinf.2020.05.046.

Review study

- Rawson et al.
- The MEDLINE and EMBASE databases were searched form 1st January 2000 to 18th April 2020 using a combination of search criteria including, coronavirus, COVID-19, SARS CoV-1, MERS, bacterial, co-infection.
- For COVID-19, 1450/2010 (72%) of patients reported received antimicrobial therapy, for example
  - 85% patients received quinolone therapy,
  - 33% received cephalosporins,
  - 25% received carbapenems
- For COVID-19, 62/806 (8%) patients were reported as experiencing bacterial/fungal coinfection during hospital admission.
- But the initial studies may be limited due to retrospective nature, or less examination were done.

Clin Infect Dis 2020 Dec 3;71(9):2459-2468. doi: 10.1093/cid/ciaa530.

Prior studies about the impact of COVID-19

- The need of antibiotics stewardship
  - prevent unintended consequences of antimicrobial therapy including toxicity (such as QT prolongation),
  - the propagation of antimicrobial resistance through increased usage of antimicrobials within healthcare systems
  - Possibility of shortage of antimicrobial
- Limitation
  - No standard diagnosis for other bacterial/virus/fungal infection
  - These initial analyses did not consider the broader context of potentially shifting patterns of infections in non–COVID-19 patients, health capacity, and practice across the pandemic waves.

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Impact on HCAI

- We analyzed blood cultures of patients presenting to a London hospital group between January 2020 and February 2021.
- We reported bloodstream infection (BSI) incidence, changes in sampling, case mix, healthcare capacity, and COVID-19 variants.
- Community-acquired *Escherichia coli* BSIs remained below pre-pandemic level during COVID-19 waves, but peaked following lockdown easing in May 2020, deviating from the historical trend of peaking in August.

Clin Infect Dis. 2022 Jul 1; 75(1): e1082–e1091.

Impact on HCAI

- The hospital-acquired BSI rate was 100.4 per 100,000 patient-days across the pandemic
- 132.3 during the first wave
- 190.9 during the second , with significant increase in elective inpatients.

Clin Infect Dis. 2022 Jul 1; 75(1): e1082–e1091.

Impact on HCAI

- In intensive care, the BSI rate was 421.0 per 100 000 intensive care unit patient-days during the second wave,
- compared to 101.3 pre–COVID-19.
- surge any space that can be used as ICU
- ICU Capacity
  - 83.1% pre–COVID-19
  - 95.1% the average ICU bed occupancy was
  - 157.6% in the first surge, with 47.3% occupied by COVID-19 patients
  - 182.8% in the second surge, with 64.0% occupied by COVID-19 patients.
- The nursing hours did not increased as much (27.5%)

Clin Infect Dis. 2022 Jul 1; 75(1): e1082–e1091.

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Trends in Antibiotic Prescribing in Out-of-Hours Primary Care in England from January 2016 to June 2020 to Understand Behaviours during the First Wave of COVID-19

- GP antibiotics prescribing
- We analysed practice-level prescribing records between January 2016 to June 2020 to report the trends for the total prescribing volume, prescribing of broad-spectrum antibiotics and key agents included in the national Quality Premium.
- In- hours (IH)
- Out-of- hours (OOH)
- Emergency department

Antibiotics (Basel). 2021 Jan; 10(1): 32.

Trends in Antibiotic Prescribing in Out-of-Hours Primary Care in England from January 2016 to June 2020 to Understand Behaviours during the First Wave of COVID-19

- In OOH, co-amoxiclav and doxycycline peaked in March to May in 2020, which was out of sync with seasonality peaks (Winter)
- While this increase might be explained by the implementation of the national guideline to use co-amoxiclav and doxycycline to manage pneumonia in the community during COVID-19.
- No change in the prescription of UTI

Antibiotics (Basel). 2021 Jan; 10(1): 32.

Trends in Antibiotic Prescribing in Out-of-Hours Primary Care in England from January 2016 to June 2020 to Understand Behaviours during the First Wave of COVID-19

- Both the IH and OOH broad spectrum antibiotics increased after the first wave of COVID-19.
- In IH, the downward trend of the proportion of broad-spectrum prescribing switched direction and started to rise from March, increasing by 0.7% per month (95% CI: 0.3% to 1.2%, $p < 0.05$).
- In OOHs, though the proportion of broad-spectrum antibiotic prescribing showed no significant overall change prior to March 2020, it started increasing by 1.4% per month (95% CI: 0.9% to 1.9%, $p < 0.05$) since.

Antibiotics (Basel). 2021 Jan; 10(1): 32.

Impact of the COVID-19 pandemic on the surveillance, prevention and control of antimicrobial resistance: a global survey

- From October to December 2020, WHO Global Antimicrobial Resistance and Use Surveillance System (GLASS) national focal points completed a questionnaire, including Likert scales and open-ended questions.
- 73 countries across income levels participated.

J Antimicrob Chemother. 2021 Oct 11;76(11):3045-3058. doi: 10.1093/jac/dkab300.

Impact of the COVID-19 pandemic on the surveillance, prevention and control of antimicrobial resistance: a global survey

- During the COVID-19 pandemic, 67% reported limited ability to work with AMR partnerships;
- decreases in funding were frequently reported by low- and middle-income countries (LMICs; $P < 0.01$).
- Reduced availability of nursing, medical and public health staff for AMR was reported by 71%, 69% and 64%, respectively
- Decreased numbers of cultures, elective procedures, chronically ill admissions and outpatients and increased ICU admissions reported could bias AMR data.
- Increases in selected inappropriate IPC practices and antimicrobial prescribing could increase rates. Most did not yet have complete data on changing AMR rates due to COVID-19.

J Antimicrob Chemother. 2021 Oct 11;76(11):3045-3058. doi: 10.1093/jac/dkab300.

Suggestions

- Responses highlight important actions to help ensure that AMR remains a global health priority,
- including engaging with GLASS to facilitate reliable AMR surveillance data,
- seizing the opportunity to develop more sustainable IPC programmes,
- promoting integrated antibiotic stewardship guidance,
- leveraging increased laboratory capabilities and other system-strengthening efforts.

J Antimicrob Chemother. 2021 Oct 11;76(11):3045-3058. doi: 10.1093/jac/dkab300.

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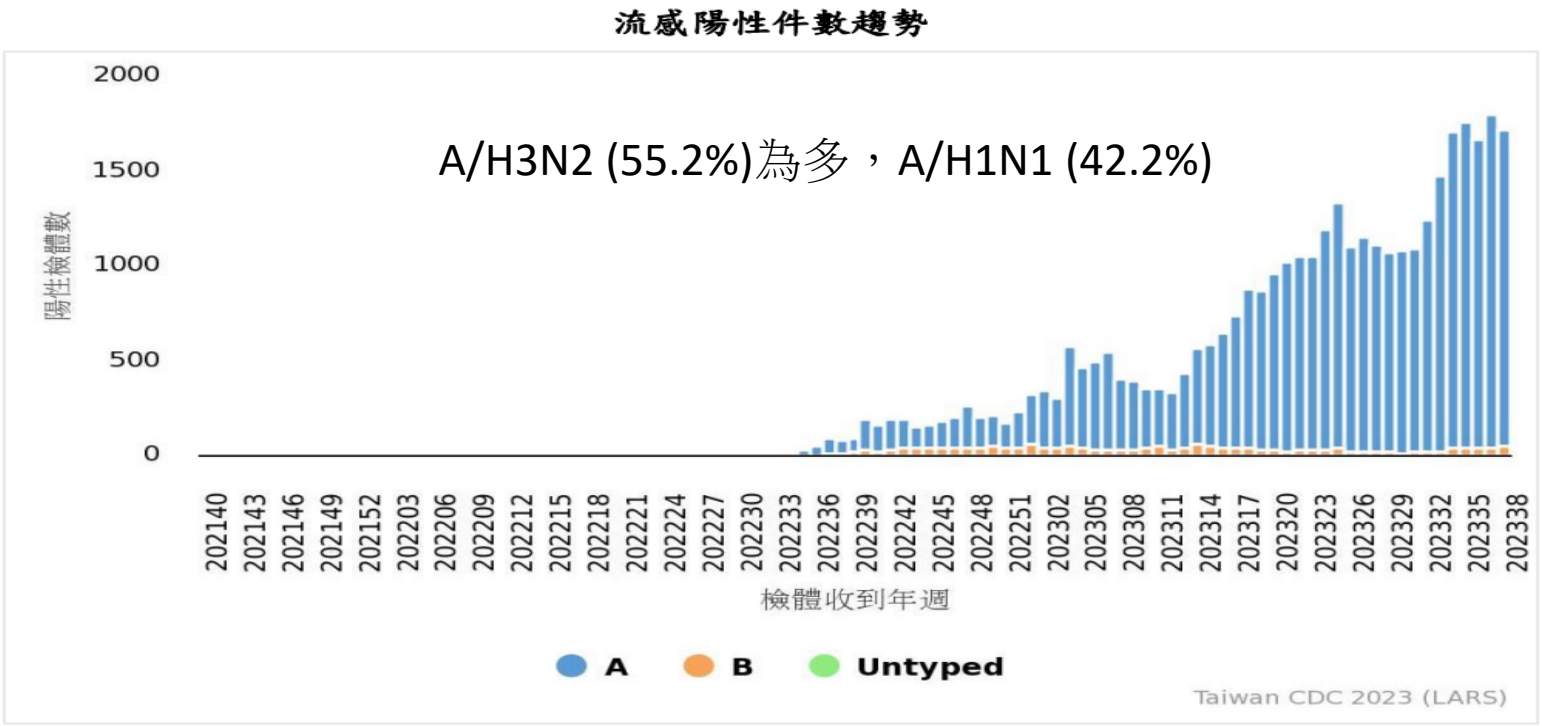
coming winter season: influenza

實驗室傳染病自動通報系統（LARS）

流感病毒陽性檢體數處高點，近四週檢出流感病毒 A 型占 98%。



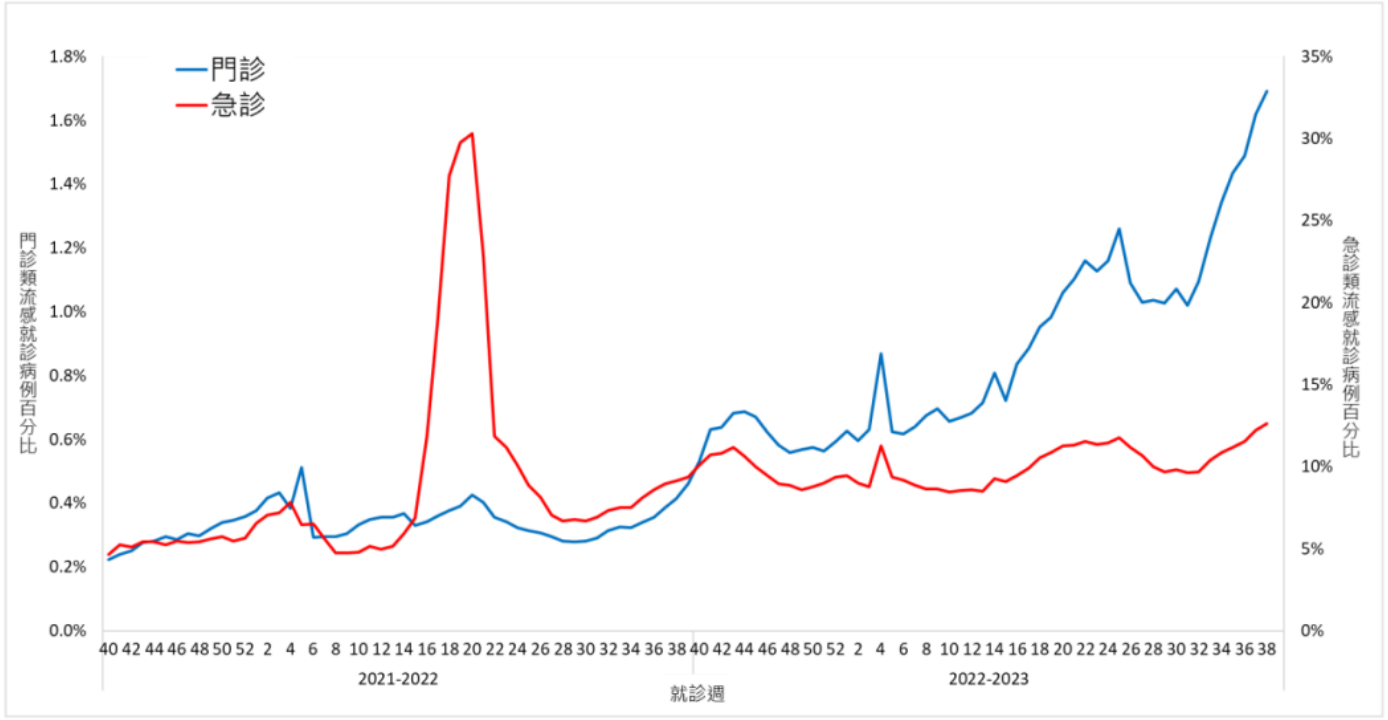
A/H3N2 (55.2%)為多，A/H1N1 (42.2%)

https://www.cdc.gov.tw/File/Get/hiZOt4KeEiIGpeQuxzc0Sw

Coming winter season: flu like illness

衛生福利部疾病管制署

2023年第38週 (2023/9/17 – 2023/9/23)



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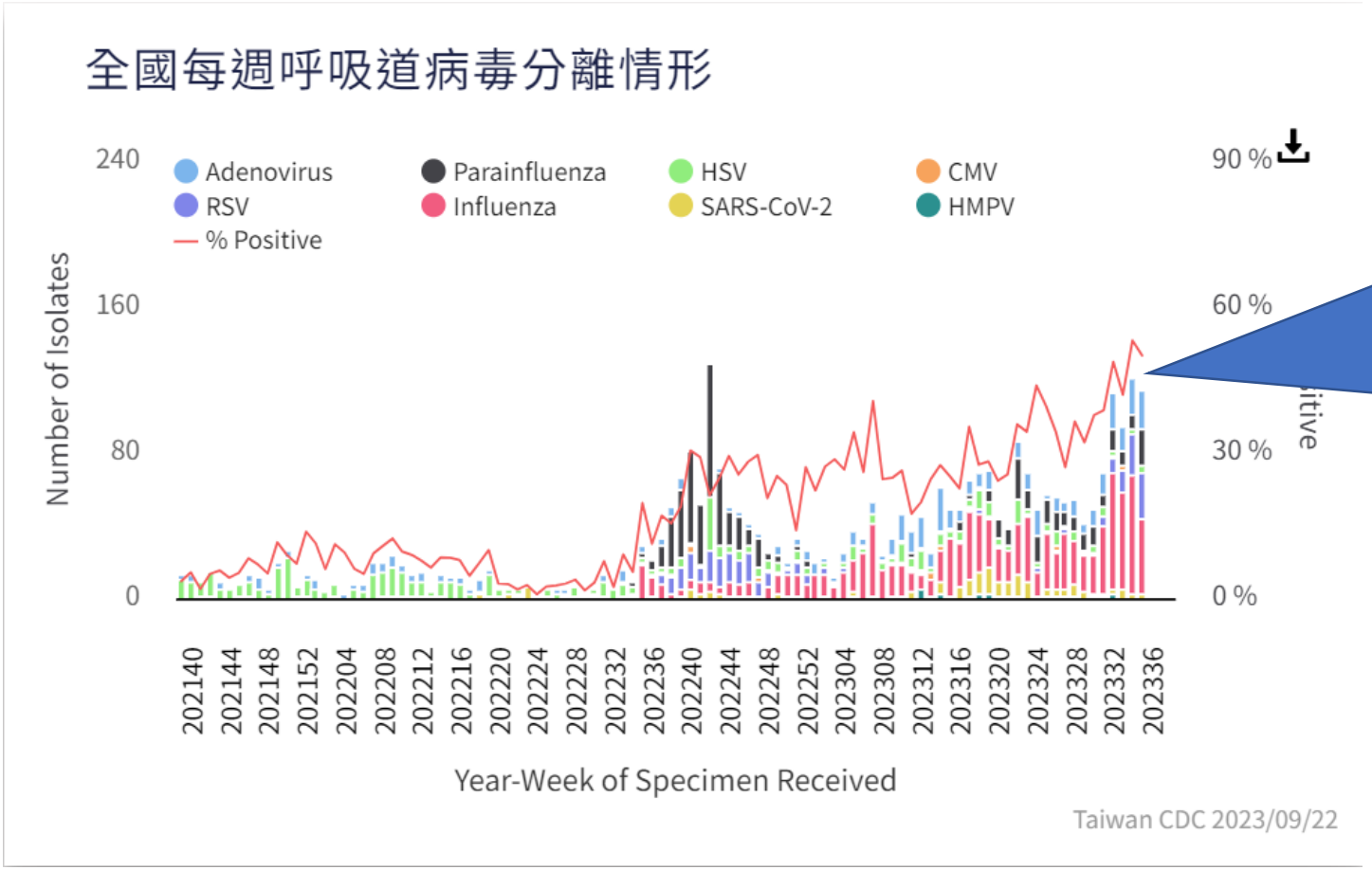
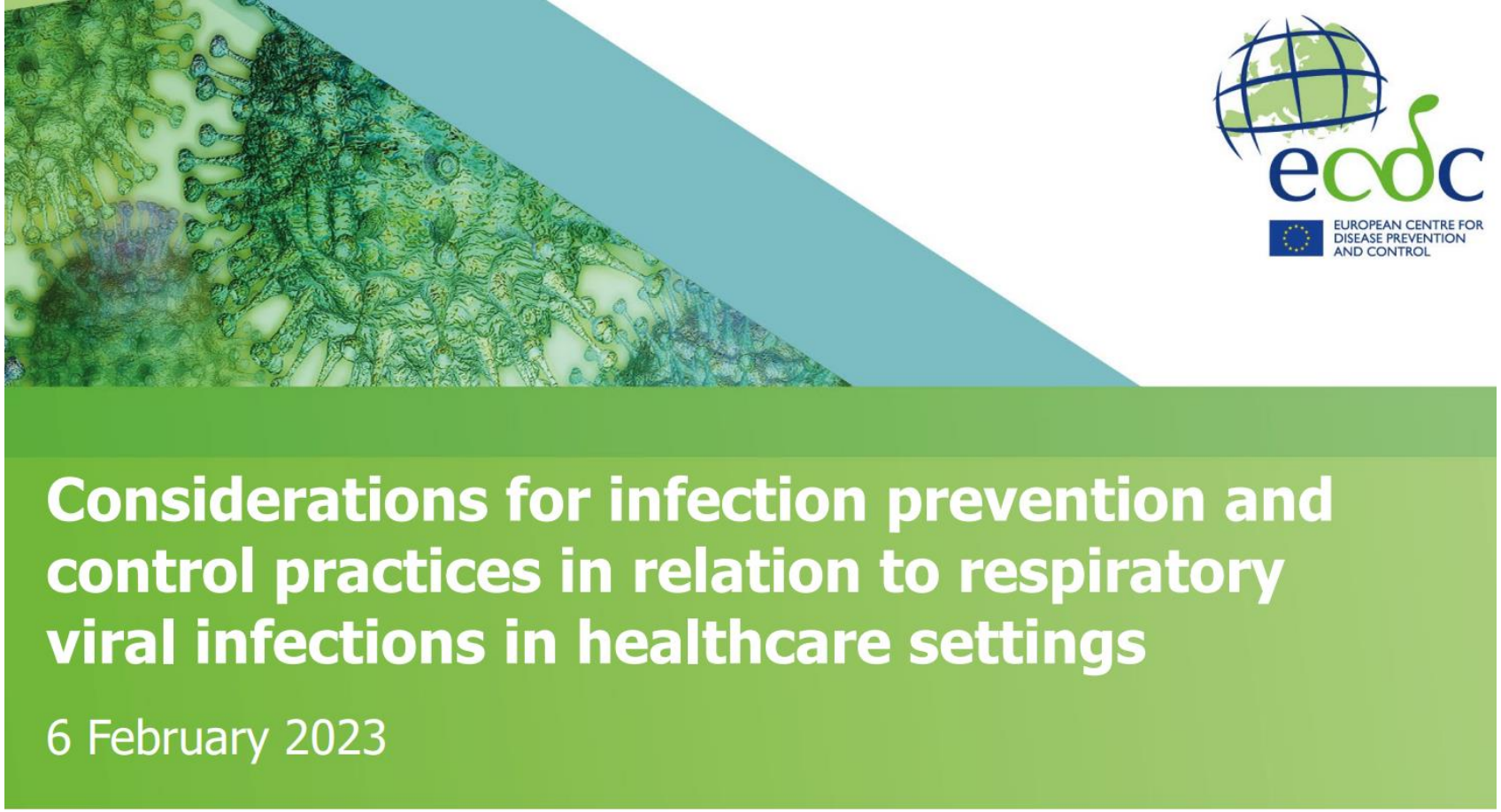
Coming winter season: other virus



202336
- Adenovirus: **21 isolates**
- Parainfluenza: **20 isolates**
- HSV: **4 isolates**
- CMV: **0 isolates**
- RSV: **26 isolates**
- Influenza: **41 isolates**
- SARS-CoV-2: **3 isolates**
- HMPV: **0 isolates**
- % Positive: **50%**

https://nidss.cdc.gov.tw/



- holistic approach, addressing risks from transmission of all respiratory viruses rather than focusing solely on SARS-CoV-2

https://www.ecdc.europa.eu/sites/default/files/documents/Considerations%20for%20IPC%20respiratory%20viral%20infections%20in%20HC%20settings.pdf

Surveillance and epidemiology

- Most EU/EEA countries operate sentinel surveillance systems in primary care based on a case definition of acute respiratory infections (ARI) or influenza-like illness (ILI), collecting information about the consultation rates by age group for syndromic monitoring in outpatient settings.
- Samples are taken from a subset of these patients and the samples are tested at national influenza centres (NICs) for respiratory viruses (mainly influenza virus, SARS-CoV-2 and RSV) to analyse the respective positivity rates and trend over time.

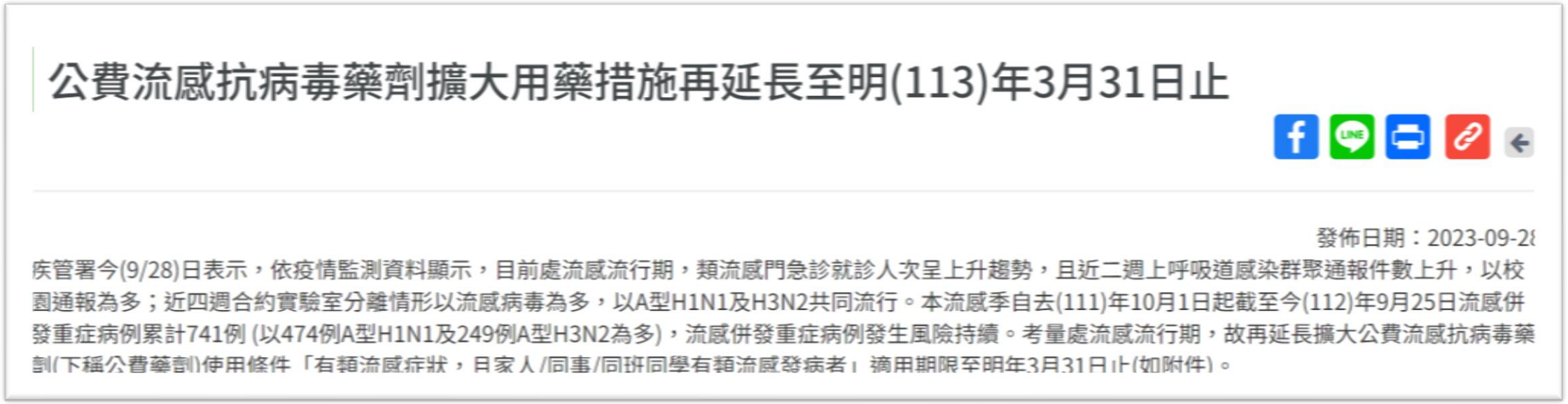
https://www.ecdc.europa.eu/sites/default/files/documents/Considerations%20for%20IPC%20respiratory%20viral%20infections%20in%20HC%20settings.pdf

COVID-19 & influenza

- Yet no clear seasonal pattern has been established for SARS-CoV-2, with yearround transmission occurring in all EU/EEA countries.
- The COVID-19 pandemic disrupted influenza circulation, with very few detections during the 2020/21 season, resulting in a delayed and less intense epidemic during the 2021/22 season than in previous years.
- The 2022/23 influenza season started early (week 45/2022) with widespread circulation and intensity levels comparable with pre-COVID-19-pandemic seasons.

https://www.ecdc.europa.eu/sites/default/files/documents/Considerations%20for%20IPC%20respiratory%20viral%20infections%20in%20HC%20settings.pdf

COVID-19 & influenza



公費流感抗病毒藥劑擴大用藥措施再延長至明(113)年3月31日止

發佈日期：2023-09-2

疾管署今(9/28)日表示，依疫情監測資料顯示，目前處流感流行期，類流感門急診就診人次呈上升趨勢，且近二週上呼吸道感染群聚通報件數上升，以校園通報為多；近四週合約實驗室分離情形以流感病毒為多，以A型H1N1及H3N2共同流行。本流感季自去(111)年10月1日起截至今(112)年9月25日流感併發重症病例累計741例 (以474例A型H1N1及249例A型H3N2為多)，流感併發重症病例發生風險持續。考量處流感流行期，故再延長擴大公費流感抗病毒藥劑(下稱公費藥劑)使用條件「有類流感症狀，且家人/同事/同班同學有類流感發病者」適用期限至明年3月31日止(如附件)。

- The 2022/23 influenza season started early (week 45/2022) with widespread circulation and intensity levels comparable with pre-COVID-19-pandemic seasons.

https://www.cdc.gov.tw/Bulletin/Detail/Jrpv0k0wUppcuMjf5SSF0A?typeid=9
https://www.ecdc.europa.eu/sites/default/files/documents/Considerations%20for%20IPC%20respiratory%20viral%20infections%20in%20HC%20settings.pdf

COVID-19 and RSV

- Each year, the RSV epidemic in Europe progressed rapidly after week 40 (beginning of October) and the median start of the RSV season was in week 49 (beginning of December).
- The current 2022/2023 RSV season started early in comparison with the pre-COVID-19 pandemic seasons and peaked in weeks 46–47/2022 in primary care and in week 50/2022 in hospitals.

https://www.ecdc.europa.eu/sites/default/files/documents/Considerations%20for%20IPC%20respiratory%20viral%20infections%20in%20HC%20settings.pdf

Transmission route

- SARS-CoV-2 mainly spreads via respiratory droplets/formite transmission.
- Influenza virus is transmitted through respiratory droplets/contact
- RSV is considered as being primarily transmitted via large respiratory droplets, or contact with contaminated nasopharyngeal secretions on surfaces and objects followed by auto-inoculation, mainly through the eyes and nose (fomite transmission).
  - RSV can survive on hands for up to 25 minutes and for longer periods on gloves, gowns, paper tissues and other surfaces.
  - the period of shedding is one week, although longer periods have also been documented, especially in young children and immunocompromised patients
  - Unrecognised asymptomatic RSV individuals also appear to play a role in the transmission of RSV within the household and the community.

https://www.ecdc.europa.eu/sites/default/files/documents/Considerations%20for%20IPC%20respiratory%20viral%20infections%20in%20HC%20settings.pdf

Infection prevention and control measures (IPC)

- Administrative measures
  - Out-patient setting: screening

Infection prevention and control measures (IPC)

- Administrative measures
  - Out-patient setting: screening

Patients should be asked to contact the primary care practice by phone in advance of a visit and inform them of any respiratory symptoms. If feasible, dedicated home visiting services should be considered for vulnerable patients to avoid crowded out-patient and emergency services .

https://www.ecdc.europa.eu/sites/default/files/documents/Considerations%20for%20IPC%20respiratory%20viral%20infections%20in%20HC%20settings.pdf

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- Administrative measures
  - Out-patient setting: screening

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  - ER: Assessment and management of patients with respiratory symptoms should ideally be performed in a separate area of the emergency department

https://www.ecdc.europa.eu/sites/default/files/documents/Considerations%20for%20IPC%20respiratory%20viral%20infections%20in%20HC%20settings.pdf

Infection prevention and control measures (IPC)

- Administrative measures
  - Out-patient setting: screening

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  - ER: Assessment and management of patients with respiratory symptoms should ideally be performed in a separate area of the emergency department
  - Admission: Universal screening by testing all patients for SARS-CoV-2 on admission to the hospital, irrespective of symptoms to reduce the risk of onward transmission by asymptomatic patients has limited additional benefit.

https://www.ecdc.europa.eu/sites/default/files/documents/Considerations%20for%20IPC%20respiratory%20viral%20infections%20in%20HC%20settings.pdf

Risk factors for test positive

TABLE 3

Multivariable logistic regression model of risk factors for SARS-CoV-2 infection in patients with low COVID-19 suspicion, Karolinska University Hospital, Stockholm, Sweden, 16 March–12 April 2020 (n = 1,482)

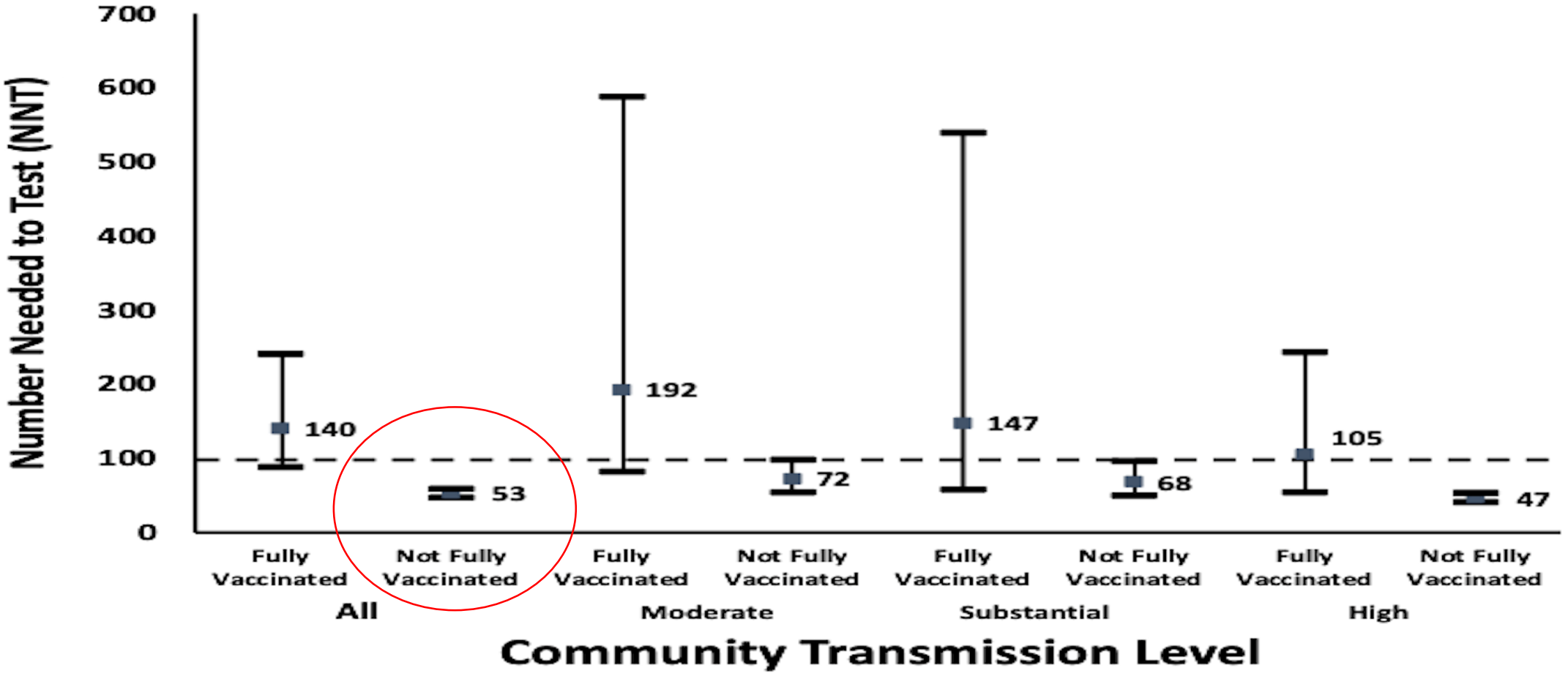
Characteristics	aOR	95% CI	p value
Age	1.0	0.99–1.02	0.7
Sex (male)	0.5	0.3–1.1	0.09
Reason for being tested			
Hospital admission	Reference	NA	NA
Before surgery	1.2	0.5–2.8	0.6
Before delivery	2.6	1.3–5.4	0.008
Comorbidities and symptoms			
Cancer	0.5	0.2–1.4	0.2
Fever (without respiratory symptoms)	2.9	1.2–7.4	0.02
Cough (without fever)	4.0	1.4–12.0	0.012
Diarrhoea	3.7	1.1–12.3	0.03
Myalgia	14.5	2.6–81.2	0.002

CI: confidence interval; COVID-19: coronavirus disease; OR: odds ratio; SARS-CoV-2: severe acute respiratory syndrome coronavirus 2.

Reference category for binary variables (cancer, fever, cough, diarrhoea, and myalgia) was not having any of these conditions. Having dysgeusia/dysosmia was not included in the final model since the number of events were very small. Penalised maximum likelihood logistic regression model adjusted by sex, age, reason for being tested, comorbidity of cancer and having fever, cough, diarrhoea, and myalgia.

Euro Surveill. 2022;27(7):2100079.

Number need to test<100



Infect Control Hosp Epidemiol. 2023 Jan;44(1):68-74. doi: 10.1017/ice.2022.301.

The cons of universal screening

- As the pandemic evolved, asymptomatic patient screening had some unintended consequences.
- Adverse outcomes related to asymptomatic testing include

(1) delays in patient placement and therefore receipt of appropriate levels of care,

(2) postponement of necessary procedures,

(3) strains on laboratory and testing personnel and resources

(4) increased costs.

At a tertiary-care cancer center, the direct cost to identify a single asymptomatically infected patient through preprocedure testing was $12,514,7.

Admission testing at an academic health system cost an added $54.50 per admission

Infect Control Hosp Epidemiol. 2023 Jan;44(1):2-7.

Using an infection prevention risk assessment to guide asymptomatic screening programs

- Community incidence and transmission of COVID-19.
- Patient populations
- Facility layout

Eg. such as in behavioral health, may create environments in which healthcare-associated transmission is more challenging to prevent and asymptomatic screening may help avert transmission.

- Procedures that may increase the risk of healthcare-associated transmission.

Infect Control Hosp Epidemiol. 2023 Jan;44(1):2-7.

Pre-admission screening

- Universal screening by testing all patients for SARS-CoV-2 on admission to the hospital, irrespective of symptoms to reduce the risk of onward transmission by asymptomatic patients has limited additional benefit.
  - during periods of high community transmission of SARS-CoV-2
  - in particular by targeting high-risk vulnerable groups (e.g. patients admitted to oncology, transplantation units, etc.)
  - in the event of emerging viruses with high impact (e.g. emerging SARS-CoV-2 variants with high morbidity and mortality).

https://www.ecdc.europa.eu/sites/default/files/documents/Considerations%20for%20IPC%20respiratory%20viral%20infections%20in%20HC%20settings.pdf

Infection prevention and control measures (IPC)

- Administrative measures
  - In-patient setting
  - Standard precautions
    - hand hygiene
    - respiratory hygiene measures
    - Universal masking if there is high community transmission of virus infection
  - Transmission-based precautions
    - Droplet precaution
    - Contact precaution

https://www.ecdc.europa.eu/sites/default/files/documents/Considerations%20for%20IPC%20respiratory%20viral%20infections%20in%20HC%20settings.pdf

Transmission-based precautions

- Patients with a confirmed respiratory viral infection, and those with probable respiratory viral infection awaiting confirmatory test results, should ideally be placed in a single room.
- patients with the same viral infection can be placed in the same room (cohorting).
- Patients diagnosed with respiratory viral infections that have pandemic potential or are high impact (MERS-CoV, avian influenza) should be prioritised for isolation in a single room or, if available, an airborne-precaution isolation room.

https://www.ecdc.europa.eu/sites/default/files/documents/Considerations%20for%20IPC%20respiratory%20viral%20infections%20in%20HC%20settings.pdf

Infection prevention and control measures (IPC)

- Personnel measures
  - Health surveillance
  - Screening and treatment
  - PPE
    - For respiratory viral infections, including COVID-19, influenza and RSV, evidence shows that the use of face masks and eye protection are effective protective measures, although the results of studies are not uniform.
  - Vaccination (influenza/COVID-19 vaccination)

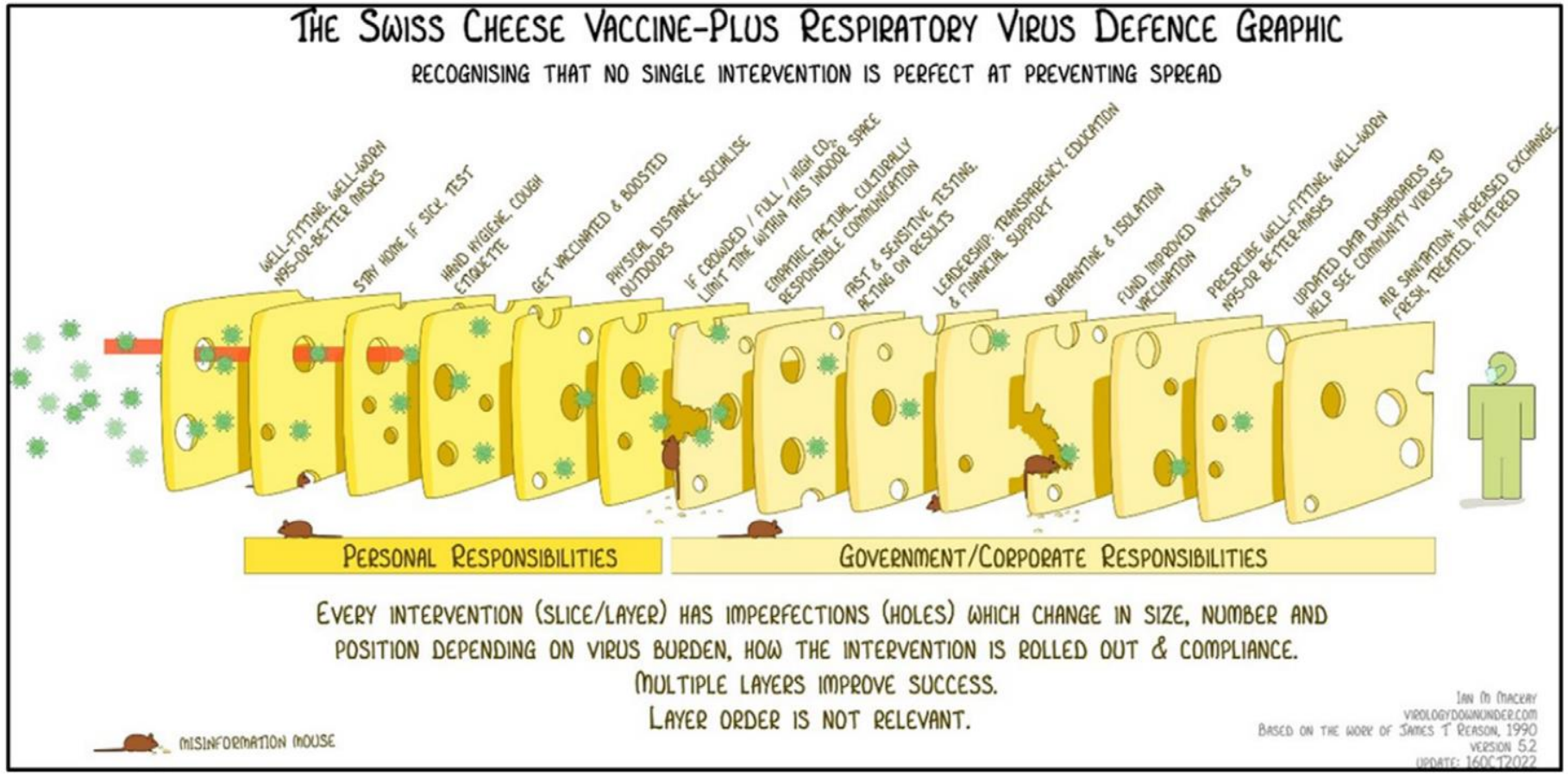
https://www.ecdc.europa.eu/sites/default/files/documents/Considerations%20for%20IPC%20respiratory%20viral%20infections%20in%20HC%20settings.pdf

Infection prevention and control measures (IPC)

- Environmental measures
  - Cleaning
    - In hospital rooms, it is recommended that the floor is cleaned regularly and that frequently-touched surfaces are disinfected using hospital disinfectants active against viruses.
    - Decontamination of non-single use medical devices
    - Regular cleaning and disinfection of electronic equipment, such as mobile phones, desk phones and other communication devices, tablets, desktop screens, keyboards and printers should be ensured.
  - Ventilation
    - Ventilation plays a key role for the prevention of respiratory infections in healthcare setting
    - Air filtration and ultraviolet germicidal irradiation (UVGI) are complementary approaches

https://www.ecdc.europa.eu/sites/default/files/documents/Considerations%20for%20IPC%20respiratory%20viral%20infections%20in%20HC%20settings.pdf

Take home message



Infect Control Hosp Epidemiol. 2023 Jan;44(1):2-7.