Winter (respiratory) Pathogens

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NSW GOVERNMENT Health Central Coast Local Health District

Podcast: https://infectioncontrolmatters.com

Acknowledgement of Country

I wish to acknowledge the Traditional Custodians of country throughout Australia and their connections to land, sea and community.

Pay my respect to their Elders past and present and extend that respect to all Aboriginal and Torres Strait Islander peoples today.

Declarations

- Received no funding for this talk

- Recipient of grant funding from government and professional bodies through a competitive process.

Podcast: https://infectioncontrolmatters.com

Overview

- Common winter pathogens and infections
- Modes of transmission
- Ways to help prevent infection

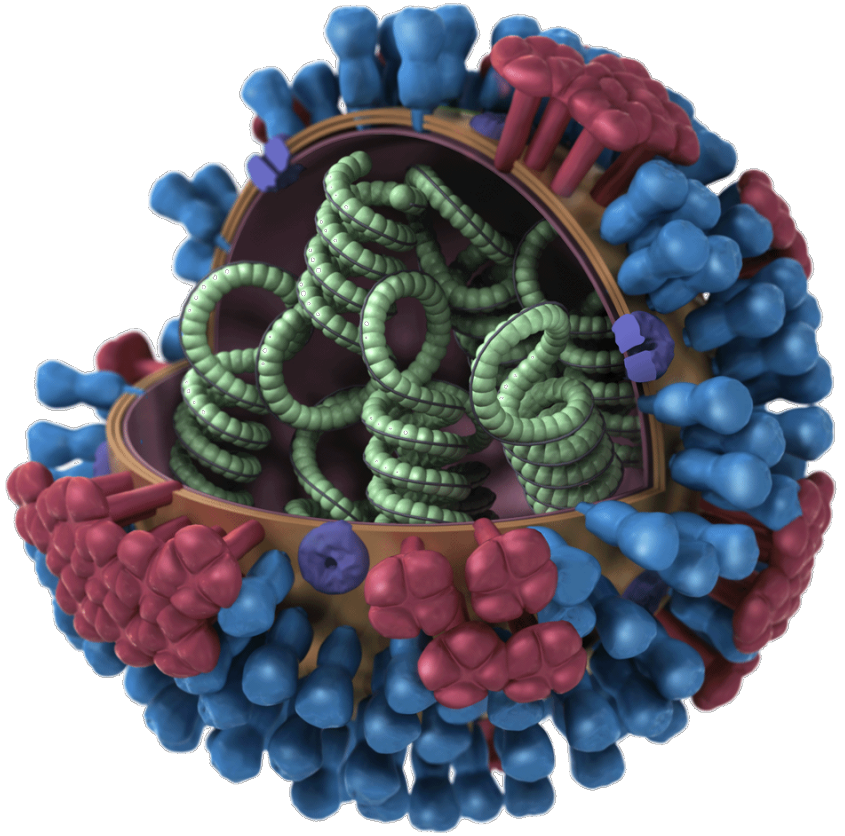
Common winter respiratory pathogens

- Influenza
- Respiratory Syncytial Virus

- Croup
- Chest infections / pneumonia
- Common cold
- COVID-19 (not just winter)

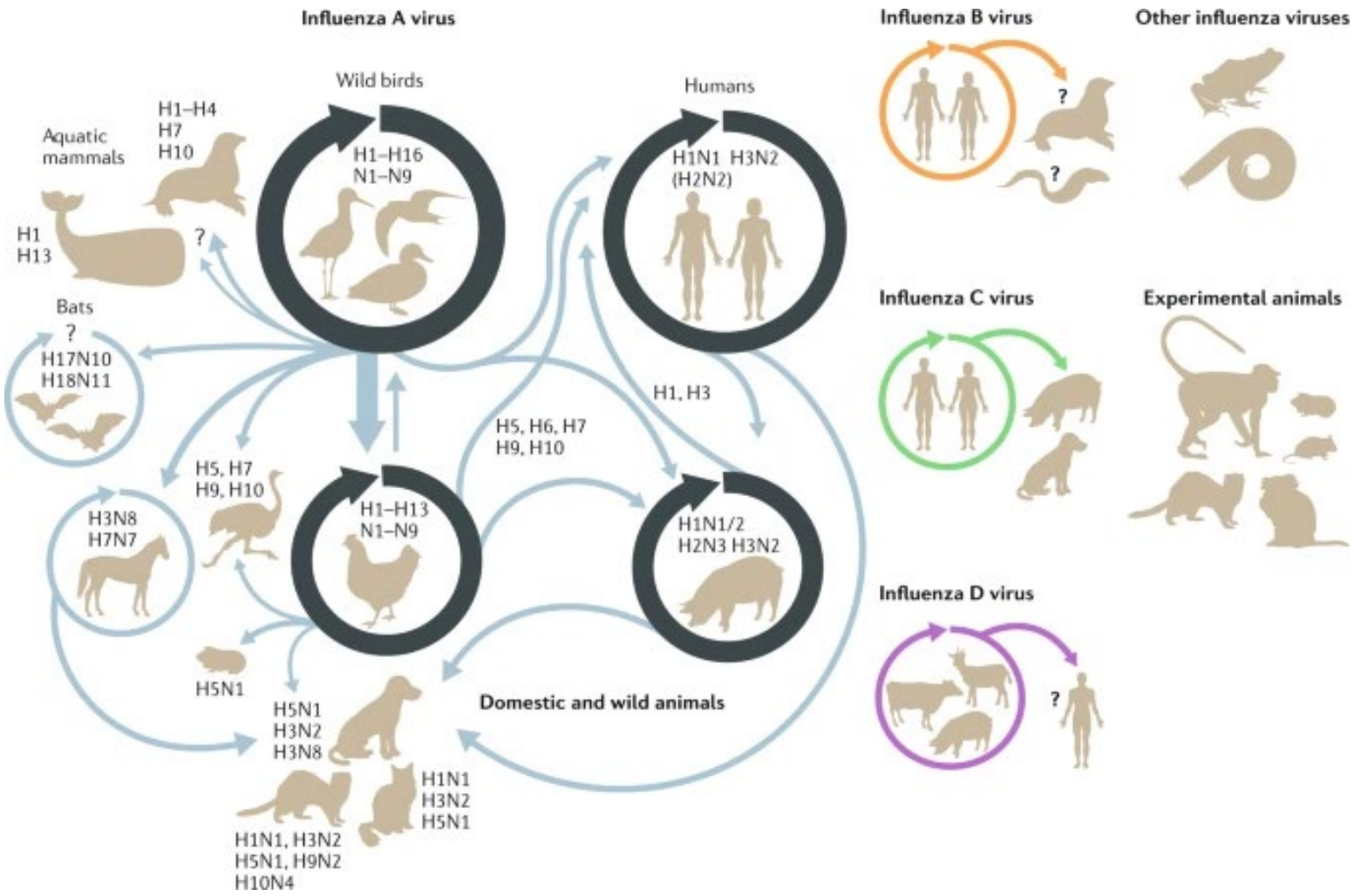
Influenza

- Influenza (flu) is a contagious respiratory illness
  - Caused by influenza viruses, orthomyxovirus
  - Spread by infectious particles
  - Types A, B, C



Credit: CDC

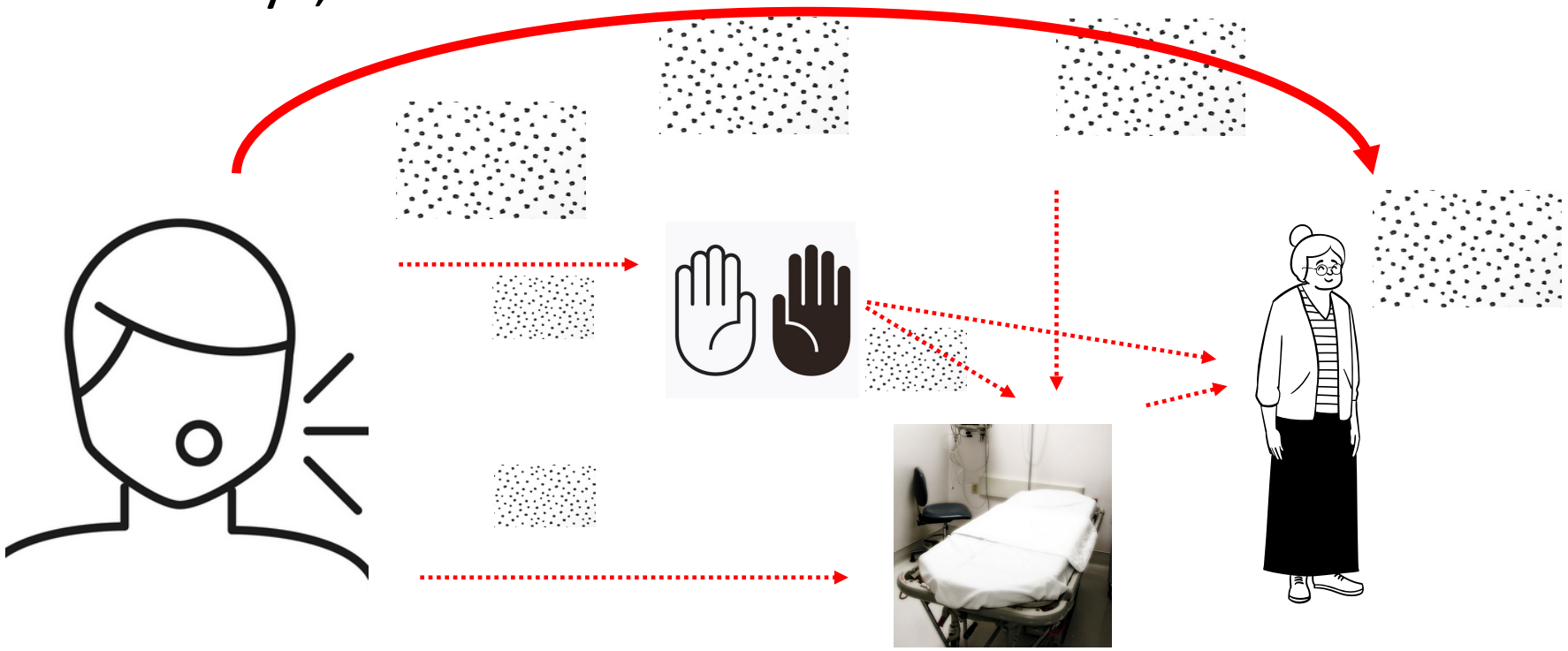
Influenza: Reservoirs



Long, J. S. et al (2019). *Nature Reviews Microbiology*, *17*(2), 67-81.

Influenza: Transmission

- The virus is spread from person- to- person through respiratory secretions and aerosols
- Incubation period 1-3 days
- Adults most infectious 3-5 days, children longer



Influenza: Transmission

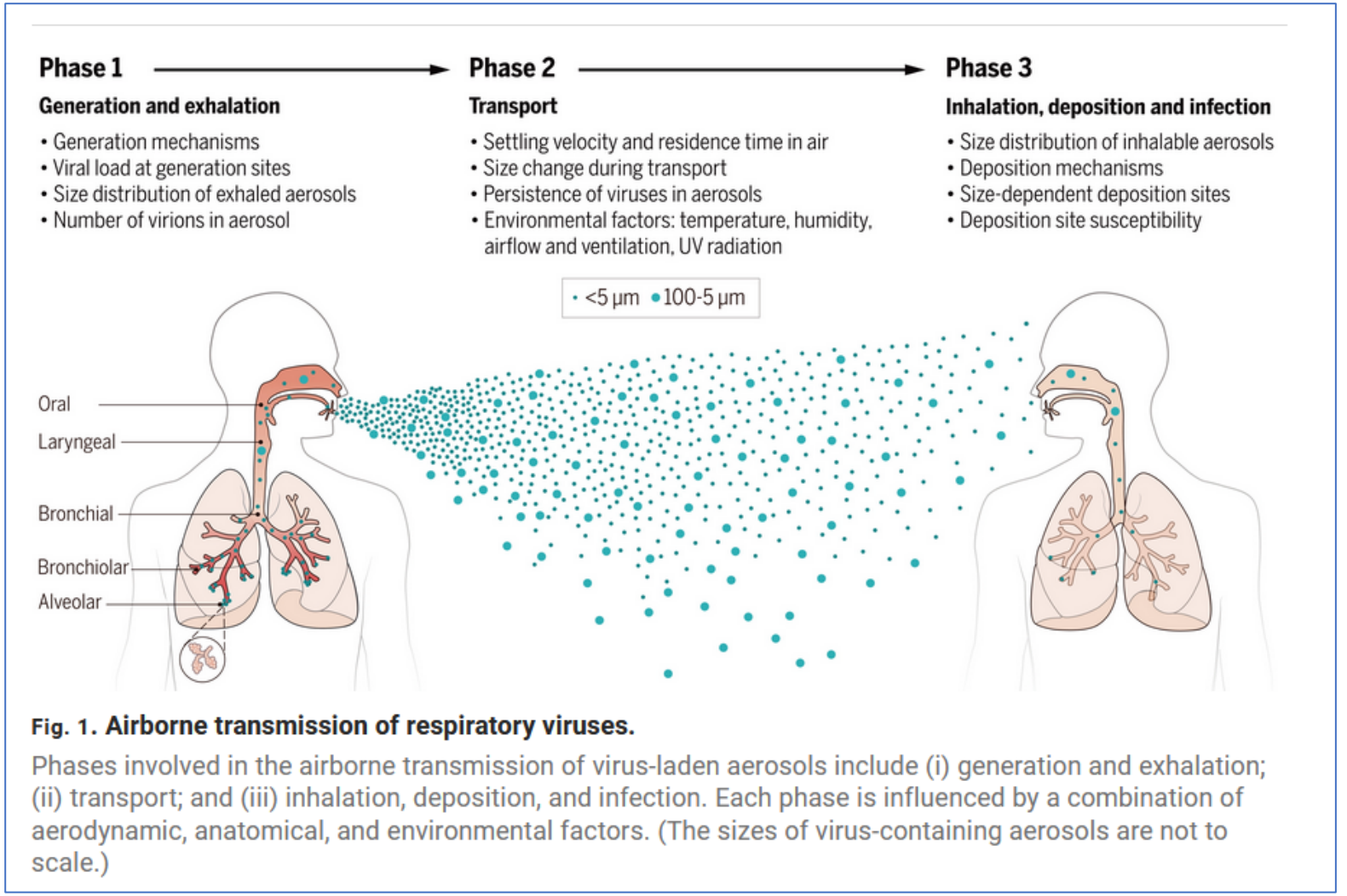


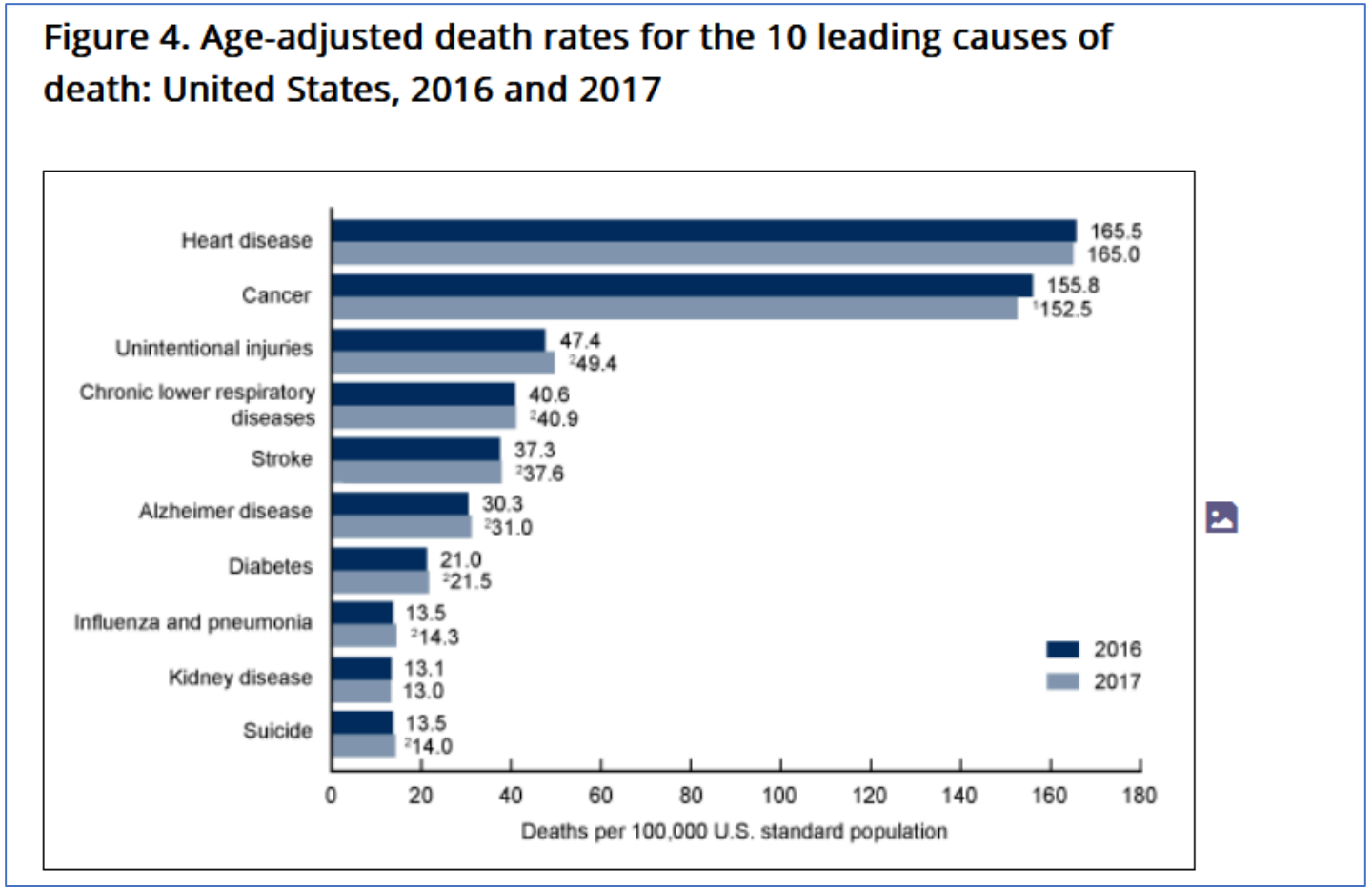
Fig. 1. Airborne transmission of respiratory viruses.

Phases involved in the airborne transmission of virus-laden aerosols include (i) generation and exhalation; (ii) transport; and (iii) inhalation, deposition, and infection. Each phase is influenced by a combination of aerodynamic, anatomical, and environmental factors. (The sizes of virus-containing aerosols are not to scale.)

Wang, C. C., et al (2021). Airborne transmission of respiratory viruses. *Science*, *373*(6558),

Influenza: Impact, context

- Influenza characterized by fever, headache, myalgia, coryza, sore throat and cough.
- Duration of illness is usually 2-7 days.
- Since the clinical picture of influenza is nonspecific, its specific diagnosis must be confirmed by laboratory tests.



Credit: CDC

Influenza: Epidemiology, FluTracking

2023 · Volume 47

Communicable Diseases Intelligence

FluTracking: Weekly online community-based surveillance of influenza-like illness in Australia, 2019 Annual Report

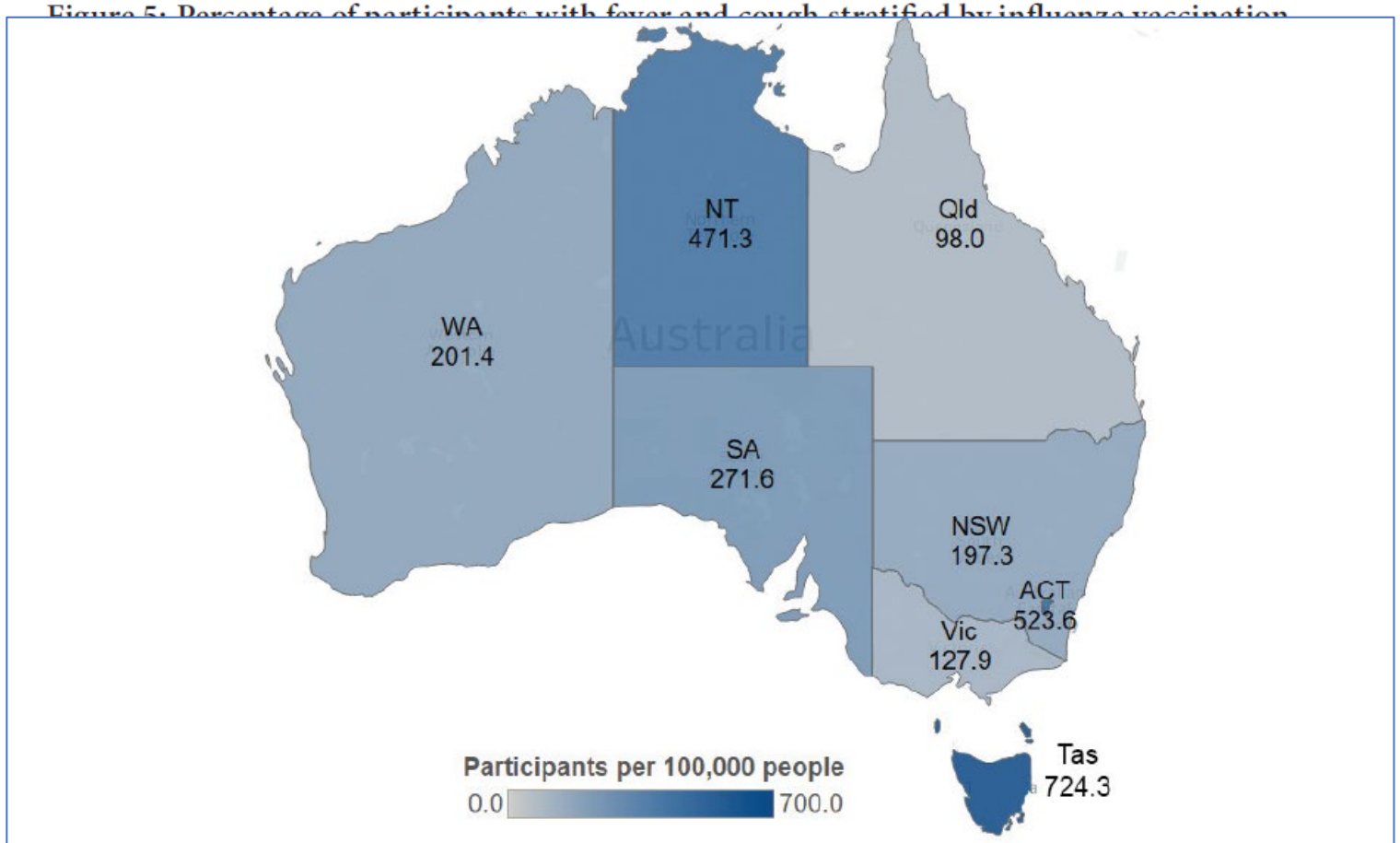
Sandra J Carlson, Reilly J Innes, Zachary L Howard, Zoe Baldwin, Michelle Butler, Craig B Dalton

Annual report

FluTracking: Weekly online community-based surveillance of influenza-like illness in Australia, 2019 Annual Report

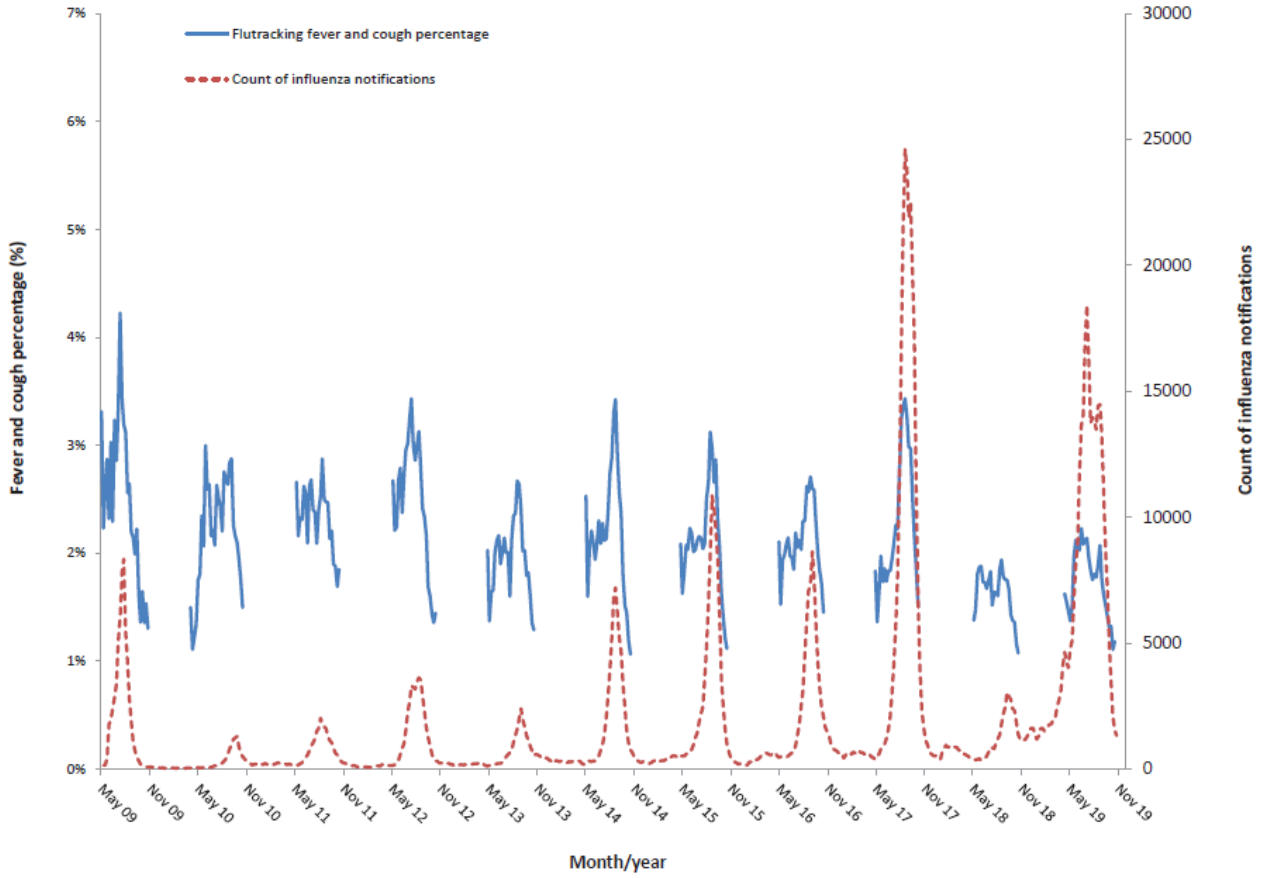
Sandra J Carlson, Reilly J Innes, Zachary L Howard, Zoe Baldwin, Michelle Butler, Craig B Dalton

Figure 5: Percentage of participants with fever and cough stratified by influenza vaccination



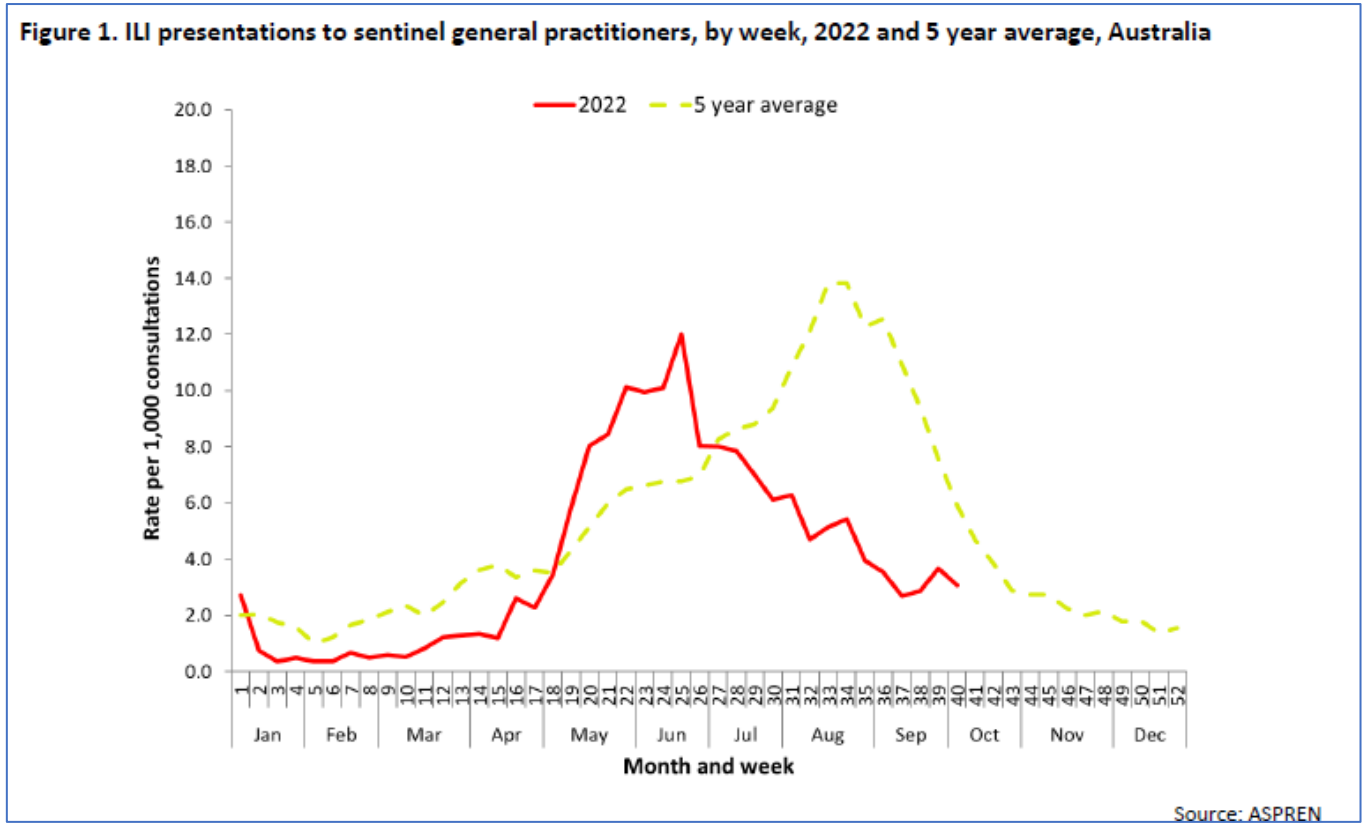
Influenza: Epidemiology, FluTracking & notifications

Figure 6: Fever and cough percentage, 1 April to 31 October[a] compared with national influenza laboratory notifications, Australia, 2009 to 2019, by week



a Not stratified by vaccination status.

Influenza: Epidemiology last year



Source: Department of Health and Aged Care (2022). National 2022 Influenza Season Summary

- Early
- Higher, but shorter
- Peak in June
- Severity: low
- Impact: low to moderate

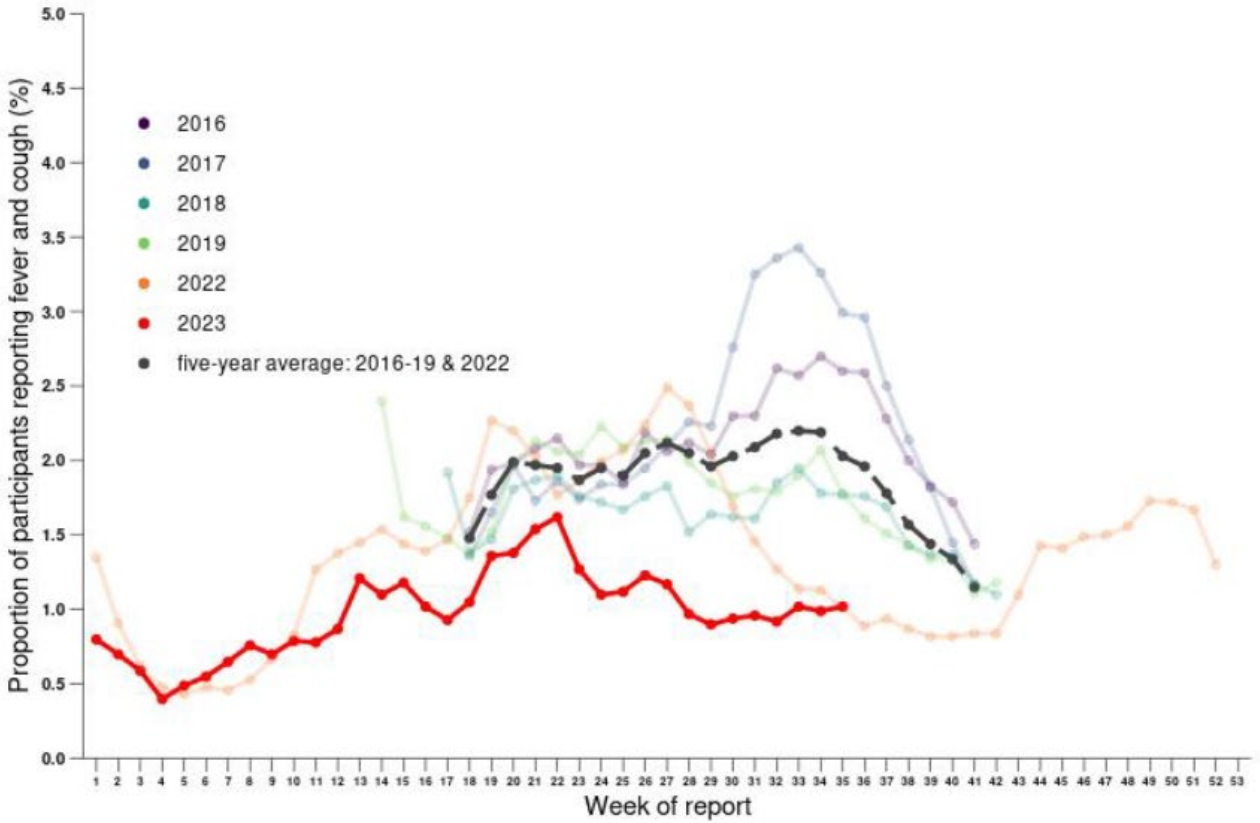
- At risk
  - 5-9 yo highest notification, then <5 yo
  - Lowest 70-74

- Vaccine significantly reduced risk of hospitalisation, effectiveness 44% (95%CI 22-60%)

Influenza: Epidemiology, this year

Influenza: Epidemiology, this year

Figure 1: Proportion of fever and cough among FluTracking participants, Australia, 2016 to 2023, by year and week of report*^

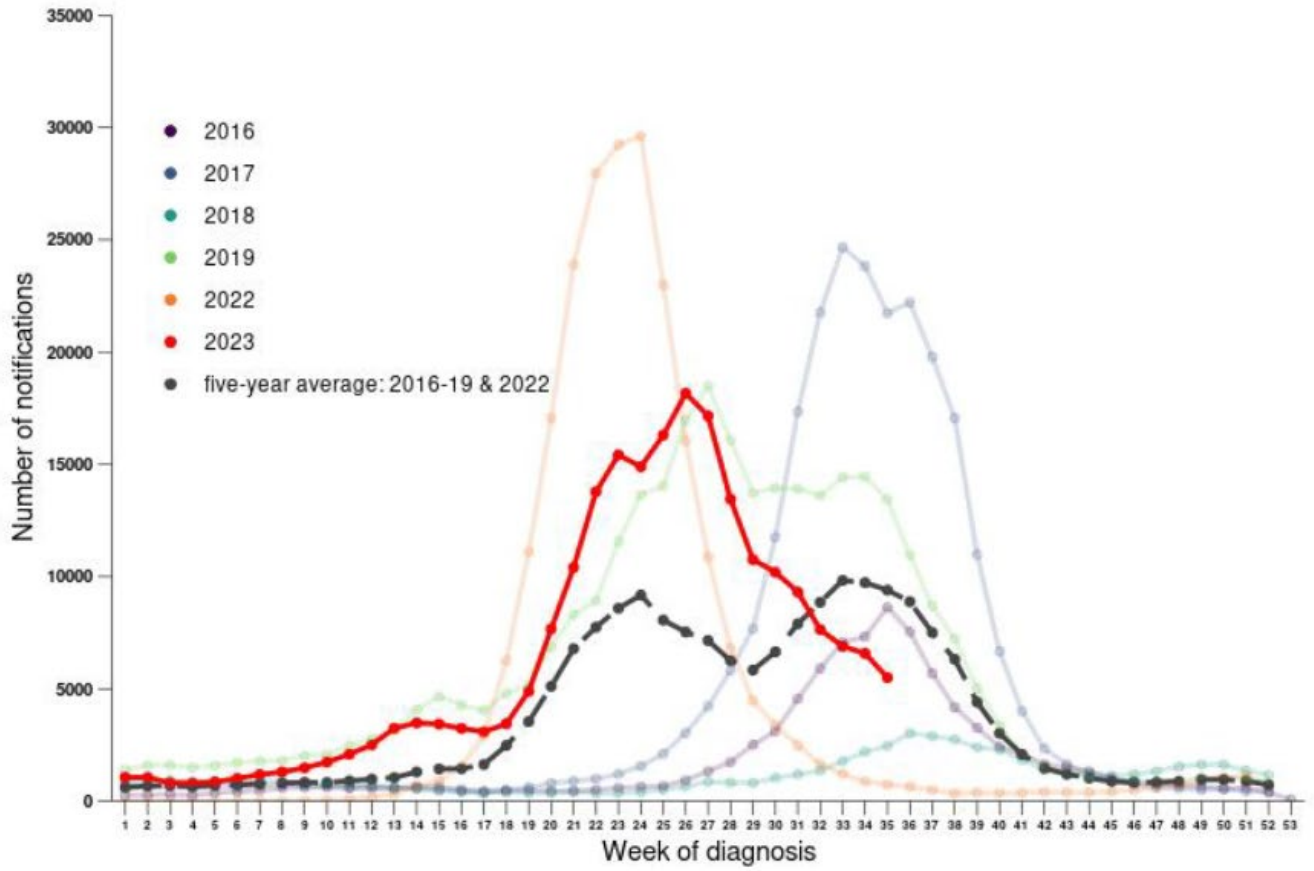


Source: FluTracking

Source: Australian Influenza Surveillance Report
Report no. 11, 2023

Influenza: Epidemiology, this year

Figure 3: Notifications of laboratory-confirmed influenza, Australia, 1 January 2016 to 3 September 2023, by year and week of diagnosis*



Source: NNDSS

Activity

- Activity in the community is stable at present

Severity

- 224K cases, 239 influenza related deaths, 3,011 sentinel hospital admissions, of which 209 (7%) were admitted directly to ICU.

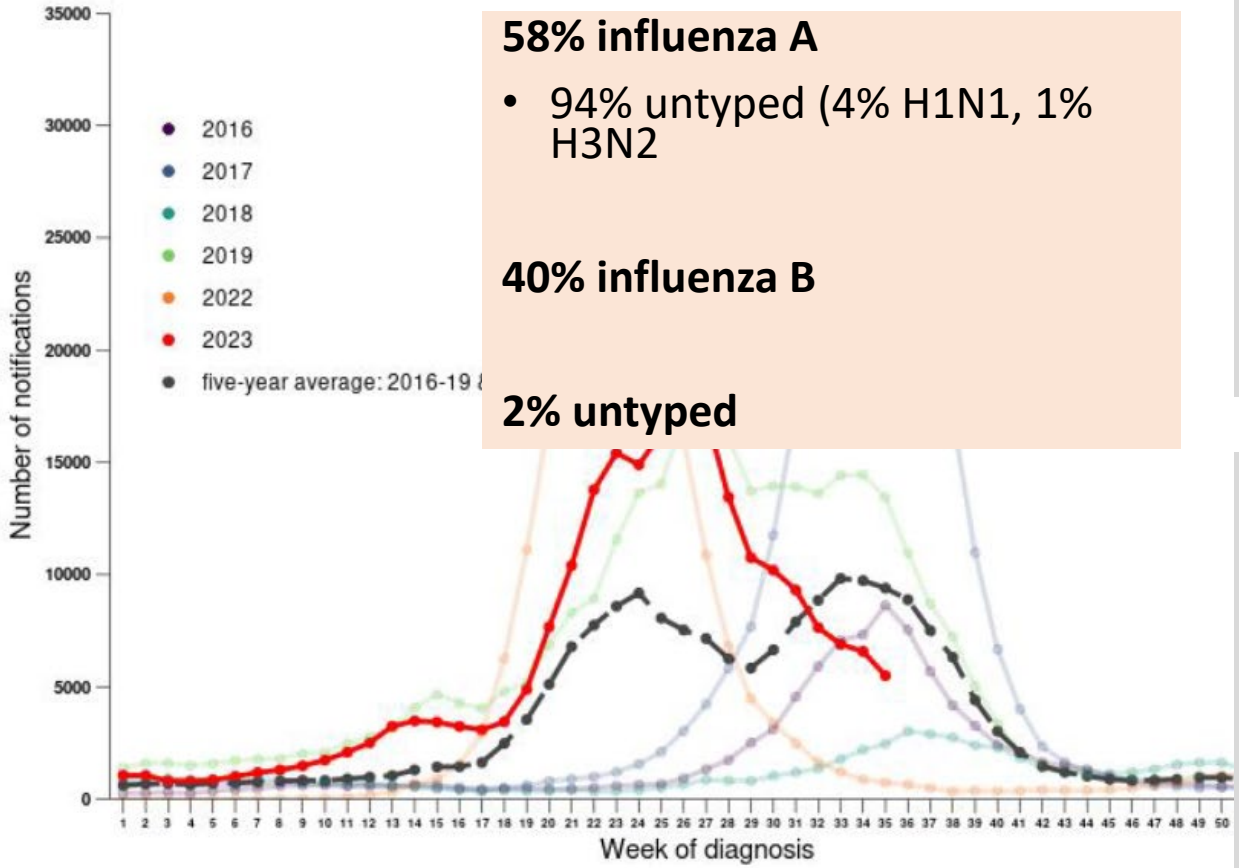
Impact

- Likely to be low (societal)
- Highest 5–9 years, followed by 0–4 and 10–14

Source: Australian Influenza Surveillance Report Report no. 11, 2023

Influenza: Epidemiology, this year

Figure 3: Notifications of laboratory-confirmed influenza, Australia, 1 January 2016 to 3 September 2023, by year and week of diagnosis*



Source: NNDSS

58% influenza A

- 94% untyped (4% H1N1, 1% H3N2

40% influenza B

2% untyped

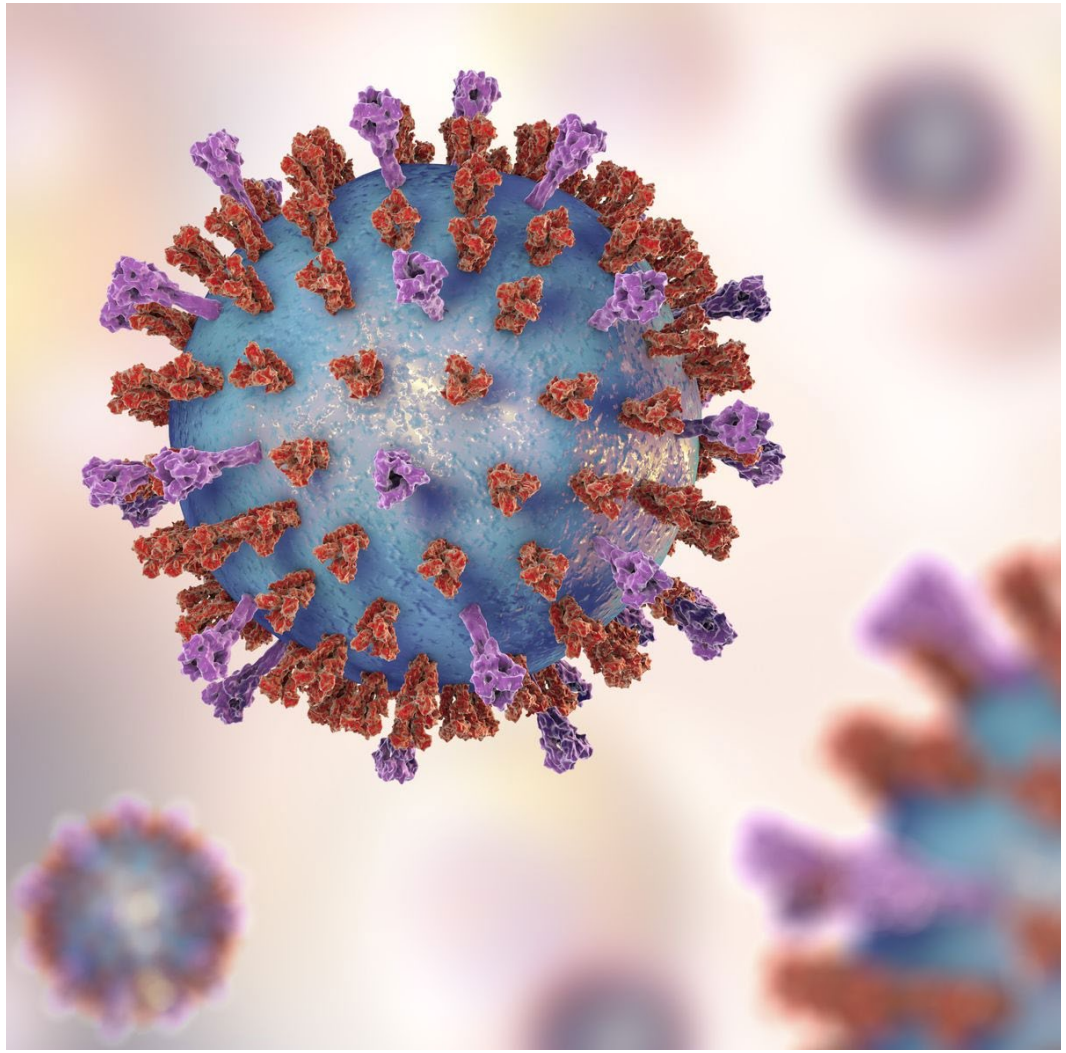
Australian Influenza Vaccine Committee recommendation for 2023

- A/Sydney/5/2021 (H1N1)– new strain for 2023.
- A/Darwin/9/2021 (H3N2)-like virus;
- B/Austria/1359417/2021; and
- B/Phuket/3073/2013

- 2,974 samples
- 98% of influenza A(H1N1) isolates, 83% of influenza A(H3N2) isolates, and 99% of influenza B/Victoria isolates characterised were antigenically similar to the corresponding vaccine components.
- Too early to assess vaccine effectiveness for this season

ort
Report no. 11, 2023

RSV



Source: Getty

RSV

- Respiratory syncytial virus (RSV) commonly affects airways and lungs
- Common, spreads easily
- Mode of transmission similar to influenza
  - Survival in environment potentially less than influenza
- Adult and healthy children, symptoms may resemble common cold
- Can cause severe infection, including < 12 months and younger (infants), especially premature infants, older adults, people with heart and lung disease, or immunocompromised

- Infectious from symptoms (or pre) to 3-8 days post start of symptoms
- Incubation ~ 5 days (3-8 days)

RSV - Symptoms

“Usual”

- Congested or runny nose
- Dry cough
- Low-grade fever
- Sore throat
- Sneezing
- Headache

Severe

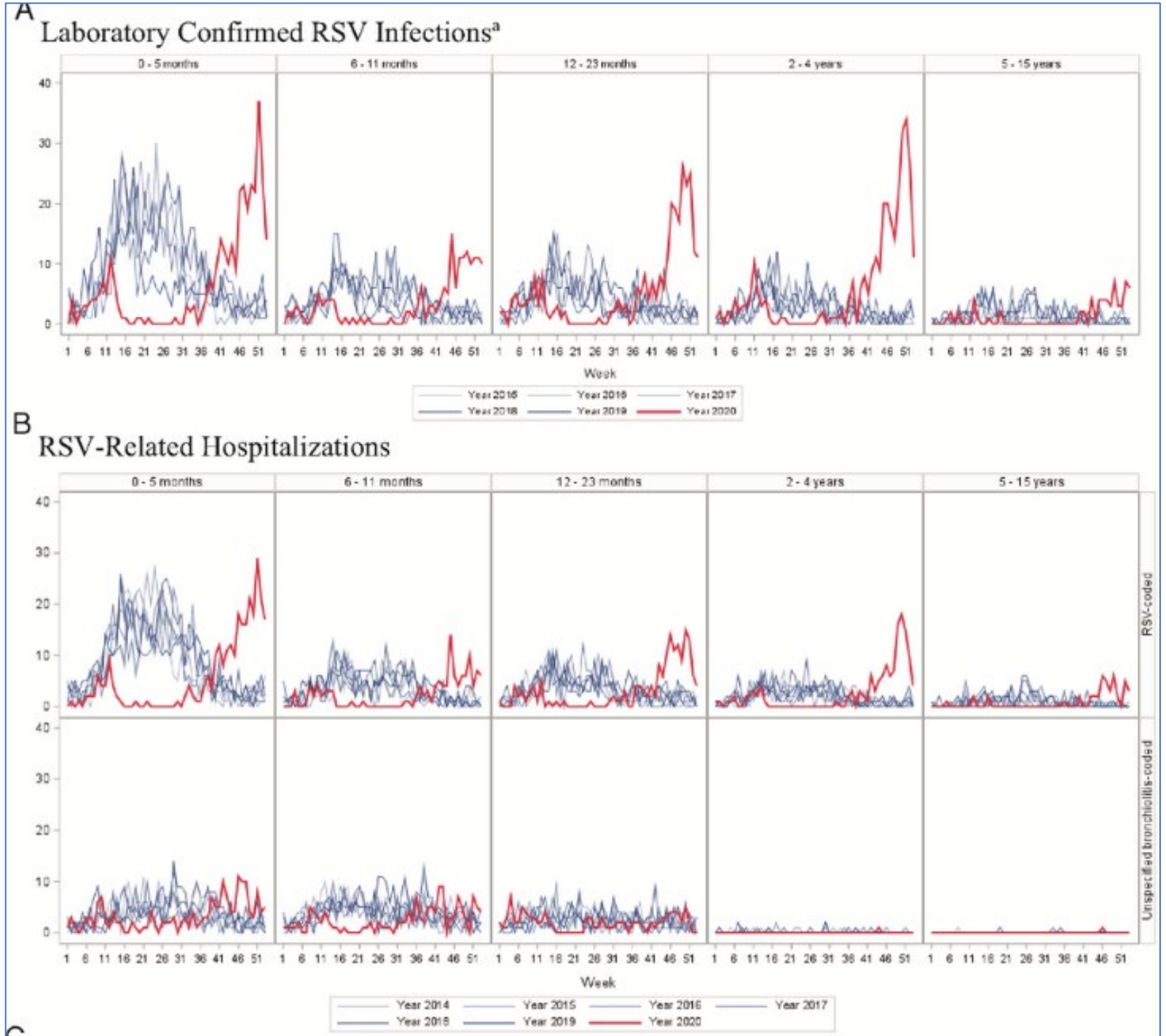
- Fever
- Severe cough
- Wheezing
- Rapid or difficulty breathing
- Cyanosis

- Usually < 2 weeks
- Cough may persist longer

RSV - Australia

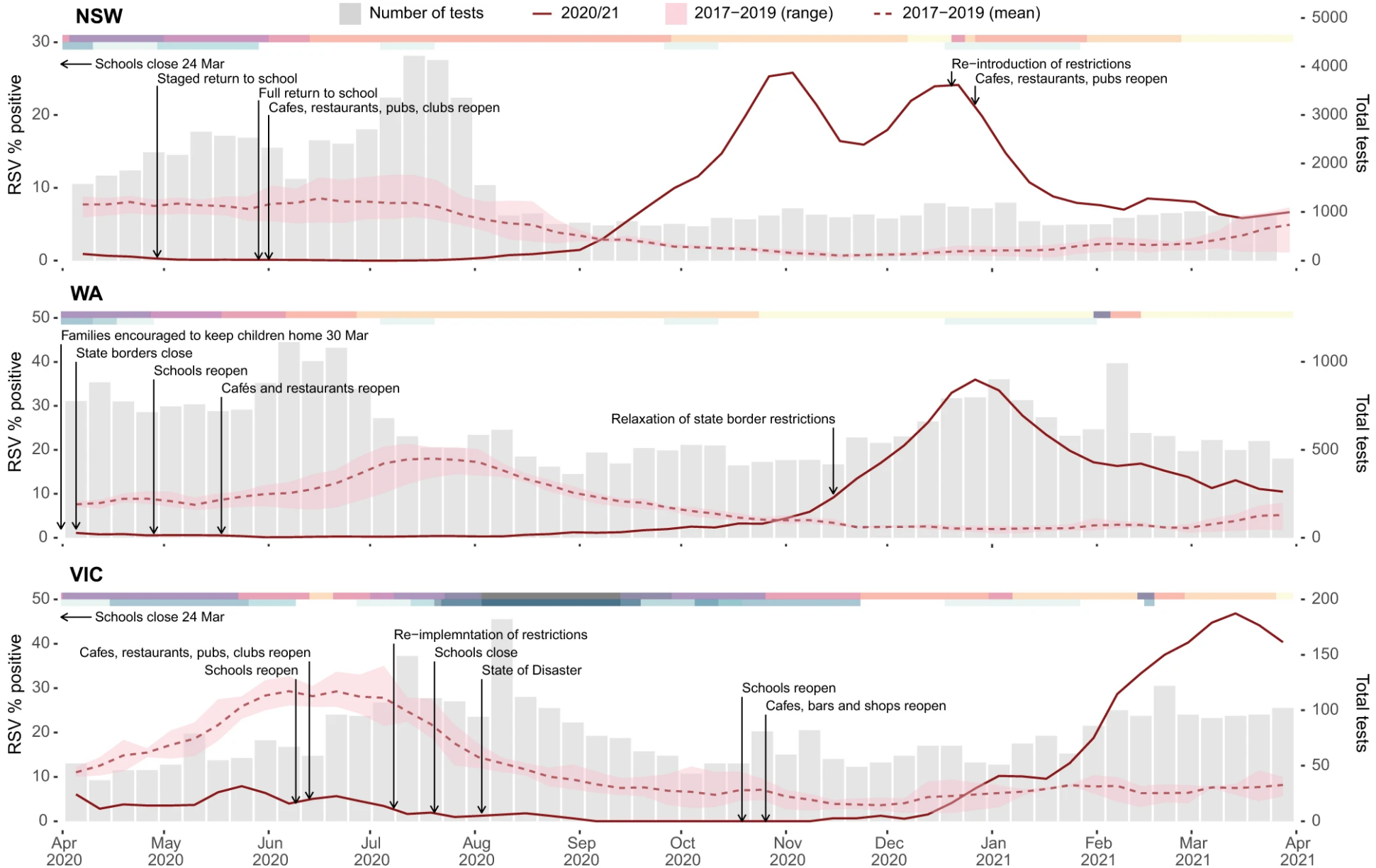
- National Notifiable Disease Surveillance System (NNDSS)
- In 2022, ~ 95,000 notifications
- In 2023, ~ 110,000 notifications (as at 19th Sept)
  - 104,000 cases in ≤4 year olds

RSV - historical



Saravanos et al (2022), Paedatrics, 149 (2),

The epidemiology of RSV detections in three Australian states—New South Wales (NSW), Western Australia (WA), and Victoria (VIC).

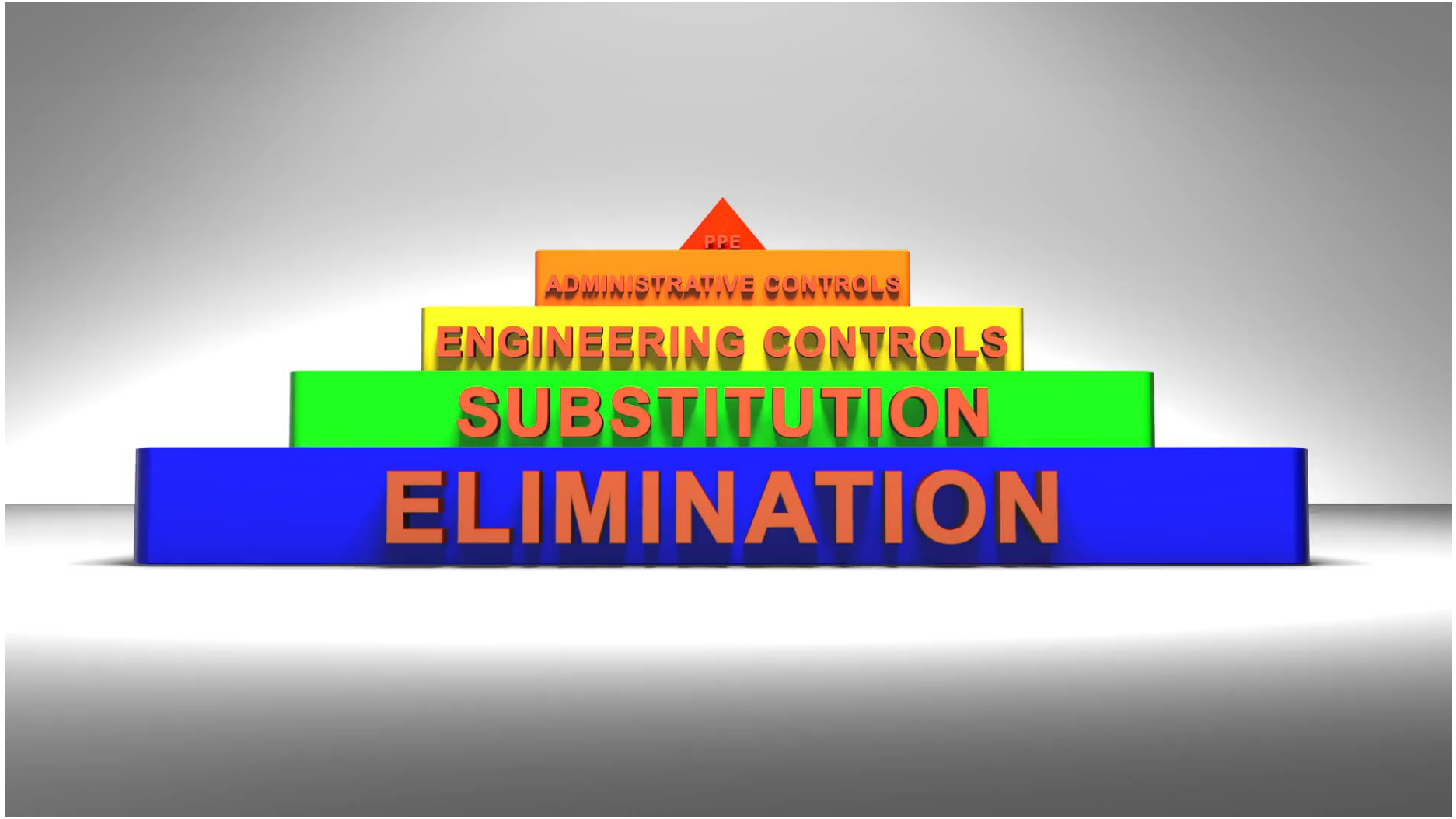


Source: Eden et al (2022), Nature Communications, 13, 2884

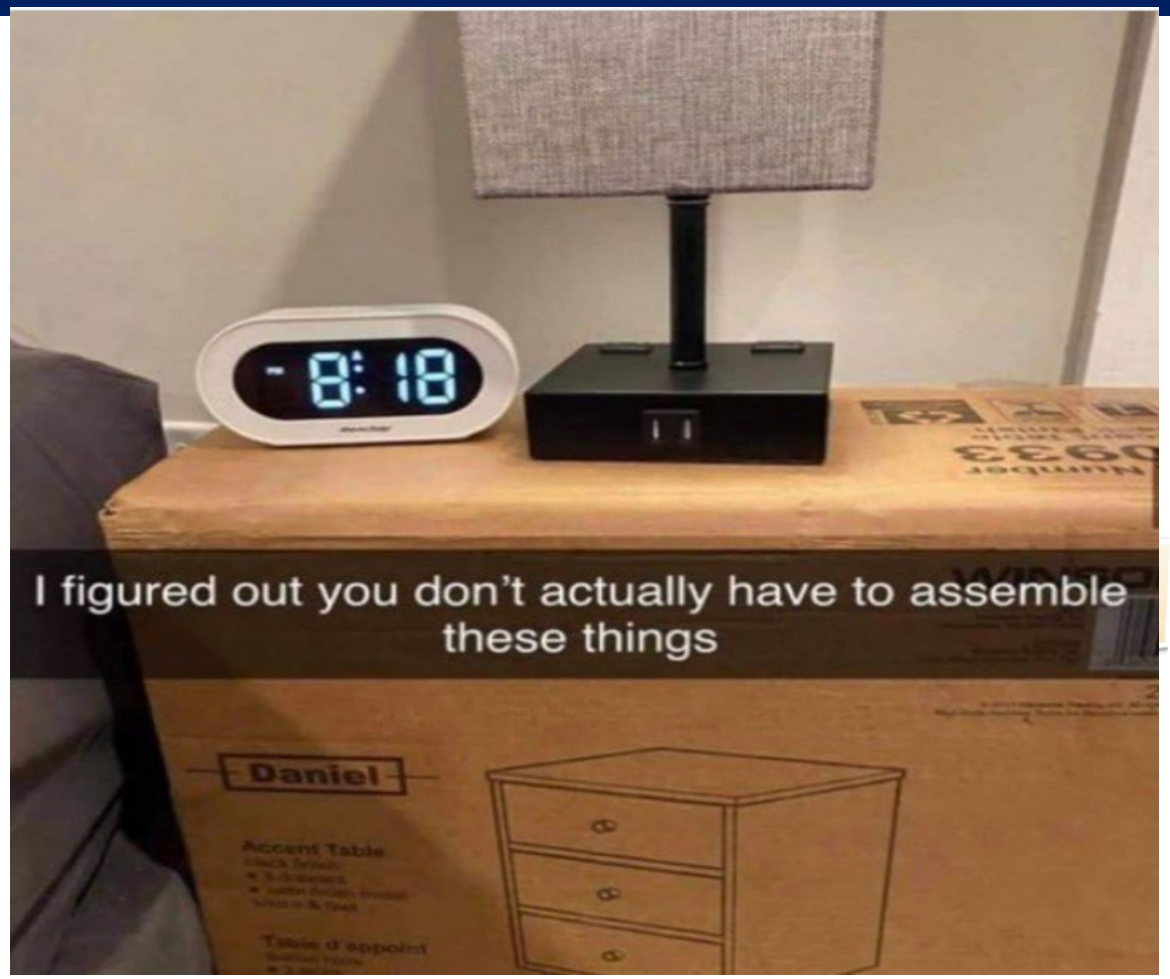
Preventing respiratory infections

- Context
  - Risk and context is different for different people
- Risk
  - Who and or what are you protecting and why?
  - How will they be harmed?
  - Likelihood and consequence
  - Epidemiology
- Control measures / intervention / actions
- Response, escalation and de-escalation (review and update)

Preventing respiratory infections



Preventing respiratory infections



- Lecture, reminders, literature via e-mail, personal interaction
- Posters, fact sheets, online presence
- Education
- One-on-one counselling
- On site vaccination
- Humorous pictures
- **Roving vaccinator**
- **Vaccinate-or-mask**
- **Flu stop shop**
- **Incentive**
- Declination form
- Executive, leaders

Schumacher, S., et al. (2021). *Infection*, *49*, 387-399.

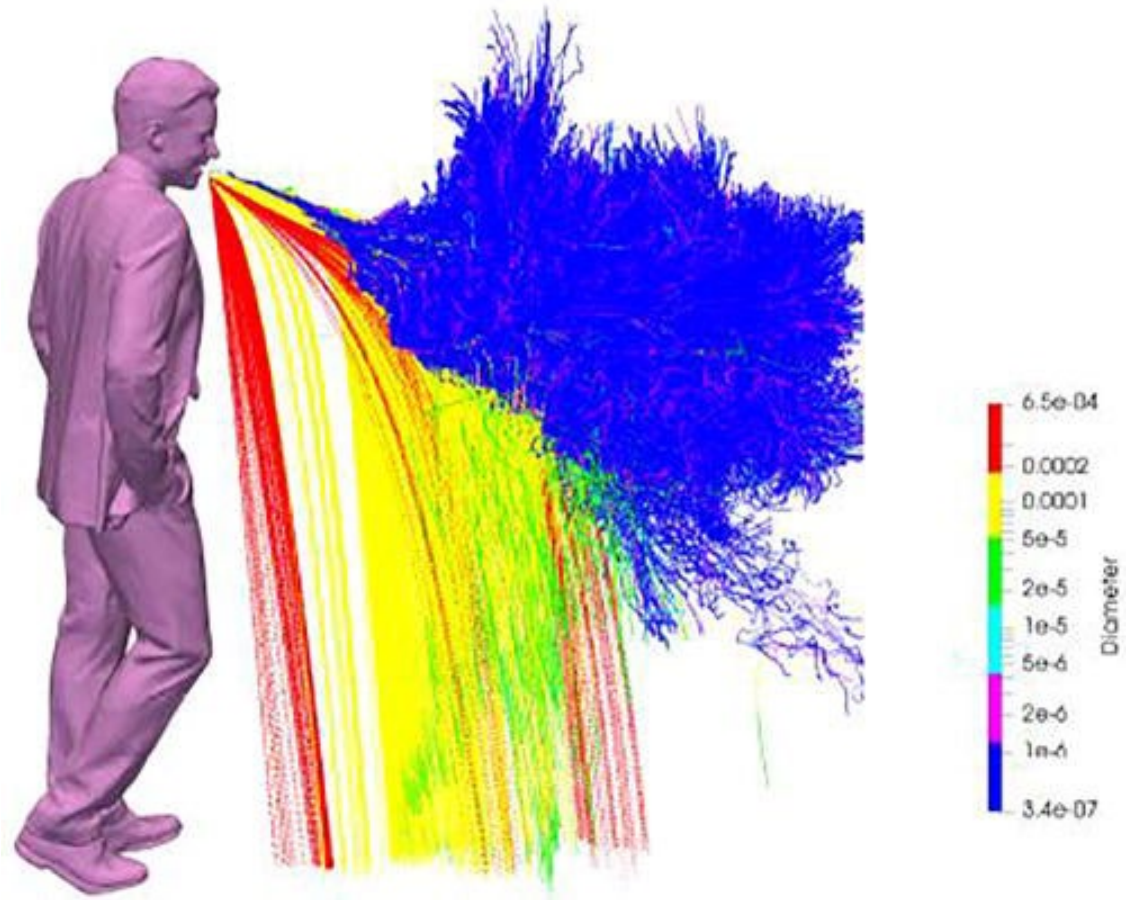
Marshall, C., et al. (2019). *Infection Control & Hospital Epidemiology*, *40*(3), 389-390

Preventing respiratory infections: Influenza vaccination in HCWs

Hall, C. et al . (2022). *Journal of Clinical Nursing*, *31*(15-16), 2112-2124.

Preventing respiratory infections

- Vaccination
- Standard precautions
  - Hand hygiene
  - Respiratory hygiene (Cough Etiquette)
  - Cleaning and disinfection
- Staying at home when unwell
  - When at home…



Trivedi, S et al (2021). *Physics of Fluids*, *33*(11), 115130.

Preventing respiratory infections

- Clean, well ventilated air (built environment)
  - Clean air and air exchange
  - Air purifiers / air scrubbers
  - Disinfection e.g. germicidal ultraviolet (GUV) radiation

- Transmission based precautions
  - Use of respiratory protection
  - Eye protection
  - ? Gown/glove – depending on situa
  - Use of single rooms / placement wh

- **HVAC**
  - Heating, Ventilation, and Air Conditioning
- **Air changes per hour (ACH)**
  - how many times per hour the entire volume of air in a given space is replaced with supply and/or recirculated air
- **Clean air delivery rate (CADR)**
  - measurement of the clean air volume that a purifier can provide in a fixed amount of time

Preventing respiratory infections

- Surveillance and audit
  - With the purpose to act
- Respiratory protection program
  - Fit testing and checking – who and how
  - Application and removal (donning/doffing) of PPE
  - Stock
  - Staff preferences
- Education, training and updates

Preventing respiratory infections: Higher risk and or individual situations

- Staff / resident / patient screening
  - High risk settings
  - Screening for home visits / office based practice
- Consider PPE requirements
- Rostering
- Physical separation, distancing
- Common areas
- Sharing drinks, crockery, cutlery, toys etc (child care, sport etc)

Preventing respiratory infections - Summary

- Context is important
- Planned approach
- Vaccination
- Standard precautions, transmission based precautions as required
- Ventilation and air
- Presenteeism
- Other specific measures

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