COVID-19, Delta outbreak and IPC considerations

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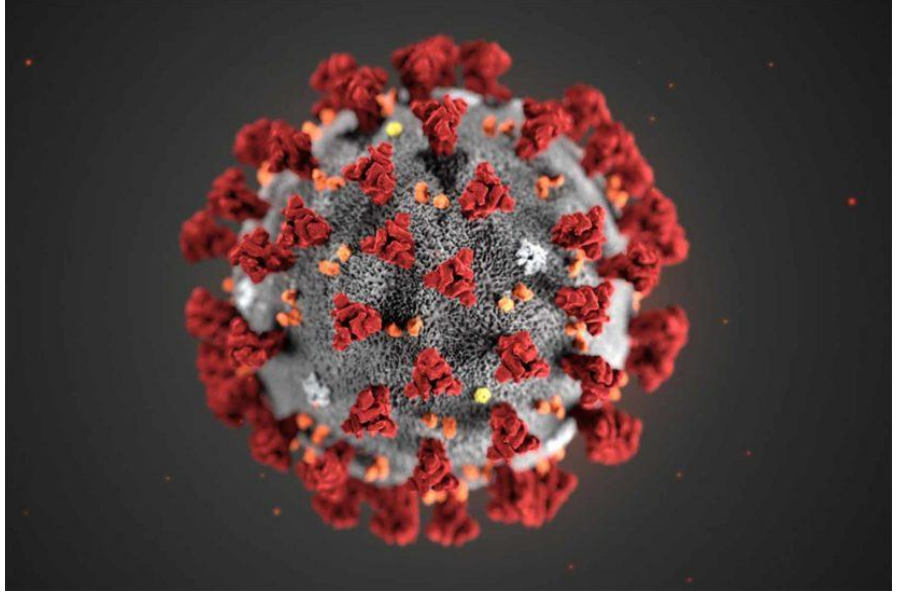
10 august 2021



Neil Diamond: Hands

CDC: Yes, wash them for at least 20 seconds

Neil Diamond: Touching hands

CDC: No, please don't touch hands

Neil Diamond: Reaching out

CDC: Avoid that too

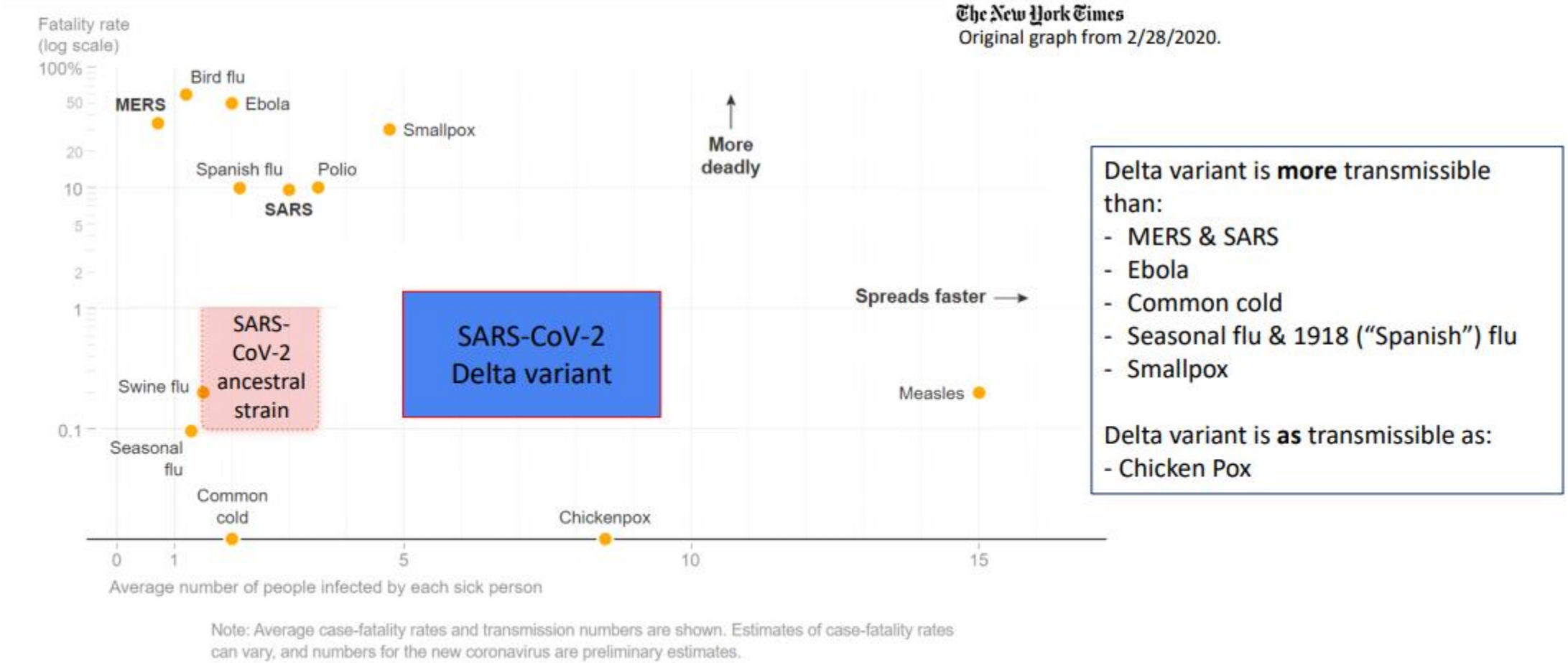
Neil Diamond: Touching me

CDC: Oh hell

Neil Diamond: TOUCHING YOU

CDC: We're doomed

Transmission of Delta variant vs. ancestral strain and other infectious diseases



Delta variant is **more** transmissible than:
- MERS & SARS
- Ebola
- Common cold
- Seasonal flu & 1918 ("Spanish") flu
- Smallpox

Delta variant is **as** transmissible as:
- Chicken Pox

Delta infections associated with higher viral load and duration of shedding: Published evidence

- India report of lower cycle threshold (Ct) values in Delta breakthrough cases in HCW (n=47, mean Ct 16.5) compared to non-Delta breakthrough cases (n=22, mean Ct 19); also larger cluster size with Delta breakthrough
- Delta infection associated with longer duration of Ct values ≤30 [median 18 days vs. 13 days for ancestral strains]
- Risk of reinfection with Delta may be higher [aOR 1.46 (CI 1.03-2.05)] compared to Alpha variant, but only if prior infection ≥180 days earlier

Micochova et al. doi: 10.21203/rs.3.rs-637724/v1
Ong et al. doi:10.2139/ssrn.3861566; PHE technical briefing 19:
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005517/Technical_Briefing_19.pdf

Delta variant vaccine breakthrough cases may be as transmissible as unvaccinated cases

- Breakthrough cases reported to national passive surveillance have lower Ct values by 3 cycles **(~10-fold increase in viral load) for Delta** (Ct=18, n=19) compared with Alpha (Ct=21, n=207) and other lineages (Ct=21, n=251)

- Barnstable County, MA, outbreak: **No difference in mean Ct values in vaccinated and unvaccinated** cases [median among vaccinated (n=80): 21.9; unvaccinated (n=65): 21.5]

Delta variant may cause more severe disease than Alpha or ancestral strains: Published evidence

- Canada: Higher odds of hospitalization [aOR 2.20 (CI 1.93-2.53)], ICU admission [aOR 3.87 (CI 2.98-4.99)], and death [aOR 2.37 (CI 1.50-3.30)][1]
- Singapore: Higher odds of oxygen requirement, ICU admission, or death [aOR 4.90 (CI 1.43-30.78)] and pneumonia [aOR 1.88 (CI 0.95-3.76)][2]
- Scotland: Higher odds of hospitalization [HR 1.85 (CI 1.39-2.47)][3]

1. Fisman and Tuite, doi:10.1101/2021.07.05.21260050; 2. Ong et al. doi:10.2139/ssrn.3861566; 3. Sheikh et al. doi:10.1016/S0140-6736(21)01358-1

In summary

- Delta is different from previous strains:
  - Highly contagious – viral loads 1000-fold higher ; evidence of transmission during fleeting contact
  - Likely more severe ; more disease in younger adults
  - Breakthrough infections may be as transmissible as unvaccinated cases
  - Vaccines will prevent >90% of severe disease, but may be less effective at preventing infection or transmission – i.e. more breakthrough and more community spread despite vaccination
- Risk of severe disease or death reduced 10-fold or greater in vaccinated
- Risk of infection reduced 3-fold in vaccinated

57c98604-3b54-44f0-8b44-b148d8f75165.
(washingtonpost.com)

Significance of aerosol transmission: esp. Delta relevant

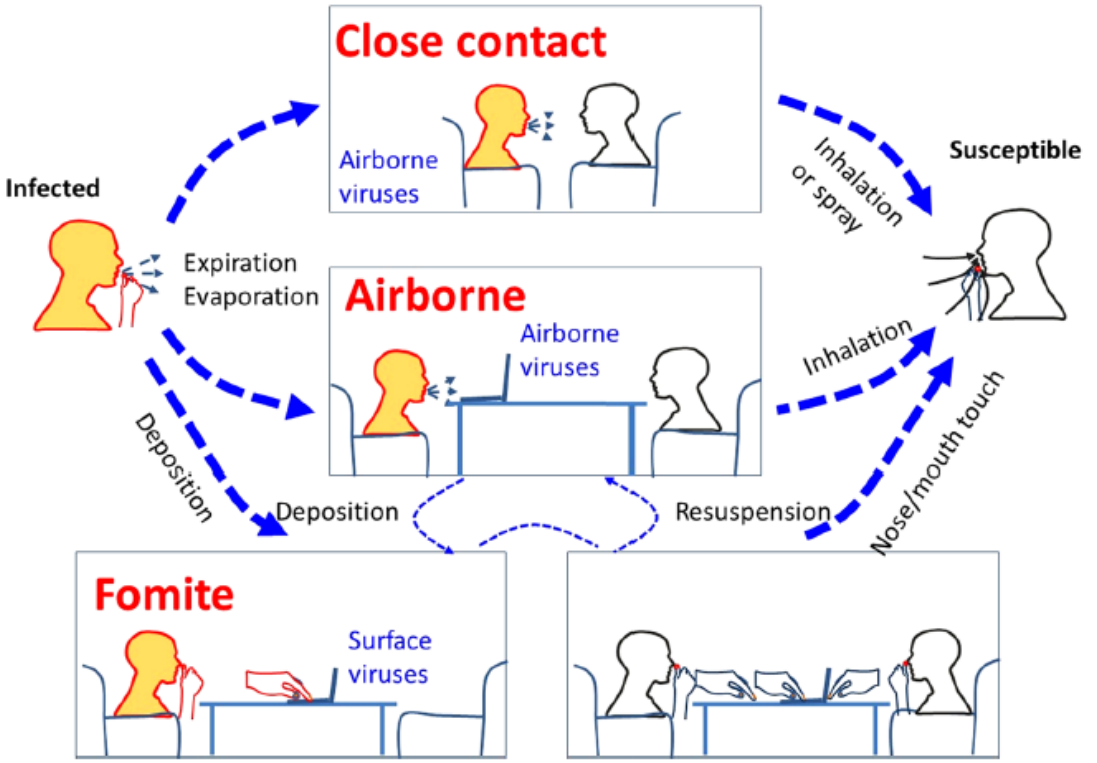


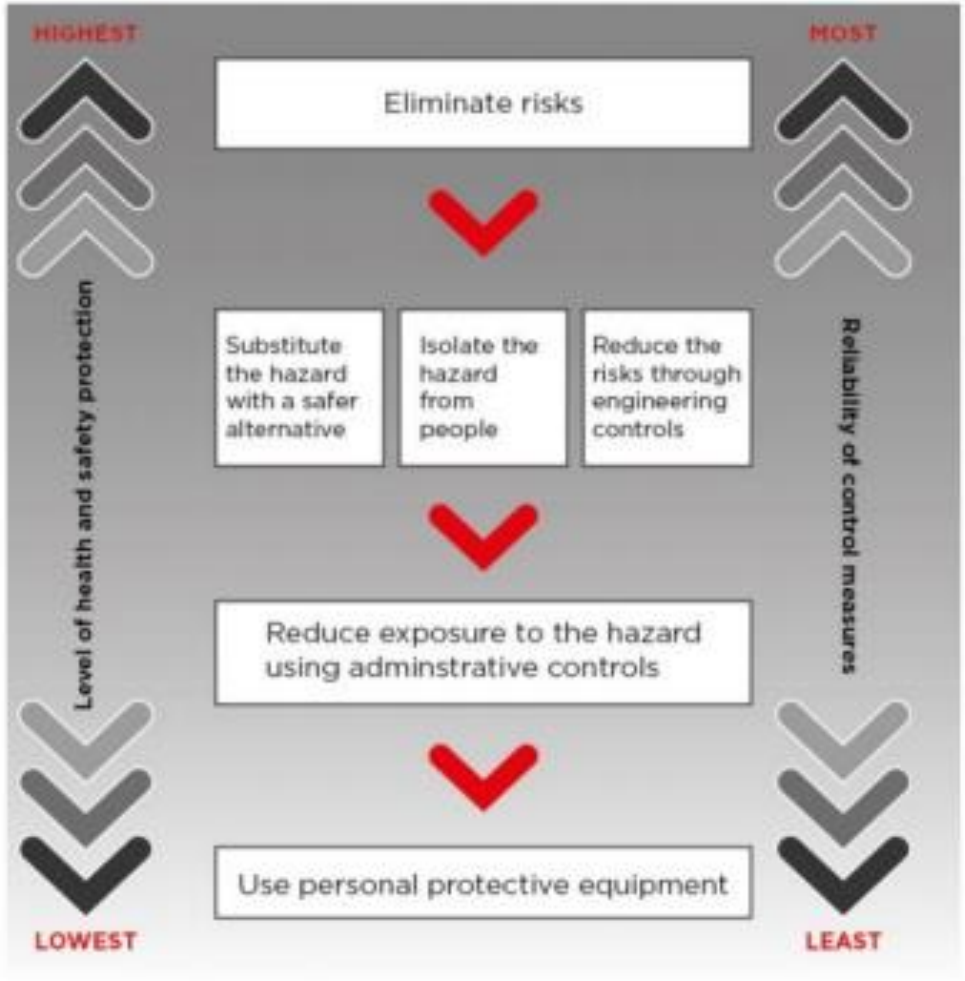
Fig. 1 An illustration of various possible transmission routes of respiratory infection between an infected and a susceptible individual. Both close range (i.e. conversational) airborne transmission and longer range (over several meters) transmission routes are illustrated here. The orange head colour represents a source and the white head colour a potential recipient (with the bottom right panel indicating that both heads are potential recipients via self-inoculation from contaminated surface fomite sources). Here 'Expiration' also includes normal breathing exhalation, as well as coughing and/or sneezing airflows. Airborne droplets can then settle on surfaces (fomites) from where they can be touched and carried on hands leading to further self-inoculation routes of transmission

National COVID Evidence Taskforce IPC panel & Infection Control Expert Group changes to advice May 2021:

P2/n95 respirators required for COVID care and high risk suspected cases

Recognition of aerosol transmission of infectious agents: a commentary. Tellier et al. BMC Infectious Diseases (2019) 19:101

Hierarchy of infection prevention controls:



1. Immunisation
2. Engineering controls
3. Administrative controls
4. PPE

https://www.health.gov.au/sites/default/files/documents/2021/07/minimising-the-risk-of-infectious-respiratory-disease-transmission-in-the-context-of-covid-19-the-hierarchy-of-controls.pdf

Engineering questions

- Maximise fresh air ventilation
- Spell period room/areas as required – dependent on ventilation rates
- Avoid directed air flows out of zone
- Provide negative pressure (flow) isolation where possible
- Reduce airborne load at the source (within area /room)
- Control temperature and humidity – internal hospital RH can rise above 80% in hot periods

Aerosol load reduction: role for air cleaners

Results: Portable air cleaners were very effective in removing aerosols, especially for the devices with high flow rate. In a small control room, the aerosols were cleared 4 to 5 times faster with portable air cleaners than the room with HVAC alone. A single bed hospital room equipped with an excellent ventilation rate (~ 14 air changes per hour) can clear the aerosols in 20 minutes. However, with the addition of two air cleaners, the clearance time became 3 times faster (in 6 minutes and 30 seconds).

Lee et al. Effectiveness of portable air filtration on reducing indoor aerosol counts: preclinical observational trials https://www.medrxiv.org/content/10.1101/2021.04.26.21256152v1

Buising et al Use of portable air cleaners to reduce aerosol transmission on a hospital COVID-19 ward 2021 ICHE

Administrative controls: loom largest

Effective organisation of care

- Detection/triage of cases
- Separation of care – patient and staff
- Managing and resourcing of staff; ensuring an adequate patient-to-staff ratio; prevent pre
- Manage all work spaces to reduce transmission : nb tea rooms etc

Effective and consistent implementation of IPAC

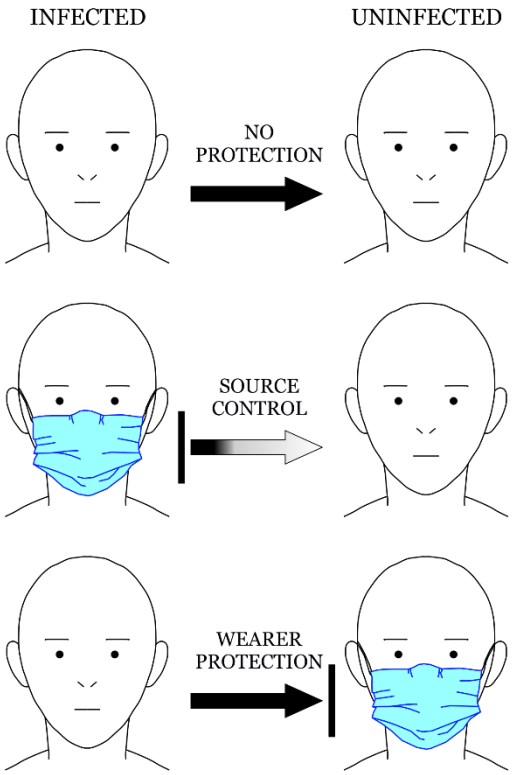
- Staff training
- Environmental cleaning
- Audit compliance with precautions
- Surveillance of ARI in staff and patients
- HCWs understand the importance of promptly seeking medical care when required;

PPE: Eye protection remains important

- Consensus recommendation
- No evidence that sealed goggles provide better protection
- Eye Protection Practice points below

https://files.magicapp.org/guideline/b49fdd52-b141-49b5-83cc-664110b07210/files/NCT023_Eye_Protection_Practice_Points_March_2021_v4_r354011.pdf

PPE: Surgical masks provide important source control (and wearer protection)



Surgical masks prevent transmission bacterial lung pathogens (TB and Pseudomonas) known to be transmitted by aerosol, by intercepting the aerosolized bacteria even from coughing patients.

Hamster model study suggests the same is true for SARS-Cov2.

Aerosol emission greatly impeded by properly applied mask and equivalent to p2/N95 respirator

https://rs-delve.github.io/addenda/2020/07/07/masks-update.html

p2/n95 respirators technically provide better levels of respiratory protection

Fit factor – ability to reduce aerosol inhalation – much higher than well-fitting surgical mask

COVID Living Evidence Taskforce review: "The evidence is uncertain as to whether P2/N95 respirators reduce the risk of SARS-CoV-2 infection in healthcare workers compared to surgical masks." (derived from 16 observational studies and one randomised controlled trial)

IPC Panel Consensus recommendation:
Likely high-risk of SARS-CoV-2 transmission:
Healthcare workers providing direct care or working within the patient/client/resident zone for individuals where assessment suggests a high-risk of transmission, should use P2/N95 respirators rather than surgical masks, along with the other PPE required.

Suspect COVID-19: patient with acute respiratory symptoms AND presence of epidemiological factors

In community with confirmed transmission: all patients with ARI become 'suspect' COVID-19 until ruled out by testing.

"Close contacts" (as specified by Pop Health): remain suspect cases for 14 days whatever test results are.

Why fit test respirators?

- Required by AS/NZS 1715:2009 and NHMRC Infection Prevention Guidelines to adequately document respiratory protection.
- Fit-checked respirators frequently fail on fit test (30-40%); **however remain superior to surgical mask**
- Advantages:
  - provides instruction on proper mask moulding and donning process
  - dynamic demonstration of fit check process possible with quantitative machine
  - Will provide better levels of assurance for staff dealing with patients who have obligate airborne transmitted infections (e.g. pulmonary TB)
- Issues:
  - Variety of respirator types to fit different faces have been lacking
  - Overuse in low risk situations by untrained staff creating pressure sores or risk from contamination
  - False levels of assurance – important not to neglect other controls – e.g. engineering/ventilation

NATIONAL COVID-19 CLINICAL EVIDENCE TASKFORCE

Caring for people with COVID-19

Supporting Australia's healthcare professionals with continually updated, evidence-based clinical guidelines

15/10/20: Weekly Communique from the National Steering Committee »

LATEST GUIDANCE

15 OCTOBER 2020

Updates this week include:

- PIMS-TS
- Interferon kappa plus trefoil factor 2 (IFN-κ plus TFF2)
- Ivermectin
- N-acetylcysteine

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EVIDENCE UNDER REVIEW

DO YOU HAVE A CLINICAL QUESTION?