END

GAMA GLOBAL WEBINAR SERIES

Prevention and control of respiratory pathogens: a focus on influenza

gama healthcare

DECEMBER 2022

1

GLOBAL WEBINAR SERIES

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1 global webinar per month, 30 minutes + Q&A in English.

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2

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3

OUR SPEAKER

Professor Brett Mitchell

Professor Brett Mitchell is Editor-in-Chief of Infection, Disease in Health. He is a Professor of Nursing at Avondale University and has over 150 peer reviewed publications and conference presentations. Professor Mitchell is a Fellow of ACIPC and the Australian College of Nursing. Brett has worked in the area of infection control for many years, including leading infection control programs in hospitals and at a state level. His research interests in the area of infection control include environmental cleaning, pneumonia, surveillance and urinary tract infections.

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4

AGENDA

1. Focus on influenza – applies to other respiratory pathogens
2. Epidemiology
3. Causes and types of influenza
4. Transmission
5. Prevention and control

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5

Prevention and control of respiratory pathogens: a focus on influenza

Professor Brett Mitchell
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Honorary Professor, University of Newcastle
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Avondale UNIVERSITY

6

Background

- Professor Brett Mitchell
- brett.mitchell@avondale.edu.au
- Twitter: @1healthau

7

Disclosures

NHMRC Investigator (GNT2008392)

Received competitive research funding from government funding agencies
(NHMRC, Commonwealth government, Office Teaching & Learning)

Received competitive research grants from non-government funding agencies
(HCF Foundation, ACIPC, Cardinal Health, Australian College Nursing)

Consultancy
(Department of Foreign Affairs and Trade, MSD)

Industry research grants

None relevant to this presentation

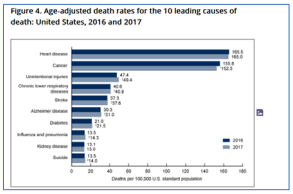
8

Background

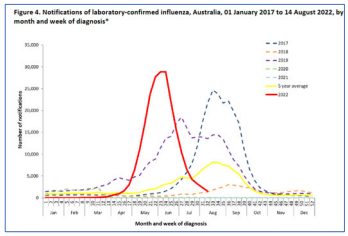
- Focus on influenza – applies to others respiratory pathogens
- Epidemiology
- Causes and types of influenza
- Transmission
- Prevention and control

9

Leading cause of death



Credit: CDC



National Notifiable Diseases Surveillance System (Australia)

(August 2022)

10

Influenza

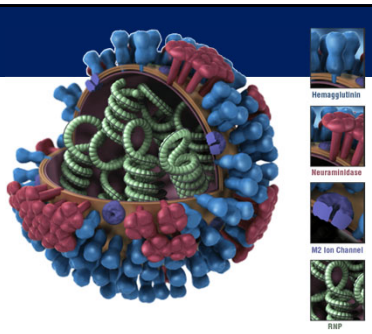
- Influenza (flu) is a contagious respiratory illness
  - Caused by influenza viruses
  - Influenza virus is an Orthomyxovirus
  - Spread by tiny particles made while coughing, sneezing, or talking or by touching surfaces that have flu virus on them
- About 8% of U.S. gets sick from flu annually

11

Types

- Types A, B, C
- Diameter 80 - 120 nm
- Pleomorphic, spherical, filamentous particles
- Single-stranded RNA
- Hemagglutinin and Neuraminidase on surface of virion

12

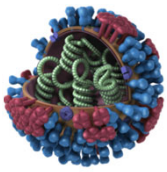


Credit: CDC

13

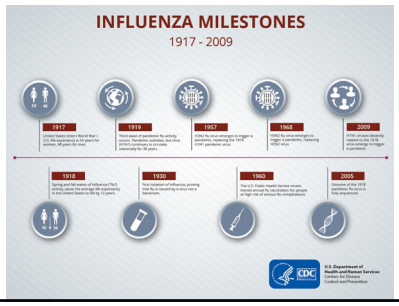
Classification

- Classified on the basis of hemagglutinin (HA) and neuraminidase (NA)
- 15 subtypes of HA and 9 subtypes of NA are known to exist in animals (HA 1-15, NA 1-9)
- 3 subtypes of HA (1-3) and 2 subtypes of NA (1-2) are human influenza viruses. HA 5, 7, 9 and NA 7 can also infect humans



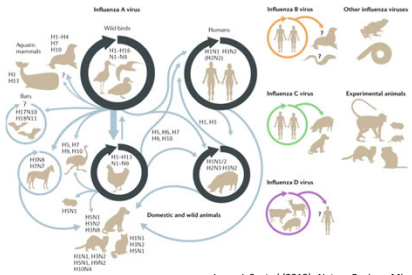
14

Pandemic influenza



15

Reservoirs

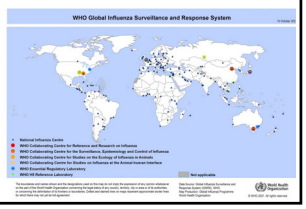


Long, J. S. et al (2019). *Nature Reviews Microbiology*, *17*(2), 67-81.

16

Surveillance

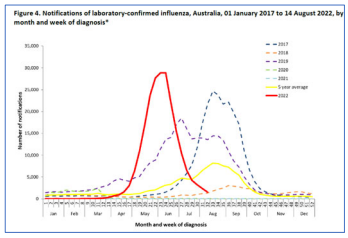
- Global influenza surveillance, both epidemiologic and virologic, is the foundation of influenza preparedness and response for influenza viruses.
- Allow
  - monitor trends
  - detect report and respond to outbreaks
  - measure impact
  - detect novel viruses



17

Surveillance and recent Australian experience

- Difficulties with data interpretation due to COVID-19
- Since April 2022, 1,666 hospital admissions due to influenza, 6.4% admitted directly to ICU
- Impact – low to moderate
- 82% were influenza A
- 0.1% were influenza B



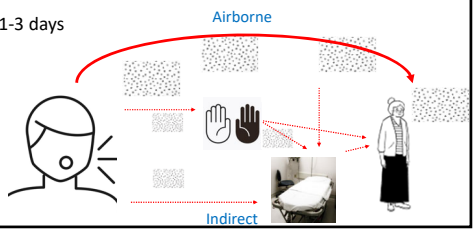
National Notifiable Diseases Surveillance System (Australia)

(August 2022)

18

Mode of transmission

- The virus is spread from person- to- person through respiratory secretions and aerosols
- Incubation period 1-3 days



19

Airborne transmission of respiratory viruses

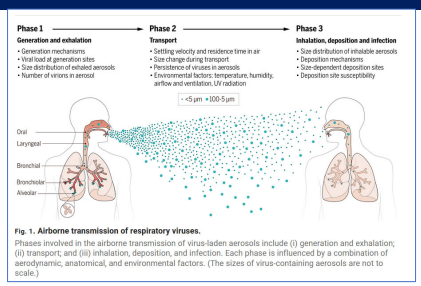


Fig. 1. Airborne transmission of respiratory viruses.
Phases involved in the airborne transmission of virus-laden aerosols include (i) generation and exhalation; (ii) transport; and (iii) inhalation, deposition, and infection. Each phase is influenced by a combination of aerodynamic, anatomical, and 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),

20

Clinical

- Influenza is an acute respiratory illness characterized by fever, headache, myalgia, coryza, sore throat and cough. Cough is frequently severe and protracted.
- 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.
- This is usually made by virus isolation, identification of specific antigens or antibody rise

21

Prevention and treatment

- Vaccination
- Anti-viral
  - Treatment and prophylaxis

22

Prevention: non drug

Public health level

- Good indoor air quality
- Avoid contact with those who are sick
- Avoid touching eyes, mouth, nose
- Clean and disinfect surfaces
- Clean hands

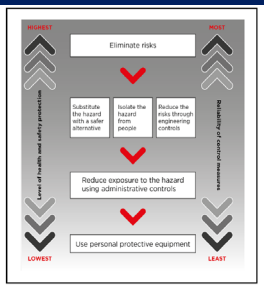
23

Prevention: non-drug

Healthcare setting

(much the same as previous + more!)

- Consider hierarchy of controls

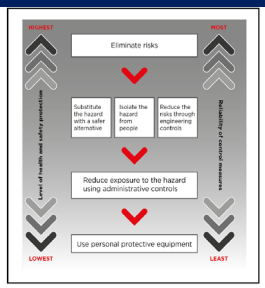


Source: Safe Work Australia

24

Hierarchy of controls - example

- Eliminate risk
  - Stay at home if sick
  - Rapid detection / isolation
  - Vaccination
  - Proximity tracking
- Substitute risk
  - Air purifiers / air quality / air filtration
  - Increase ventilation / natural air
  - Worker cohorts/bubble rostering
  - High risk procedures in most suitable location
  - Cleaning



Source: Safe Work Australia

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Proximity tracking

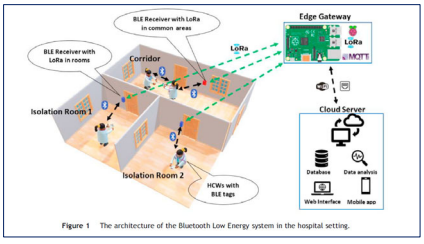
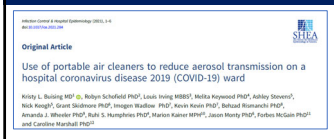


Figure 1 The architecture of the Bluetooth Low Energy system in the hospital setting.

26

Air purifiers



- Transmission of aerosols from single patient room into corridors & nurses station
- Rate of clearance measured
- Aerosol travelled from patient room
- Cleaners effective in increasing the clearance of aerosols
- 99% aerosols cleared within 5 minutes

27

Air purifiers in classrooms

Physics of Fluids

Transmission and reduction of aerosols in classrooms using air purifier systems

Cite as: Phys. Fluids 33, 033321 (2021); https://doi.org/10.1063/5.0044046
Submitted: 13 January 2021 • Accepted: 24 February 2021 • Published Online: 23 March 2021

Sebastian Burgmann and Uwe Janoske

COLLECTIONS

Paper published as part of the special topic on Flow and the Virus

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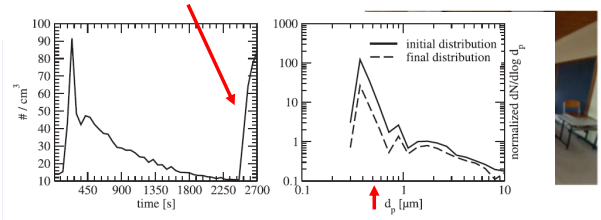
28

Ventilation and air purifiers

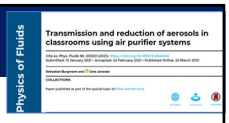
Typical example of particle concentration of time



Reduction 80%, particles <1um, no ventilation, just purifier

29

Ventilation and air purifiers



Simulated different scenarios

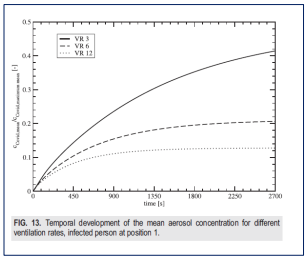
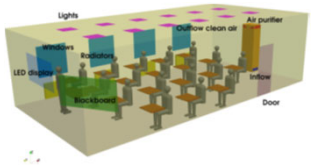


FIG. 13. Temporal development of the mean aerosol concentration for different ventilation rates, infected person at position 1.



30

Ventilation and air purifiers

Simulated different scenarios

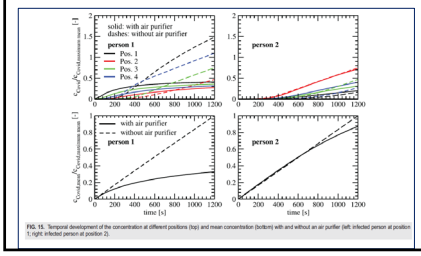
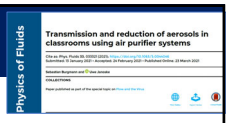


FIG. 15. Temporal development of the concentration at different positions (top) and mean concentration (bottom) with and without an air purifier (left: infected person at position 1; right: infected person at position 2).

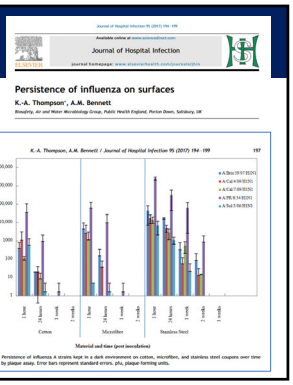


- Increase in VR = reduces aerosol
- Position of infective person influences concentration
- Air purifier may lead to low aerosols
- Useful addition to window ventilation

31

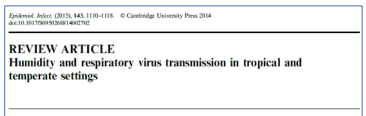
Cleaning

- ~~Fomite Vs Air~~
  - Lets do both
  - Quantifying fomite risk is always difficult – just look at healthcare



32

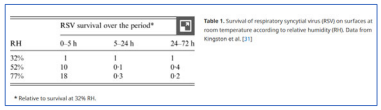
Survival of respiratory virus (not COVID-19)



Epidemiol. Infect. (2015), **143**, 1110–1118. © Cambridge University Press 2014
doi:10.1017/S0950268814002702

REVIEW ARTICLE
Humidity and respiratory virus transmission in tropical and temperate settings

S. PAYNTER*
School of Population Health, University of Queensland, Brisbane, Australia



RSV survival over the period*

RH	0–5 h	5–24 h	24–72 h
32%	1	1	1
52%	10	0·1	0·4
77%	18	0·3	0·2

* Relative to survival at 32% RH.

Table 1. Survival of respiratory syncytial virus (RSV) on surfaces at room temperature according to relative humidity (RH). Data from Kingston et al. [31]

- Humidity a factor, may prolong survival.

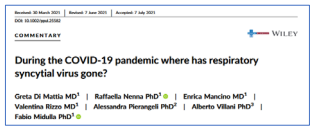
33

Survival of respiratory virus (not COVID-19)


BMC Infectious Diseases

RESEARCH ARTICLE Open Access

Contamination by respiratory viruses on outer surface of medical masks used by hospital healthcare workers


COMMENTARY

WILEY

During the COVID-19 pandemic where has respiratory syncytial virus gone?

Greta Di Mattia MD[1] | Raffaella Nenna PhD[1] | Enrica Mancino MD[1] | Valentina Rizzo MD[1] | Alessandra Pierangeli PhD[2] | Alberto Villani PhD[2] | Fabio Midulla PhD[1]

Pediatric Pulmonology

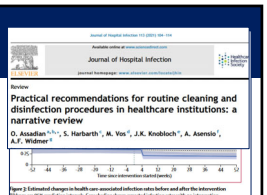
- RSV decreased during COVID-19, what did we do?
- Isolate, source protection etc.
- Effect of these on contamination?

34

Cleaning

- Assess risk
- Product that is effective against the target organism
- Technique is important
- Training, audit and feedback critical


An environmental cleaning bundle and health-care-associated infections in hospitals (REACH): a multicentre, randomised trial


Journal of Hospital Infection

Review

Practical recommendations for routine cleaning and disinfection procedures in healthcare institutions: a narrative review

Q. Assadian, S. Harbarth, M. Vos, J.K. Knobloch, A. Asensio, A.F. Widmer

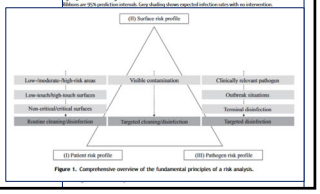
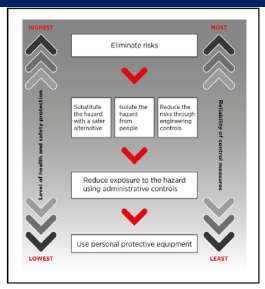


Figure 1. Comprehensive overview of the fundamental principles of a risk analysis.

35

Hierarchy of controls - example

- Isolate risk
  - Isolation / segregation / cohorting
  - Source control masking
- Engineering
  - HVAC and air cleaning
- Administrative
  - Policies/procedures
  - PPE spotters
  - Education, training
  - Audit

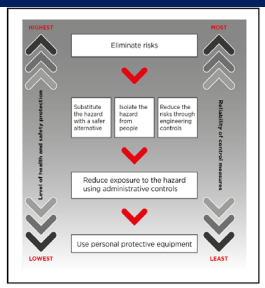


Source: Safe Work Australia

36

Hierarchy of controls - example

- Personal protective equipment
  - P2 / N95 respirator
    - Numerous reviews and articles
  - Eye protection
    - Byambasuren, O et a; (2021). Antimicrobial Resistance & Infection Control, 10(1), 1-7.
  - Gown/gloves where appropriate



Source: Safe Work Australia

37

Prevention and control of respiratory pathogens: a focus on influenza

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Infection Research Program Co-Lead, Hunter Medical Research Institute

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38

Q&A

Professor Brett Mitchell
Nursing
Avondale University

Dr Phillip Norville
Clinical & Scientific Director
GAMA Healthcare

Dr Maria Rubiano
Microbiology Sciences Team Leader
GAMA Healthcare

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39

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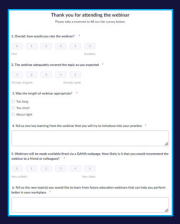
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1 2 3 4 5

Poor Excellent

2. The webinar adequately covered the topic as you expected *

1 2 3 4 5

Strongly disagree Strongly agree

3. Was the length of webinar appropriate? *

Too long
Just short
About right

4. Tell us one key learning from the webinar that you will try to introduce into your practice *

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1 2 3 4 5

Very unlikely Very likely

6. Tell us the new topic(s) you would like to learn from future education webinars that can help you perform better in your workplace *

40