

Unprecedented times: Communicable disease control in the early 21st century



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This is a story in 3 parts

Everything old is new: the resurgence of the Great Imitator

Sharing the air: finding the vulnerable in a highly-vaccinated population

2020 vision: learnings from the SARS-CoV-2 pandemic

Overview

- Practical aspects of communicable disease control and outbreak management using recent examples
- Tried and true traditional measures
- Pandemic-accelerated innovations in outbreak control
- The context within which communicable disease control occurs
- Politics, economics, health, social determinants



Syphilis

Everything old is new:
the resurgence of the Great Imitator

There is a syphilis outbreak in Perth

Add syphilis serology to STI screening

Screen for syphilis at least **THREE** times in pregnancy



Test



Treat



Trace

Why do you need to know about syphilis?

Syphilis is rising in many parts of the world

It is the Great Imitator – so can be missed

Test lesions: syphilis PCR (dry swab)

It can be treated: long-acting penicillin IMI

Rx to avoid long term sequelae or congenital syphilis (woman of reproductive age)

What is syphilis?



- Highly contagious sexually transmitted infection
- *Treponema pallidum*
- Painless* sore on the genitals, rectum or oral cavity (chancre)
- Transmitted through direct contact
- Incubation period: 10 days to 3 months
- Infectious for up to 2 years after infection
- Re-infection can occur

Stages of syphilis



Primary syphilis

- 9-90 days, av 30 days
- Chancre (ulcer) at site of sexual contact (can be oral)
- Uveitis, cranial nerve palsies
- Infectious

Stages of syphilis



Secondary/Early latent (Up to 2y)

- Flu-like illness/systemic symptoms
- Rashes (trunk, palm, soles), patchy alopecia
- Ophthalmic, neurological and oral presentations can occur
- Infectious

Stages of syphilis



Gummatous Syphilide, with ulceration and necrosis of frontal bone (from Nature).

Tertiary syphilis (2y+)

- Non-infectious
- Can occur if person remains untreated (~1/3rd of cases)
- Neurosyphilis (dementia, psychiatric manifestations)
- Cardiac sequelae

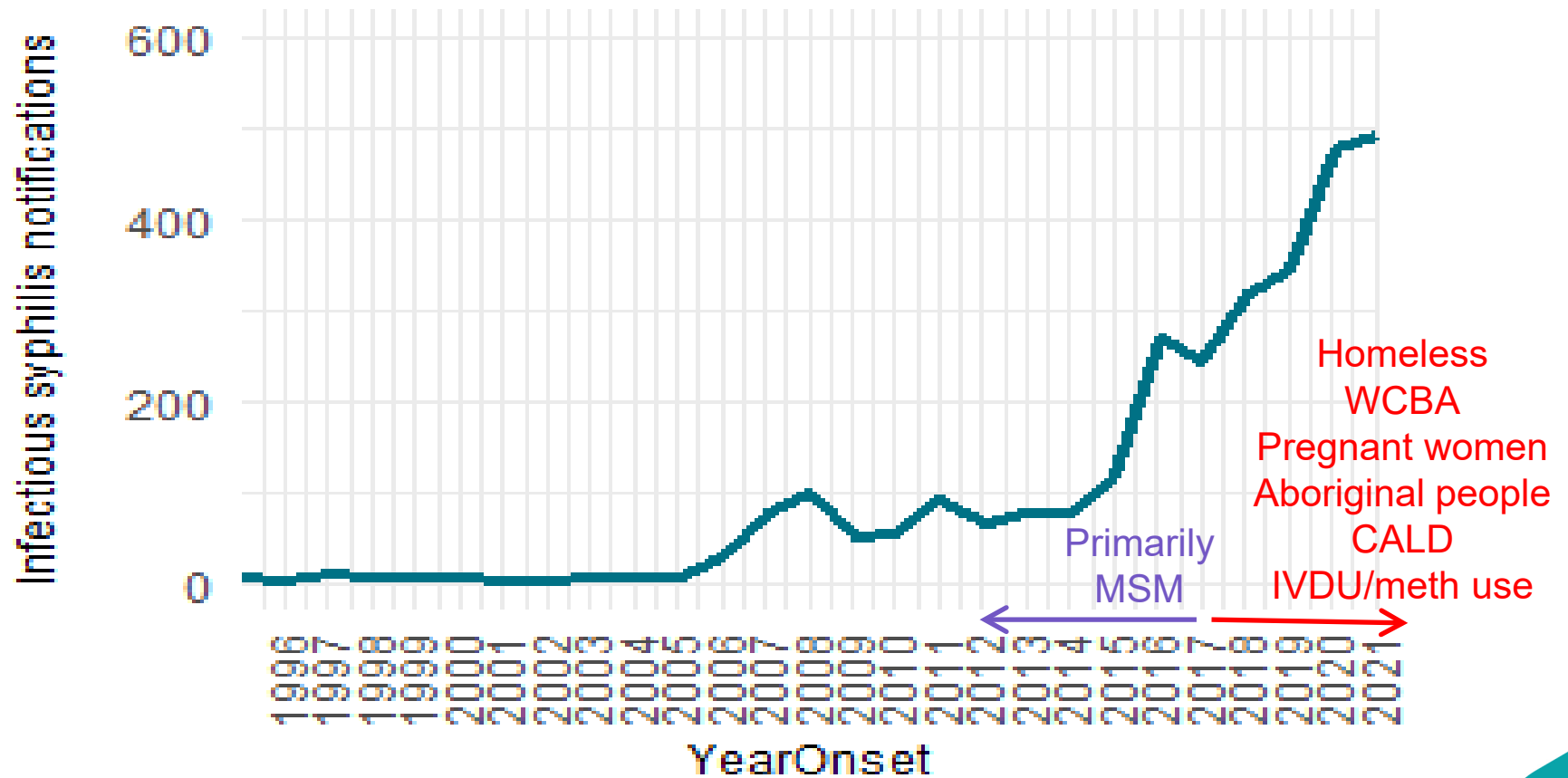
Congenital syphilis

- At birth, hepatosplenomegaly, thrombocytopenia and anaemia, periostitis
- 'Snuffly', Failure to thrive
- Congenital anomalies including blindness, deafness, skeletal and dental abnormalities, neurodevelopmental delay

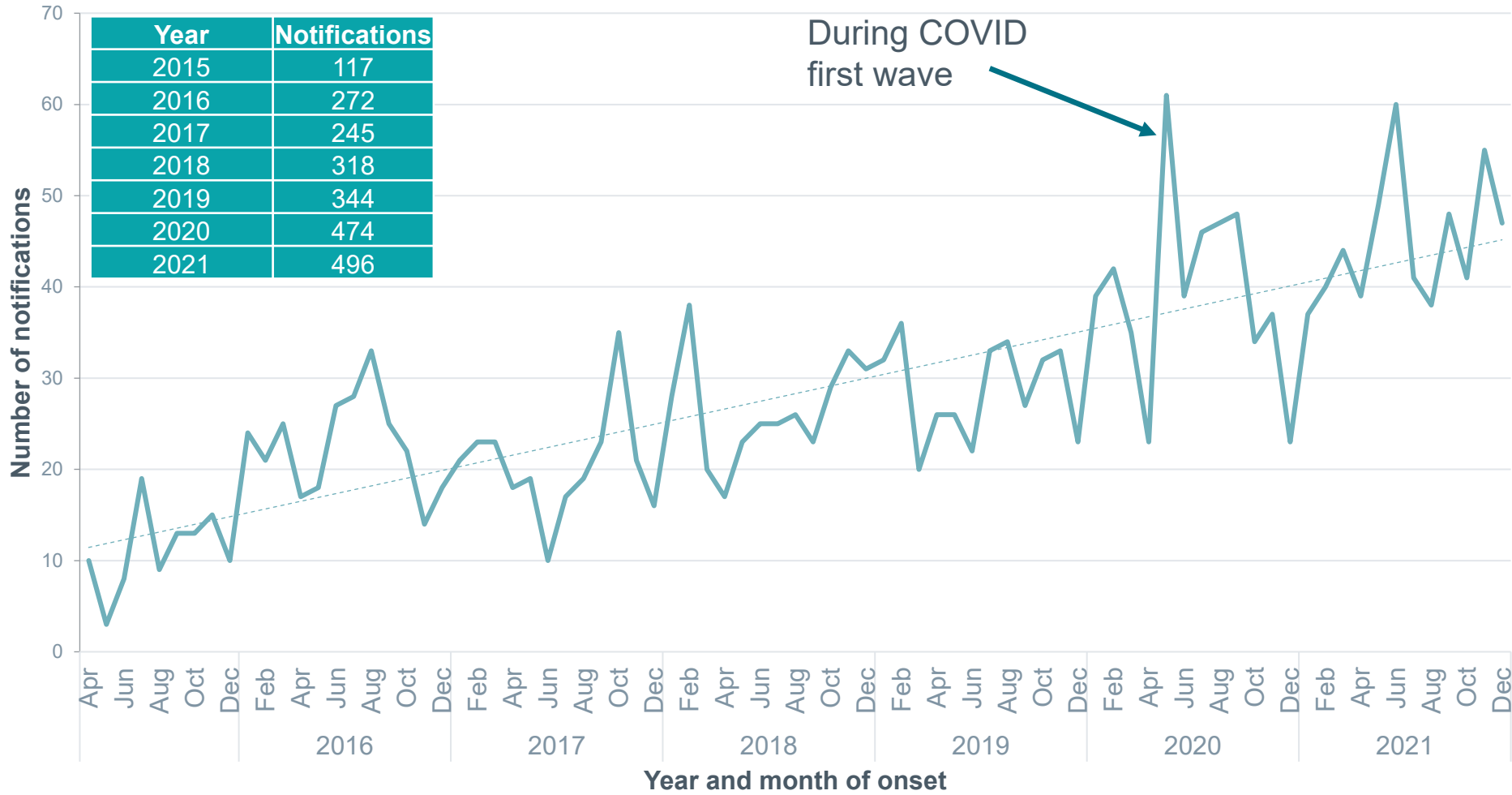


Epidemiology of syphilis in an Australian metropolitan setting

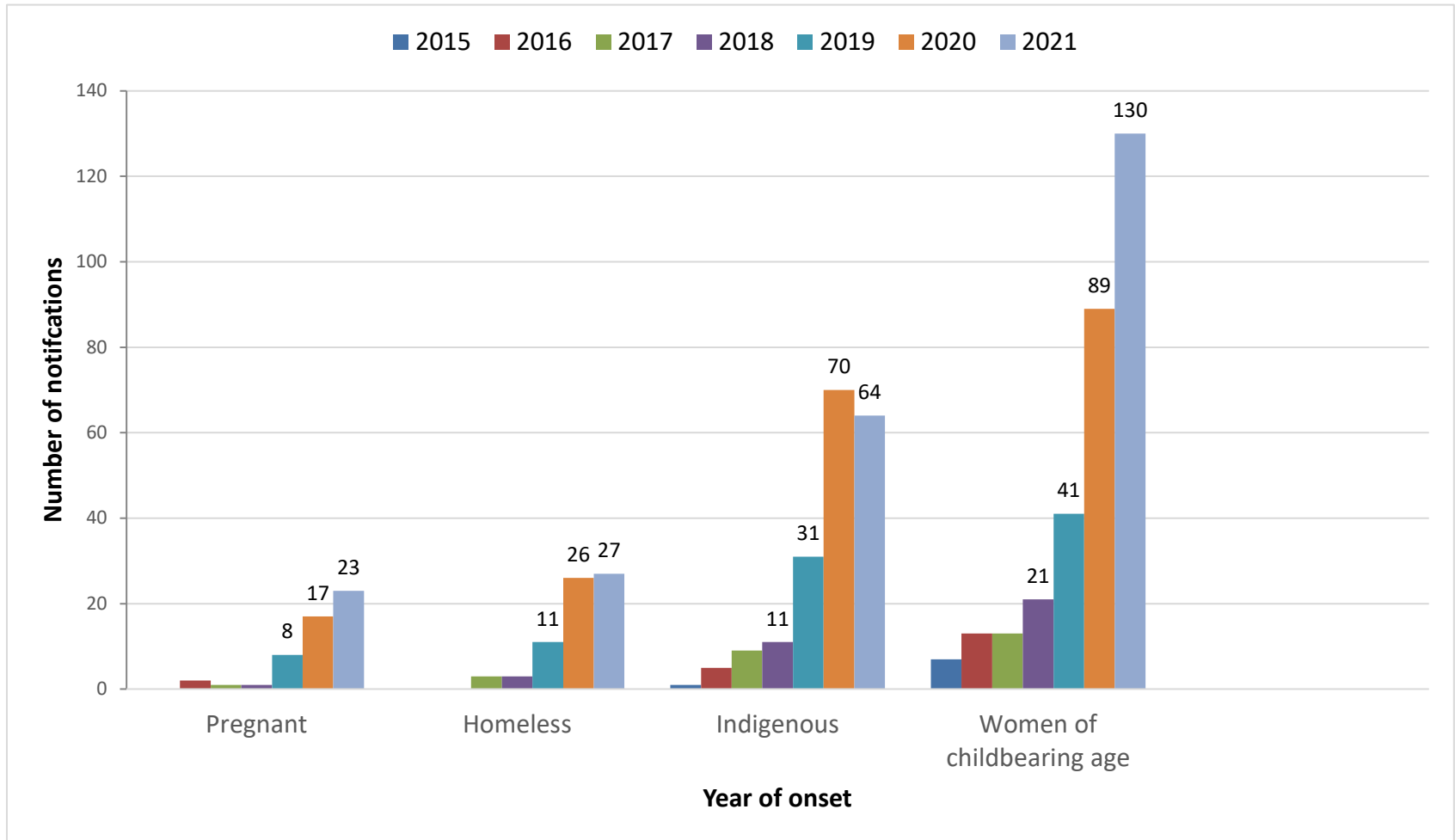
Infectious syphilis in Perth



Infectious syphilis by month, 2015 to 2021



Key and at risk groups for infectious syphilis, 2015 - 2021



Syphilis outbreak in Perth declared by Chief Health Officer, 7/2020

Metropolitan Syphilis Outbreak Response Team (MSORT) started

4 working groups

- Antenatal / Postnatal (3-point testing)
- Prevention, Education and Community Engagement
- Surveillance and Reporting
- STIGMA

Meetings for priority groups: pregnant women and homeless



PHU's action plan

- Workforce development
- Education
- Outreach (ACCHOs, Homeless Healthcare, Street Doctor, CALD organisations, DOJ, DOC, etc.)
- Collaboration with health services in primary and community health and hospitals
- Multidisciplinary: doctors, nurses, social workers, Aboriginal health professionals, allied health, health promotion
- Testing, treatment and contact tracing
- New syphilis electronic public health management system which also serves as a metro syphilis register ► improved reporting

Testing tips and interpreting syphilis serology

- Syphilis PCR: Swab lesions (add **syphilis**, HSV, HZV)
- Syphilis serology: Treponemal antibodies, Rapid Plasma Reagin (RPR)
- Interpreting results depends on
 - Sexual history, symptoms and clinical signs AND
 - **Treponemal test** results (TPPA, TPHA, EIA, IgM and IgG, FTA Abs, point of care (POC) tests AND
 - **RPR** result (marker of activity, treatment response, re-infection) AND
 - Previous syphilis serology results (if available) AND
 - History of treatment (if available)
- RPR – serofast state (persistent low titre)
- [How to Interpret Syphilis Test Results in Australia \(syphilisoutbreaktraining.com.au\)](http://syphilisoutbreaktraining.com.au)

Case study

Woman of childbearing age

Presented to GP

- Painful palatal ulceration
- Persistent (weeks)

GP referred patient to a specialist clinic

- Biopsy
- Results: spirochaetal organisms seen
- *“in the correct clinical context Treponema pallidum could be considered and appropriate serology testing arranged”*
- No syphilis serology taken



Three months later

- Patient presented to ED with an unrelated complaint
- ED consultant reviewed all recent results
- Contacted ID physician about the histopathology result

Syphilis serology ordered

- Infectious syphilis confirmed
- Treatment with benzathine penicillin 2.4MU IMI arranged

Issues

Delayed diagnosis

Delayed treatment

Risks

- Pregnancy
- Long term health issues
- Infectious to other sexual contacts
- Delayed contact tracing

Syphilis can hide in plain sight



Summary

Syphilis is rising in many parts of the world

Social determinants matter

Outbreak response in a resource-limited setting

Outbreak control relies on micro (case and contacts) and macro aspects (stakeholder engagement, education, CHO support)

Innovations in outbreak control – electronic data collection – public health management, surveillance, monitoring risk groups, etc.

Measles

Sharing the air:

Finding the vulnerable
in a highly-vaccinated
population



PHOTO: Measles can be particularly severe in infants and people with compromised immune systems.
(Centres for Disease Control)



Why is measles important to diagnose rapidly?

It's highly communicable – spreads rapidly (R_0 12-18)

Opportunity to prevent further cases if notified early (isolate, quarantine, MMR, NHIG – the original TTIQ)

It's serious

- 33% of cases were hospitalised (10-year review)
- Pneumonia was the most common complication
- Most hospitalisations in young-middle aged adults (20-44 years) and children <1 year
- Large cohort inadequately protected (0 or 1 dose of measles-containing vaccine only)



Vaccination schedule over time

- Single dose of funded measles vaccine
 - 1970-1972: Introduced in Aust (jurisdiction dependent), 12-23 months
- Addition of second dose to schedule
 - 1993/4: School-based catch up for 10-14yo
 - 1998: Change to 4-5yo w one-off catch up of 5-12yo
 - 2013: 18m (MMRV)
- Gaps
 - Anyone born since 1965 who has not had 2 doses of measles-containing vaccine
 - Cohorts: 1965-1980 no or one dose only
 1981-1998 one or two doses
 1999-2018 immunisation rate ~90% at 5 years, 1 in 10 susceptible
 - Immunocompromised individuals, <1y, born overseas



Measles globally

There have been recent large outbreaks worldwide

- NZ (~2000 cases in 2019)
- Throughout Europe (>70 deaths in 2017/18, >80k cases)
 - Where vaccine status was known, 93%-95% were unvaccinated (82%-87%) or under-vaccinated (1 MMR 8%-11%); Source: ECDC
- Large tracts of Asia (Vietnam, Philippines, Bali)
- Ongoing through Africa
- Resurgence in the Americas (Ex Venezuela, spot outbreaks in US)

With international travel resuming, incursions into Australia are likely

Perth measles outbreak fears after unvaccinated families exposed

Updated 21 Dec 2016, 2:12pm

perth now
Sunday Times

PERTH 9-25°C

A race against the clock to tackle the worst measles outbreak in WA this century

By James Carmody

Updated about 6 hours ago

Perth measles outbreak worsens as three more cases confirmed after visit by infected NZ tourist

By Alisha O'Flaherty

Posted 3 Oct 2019, 4:03pm



PHOTO: Authorities are urging West Australians to make sure their children are vaccinated for measles. (Reuters: Valentin Flauraud)

Four backpackers visiting Perth have been diagnosed with measles. File image

WA News

Measles outbreak: Cases confirmed among Northbridge backpackers

STAFF WRITERS, PerthNow
July 21, 2016 7:14pm

Measles cases in babies alarm doctors

Cathy O'Leary, Medical Editor

Saturday, 28 January 2017 12:31AM



Outbreak scenario

Eve of a long weekend, Sept 2019

- Surprisingly, not too busy. In my handover to on-call Dr, I wrote, 'I hope it stays quiet for you.' Little did we know...
- Saturday
 - Meningococcal case
 - ?Measles (not)
- Sunday
 - ?Measles (confirmed – prelim neg – isolation lifted, but pos)
 - Measles (confirmed)
- Monday
 - ?Measles (confirmed)
 - ?Measles (confirmed)
 - Measles (confirmed)
 - ?Measles (confirmed)
 - ?Measles (not)



A week earlier...

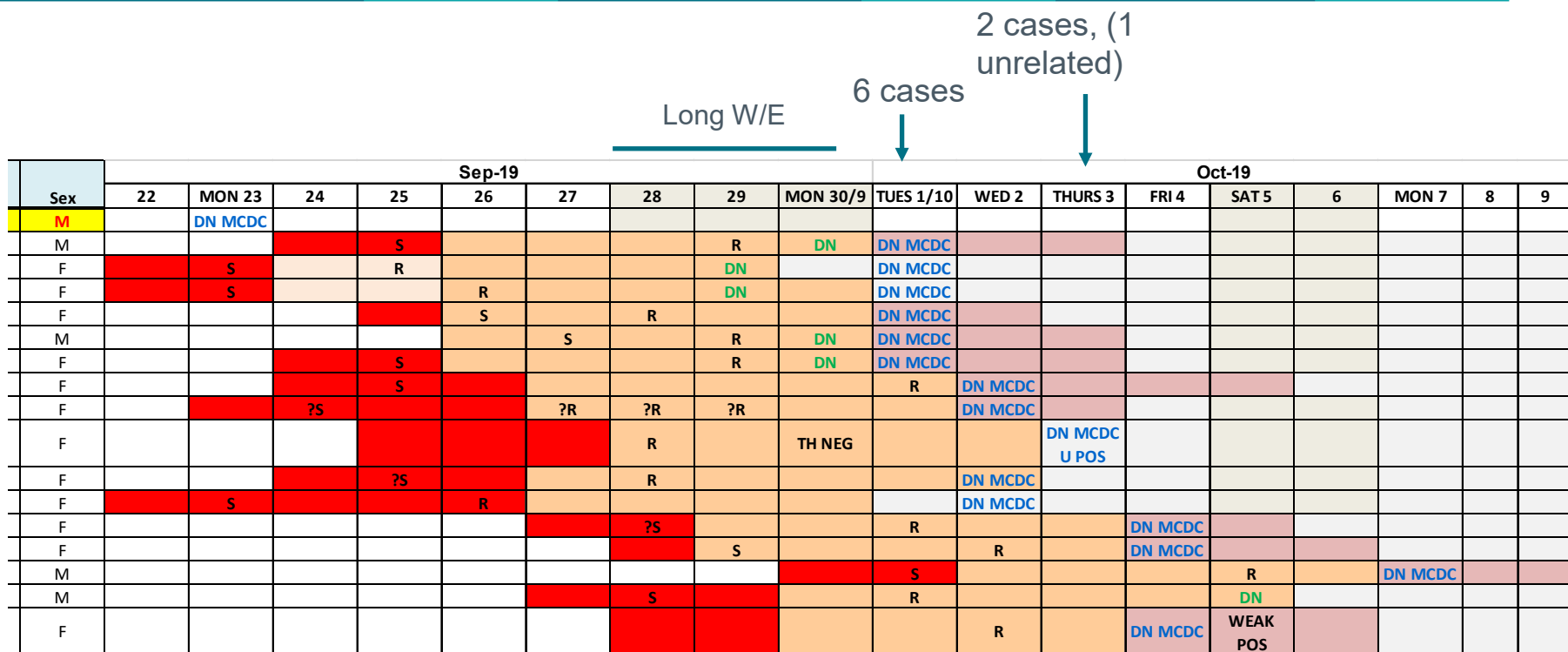
- Late Friday, CDC was informed by MOH NZ of a case of measles who had been in Perth while infectious (10/9 – 15/9)
- Saturday: WA DOH released a media statement about the measles case



What transpired...

- 16 secondary cases
 - 7 related to a sporting grand final (Exp: 14/9)
 - 6 from the suburb the index stayed in (10/9-15/9)
 - 2 related to his return travel to NZ (Exp: 15/9)
 - 1 case in a relative
- 6m-43y
 - Vaccination status: 3 too young, 9 unvaccinated at time of exposure, 2 had 1 MMR each, 2 unknown

Infectious period of secondary cases



KEY	
E	Exposure
S	Onset of symptoms
R	Onset of rash
DN	Date notified to CDC
DN MCDC	Date notified to MCDC
	PH intervention possible (i.e. 72h MMR, NHIG 6 days)
	Isolated for remaining infectious period

4 cases

3 cases

15 cases of measles in 1 week



Tertiary cases

- 6 tertiary cases from 4 secondary cases
 - 2 exposed in hospital (25/9), 1 had 1 MMR, other unknown
 - 3 from non-vaccinating families (with HH-like exposure)
 - 1 person exposed at a party, vaccination status unknown

Tertiary cases: Infectious periods

Sex	Oct-19																
	FRI 4	SAT 5	6	MON 7	8	9	10	FRI 11	12	13	MON 14	15	16	17	18	SAT 19	20
M	E	E	E	E	R	E	E	DN MCDC	E	E	E	E	E	E	E	E	E
F	E	E	E	E	E	S	E	E	R	E	(DN)	E	E	←	E	E	E
F	E	E	S	DN MCDC	E	E	E	R	E	E	E	E	E	E	E	E	E
M	E	E	E	E	S	E	R	E	E	E	E	E	E	E	E	E	E
M	E	E	E	E	E	?S	E	R	E	E	E	E	E	E	E	E	E
F	E	E	E	E	E	E	E	E	E	E	E	S	R, DN MCDC	E	E	E	E

FIFO

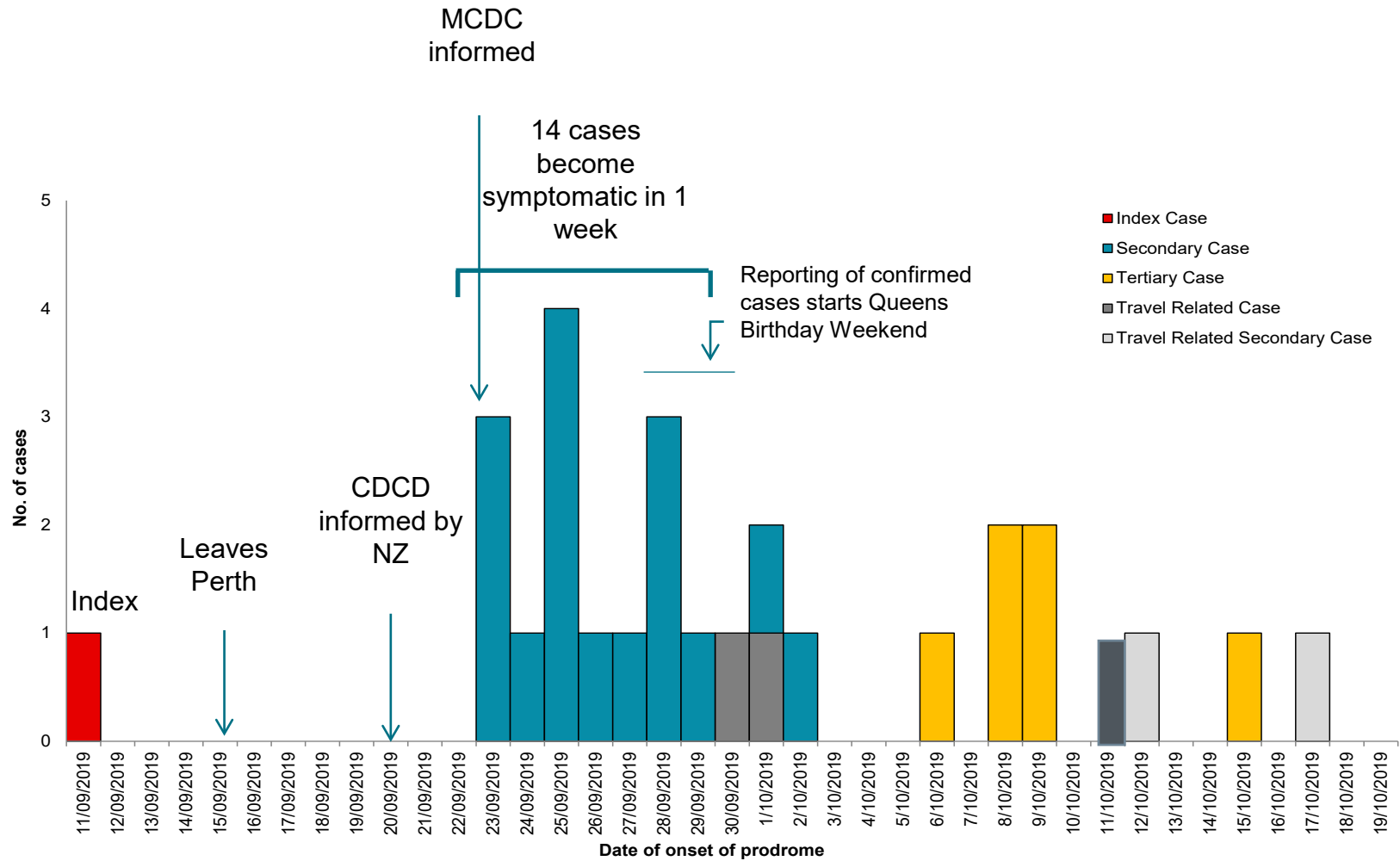
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	PH intervention possible (i.e. 72h MMR, NHIG 6 days)
	Isolated for remaining infectious period

Concurrently, another 5 measles cases in Perth

Perhaps a taster for what was to come a few short months later...



Measles epicurve



Outbreak response

- Incident command
- Operations for metro cases (follow up: Calls, MMR, NHIG, info)
- Working with the laboratories, including results, domiciliary collections
- Liaison with workplaces, public places, airport, schools, CCCs
- Keeping Executive informed
- Hospitals/General Practice
- Communications/Media
- Logistics and surge capacity

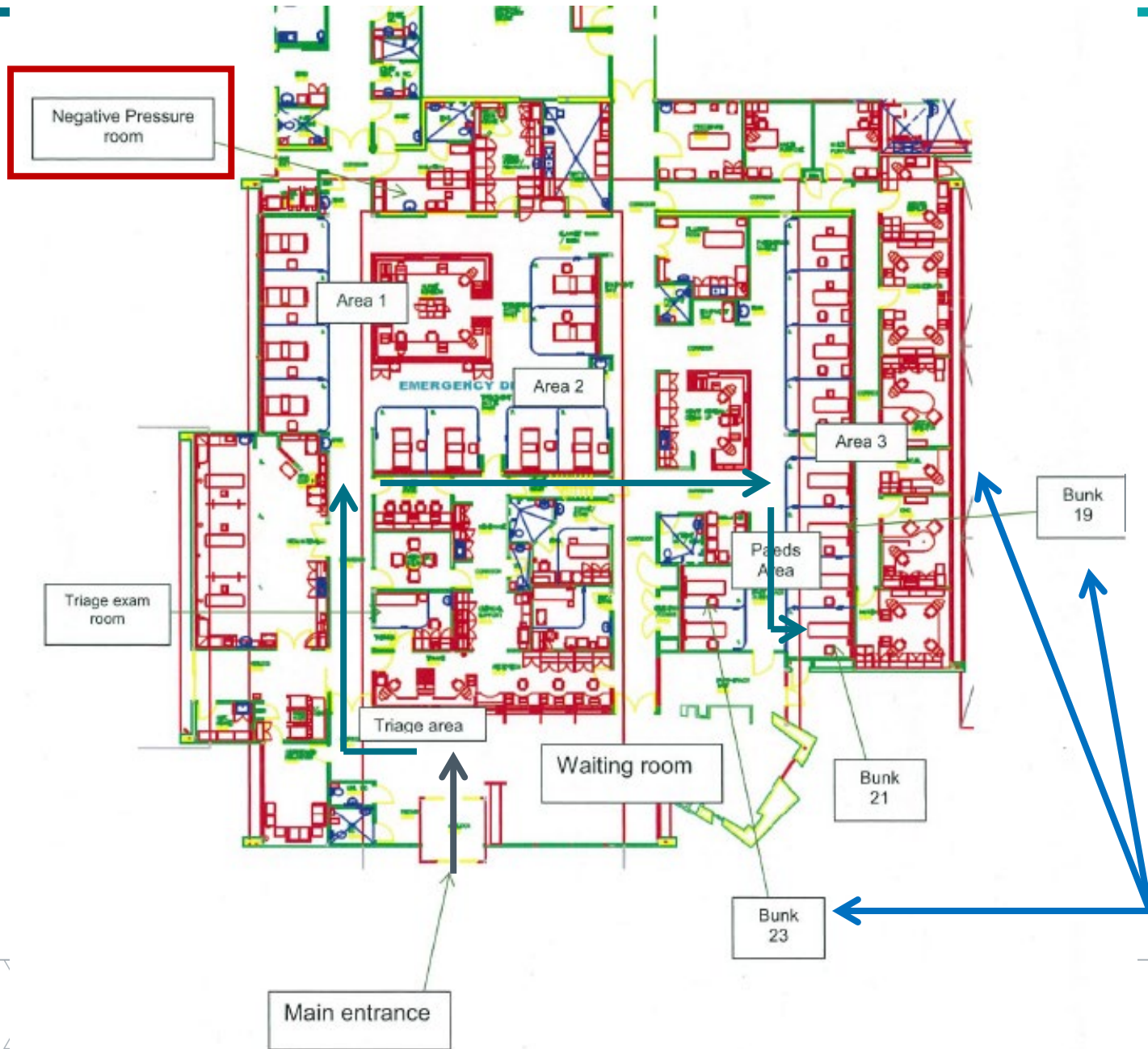


Impacts

- ‘000s of contacts, MMR use, NHIG (high risk)
- Exposures in over 100 individual locations, incl:
 - 7 hospitals
 - 14 general practices: many frequented several times
 - Workplaces (incl. mine site and corrective services)
 - Schools, childcare centres
 - Perth Airport, multiple shopping centres, cafes
- Resources: public health, frontline clinical services, laboratory, comms/media
- Testing, notification, isolation, quarantining



Sharing the air in a Metro ED. Floor Plan shown



Summary

- Measles will make a return now that international borders have been relaxed
- The pandemic has adversely affected the delivery of immunisation programs in many countries, so incursions into Australia are to be expected
- Mitigate risk by encouraging inadequately vaccinated adults to seek a MMR vaccine prior to overseas travel
- Operationalising national guidelines for local conditions: established communications process with e.g. laboratories, ride share/taxis, airport, hospital EDs

COVID-19



2020 vision: learnings from the SARS-CoV-2 pandemic

Sent: Tue 31/12/2019 8:00 PM

Sent: Tue 31/12/2019 8:00 PM

From: promed-bounces@promedmail.org on behalf of promed-request@promedmail.org
To: promed@promedmail.org
Cc:
Subject: ProMED Digest, Vol 90, Issue 75

RED: UNDIAGNOSED PNEUMONIA - CHINA (HUBEI), REQUEST FOR INFORMATION

A ProMED-mail post

<<http://www.promedmail.org>>

ProMED-mail is a program of the International Society for Infectious Diseases <<http://www.isid.org>>

[1]
[1]

Date: 30 Dec 2019

Source: Finance Sina [machine translation] <<https://finance.sina.cn/2019-12-31/detail-iihnzakh1074832.d.html?from=wap>>

Wuhan unexplained pneumonia has been isolated test results will be announced [as soon as available]

On the evening of [30 Dec 2019], an "urgent notice on the treatment of pneumonia of unknown cause" was issued, which was widely distributed on the Internet by the red-headed document of the Medical Administration and Medical Administration of Wuhan Municipal Health Committee.

On the morning of [31 Dec 2019], China Business News reporter called the official hotline of Wuhan Municipal Health and Health Committee 12320 and learned that the content of the document is true.

12320 hotline staff said that what type of pneumonia of unknown cause appeared in Wuhan this time remains to be determined.

According to the above documents, according to the urgent notice from the superior, some medical institutions in Wuhan have successively appeared patients with pneumonia of unknown cause. All medical institutions should strengthen the management of outpatient and emergency departments, strictly implement the first-in-patient responsibility system, and find that patients with unknown cause of pneumonia actively adjust the power to treat them on the spot, and there should be no refusal to be pushed or pushed.

The document emphasizes that medical institutions need to strengthen multidisciplinary professional forces such as respiratory, infectious diseases, and intensive medicine in a targeted manner, open green channels, make effective connections between outpatient and emergency departments, and improve emergency plans for medical treatment.

RED: UNDIAGNOSED PNEUMONIA - CHINA (HUBEI), REQUEST FOR INFORMATION

Little did we know...





City of Perth
We acknowledge the Traditional Owners
of this land, the Whadjuk Noongar people.

City of Perth
We acknowledge the Traditional Owners
of this land, the Whadjuk Noongar people.

MYER

MYER

MYER

MYER

FORREST CHASE

sussan

BREWERY

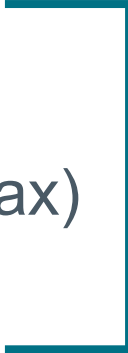
HORSE

FORREST CHASE


People expressed THINGS THAT WERE...

Traditional measures

- Surveillance
- Testing
- Contact tracing (pen, paper, phone & fax)
- Isolation and quarantine
- Vaccination
- Border control
- Physical distancing
- Restrictions – activities and/or movement
- Density limits
- Widespread mask use



Commonly used
in day-to-day
communicable
disease control



Infrequently used
in day-to-day
communicable
disease control



Challenges

- Size of public health workforce/BCP
- Establishing new processes
 - Local Standard Operating Procedures
 - Case reporting & management
 - Contact tracing
 - Patient monitoring at home (lack of Telehealth, lack of home visiting services)
 - Testing / testing criteria (lagged)
 - Clearance
- Cases in persons of culturally-diverse backgrounds
- Purchasing and procurement (PPE, ventilators, etc.)
- Health-information sharing/Comms

Innovation during a pandemic

Contact tracing
using electronic
relational
databases

Dashboards and
monitoring

Streamlined
electronic
laboratory feeds

Monitoring
immunisation
coverage (AIR)

Monitoring
quarantine and
isolation using
G2G

QR codes
(digital tracing,
automated
messaging)

Transition to
Telehealth

Managing
COVID-19 at
home (pulse
oximetry)

Innovation during a pandemic

Testing

- Establish testing processes (incl. domiciliary) and real-time electronic reporting
- Rapid increase in testing capacity
- Rapid diagnostic testing: PCR, RAT
- Value of whole genome sequencing

Control: vaccines - mRNA vaccines

Advances in treatment

- Antivirals and monoclonal antibodies
- Proning in ICU

Understanding of airborne transmission

Inform ventilation of buildings to reduce risk

Use of modelling to inform public health settings during a pandemic



Legislation

- Use of emergency management and public health acts
- Directions/Mandates:
 - Travel restrictions, public health and social measures (capacity limits, mask use), vaccination mandates (incl proof), testing, quarantine and isolation
- Emergency management acts
 - Generally designed for acute responses to disasters
 - Traditional PPRR model
 - Progression through phases more timely
- In WA, State of Emergency declaration signed 15 March 2020, and extended ever since



Equity and access

- Matter at all times but especially in a pandemic
 - CALD and indigenous populations
 - Aged care
 - Vulnerable populations with underlying health conditions
 - Persons experiencing homelessness
 - Frontline workers
- Inequity demonstrated abroad and in Australia
 - COB overseas 6.8 deaths per 100 000 versus 2.3 deaths among Australian-born (ASR) [ME 29.3]
 - Lowest SEIFA quintile over 3 times more likely to die than highest quintile

[COVID-19 Mortality in Australia | Australian Bureau of Statistics](#)
[\(abs.gov.au\)](#) Data to 31/01/2022



COVID-19 lessons

- Human health influences economic health
- Costs, benefits and unintended consequences need to be carefully assessed
- Importance of good leadership and multidisciplinary teams
- Effective communication strategy, experts, trust
- Building community support and purpose, concern for our community (social cohesion)
- Protocols needed but flexibility, rapidly changing circumstances (VOCs – omicron) require system agility



**Any
questions?**