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2024 WEBINAR

MENINGOCOCCAL DISEASE UPDATE

20 FEBRUARY 2024 | 6PM – 7PM AEDT

Presenter: Prof Robert Booy

Moderator: Dr Andrew Baird



Introductions

The Changing Epidemiology Of Meningococcal Disease

Professor Robert Booy

Professor Robert Booy is an infectious diseases paediatrician. Since 2005 he has worked at the University of Sydney in the fields of vaccinology, epidemiology, and infectious diseases.

He is currently a Senior Professorial Fellow at the University of Sydney Children's Hospital Westmead Clinical School, and Chair of the IC Scientific Advisory Committee.

From 2005 to 2019 he held the position of Head of Clinical Research at the National Centre for Immunisation Research and Surveillance (NCIRS) at Westmead Children's Hospital and remains an Affiliate of NCIRS.



Webinar Moderator

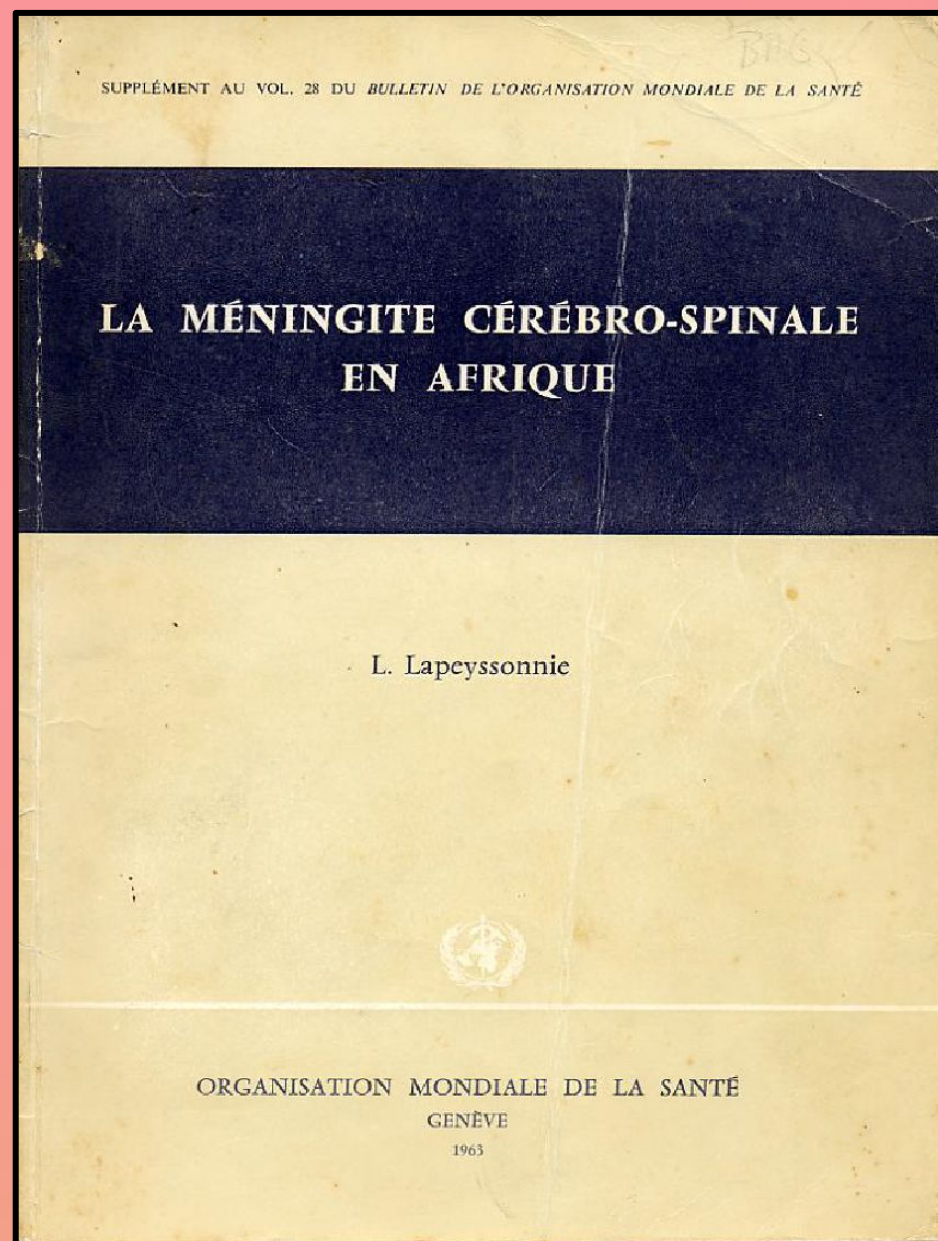
Dr Andrew Baird

Andrew is a General Practitioner in Elwood, Melbourne and a tutor in Professional Practice for medical students at University of Melbourne.

He has a background in rural general practice. His interests are in general practice and medical education.

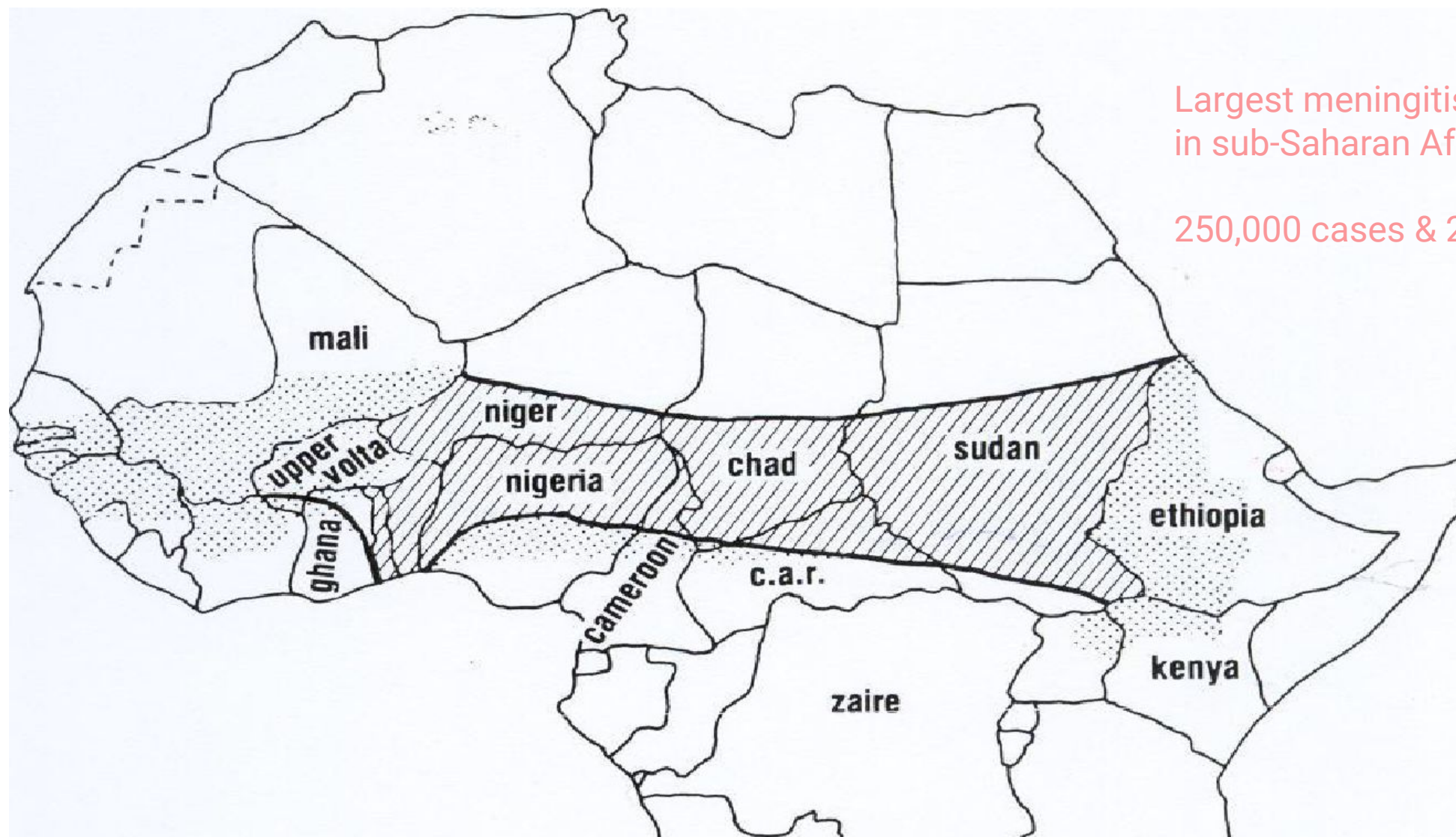


Lapeyssonnie, Bull
WHO 1963;28
suppl:3-114



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The Sahel blows from the Sahara



Largest meningitis epidemic 'ever'
in sub-Saharan Africa in 1996/7

250,000 cases & 25,000 deaths

Meningococcal disease: Frequently in the News



“Ballarat Grammar School confirms meningococcal disease outbreak as staff member hospitalised”

May 2023

“NSW residents on high alert for meningococcal symptoms after death”

June 2023

QLD: The Queensland Men B Vaccination Program will provide free meningococcal B (men B) vaccines to eligible Queensland infants, children and adolescents

February 14th, 2024

QLD Men B Program

- This program will be **implemented in full by the end of March 2024, with vaccine deliveries to Queensland Health registered vaccination service providers commencing from mid-Feb 2024**
- Aboriginal and Torres Strait Islander children (less than 2 years of age) and people with specific medical risk factors for invasive meningococcal disease are currently eligible for free menB vaccine through the NIP
- **The Queensland Men B Vaccination Program will make men B vaccines available for eligible infants, children and adolescents in addition to NIP eligible groups**
- Currently, men B vaccine is available for purchase on the **private market** for those who are not eligible under the NIP

Discuss your family's vaccination needs with your immunisation provider such as your GP – most GPs have under 10% uptake - the enthusiastic can achieve over 75%.....

The irony of the missed case...

QLD Men B Program

- The following Queenslanders who have not yet started or completed an age-appropriate course of men B vaccination will be eligible for the Queensland Men B Vaccination Program:
 - ***Infants, 6 weeks to 12 months of age***
 - ***Catch up vaccination will be offered for children aged over 12 months to less than 2 years***
 - ***Adolescents aged 15 to 19 years (inclusive)***

Once vaccination is commenced during the eligibility period, a person remains eligible for their second dose, regardless of age

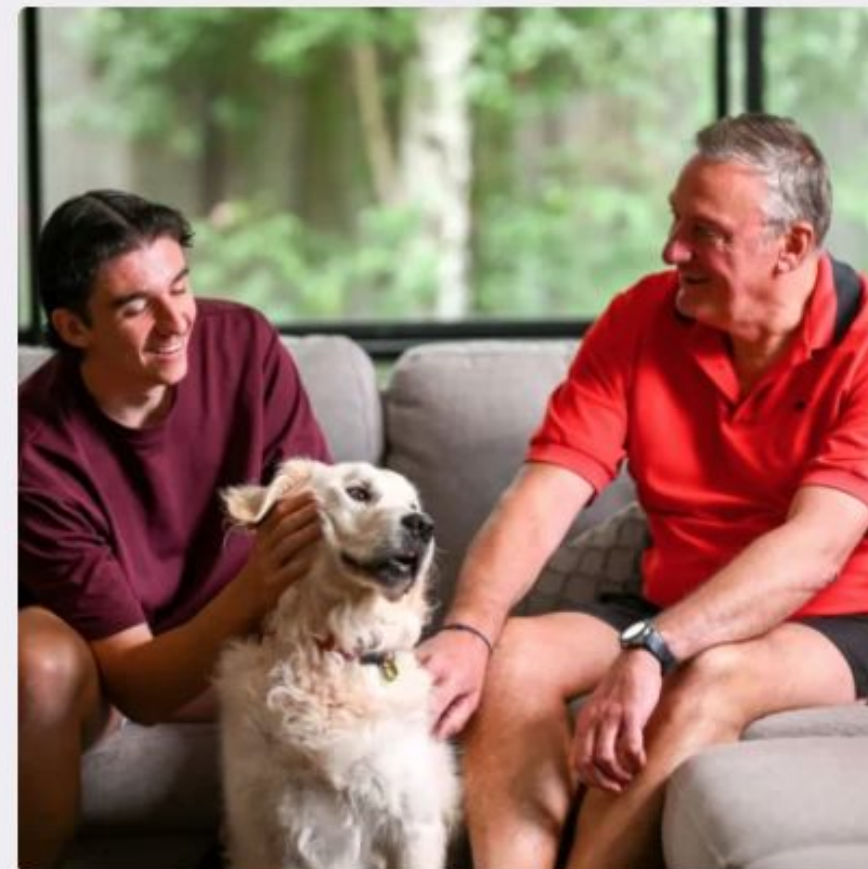
Nation-wide Meningococcal B is the predominant serogroup: >80% of cases; highest rate in QLD!



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Advocacy for Meningococcal B Immunisation: A Local Father's Crusade

In a recent conversation with Raf Epstein on ABC Listen, Paul Wright recounts the alarming ordeal that led him to advocate for this life-saving initiative.



I write to beg you to put B Meningococcal vaccination onto the NSW health vaccination schedule



The Hon. Ryan Park MP

GPO Box 5341, SYDNEY NSW 2001 Date: 20 November 2023

Dear Minister,

I ask not because the cases of B have surpassed W as the most common strain of the disease, and not because the cost B vaccination is beyond the means for most families with vulnerable children and young adults. I ask because no family should have to experience what our family did when faced with meningococcal in 2017.

On Christmas Day, 2017, my daughter, Lily, (then 23), was ready to celebrate the holiday with family (Pic A, Lily (L)). She had battled a fever and flu-like symptoms for two days but was well enough to attend dinner. By midnight her condition dramatically deteriorated. Lily was dying.

I called the home doctor service. Within about 30 minutes, before a doctor could arrive, a bruising rash appeared on her face and limbs (Pic B). I rushed her to hospital. We arrived with only minutes to spare. For three days, whilst in intensive care (ICU), there was no reassurance that Lily would survive.

In recent years I have written and produced vaccination awareness video campaigns and a podcast series, MatterofVax,

- **Prevention is the only hope** for those who are vulnerable and encounter this disease. At the outset symptoms can appear benign. The infamous meningococcal rash is not always present - a fact that may contribute to poor early detection and the related mortality rate. Once the disease takes hold, emergency medical care is needed. The impact can be devastating for both patient and family.
- **Lily lost both adrenal glands and kidneys that night. A kidney transplant, from her sister Grace (then 25), gave her back her life** but, ironically compromised her immune system forever.
- In the aftermath of Lily's diagnosis, I discovered that her peers were simply unaware of the need for vaccination and their impact on spread of the disease. Understanding the breakdown in communication to vulnerable groups about the disease and uptake of vaccination was motivating for our family.
- **Since then, Lily has since been the face of the NSW HEALTH meningococcal campaigns.** Our family's advocacy was seen nationally and internationally. She has since been the face of many campaigns asking Australians to consider vaccination as a prevention of all strains of the disease.



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Invasive Meningococcal notifications in Australia 2023, updated Jan 2024

	Serogroups				
	B	W	Y	NG*	TOTAL
ACT¹	-	-	-	2	2
NSW^{1,2}	28	2	5	1	36
NT¹	-	-	-	3	3
QLD ^{1,3}	36	-	2	3	41
SA ^{1,4}	17	3	1	1	22 [‡]
TAS^{1,5}	2	-	-	3	5
VIC ^{1,6}	20	3	2	1	26
WA ^{1,7}	8	-	1	-	9 [^]
Total	111	8	11	14	144

Cf 127 in 2022, < 100 in 2020 & 2021

The world has changed ... and keeps changing

- SA success: 4CMenB sustained vaccine effectiveness against invasive meningococcal B disease & gonorrhoea in South Australia
- Men B Cases began exceeding pre-pandemic levels in UK university students, from September 2021

(During the pandemic, lockdowns used to curb the spread of Covid-19 also led to a decline in other infectious diseases – UK restrictions eased in July 21 cf March 2022 in Australia)

- UK meningococcal rates at historic low until September 2021. So were Australia's in 2020 & 2021
- Stark increase in UK meningococcal B cases in adolescents and young adults “particularly in Uni students”

41.5% of meningococcal cases occurred among those aged 15 to 19, compared with 11.8% and 14.3% during the same period in 2018 and 2019 respectively

The more things change, the more they stay the same...

UK risk factor case-control study, late 1990s, both B and C disease

144 teen Meningococcal survivors, matched controls

BMJ 2006, Tully J, Viner R... Booy R

Key Risk Factors:

Flu-like illness, university / school student, multiple intimate kissing contacts, exposure to smokers rather than the smoke.

Many of these risks were found in BMJ 1918 article: *The Epidemiology of Meningococcal Meningitis*

BUT this is an unpredictable epidemic disease.

Serogroup Change

Men A used to predominate in Australia, eg both WW1 and 2, but has virtually disappeared in Australia since 1970s

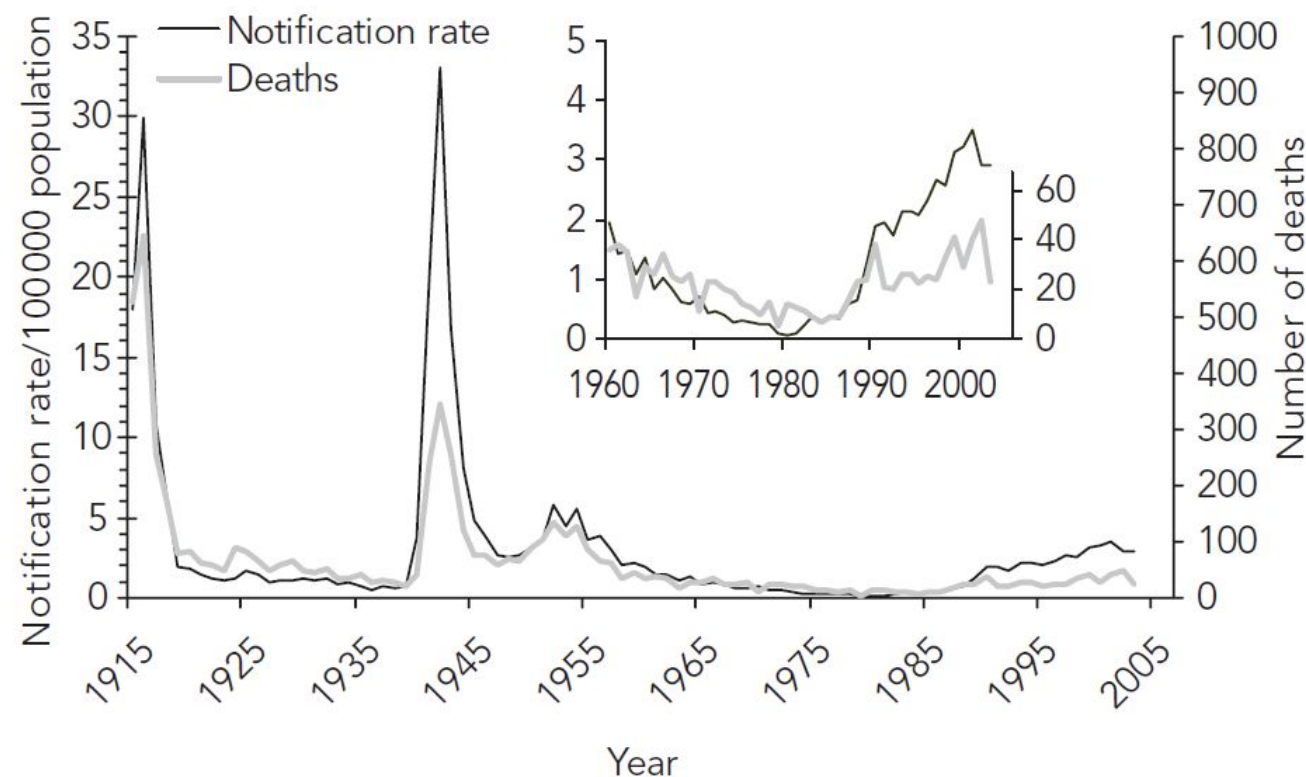
Some ask, might Men B disappear too?

- With some help from improved living conditions
- And a vaccination program?

NB: SA cluster-randomised trial in high schools – “B part of it”
No impact on carriage



2 Annual notification rates and deaths from meningococcal disease for all states/territories in Australia, 1915–2003



The annual number of deaths from meningococcal disease was obtained from the compilation of mortality data collected by the Australian Bureau of Statistics.²⁹



Men B IMD Australia 1997–2020



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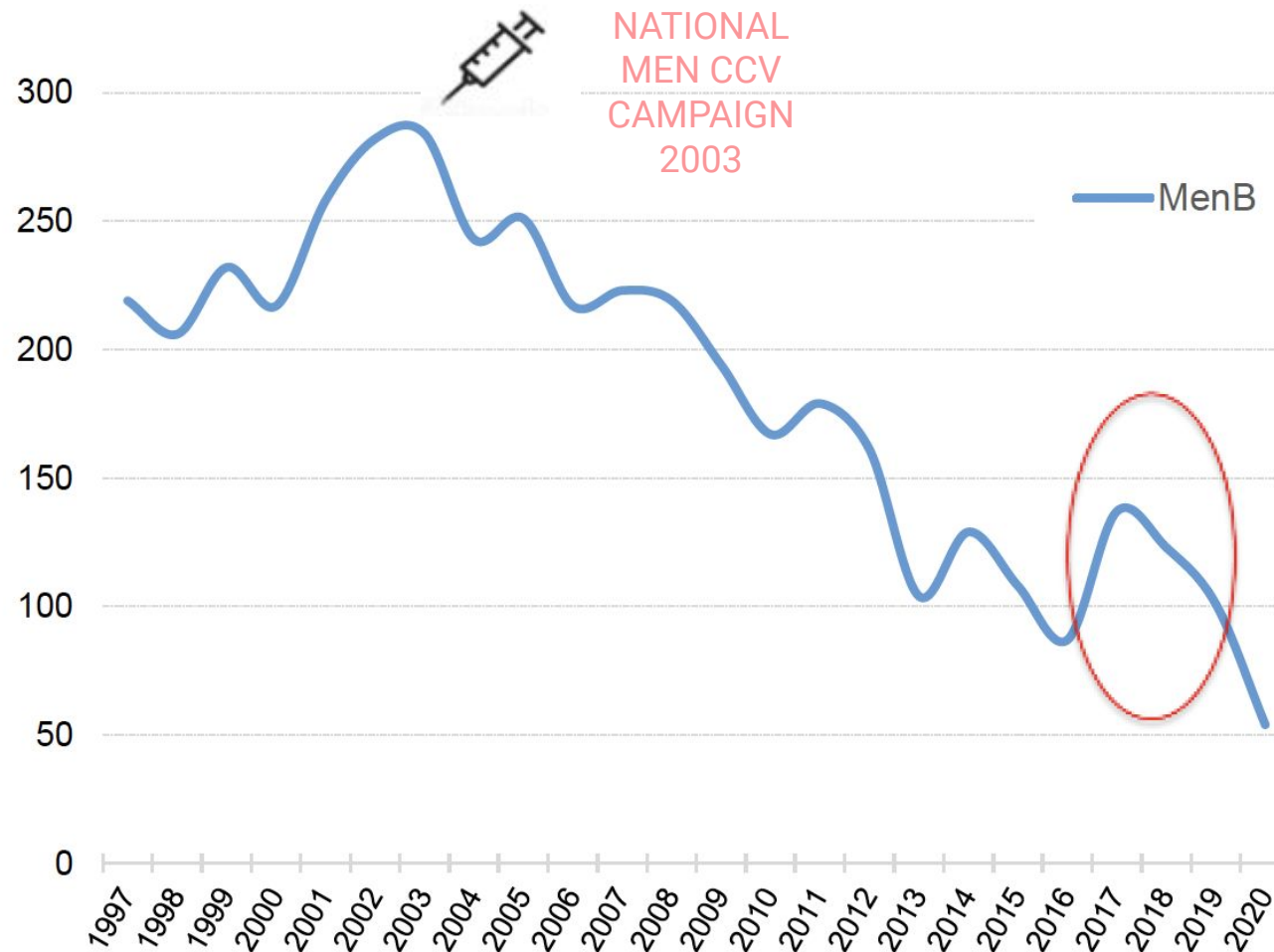
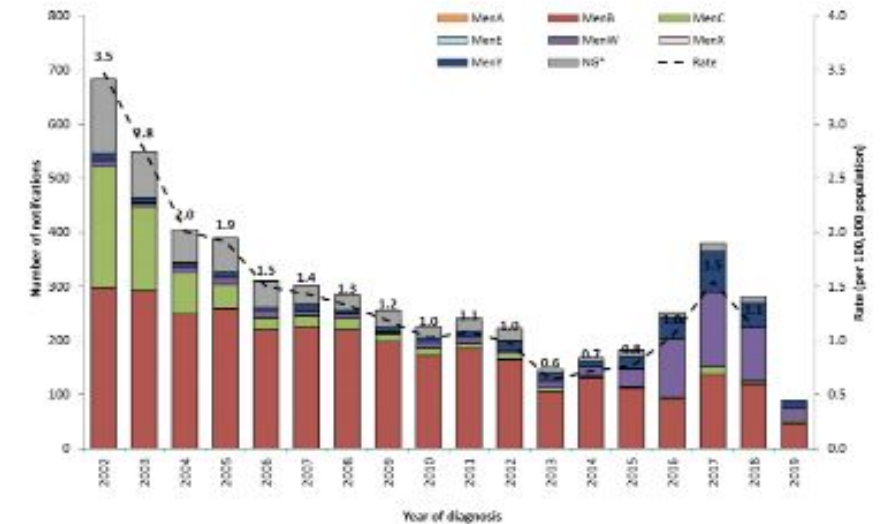


Figure 1. Annual cases and annual rate of IMD, Australia, 1 January 2002 to 30 June 2019 by serogroup



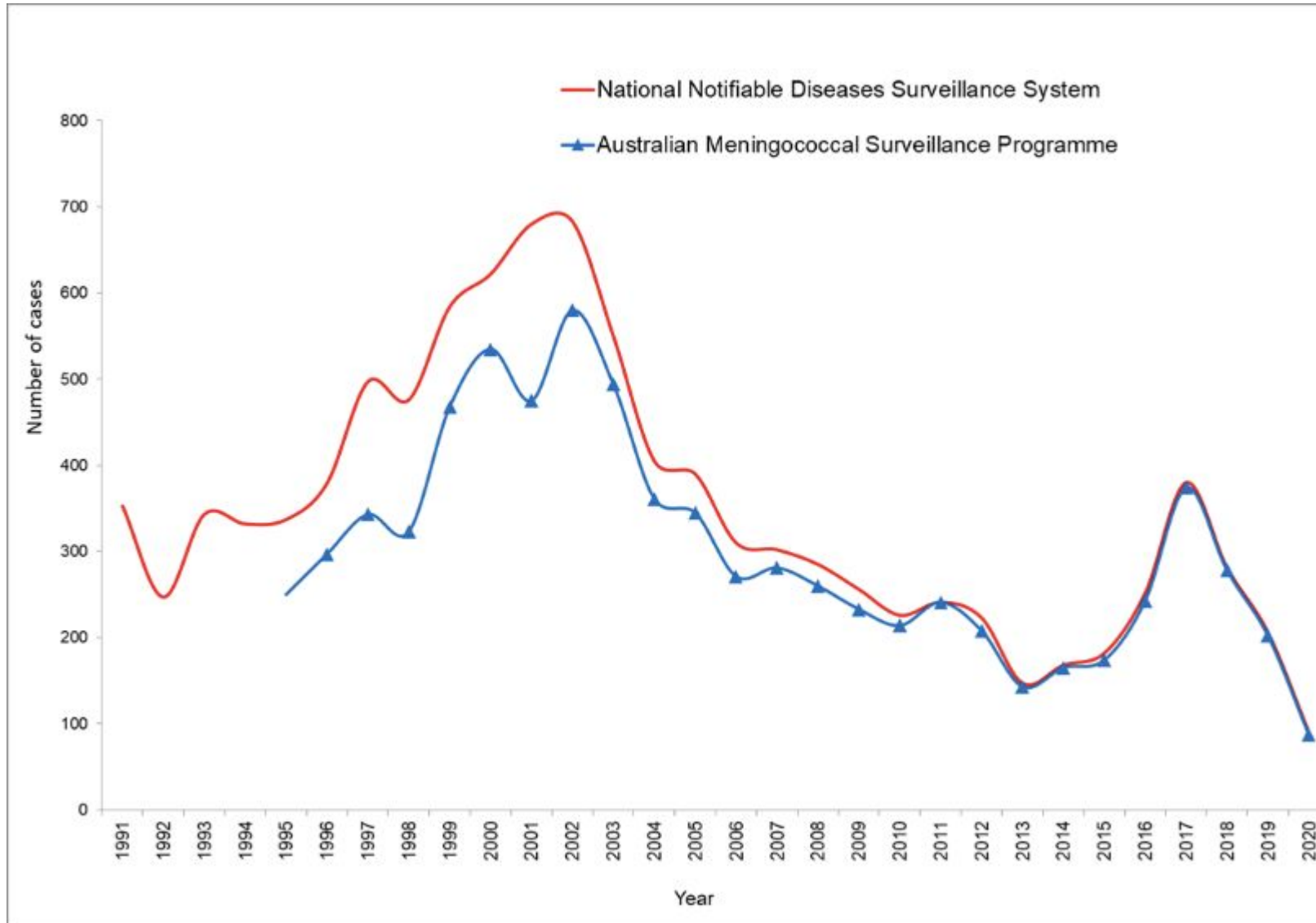
Men B in Australia

- 69% decline post Men CCV
- most common serogroup until 2015
- 2016 eclipsed by Men W
- 2017 spike in IMD ACWY vaccine
- 2020 most common serogroup, 62% IMD

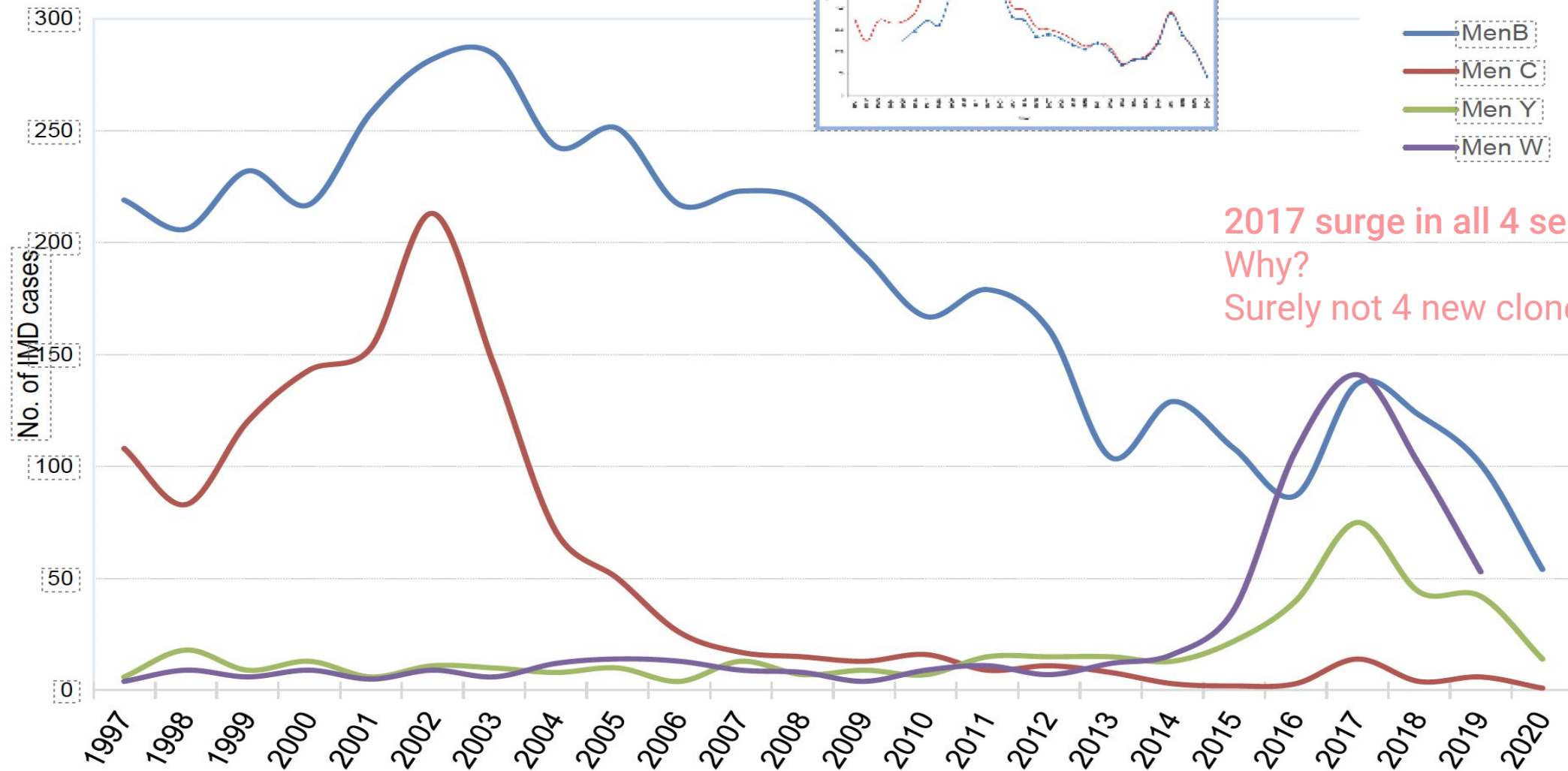
Notifications invasive meningococcal disease compared with laboratory data 1991-2020



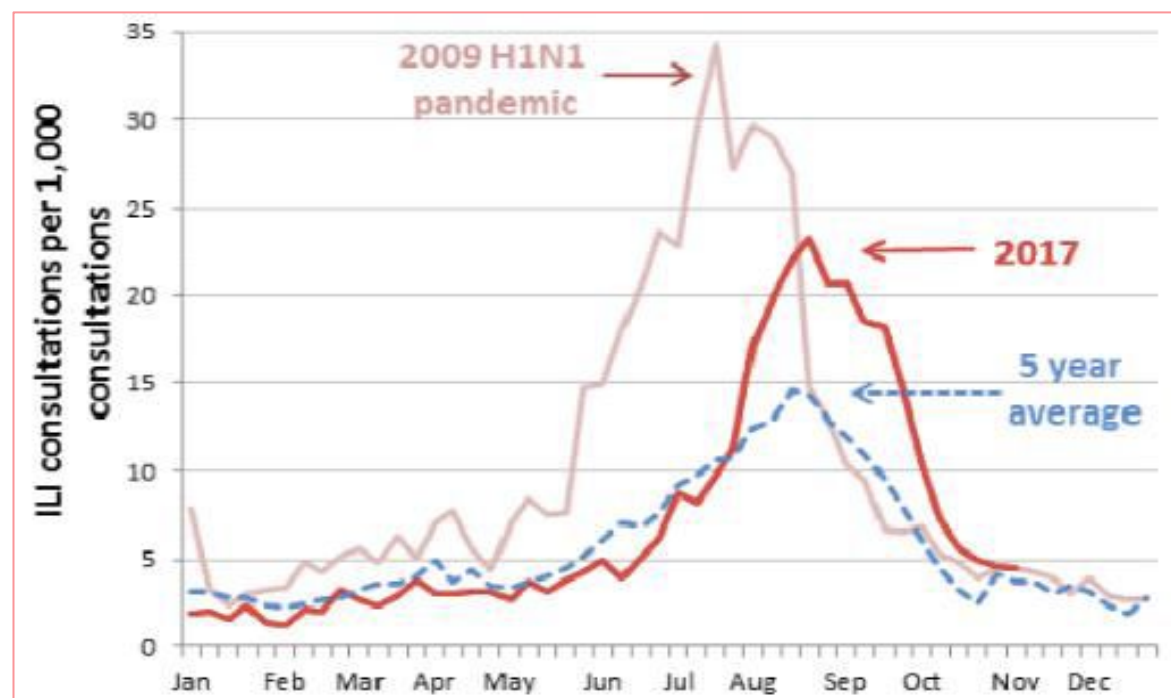
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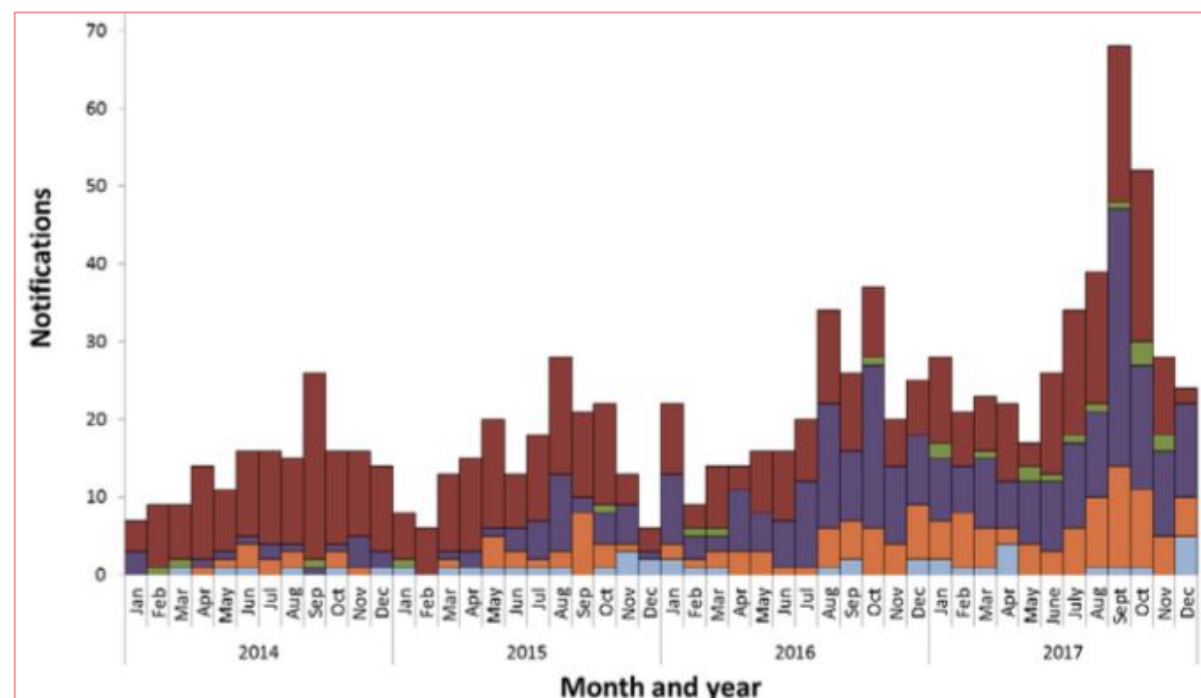
Serogroups causing invasive meningococcal disease 1997 – 2020



ILI presentations to sentinel GPs, by week 2009-2017, Australia

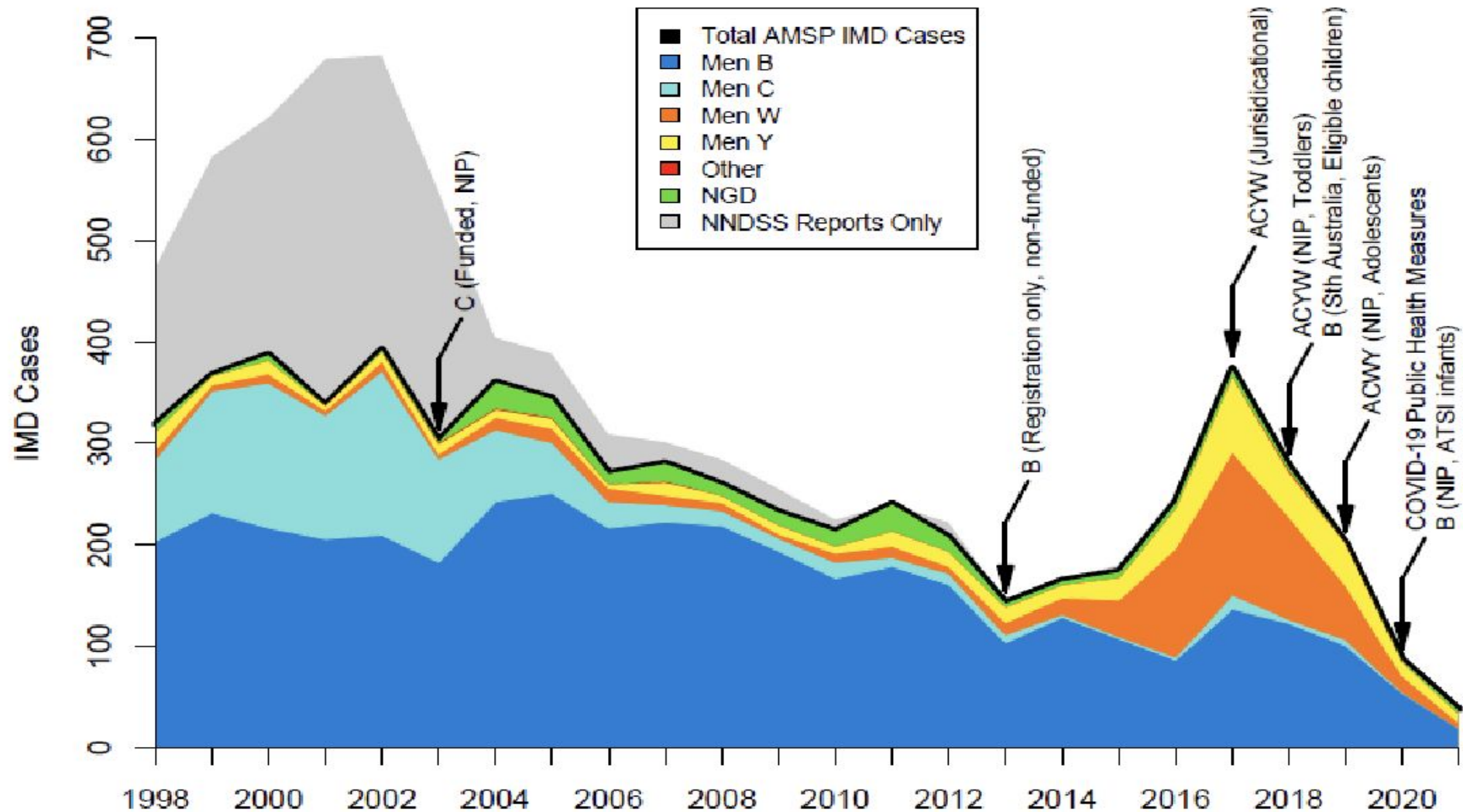


2017: Most common influenza virus A(H3N2)

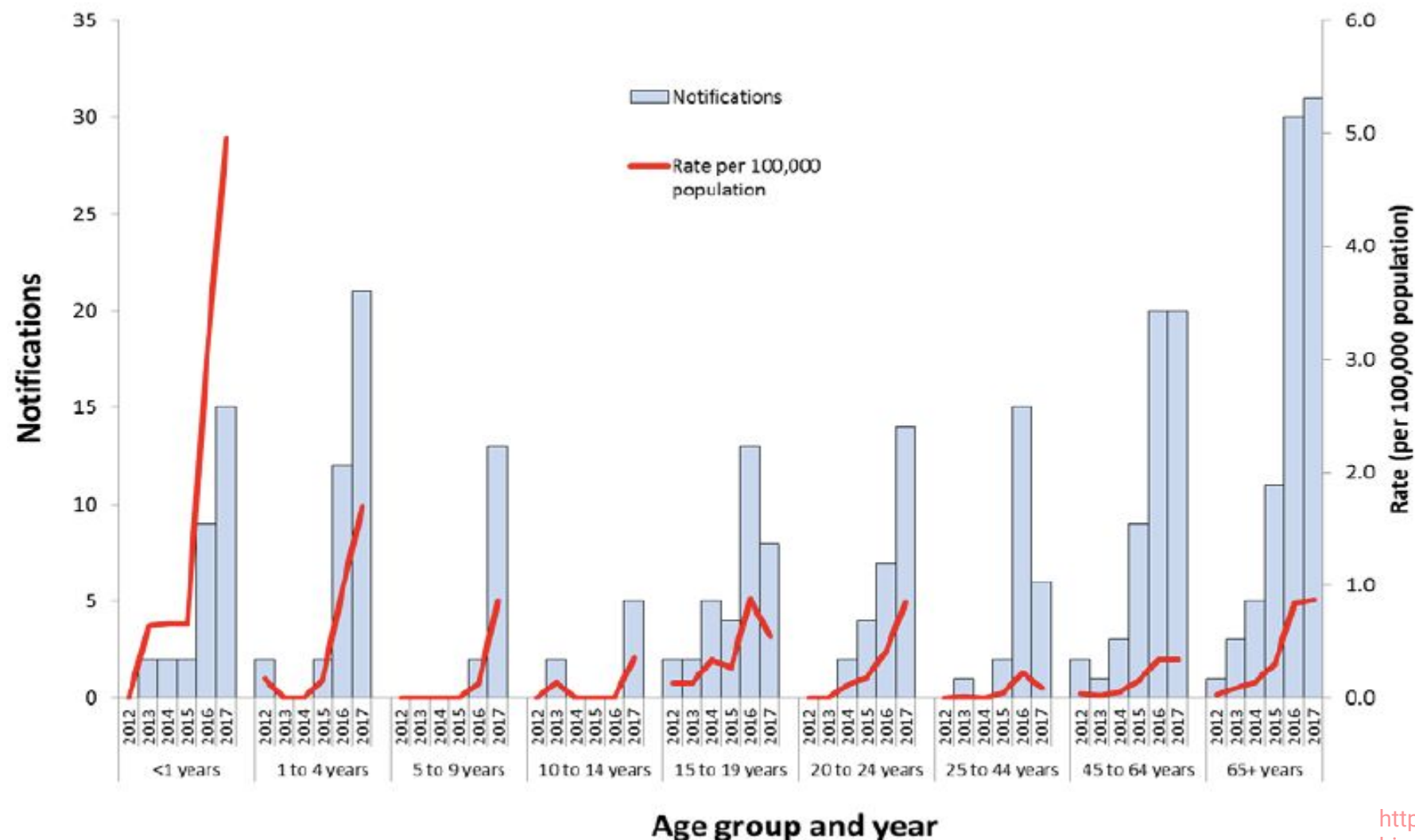


Peak in 2017 then rapid decline..

Was it a vaccination effect?
Or due to decline in flu rate?..
Or both??



Age-specific notifications and rates Of Men W IMD Australia 2012–2017





The Hon. Greg Hunt MP
Minister for Health

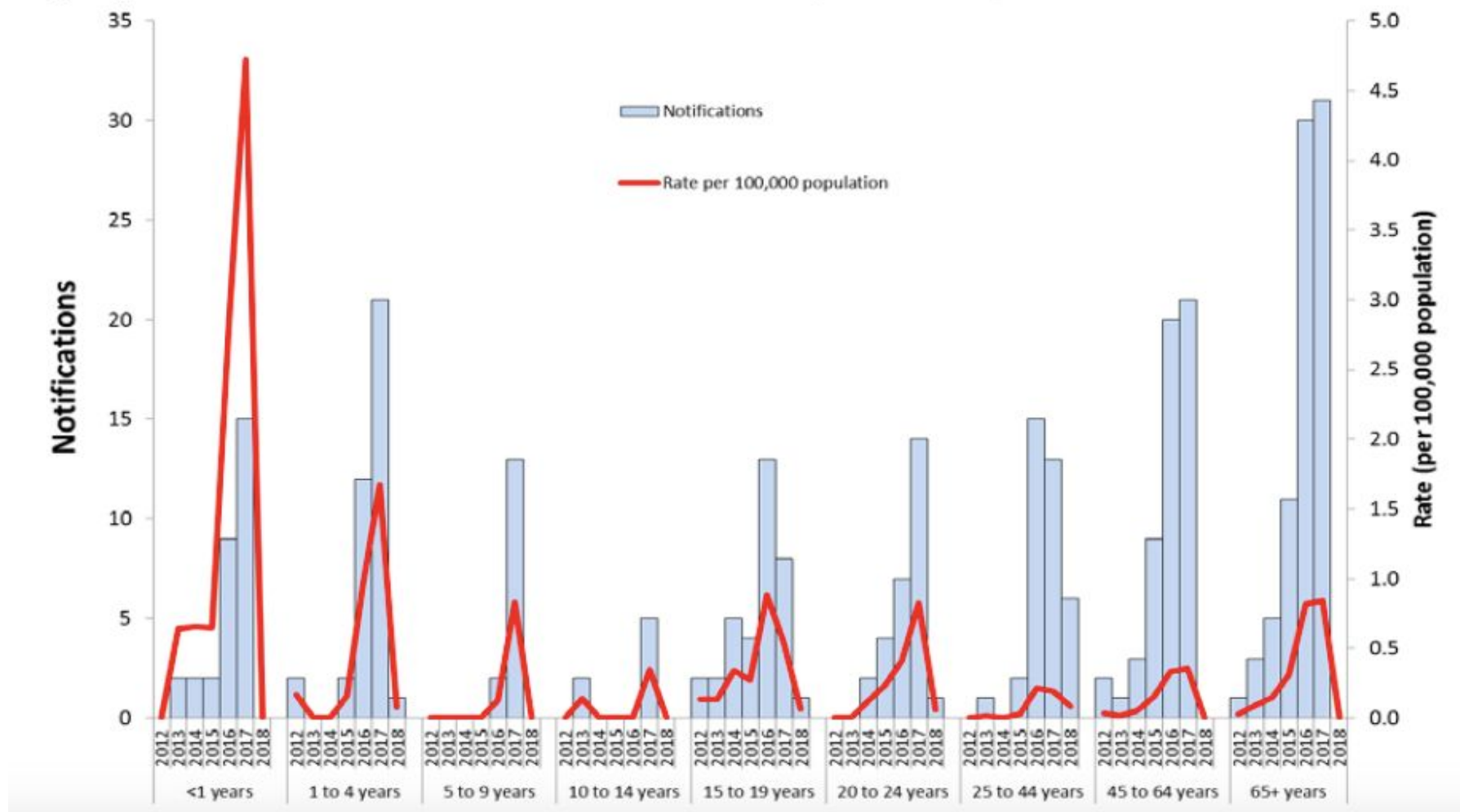
MEDIA RELEASE

2 February 2018

**Quad-strain meningococcal vaccine to be added to
National Immunisation Program**



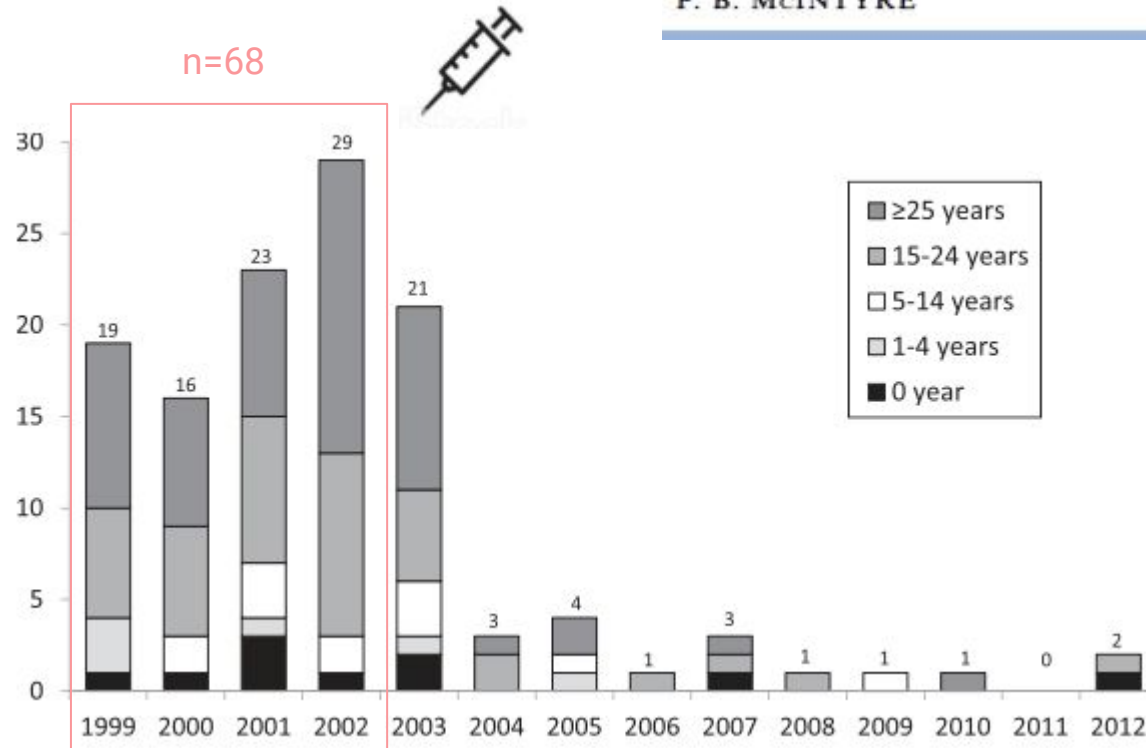
Age-specific notifications and rates of MenW, Australia, 2012 to 2018 YTD[#]



More historical observations:
Men C vacc'n started in 2003

Meningococcal disease epidemiology in Australia 10 years after implementation of a national conjugate meningococcal C immunization programme

G. L. LAWRENCE^{1,2*}, H. WANG², M. LAHRA³, R. BOOY^{2,4} AND
P. B. McINTYRE²



PROTECTIVE EFFECT DIRECT AND INDIRECT

By 2016: 99% reduction in Men C IMD
55% concurrent, independent reduction in Men B IMD – danger of ecological association



Estimated deaths due to Men C IMD Australia by age group and year 1999-2012

Large decline in
meningococcal disease in
2020 and 2021

First time ever that the annual
number of cases was under
100

(Rapid increase in last 2 years
to 144 cases in 2023; over
80% due to Men B..)

***“The Silver Lining of the Pandemic Playbook:
the fall of meningococcal disease and
influenza in the time of COVID”***

Rob George, Robert Booy,
Michael Nissen, Monica Lahra

***We explored reasons for this reduction,
considering interventions targeting
circulating meningococcal serogroups,
influenza & COVID***

SMH June 2021 – the power of social separation


The Sydney Morning Herald


National NSW Illness

‘This has never been seen before’: Common illnesses wiped out in fight against COVID-19

By [Lucy Carroll](#)

June 3, 2021 — 12.09pm

 Save

 Share

 A A A

For our free coronavirus pandemic coverage, [learn more here](#).

Cases of common illnesses have hit record lows as hygiene measures used to stop the spread of COVID-19 have put the brakes on the transmission of many childhood viruses and diseases.

South Australia: *B Part Of It Study*

The impact of vaccination on carriage



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2016 SA:

Highest IMD rate since 2012

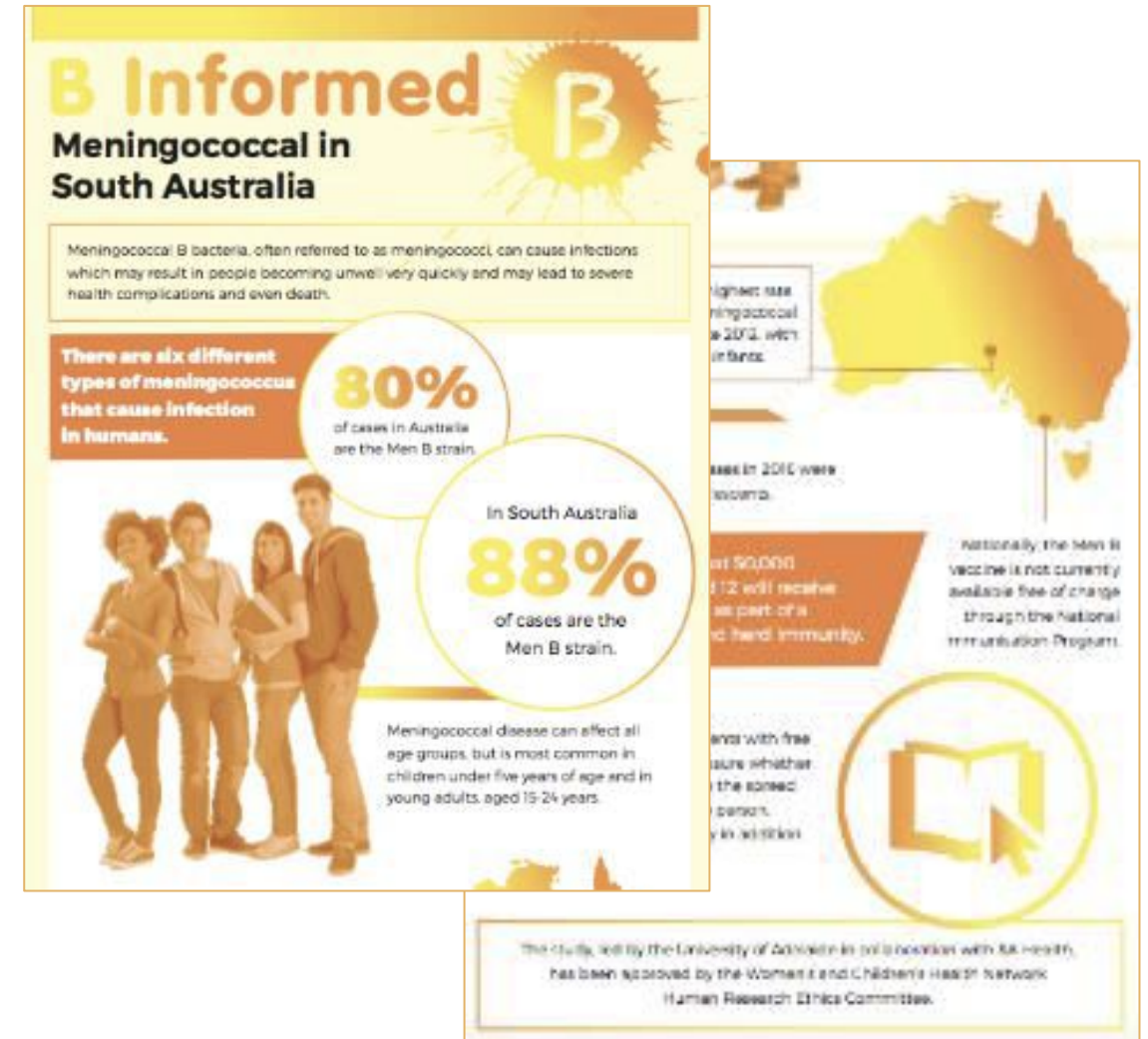
>80% IMD due to Men B

50% in adolescents

B PART of IT:

Cluster RCT

Impact of 4CMenB on nasopharyngeal carriage of *N. meningitidis* in adolescents in SA



South Australian Research, J Infection 2023

The Power of Vaccination on Disease! (Wang, Marshall et al)



The persistence of vaccine effectiveness (VE) & vaccine impact (VI) on invasive meningococcal B (Men B) disease and gonorrhoea; 3 years after implementation

A state funded 4CMenB program for infants, children, adolescents and young people in **SA since 2018**

- VE was estimated using screening and case-control methods
- Chlamydia controls were used to estimate VE in the primary analysis to control potential confounding effects such as high-risk sexual behaviour associated with sexually transmitted infections
- **Reductions of 63% (95%CI 29% to 81%) and 78.5% (95%CI 33% to 93%) in incidence of Men B disease were observed in infants and adolescents**
- **Two-dose VE against Men B disease was 91% (95%CI 6.9% to 99.1%) for the childhood program and 83.5% (95%CI 0 to 98.2%) for the adolescent program**

Two-dose VE against gonorrhoea in adolescents was 33% (95%CI 15.9% to 47.0%) (less after 3 years) due to cross-protective antibodies

Extra protection with 4CMenB vaccine from gonorrhoea should be considered in **cost-effectiveness analyses**

Castilla et al, Spain Men B effectiveness; NEJM 2023



Sept 2015, the four-component, protein-based meningococcal serogroup B vaccine (4CMenB; Bexsero) available for private purchase in Spain

Compared 306 case patients (243 [79.4%] with serogroup B disease with 1224 controls

A total of 35 case patients (11.4%) and 298 controls (24.3%) had received at least one dose of 4CMenB

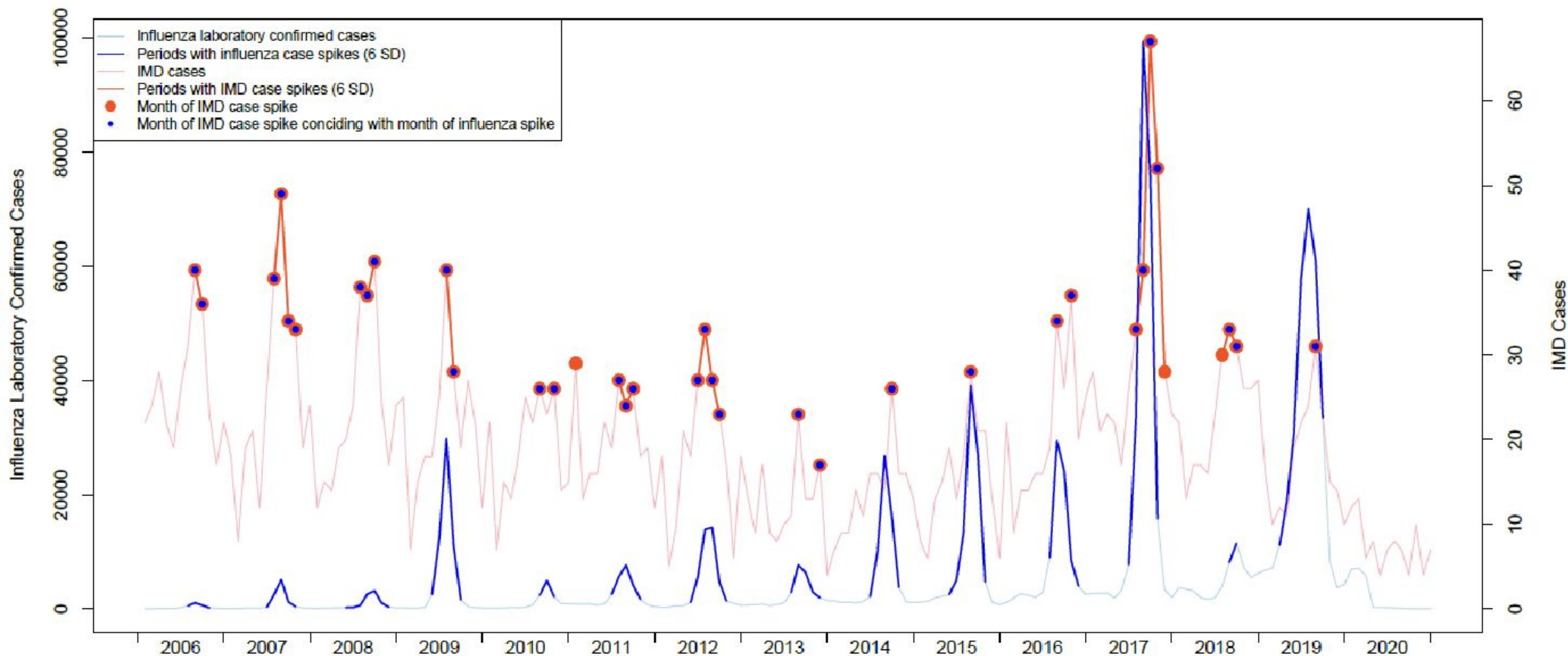
The effectiveness of complete vaccination with 4CMenB (defined as receipt of at least 2 doses, administered in accordance with the manufacturer's recommendations) was 76% (95% [CI], 57 to 87) against invasive meningococcal disease caused by any serogroup

Complete vaccination resulted in effectiveness of 71% (95% CI, 45 to 85) for meningococcal B disease

Vaccine effectiveness with at least one dose of 4CMenB was 64% (95% CI, 41 to 78) against serogroup B disease and 82%(95% CI, 21 to 96) against non-serogroup B disease



Peaks of IMD and of flu coincide...



Both influenza and invasive meningococcal disease (IMD) are recognised as diseases of crowding (but have a special relationship, more than that)

- A factor also identified as central to COVID-19 transmission
- Observations from military outbreaks published in 1918 more than 100 years ago illustrated the impact of overcrowding on both meningococcal carriage and invasive disease, and the effects of simple public health strategies to improve hygiene
- Landmark paper **BMJ 1918**: six predisposing factors for IMD were observed: season, severe weather, antecedent epidemics of influenza, temporarily lowered resistance, overcrowding, and high carriage rates

Vaccination Practices And Policies In Australia and IMD Rates

- Since 2003, progressive vaccine roll-outs in Australia have influenced IMD rates. Vaccination programmes targeting meningococcal serogroups and also those targeting influenza are relevant to IMD case reduction
- From October 2018 Men B vaccination was funded for eligible children including those residing in South Australia where Men B disease rates were high
- Aboriginal and Torres Strait Islander infants nationally via NIP July 2020

The constellation of practices and policies in Australia targeting IMD and influenza over the over the past two decades, were then influenced the extensive COVID-19 public health measures commencing in 2020 – particularly “social distancing”

There was clearly also an association of flu infection followed by meningococcal disease, BUT there were fewer cases of any bacterial disease following COVID disease

The Result?

Coincided with the lowest rates of IMD and influenza during 2020/1 since national records were kept!

Multicomponent Recombinant Men B Vaccine



2013

- Bexsero Novartis/GSK
- Broad spectrum cover Men B strains
- Registered in Australia for vaccinating people at least 2 months

2014

- Available in Australia by private prescription

Australian Technical Advisory Group on Immunisation (ATAGI):

- Targeted use in <2 and 15-19 year olds and populations at increased risk

Pharmaceutical Benefits Advisory Committee:

- Rejected applications for inclusion in National Immunisation Program

QLD Men B Program



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Important advocacy work by The Meningitis Centre Australia and affected/bereaved families

Like the Fidler and O'Connell families in QLD -with The Health Minister, Shannon Fentiman

Governments need convincing to use Men B vaccines



There are obvious and also hidden complications in the limbs and elsewhere

Parents need convincing too

- Dr Lisa Beecham, chair GCPHN has been working on a **tool for GP desktops** for the last 3-4 years that **gives various prompts some of which are immunisation related**
- We have good evidence that this Point of care approach has good outcomes see article and population based approach means patients don't fall through the gap with good outcomes.
- Primary Sense is the name of the tool

Article from AFJP

www1.racgp.org.au/ajgp/2022/november/response-rates-to-computer-decision-support

What has slowed adoption of Men B vaccines in Australia?

The 5% discount rate applied to future costs and benefits, which is high by international standards and has the impact of making preventative interventions like vaccines (which often take time for benefits to accrue) appear less cost-effective as compared to therapeutic medicines - which are more likely to provide benefits soon after initiation

The true cost-effectiveness of Men B vaccine on preventing the tremendous life-long disease burden on the survivor, carer, family and society as a whole is not taken into account

The current cost assessment process typically limits the scope of review to only the benefits and costs relevant to the individual/ patient and to the healthcare system (i.e. hospitalisations)

This approach disregards the broad societal impact of immunisation which occurs outside the scope of the healthcare system – For example, benefits to families and carers and benefits to other areas of government expenditure such as the disability and welfare systems

Current disparity in the “willingness to pay per unit health gained” between vaccines like Bexsero and therapeutic medicines.

The lower cost-effectiveness threshold (willingness to pay per unit of health gained) applied for preventative interventions like vaccines as compared to therapeutic medicines, which has the impact of applying a lower willingness to pay for lives saved through prevention as compared to treatment and thereby disadvantaging vaccines – i.e. the figure is around \$50,000 for therapeutic medicines, versus \$15,000 for vaccines.

Current HTA process: GSK has made 4 submissions to the PBAC in the past to have Bexsero considered for NIP listing

How to improve the HTA process to enable a more accurate cost-effectiveness reflection of a vaccine like Bexsero

Doctoring Little Mermaid video



**Triumph of resilience
over adversity**

**Patient advocacy
(eg Meningitis Centre, Australia)
can be successful
(eg QLD)**

[See Immunisation Coalition website](#)

Men B Epidemiology & Prevention in Australia

- There have been many fascinating twists and turns in meningococcal epidemiology
- Men B is the commonest cause of IMD in Australia (blip of W in 2016) and it is preventable; in 2022 it accounted for about 90% of cases in <5-year-olds and 15–19-year-olds
- We've had a licensed vaccine for over 10 years; Men B vaccination may also be protective against gonorrhoea, and non-B serogroups
- Another Men B vaccine focussed on kids aged 10+ years is also available (in Oct 2023, the US FDA/CDC ACIP approved 2 doses, 6 months apart, of PEMBRAYA in 10–25-year-olds for A B C W & Y prevention)
- QLD is implementing a Men B Bexsero program for teens and infants



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