Associate Professor Nikki Turner

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University of Auckland
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Saturday, August 10, 2019 (Room 3)

16:30 - 17:30 WS #128: Immunisation - Current Issues and New Directions

17:35 - 18:30 WS #138: Immunisation - Current Issues and New Directions (Repeated)

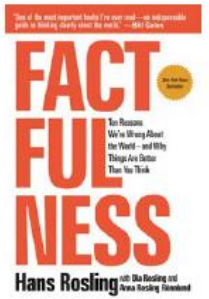
Immunisation:
current issues and new directions

Nikki Turner
Immunisation Advisory Centre
University of Auckland
August 2019

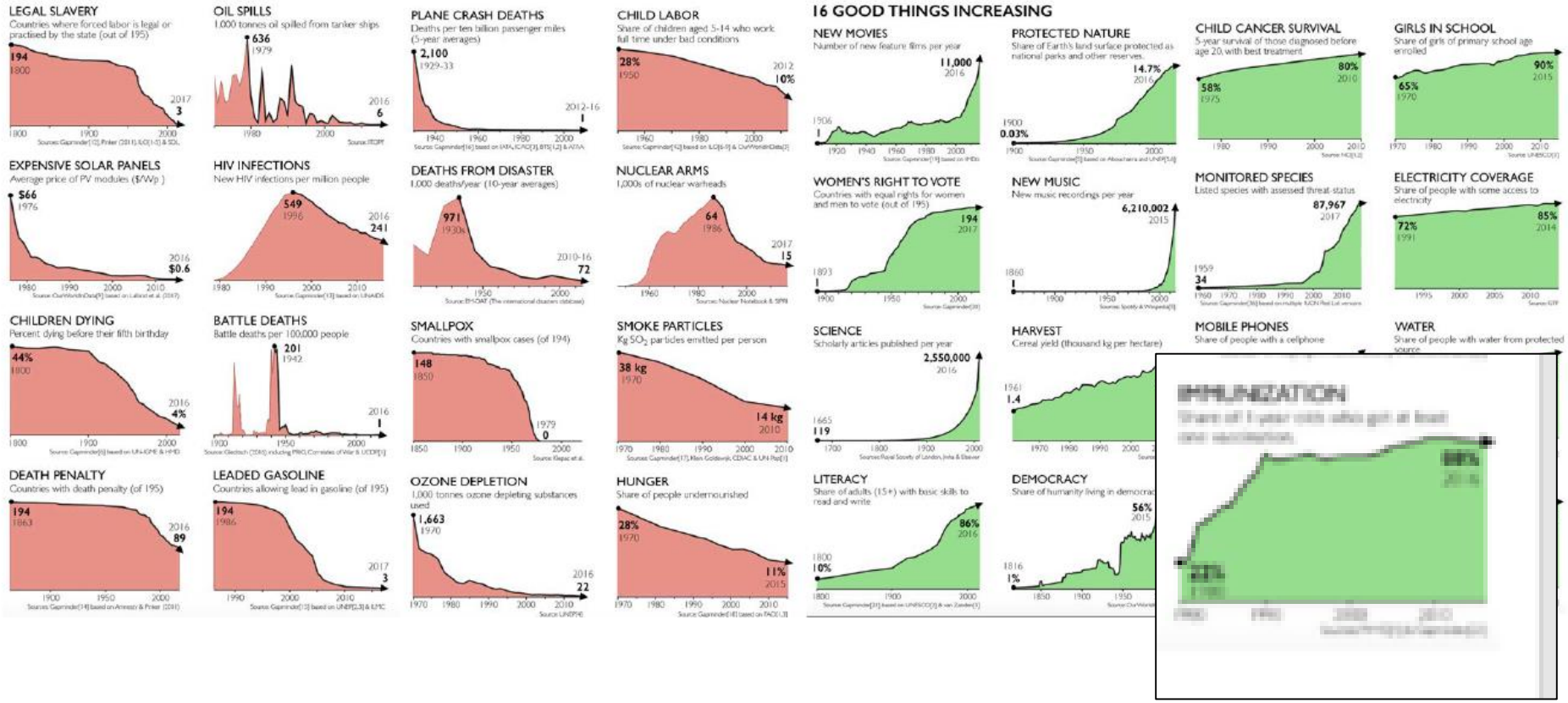
IMMUNISATION ADVISORY CENTRE
THE UNIVERSITY OF AUCKLAND
Te Whare Wānanga o Tāmaki Makaurau

Only clean water and antibiotics have had an impact on childhood death and disease that is equal to that of vaccines

World Health Organization



32 things improving



Slide courtesy of K O'Brien, IVB Director, WHO April 2019

My list

- The current national schedule
  - Changes ahead
  - Potential future changes
- Diseases
  - Measles
  - Pertussis
    - Pregnancy vaccination
- Private market vaccines
  - Pneumococcal vaccines
  - Meningococcal vaccines
- High risk groups
- Zostavax
- Contraindications
- Future vaccines
- Current challenges
  - Communication challenges

Schedule Change 1 July 2020

What is going to change next year

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1. Pneumococcal schedule change
   - PCV 10 (Synflorix) at 6 weeks , 5 months and toddler booster at 12 months (2 + 1)
   - High risk infants continue PCV13 (Prevenar13) at 6 weeks, 3 months, 5 months and toddler booster

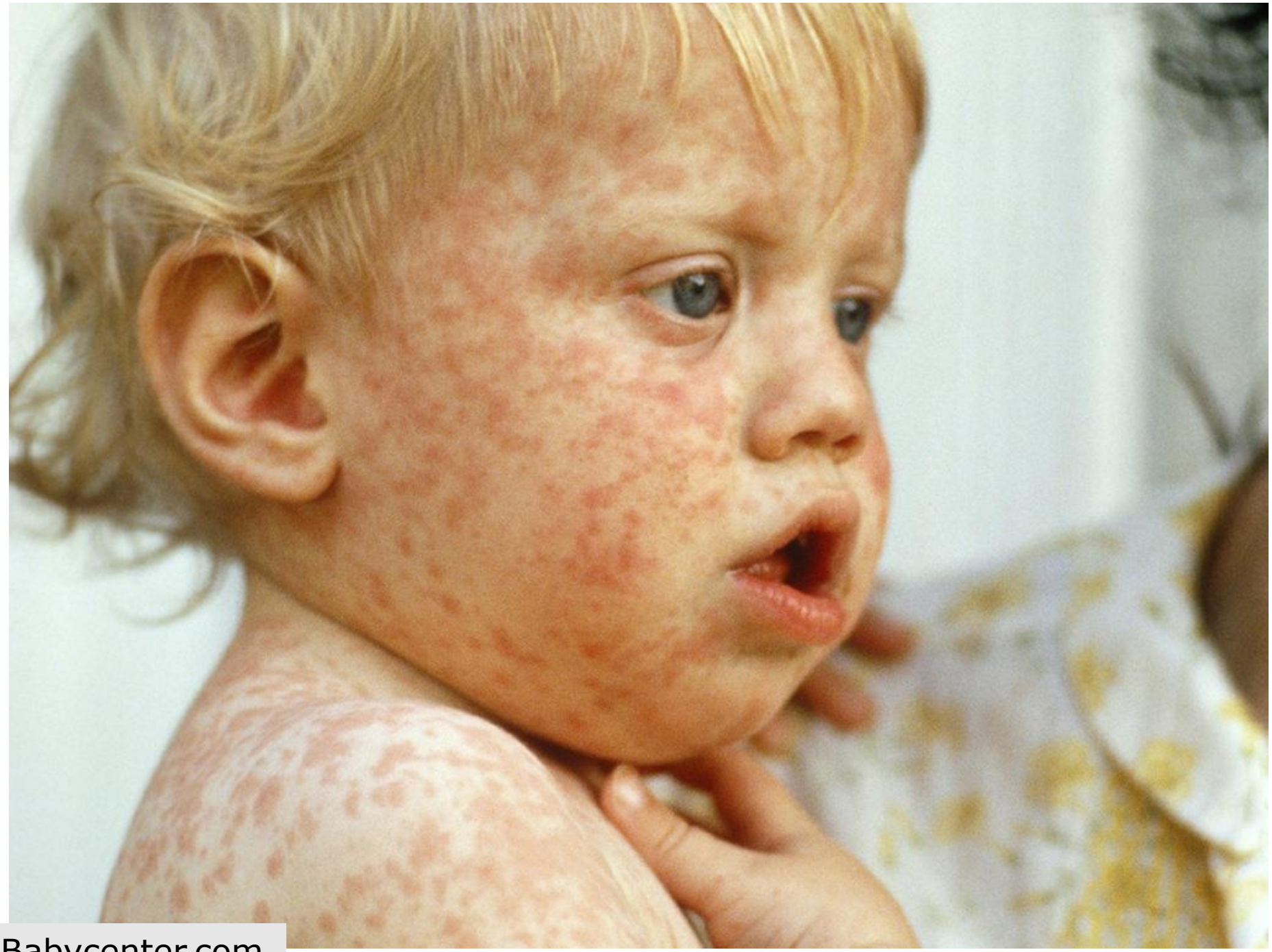
2. ADT – Tdap at adult booster ages
   1. 45 years catch up (if not had 4 doses)
   2. 65 years booster dose

Also brand changes:
- Varilrix with Varivax
- HBVaxPRO with Engerix-B
- Influvac Tetra with Afluria Quad

What else may change

- Two visits in the second year of life:
  - 12 months and 15 months
- Lowering age of delivery MMR1 and MMR2
- Meningococcal vaccines
  - ? toddler and teenager doses
    - + mass campaign to reduce carriage
    - Quadravalent ACWY
  - Meningococcal B – Bexsero: ? infant, toddler, teenager

  Other possibilities
  - Another Varicella dose
  - Shifting Hib to hexavalent (an extra pertussis)



Babycenter.com

My infant is 8 months old and we are travelling to Auckland but I am worried about him being exposed to measles.

I think I was vaccinated as a child, I am now 27 years old , am I at risk?

My father was born in Syria, he is now 58 years old and doesn't know if he has had measles vaccination. Should he be vaccinated?

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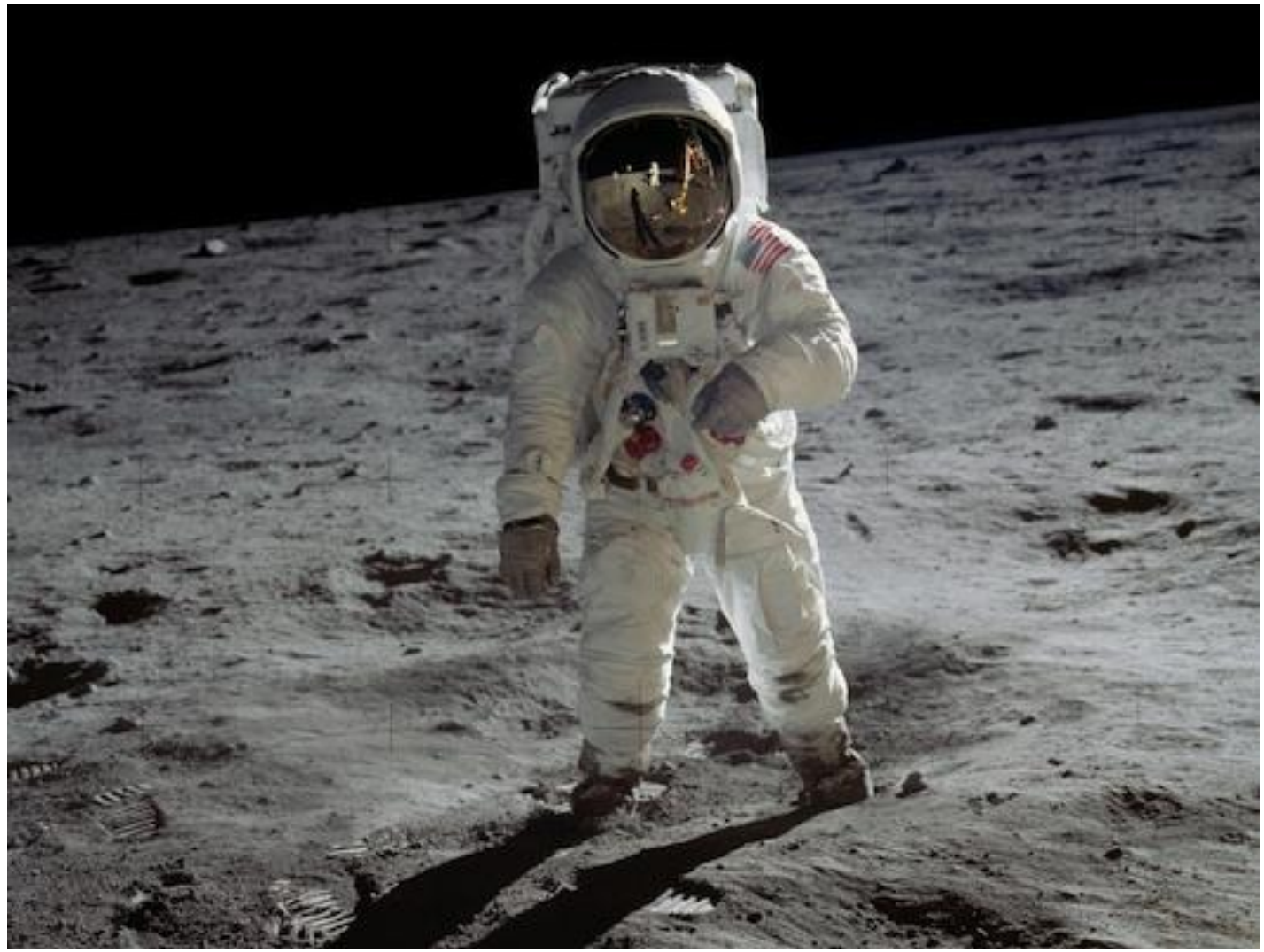
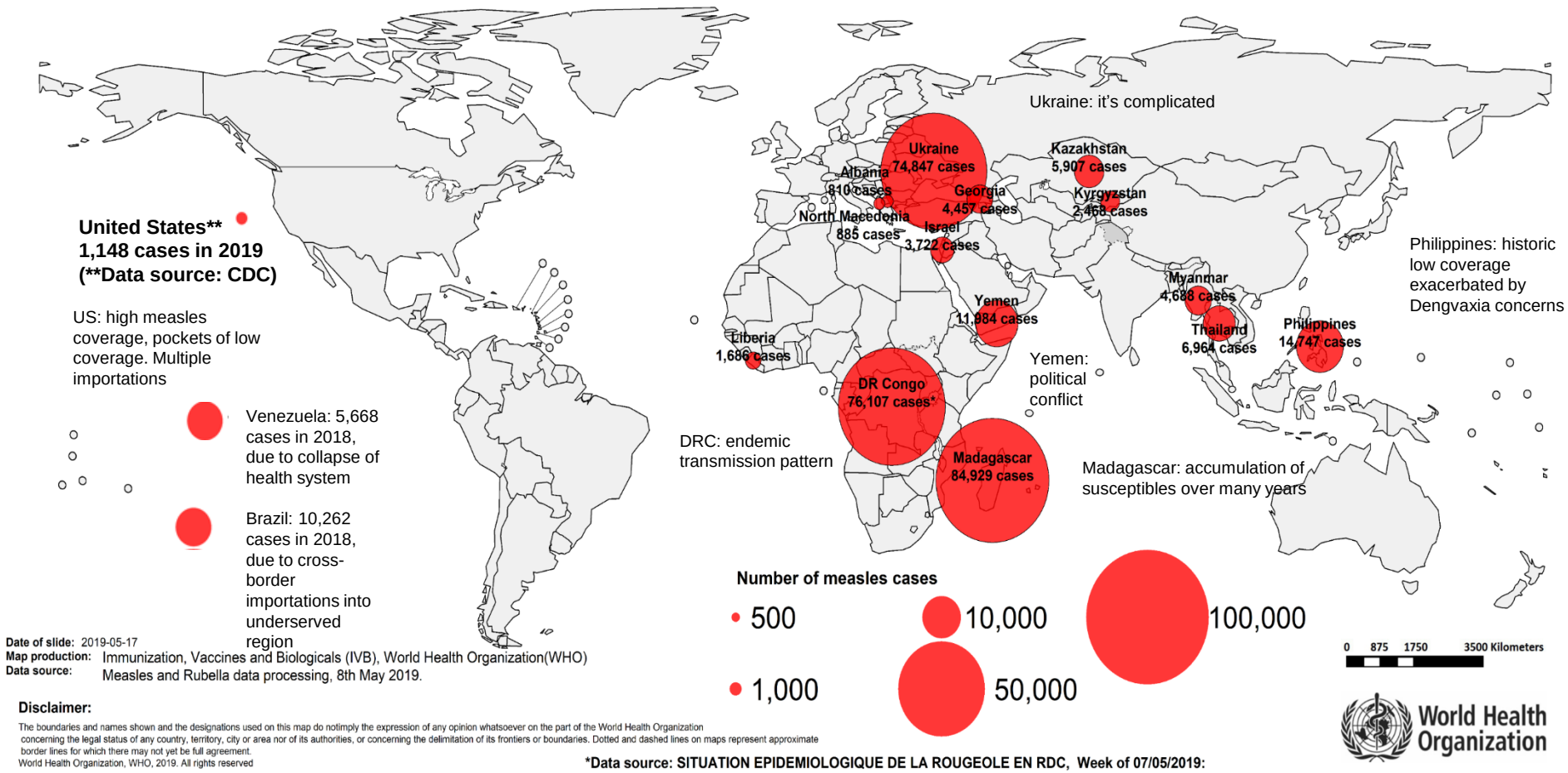


World Health Organization

Selected Measles Outbreaks



Date of slide: 2019-05-17
Map production: Immunization, Vaccines and Biologicals (IVB), World Health Organization(WHO)
Data source: Measles and Rubella data processing, 8th May 2019.

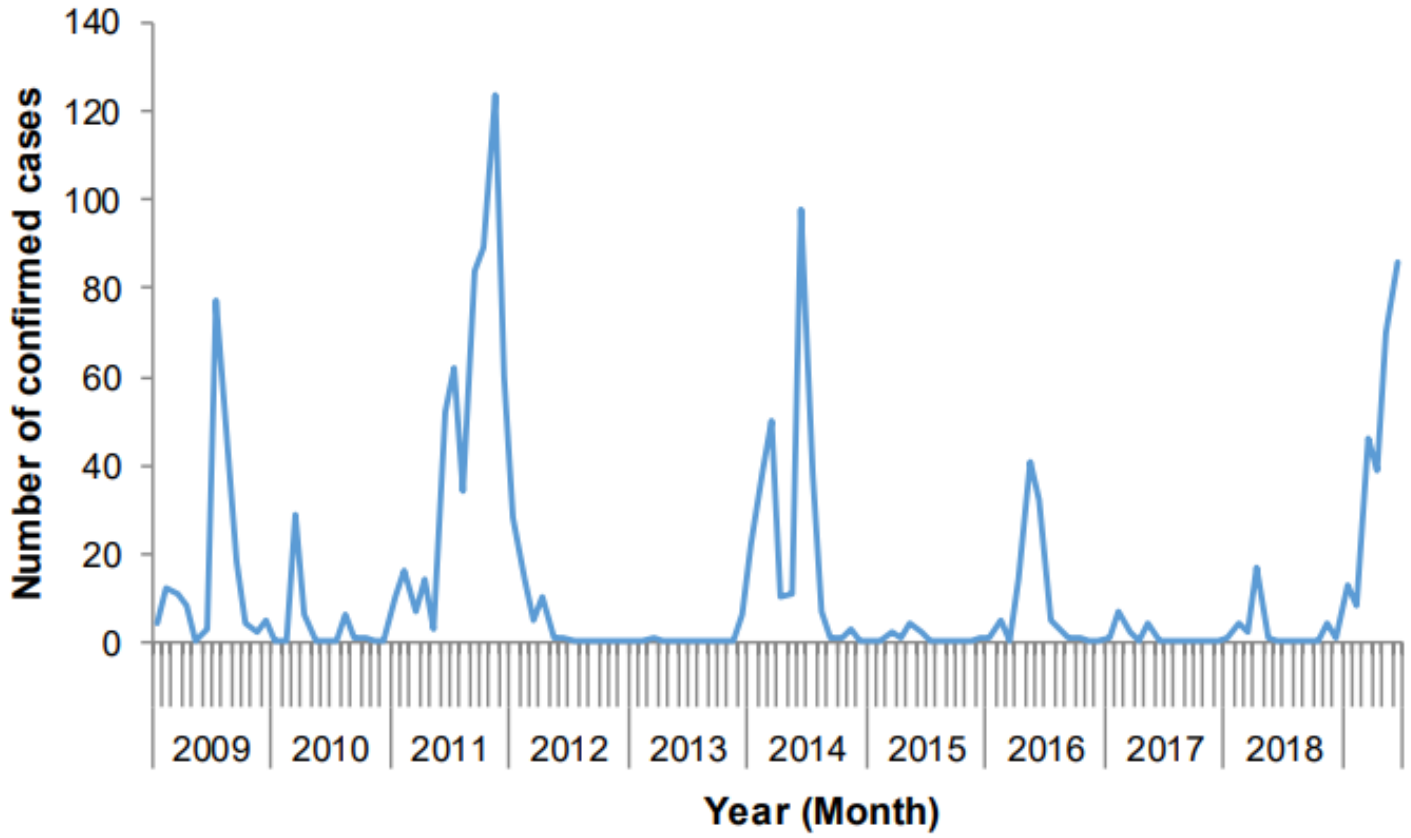
Disclaimer:

The boundaries and names shown and the designations used on this map do notimply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area nor of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

*Data source: SITUATION EPIDEMIOLOGIQUE DE LA ROUGEOLE EN RDC, Week of 07/05/2019:

World Health Organization

Figure 2. Number of measles notifications by month reported, January 2009 to June 2019



Source: ESR, Measles weekly report, 20 – 26 July 2019

Table 1. Number of confirmed measles cases for Week 30/2019 and cumulative number of cases and hospitalisations for 2019 by age group

Age group	Surveillance Week 30	Cumulative total 2019	Number of hospitalisations 2019
<15 months	12	78	52
15 months–3 years	6	50	24
4–9 years	1	25	2
10–19 years	10	82	18
20–29 years	21	108	40
30–49 years	4	55	17
50+ years	0	9	8
Total	**54**	**407**	**161**

Hospitalised approx. 40%

Source: ESR, Measles weekly report, 20 – 26 July 2019

Key points

- International outbreaks increasing
- higher risk of imports

- Immunity gaps in NZ population

- MMR1 is most vital
  - = 90 to 95% seroconversion
  - MMR2 extra 5% protection

- Vaccinate all < 50 years with no historical records
  - No concern with over-vaccinating
  - 50 years plus assumed to have natural immunity(exposed to circulating disease prior to vaccination programmes)

I wish to delay the start of the vaccination programme until my infant's immune system is a little more mature

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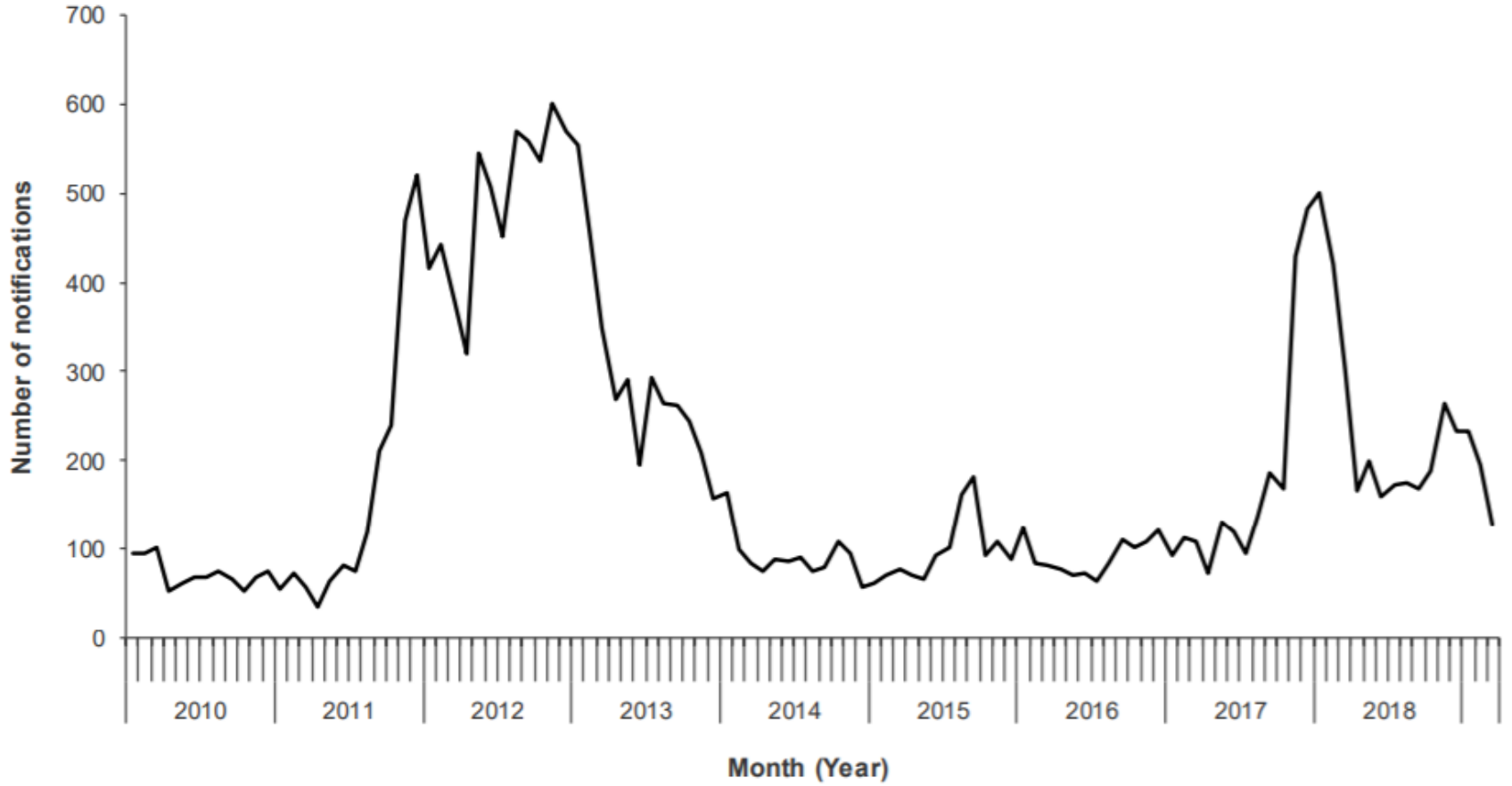
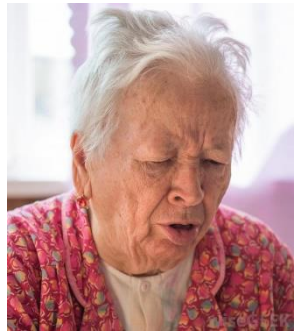
Figure 1: Number of pertussis notifications by month and year, January 2010–March 2019



Note: Includes confirmed, probable, and suspect cases only. Cases still under investigation are excluded.

https://surv.esr.cri.nz/PDF_surveillance/PertussisRpt/2019/PertussisReportMarch2019.pdf



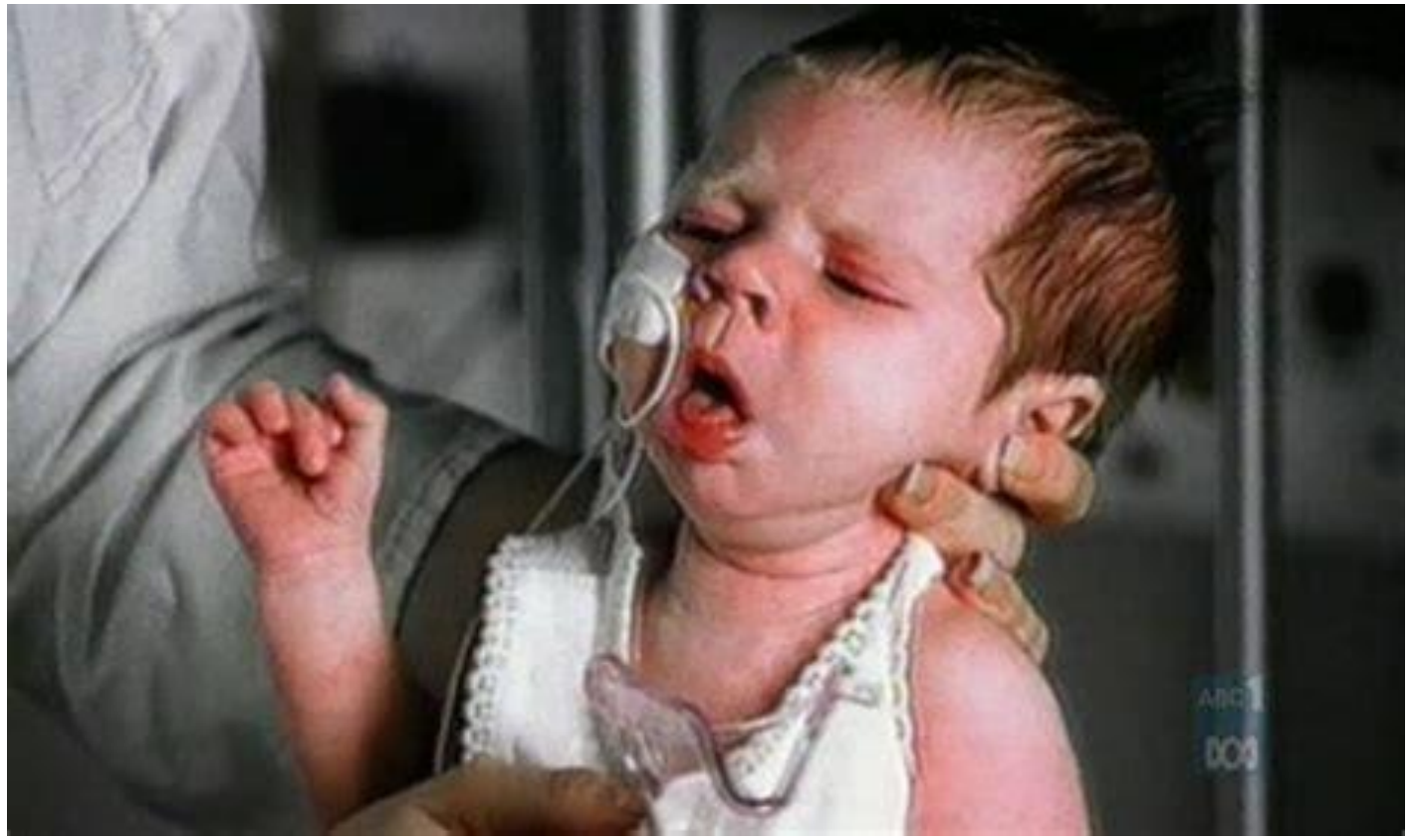


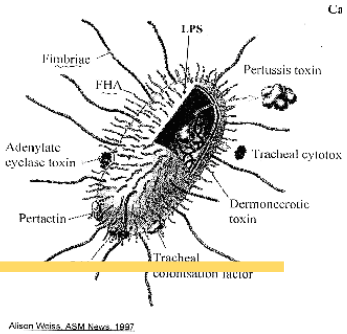
Table 1: Number of (confirmed, probable and suspect) pertussis notifications, rates and hospitalisations by age group

Age group (years)	Total			Hospitalised		
	March	Last 12 months	Rate[1]	March	Last 12 months	Percent[2]
<1	11	160	265.7	4	80	50.0
1–4	19	278	112.9	2	29	10.4
5–9	8	310	94.7	0	4	1.3
10–14	14	242	77.8	0	5	2.1
15–19	5	143	45.5	0	2	1.4
20+	71	1149	31.7	5	93	8.1
All ages	**128**	**2282**	**46.7**	**11**	**213**	**9.3**

[1] Annual rate for the 12-months ending March 2019 per 100,000 population, calculated using 2018 mid-year population estimates.
[2] Percentage of notified cases in the last 12 months that were hospitalised.

https://surv.esr.cri.nz/PDF_surveillance/PertussisRpt/2019/PertussisReportMarch2019.pdf

Pertussis control



- Unable to eradicate from whole community
- Most severe in younger children
  - Main target of immunisation strategies
- KEY ONE: High coverage and <u>timeliness</u> of delivery
- Key TWO: Immunising pregnant women to reduce burden in infants too young to be fully immunised

- Other strategies
  - Immunising older children
  - Immunising adults
  - Healthcare and early childcare worker immunisation

Pregnancy and Vaccination

Pregnancy Vaccination

Influenza vaccination

- Reduces maternal morbidity/mortality
- Reduces fetal mortality
  - Reduces fever
- Any time in pregnancy
- Reduces flu in newborn
  91% effective in reducing flu in infants
  Protective for around 8 weeks

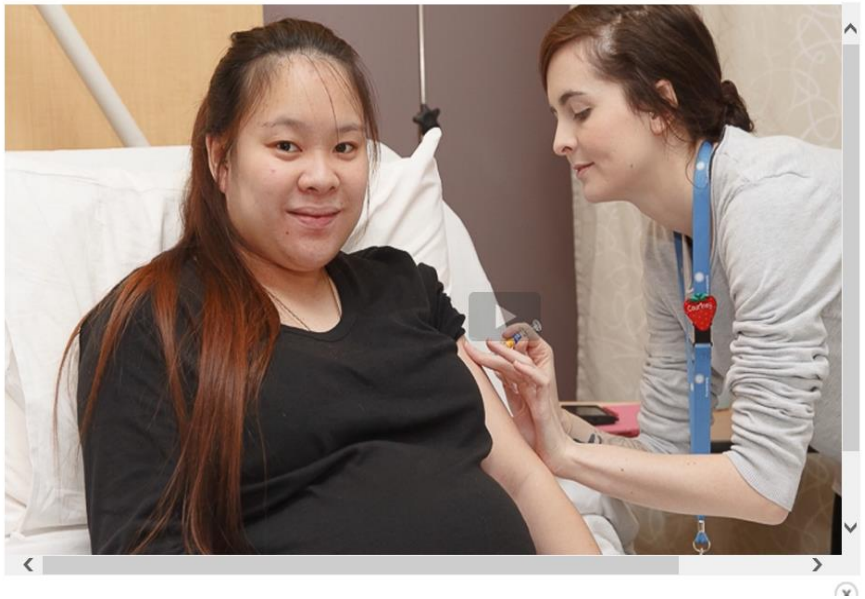
Pertussis-containing vaccination

- Reduces maternal morbidity
- Passive protection to newborn
- From *16 weeks* pregnancy (currently 28 weeks)

>90% effective in reducing pertussis for first 2 months of life

Pregnancy and immunisation video

- http://www.immune.org.nz/resources/videos



But no one informed me that there are good vaccines that aren't on the national schedule that can be used to protect my children

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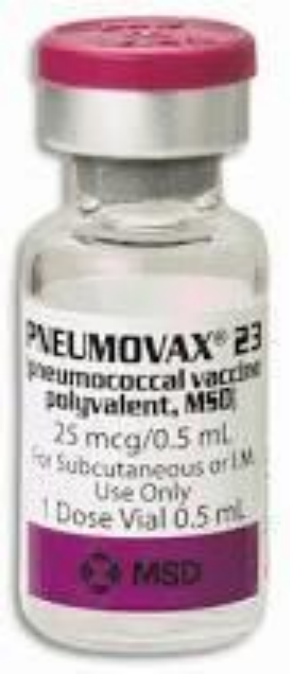
Private market vaccines

- Cost can be high
- Consumers want to be given the choice
- We are not effectively or systematically offering private market vaccines in GP

Consider……

- **Ring protection for flu**
  - contacts of those at high risk e.g. family members
- **Pneumococcal for high risk**
- **Meningococcal** – infants / young adults
  - C : Meningitec, NeisVac-C (conjugates)
  - Quadravalent: Menactra, Menveo (conjugates)
  - B (Bexsero)
- *Pertussis ring protection (family members of newborns) – but limited evidence of effectiveness*
  - Pregnancy vaccination much more effective

MR JONES IS 72 WITH SEVERE COPD, SHOULD I BE OFFERING HIM PNEUMOCOCCAL VACCINATION FOR HIS PROTECTION?
AND WHICH VACCINE?



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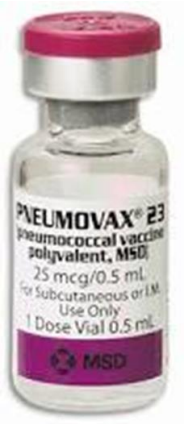
?role of Pneumococcal vaccines in the elderly



PPV23 (polysaccharide)

- Effectiveness against IPD
- Some, but less, against pneumonia

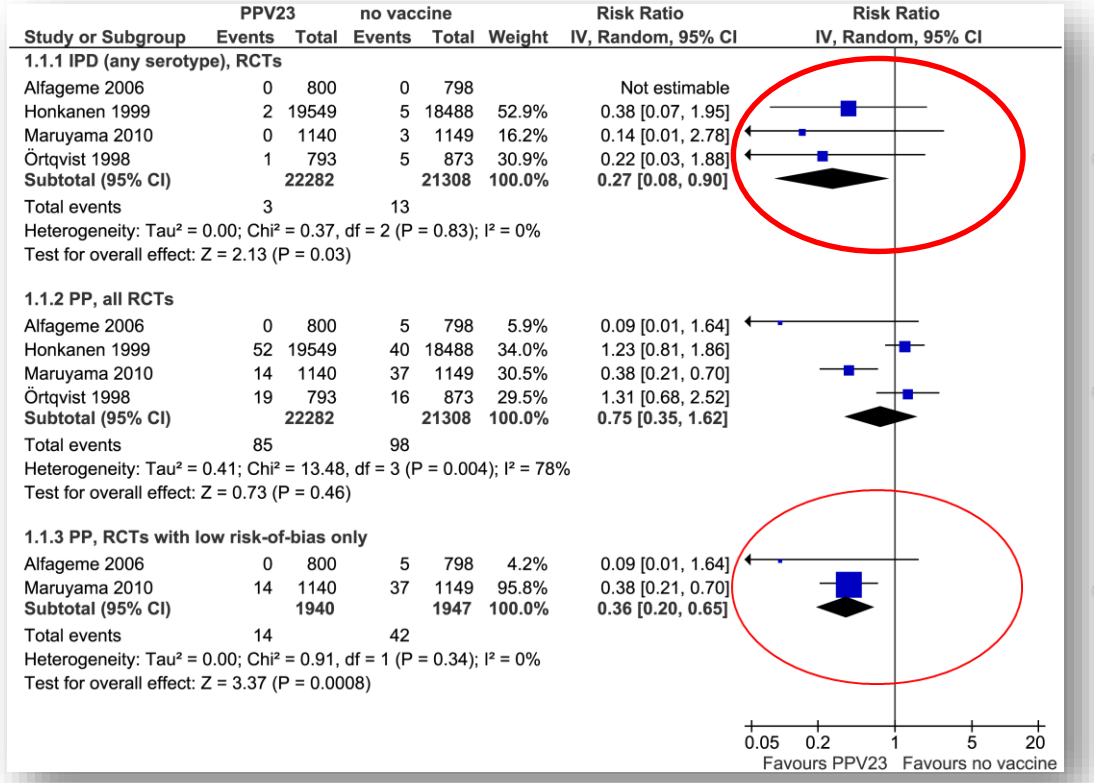
PCV13 (conjugate)

CAPITA study (Bronten et al March 25 2015 NEJM) in Dutch population

- 75% (41 – 92) effective against vaccine-strain invasive IPD
- 45% (14 – 63) effective against vaccine-strain types community-acquired pneumonia
- Efficacy lasted up to 4 years

- Adults >65yrs: 13% of all pneumonia was vaccine-strain
- No significant effect against all-cause pneumonia

PPV23 RCTs: VE 73% against IPD any serotype, 64% against pneumococcal pneumonia



Falkenhorst, G., Remschmidt, C., Harder, T., Hummers-Pradier, E., Wichmann, O., & Bogdan, C. (2017). Effectiveness of the 23-valent pneumococcal polysaccharide vaccine (PPV23) against pneumococcal disease in the elderly: systematic review and meta-analysis. PLoS One, 12(1), e0169368.

Slide courtesy of Dr Helen Petousis-Harris, 2019

PCV13 effective against multiple outcomes (Netherlands)

Post hoc analysis of RCT in older adults 42,240 vaccine, 42,256 placebo

CAP, IPD, death from infection, all cause mortality, ARI death

- VT-CAP 37.5% (14.3%, 54.5%)
- VT-IPD 75.8% (47.6%, 88.8%)
- Death from infection 14.7% (-5.5% to 31.1%)
- Death from ARI 22.9% (–5.1% to 43.4%)
- Incidence rate reductions higher in at-risk adults
- No effect on all cause death

Gessner, B. D., Jiang, Q., Van Werkhoven, C. H., Sings, H. L., Webber, C., Scott, D., ... & Bonten, M. J. (2018). A public health evaluation of 13-valent pneumococcal conjugate vaccine impact on adult disease outcomes from a randomized clinical trial in the Netherlands. Vaccine.

Who is high risk for pneumococcal disease?

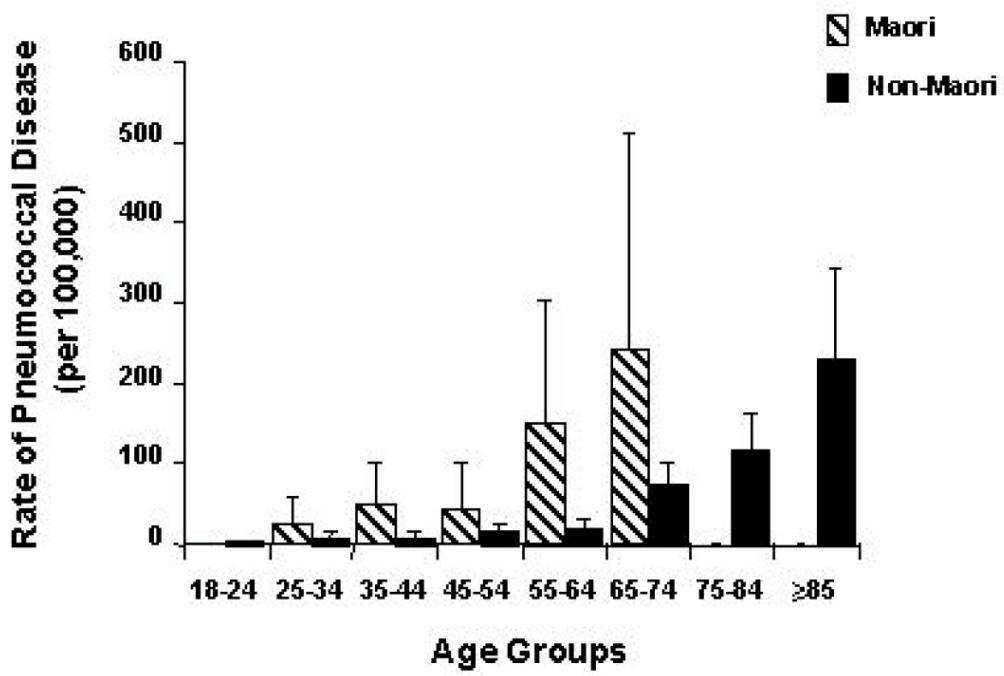
Condition/s	Rate ratio for all cause neumonia (cf healthy = 1)
Asplenia	14.6 (13.9 – 15.3)
Diseases of WBCs	10.3 (9.7-11)
Downs	9.4 (8.9- 10)
Congenital immunodeficiencies	7.5 (7.0 – 8.0)
Chronic renal failure	7.2 (6.7 – 7.7)
Chronic liver disease	6.7 (5.7-7.8)
Chronic heart disease	6.3 (6.1-6.5)
Immune compromising conditions/medications	6.1 (5.9-6.4)
Chronic lung disease	5.9(5.8-6.1
Neuromuscular/seizure disorder	4.3 (4.2 – 4.4)
HIV, Cochlear implant, low birthweight, asthma	2 - 4
Smoker, diabetes, chronic steroid use, alcohol abuse	1- 2

Red = in NZ mostly funded (either children alone , or all ages)

From: Weycker D et al BMC Health Services Research (2016) 16: 182

At what age would you vaccinate against pneumococcal CAP?

Figure 2. Population age-specific rates of pneumococcal community-acquired pneumonia for Maori and non-Maori



Chambers, S., Laing, R., Murdoch, D., Frampton, C., Jennings, L., Karalus, N., ... & Town, I. (2006). Maori have a much higher incidence of community-acquired pneumonia and pneumococcal pneumonia than non-Maori: findings from two New Zealand hospitals. The New Zealand Medical Journal (Online), 119(1234).

Slide courtesy of Dr Helen Petousis-Harris, 2019

High risk groups for pneumococcal disease

Use PCV13 followed by PPV23
- Cost is a problem for many

FUNDED

HIV, chemotherapy pre or post splenectomy, functional asplenia, pre or post transplant or haemopoietic stem cell transplant, renal dialysis, complement deficiency, cochlear implants, primary immundeficiency

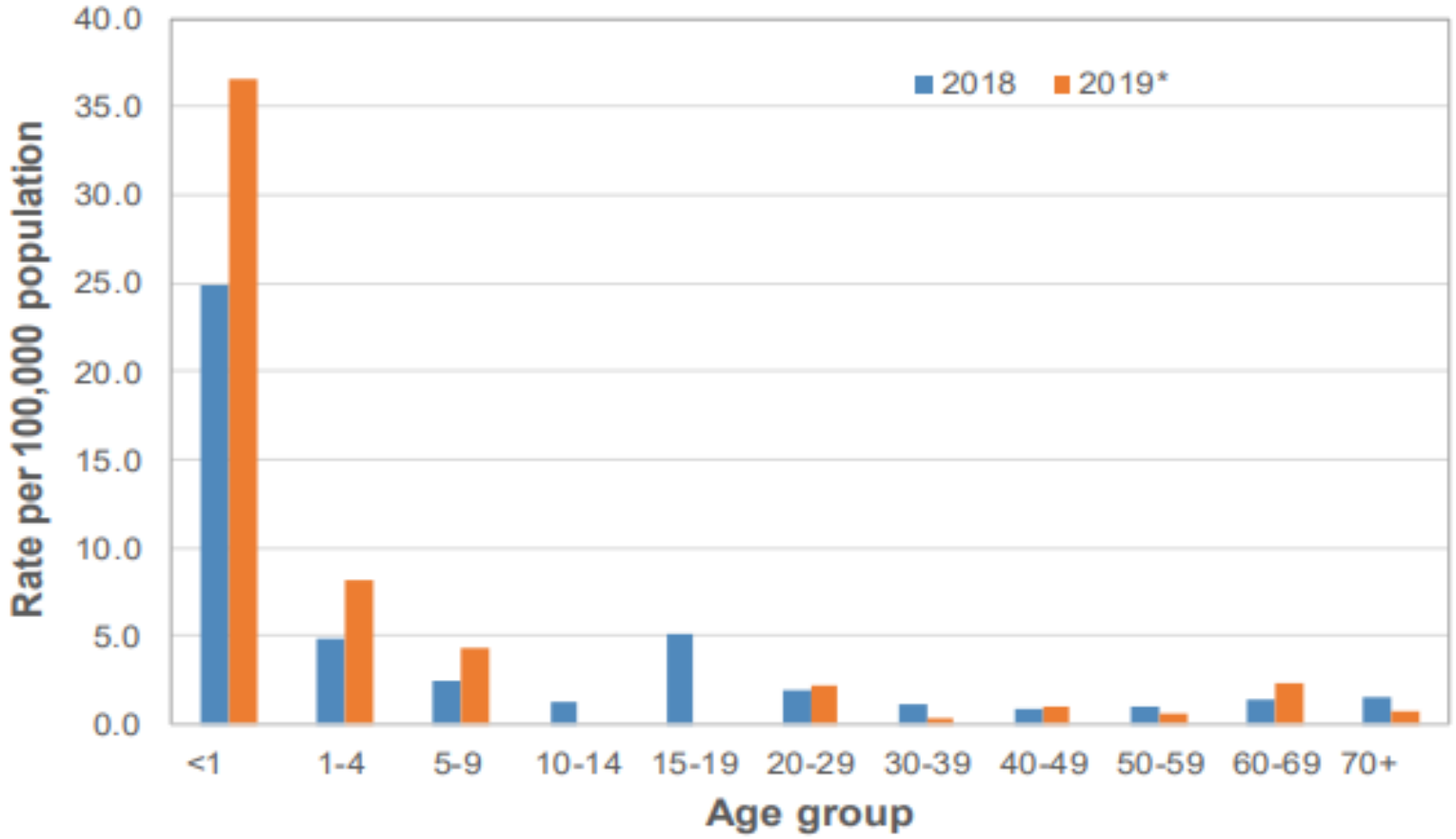
Meningococcal disease

- Rare but frightening,
  - diagnosis can be challenging
- Main age groups < 5yrs and late teenagers, early 20s
  - Carriage highest rates teens/young adults
- Cases rising since 2017 (now around 2.3/100 000)
- B traditionally about two thirds, but from 2018 about 50%
- Rest is usually C, smaller amounts W, Y and very rarely X
  - **BUT W increasing, now approx. 25%**

  W in 2018
  - 'hyper virulent strain', higher case fatality, up to 15%
  - Atypical presentation, possibly up to 50% with GI symptomatology, also pneumonia, septic arthritis, endocarditis, epi/supraglottitis
  - Typical ages young and old but more seen across all age range (44% 40 years plus)
  - On the rise nationally, particularly currently in Northland

- Difficult diagnosis - USE ABIOTICS EARLY *"over-treatment is acceptable"*

Figure 3. Meningococcal disease notifications rate by age group, 2018 and 2019*



*Cases reported up to 30 June 2019 only. Annualised rate using quarter 1 and 2 notifications.

ESR: 12 July 2019

Vaccines available in NZ

B – Bexsero®

Quadravalent A,C,Y,W

- Menactra® (from 9 months)
- Nimenrix® (from 6 weeks)

C - NeisVac-C ®

www.immune.org.nz/sites/default/files/resources/Written%20Resources/DiseaseMeningococcalImac20180912V01Final_0.pdf

Who to vaccinate?

FUNDED: very high risk

- Pre/post splenectomy or with functional asplenia
- HIV positive HIV positive
- Inherited or acquired complement deficiency
- Pre/post solid organ transplantation or haematopoietic stem cell transplantation
- Following immunosuppression due to steroid or other immunosuppressive therapy longer than 28 days
- Close contacts of a meningococcal case

- **Menactra®**
- **Under 9 months NeisVac-C**

Unfunded but recommended

- Other infants and young children aged under 5 years, adolescents and young adults.
    - Particularly adolescents and young adults living in close proximity to each other, e.g. boarding school, university halls of residence or in long-term institutional care.
- Travellers to high-risk countries and Hajj pilgrims.
- Laboratory workers regularly exposed to meningococcal cultures.
- workers regularly handling meningococcal cultures

Nimenrix® / Menactra®
Bexero®

HCL Non-Funded Vaccines* - Consolidated Order Form (as at 4 April 2019)

Email to: orders@healthcarelogistics.co.nz or **Free Fax 0508 408 358**

Faxed, or emailed orders now incur a Manual Order Processing fee of $10 per order. This fee can be avoided by ordering on the website: www.hcl.co.nz **(registration required)** (please destroy older version)

Business Name		HCL Account #	
Delivery Address			
Customer Order Ref		Contact Name	Phone

Before prescribing a vaccine please review full datasheet – www.medsafe.govt.nz

*All purchases will be invoiced at the current price. Prices quoted are valid as at above date of issue, subject to change; all prices are excluding of GST.

GSK

Product	Qty
Bexsero® pre-filled syringe Meningococcal Group B Vaccine 1147377 *PC 2556251* $96.50	
Boostrix® pre-filled syringe Diphtheria/Tetanus/Pertussis 1049350 *PC 2061896* $25.00	
Engerix-B® PFS Hepatitis B 1143421 *PC 2061945* $22.50	
Havrix® 1440 pre-filled syringe Hepatitis A 1039005 *PC 282502* $63.80	
Havrix Junior® PFS Hepatitis A 1038264 *PC 793582* $35.00	
Malarone® tablets (12 Tabs/pack) Malaria 1050297 *PC 2016370* $64.00	
Malarone® tablets Junior (12 Tabs/pack) Malaria 1111370 *PC 2385538* $25.00	
Rabipur® Vial + Amp 1ml Rabies 1149214 $93.00	
Twinrix® PFS Hepatitis A / Hepatitis B 1038268 *PC 2061910* $60.00	
Twinrix® Junior PFS Hepatitis A / Hepatitis B 1038265 *PC 2061929* $35.00	
Varilrix® Vial Varicella 1140976 *PC 1140976* $50.00	

MSD

Product	Qty
PNEUMOVAX®23 PFS Pneumococcal (polysaccharide) 1129418 *PC 2478838* $40.00	
ZOSTAVAX™ Varicella Zoster (shingles) vaccine 1131393 *PC 2493039* $152.40	

Mylan

Product	Qty
Influvac Tetra® 1unit = 10 doses Seasonal Influenza 2019 1149291 *PC 2558483* $90.00	
Fluarix Tetra 1unit = 1 unit Seasonal Influenza 2019 1149318 $28.00	

Pfizer

Product	Qty
NeisVac-C™ PFS Single Dose Meningococcal C 1114467 *PC 1114467* $50.00	
Nimenrix® Vial+PFS Meningococcal A,C,W$_{135}$,Y conjugate 1130570 *PC 1130570* $80.00	
Prevenar 13® pre-filled syringe PCV 13-valent 1088608 *PC 1088608* $168.20	

Seqirus

Product	Qty
ADT™ Booster 5 pack PFS Diphtheria & Tetanus 1073579 *PC 2230062* $84.83	
Dukoral® Oral, Cholera/Travellers' Diarrhoea 1113134 *PC 2119471* $48.65	
GARDASIL® 9 PFS 9 HPV (types 6,11,16,18,31,33,45,52,58) - replaces Gardasil (4) 1138671 *PC 2485427* $141.50	
Jespect® PFS Japanese Encephalitis 1081273 *PC 2312700* $120.00	
Vivotif® 3 capsules Typhoid live attenuated (oral) vaccine 1115491 *PC 2401177* $29.50	

SANOFI PASTEUR

Product	Qty
Adacel® Vial Diphtheria/Tetanus/Pertussis 1077023 *PC 2297280* $29.00	
Adacel Polio® PFS Diphtheria/Tetanus/Pertussis plus Polio 1076065 *PC 2288192* $58.50	
Avaxim™ PFS sep needles Hepatitis A 1146405 *PC 2102774* $63.80	
IPOL PFS Poliomyelitis 1143935 *PC 216909* $46.00	
Menactra® Vial Meningococcal ACW & Y Conjugate 1113087 *PC 2401959* $89.95	
MIRV™ Vial+Syringe Rabies 1070342 *PC 217581* $102.75	
Stamaril® Vial - WHO Approved Clinics Only - Yellow Fever (provide Stamp below) 1070343 *PC 471615* $70.00	
Tubersol® 10 dose vial Tuberculosis Test 1070355 *PC 703338* $57.50	
Typhim VI™ PFS Typhoid Fever 1143902 *PC 200697* $40.00	
Vivaxim® PFS Hepatitis A / Typhoid Fever 1070358 *PC 2181878* $97.00	

Ordering Stamaril® ?

Place WHO Yellow Fever Stamp here

Doctor's Name:

Doctor's Registration #

HCL Customer Service – (09) 969 0736 – Orders of 1 - 4 (mixed) units incur a $45 Small Order Handling Fee. Orders of 5-9 (mixed) units incur a $25 Small Order Handling Fee. Orders of 10 and above (mixed) units are exempt from the Small Order Handling Fee.

Funded vaccines for special groups from 1 April 2018

Please refer to individual vaccines for detailed eligibility criteria and to the electronic *Immunisation Handbook 2017* for vaccine administration schedules

Asplenia - Functional or Pre- or Post-Splenectomy Immunisation Programme
- Hib, influenza, meningococcal, pneumococcal, and Tdap vaccines

Chemotherapy - following
- Hib, HPV, influenza, pneumococcal, Tdap, and varicella vaccines

Also consider immunosuppression for longer than 28 days
- Hepatitis B and meningococcal vaccines

Cochlear implant
- Hib, influenza, and pneumococcal vaccines

Error of metabolism at risk of major metabolic decompensation
- Influenza and varicella vaccines

Haematopoietic stem cell transplantation (HSCT) - following
- Hib, HPV, influenza, meningococcal, pneumococcal, Tdap, and varicella vaccines

Also consider immunosuppression for longer than 28 days
- Hepatitis B vaccine

Hepatitis A case - contact with
- Hepatitis A vaccine

Hepatitis B case - contact with Infants born to mothers who are hepatitis B surface antigen (HBsAg) positive
- Hepatitis B vaccine and hepatitis B immunoglobulin (HBIG) at birth

Household and sexual contacts of known acute hepatitis B cases or carriers
- Hepatitis B vaccine

Hepatitis C positive individual
- Hepatitis B vaccine

HIV positive individual
- Hepatitis B, HPV, influenza, meningococcal, pneumococcal, and varicella vaccines

Immune deficiency/immunosuppression

Individuals with an immune deficiency
- Influenza, meningococcal, and pneumococcal vaccines

Household contacts of children or adults who will be/are immunosuppressed
- Varicella vaccine

Prior to elective immunosuppression for longer than 28 days
- Varicella vaccine

Following immunosuppression for longer than 28 days
- Hepatitis B, Hib, influenza, meningococcal, and Tdap vaccines

Influenza Immunisation Programme
- » Pregnancy,
- » Children aged 6 months to under 5 years who have been hospitalised for respiratory illness or have a history of significant respiratory illness,
- » Individuals aged 6 months to under 65 years with an eligible medical condition,
- » Individuals aged 65 years or older.
- Influenza vaccine

Kidney disease
- Hepatitis B, Hib, influenza, pneumococcal, Tdap, and varicella vaccines

Liver disease
- Hepatitis A and varicella vaccines

Meningococcal disease case - contact with
- Meningococcal vaccine

Needle stick injury - following
- Hepatitis B vaccine

Non-consensual sexual intercourse - following
- Hepatitis B vaccine

Pneumococcal disease - increased risk
- Additional pneumococcal vaccine

Pregnancy
- Influenza and Tdap vaccines in every pregnancy

Rubella - women of childbearing age who are not immune to rubella
- MMR vaccine

Solid organ transplantation

Prior to solid organ transplantation
- Hib, meningococcal, pneumococcal, Tdap, and varicella vaccines

Following solid organ transplantation
- Hepatitis A, hepatitis B, Hib, HPV, influenza, meningococcal, pneumococcal, and Tdap vaccines

Tuberculosis - infants and children aged under 5 years at risk of tuberculosis (TB) exposure
- BCG vaccine

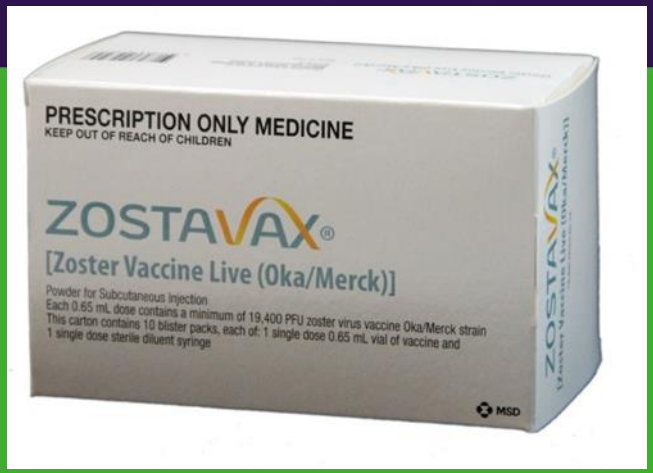
VACCINE KEY

BCG: tuberculosis
Hib: *Haemophilus influenzae* type b
HPV: human papillomavirus
MMR: measles, mumps, rubella
Tdap: tetanus, diphtheria, acellular pertussis
Varicella: chickenpox

The Immunisation Advisory Centre

For more details, visit **immune.org.nz**

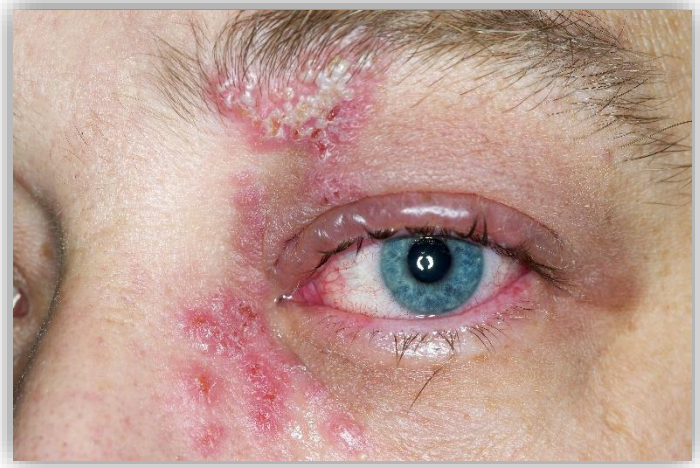
THE NEWER VACCINES



Dave is 58 and is requesting a Shingles vaccines as he had shingles recently and does not want it again

A severe case of chickenpuss

Funded Zostavax
Commenced 1st April 2018



- ***Single dose for age 65 years*** and over
- Two year ***catch-up for age 66-80*** years inclusive until March 2020
- Whether or not they recall a history of chickenpox disease
- Can be given at the same visit for influenza vaccine
- Live attenuated
  - **<u>beware Immunocompromised</u>**
    - CK HANDBOOK

Our Practice nurse is concerned she may have given a shingles vaccine to an immunocompromised patient.

Immunisation Handbook

Table 22.2 below provides recommendations for the use of HZV in persons on immunosuppressive therapy.

See also section 4.3.3.

Table 22.2: Recommendations for use of herpes zoster vaccine for individuals on immunosuppressive therapy

Immunosuppressive therapy	Treatment regimen	Potential timing of vaccination
High-dose corticosteroid monotherapy (≥20 mg per day of prednisone or equivalent)	<14 days	Immunise 4 weeks before treatment starts OR any time after treatment stops[a]
	≥14 days	Immunise 4 weeks before treatment starts OR at least 4 weeks after treatment stops
DMARDs: • Azathioprine • Methotrexate • All other DMARDs[b,c]	>3.0 mg/kg per day >0.4 mg/kg per week All regimens	Immunise 4 weeks before treatment starts OR at least 3 months after treatment stops
T-cell inhibitors (eg, tacrolimus, cyclosporin)	All regimens	Immunise 4 weeks before treatment starts OR at least 3 months after treatment stops
Other unspecified immunosuppressants (eg, chemotherapy[d])[e]	All regimens	Immunise 4 weeks before treatment starts OR at least 3 months after treatment stops
Targeted biological therapies (eg, monoclonal antibodies)[f]	All regimens	Immunise 4 weeks before treatment starts OR at least 12 months after treatment stops[g]

Zostavax® contraindications

1. History of anaphylaxis to vaccine or components - **gelatin** & **neomycin**
2. Primary/acquired immunodeficiency states/conditions:
   - Leukaemia, lymphoma, AIDS
   - HIV-positive status alone is not an contraindication - symptomatic HIV infection with a CD4+ lymphocyte count <200 cells/mm3, or cellular immune deficiency
3. Immunosuppression therapy
   - High-dose steroids, biological response modifiers, chemotherapy,
   - ≥65 y.o. anticipating immunodeficiency should have HZV first
4. Active untreated tuberculosis (if known)
5. Pregnant women (avoid pregnancy for one month)

CDC. Prevention of Herpes Zoster. MMWR 2008. 57(RR-5): p. 1-30

For Health Professional use

The Immunisation Advisory Centre

Screening tool for the HZV (shingles) vaccine (Zostavax®)

Question	Rationale
Are you well today?	General screening for acute moderate/severe illness.
Have you had a shingles vaccine before? Have you had any other live vaccines in last 4 weeks?	12 month gap between purchased HZV and funded HZV vaccination recommended. Live vaccines are either given on same day or with 4 week gap, to ensure adequate immune response to the second vaccine.
Have you ever had shingles?	Minimum gap of 12 months between disease and HZV vaccination recommended.
Have you ever had a serious allergic reaction?	Screening for history of anaphylaxis to vaccine or vaccine component e.g. neomycin or gelatin.
Are you taking any medication to prevent cold sores, herpes or shingles?	Antiviral medication needs to be stopped for 24 hours prior to HZV vaccination and for 14 days after vaccination. Antiviral medication can interfere with HZV vaccination and make it less effective. Patients on long-term antiviral medication should discuss the possible risk of disease flare-up from stopping the antiviral medication and risks and benefits of HZV vaccination with their health professional.
Do you have or have you ever had cancer, leukaemia, lymphoma, a transplant, stem cell therapy, TB or any condition that effects your immune system (including HIV/AIDS) or any blood disorders?	Screening for compromised immune system. Refer to sections 4.3.2, 4.3.3 and 22.6.2 of the Immunisation Handbook 2017 2nd Ed for more information. HZV vaccine is contraindicated or specialist opinion is required.
In the past 12 months have you taken any medications that affect your immune system such as oral steroids for asthma , COPD, sarcoidosis, other steroids, or anticancer drugs; drugs for the treatment of rheumatoid arthritis, Crohn's disease, ulcerative colitis or psoriasis?	Screening for medications that could cause immune system compromise Refer to table 22.2 in the Immunisation Handbook 2017 2nd Ed for information on treatments and timing of vaccination. Check practice management system for any medications that are listed there. HZV vaccination is contraindicated or specialist opinion required.

Potential screening outcomes

- **There are no contraindications to HZV vaccination.** Follow your usual informed consent process, ensuring that you fully document this in the patient notes.
- **HZV vaccine is contraindicated.** Advise the patient of the outcome and why they cannot receive the vaccine.
- **Specialist opinion is required.** Let the patient know and discuss how the advice from the specialist will be sought and approximately when you will tell them whether they can have HZV vaccine or not.

For Patient use

The Immunisation Advisory Centre

Checklist for the shingles vaccine (Zostavax®)

The following questions will help us decide if you should have the shingles vaccine (Zostavax®) today. Answering "yes" to any question, does not necessarily mean you won't be vaccinated. It means that we will need to ask some extra questions. If you do not understand a question, please ask your health professional to explain it.

Name:	Date of birth:

Questions:	Yes	No	Unsure
Are you feeling well today, with no fever?			
Have you ever had a shingles vaccine? If so, when?			
Have you ever had shingles before? If so, when?			
Have you ever had a serious allergic reaction to any vaccine, or to gelatin or neomycin?			
Do you have or have you had cancer of any sort?			
Have you had any organ or bone marrow transplant or stem cell therapy?			
Have you had leukaemia or other blood or bleeding disorders?			
Do you have HIV/AIDS, or any other immune system problems?			
In the past 12 months have you taken any medications that could affect your immunity such as: • Oral steroids for asthma or COPD such as prednisone or other steroids? • Medications for the treatment of cancer? • Medications for the treatment of rheumatoid arthritis, multiple sclerosis, Crohn's disease or ulcerative colitis, psoriasis, sarcoidosis, TB or polymyositis?			
Have you ever been told you should not receive live vaccines?			
Are you taking any medications that are not prescribed at this practice?			
Are you taking any medication to prevent cold sores, herpes or shingles?			

Signing this form does not indicate informed consent. Your health professional will discuss the benefits, risks, vaccine responses and answer any questions you have about the vaccine prior to vaccination.

Form Completed By: Date:

Form Reviewed By: Date:

This screening tool has been adapted from NSW Immunisation Specialist Service by the Pegasus Immunisation Coordinator Lead in conjunction with The Immunisation Advisory Centre. April 2018

Checking varicella serology?

- **Varicella serology** not required unless:
  - Asymptomatic HIV+ with CD4+ lymphocyte count of ≥200 cells/mm3 or
  - Anticipating future significant immune compromise

Resources: www.immune.org.nz/zostavax-health-professionals

Immunisation Handbook 2017 2nd Edition March 2018

- Chapter 4 Immunisation of special groups
  - **Section 4.3.2 Primary immune deficiencies page 126**
  - **Section 4.3.3 Secondary (acquired) immune deficiences page 128**
    - Individuals receiving corticosteroids
    - Table 4.2 Guidelines for live virus vaccine administration for individuals on high-dose corticosteroids
    - Other immunosuppressive agents
- Chapter 22 Zoster (herpes zoster/shingles)
  - **Section 22.5 Recommended immunisation schedule page 577**
    - Table 22.1 Herpes zoster vaccine (HZV) recommendations
  - **Section 22.5.2 Other considerations page 578**
    - Individuals with a history of HZ (shingles)
    - Household contacts of immunocompromised individuals
    - Serological testing
  - **Section 22.6 Contraindications and precautions page 580**
    - Section 22.6.1 Contraindications
    - Section 22.6.2 Precautions
      - Table 22.2 Recommendations for use of herpes zoster vaccine for individuals on immunosuppressive therapy

The Immunisation Advisory Centre

HIGH RISK GROUPS

Additional vaccines funded for special groups

Eligibility criteria is defined in the Pharmaceutical schedule on the PHARMAC website

www.pharmac.govt.nz – ‘Health Professionals’, ‘Pharmaceutical schedule’, ‘Vaccinations’

PHARMAC
Pharmaceutical Management Agency

Funded Special Risk Groups

	Vaccine	For whom
Pneumococcal	PCV13(Prevenar13) and PPV23 (pneumovax23)	• High risk children - long list • High risk adults - smaller list - HIV, transplants, chemo, splenectomy, dialysis, Complement deficiency, prim immunodeficiency
Targeted varicella vaccine for high risk groups	Varilrix®	• Targeted programme for high risk groups and close contacts
Meningococcal conjugate vaccines	Menactra® for 2 years of age and older. Neisvac-C® for under 2 years of age.	• Pre- and post-splenectomy, functional asplenia • Post solid organ or bone marrow transplant • Post immunosuppression • HIV, complement deficiencies • Close contacts of meningococcal cases
Hepatitis A vaccine	Havrix® and Havrix Junior®	• Transplant patients • Children with chronic liver disease • Close contacts of hepatitis A cases • On recommendation of a local MOH
Higher dose Hepatitis B vaccine (40mcg)	HBvaxPRO® 40mcg	• Dialysis patients • Liver or kidney transplant patients
HPV vaccine	Gardasil9®	• HIV • Transplant patients • Post chemotherapy

FUNDED HIGH RISK PROGRAMME – - USE THE IMAC WEBSITE RESOURCE

http://www.immune.org.nz/sites/default/files/resources/ProgrammeScheduleChanges20170113V01Final_0.pdf

Funded vaccines for special groups from 1st January 2017

Please refer to individual vaccines for detailed eligibility criteria and to the electronic *Immunisation Handbook 2014 (3rd edition)* for vaccine administration schedules

Asplenia - Functional or Pre- or Post-Splenectomy Immunisation Programme
• Hib, influenza, meningococcal, pneumococcal, and Tdap vaccines

Chemotherapy - following
• Hib, HPV, influenza, pneumococcal, Tdap, and varicella vaccines
Also consider immunosuppression for longer than 28 days
• Hepatitis B and meningococcal vaccines

Cochlear implant
• Hib, influenza, and pneumococcal vaccines

Error of metabolism at risk of major metabolic decompensation
• Influenza and varicella vaccines

Haematopoietic stem cell transplantation (HSCT) - following
• Hib, HPV, influenza, meningococcal, pneumococcal, Tdap, and varicella vaccines
Also consider immunosuppression for longer than 28 days
• Hepatitis B vaccine

Hepatitis A case - contact with
• Hepatitis A vaccine

Hepatitis B case - contact with Infants born to mothers who are hepatitis B surface antigen (HBsAg) positive
• Hepatitis B vaccine and hepatitis B immunoglobulin (HBIG) at birth
Household and sexual contacts of known acute hepatitis B cases or carriers
• Hepatitis B vaccine

Hepatitis C positive individual
• Hepatitis B vaccine

HIV positive individual
• Hepatitis B, HPV, influenza, meningococcal, pneumococcal, and varicella vaccines

Immune deficiency/immunosuppression
Individuals with an immune deficiency
• Influenza, meningococcal, and pneumococcal vaccines
Household contacts of children or adults who will be/are immunosuppressed
• Varicella vaccine
Prior to elective immunosuppression for longer than 28 days
• Varicella vaccine
Following immunosuppression for longer than 28 days
• Hepatitis B, Hib, influenza, meningococcal, and Tdap vaccines

Influenza Immunisation Programme
» Pregnancy,
» Children aged 6 months to under 5 years who have been hospitalised for respiratory illness or have a history of significant respiratory illness,
» Individuals aged 6 months to under 65 years with an eligible medical condition,
» Individuals aged 65 years or older.
• Influenza vaccine

Kidney disease
• Hepatitis B, Hib, influenza, pneumococcal, Tdap, and varicella vaccines

Liver disease
• Hepatitis A and varicella vaccines

Meningococcal disease case - contact with
• Meningococcal vaccine

Needle stick injury - following
• Hepatitis B vaccine

Non-consensual sexual intercourse - following
• Hepatitis B vaccine

Pneumococcal disease - increased risk
• Additional pneumococcal vaccine

Pregnancy
• Influenza and Tdap vaccines in every pregnancy

Rubella - women of childbearing age who are not immune to rubella
• MMR vaccine

Solid organ transplantation
Prior to solid organ transplantation
• Hib, meningococcal, pneumococcal, Tdap, and varicella vaccines
Following solid organ transplantation
• Hepatitis A, hepatitis B, Hib, HPV, influenza, meningococcal, pneumococcal, and Tdap vaccines

Tuberculosis - infants and children aged under 5 years at risk of tuberculosis (TB) exposure
• BCG vaccine

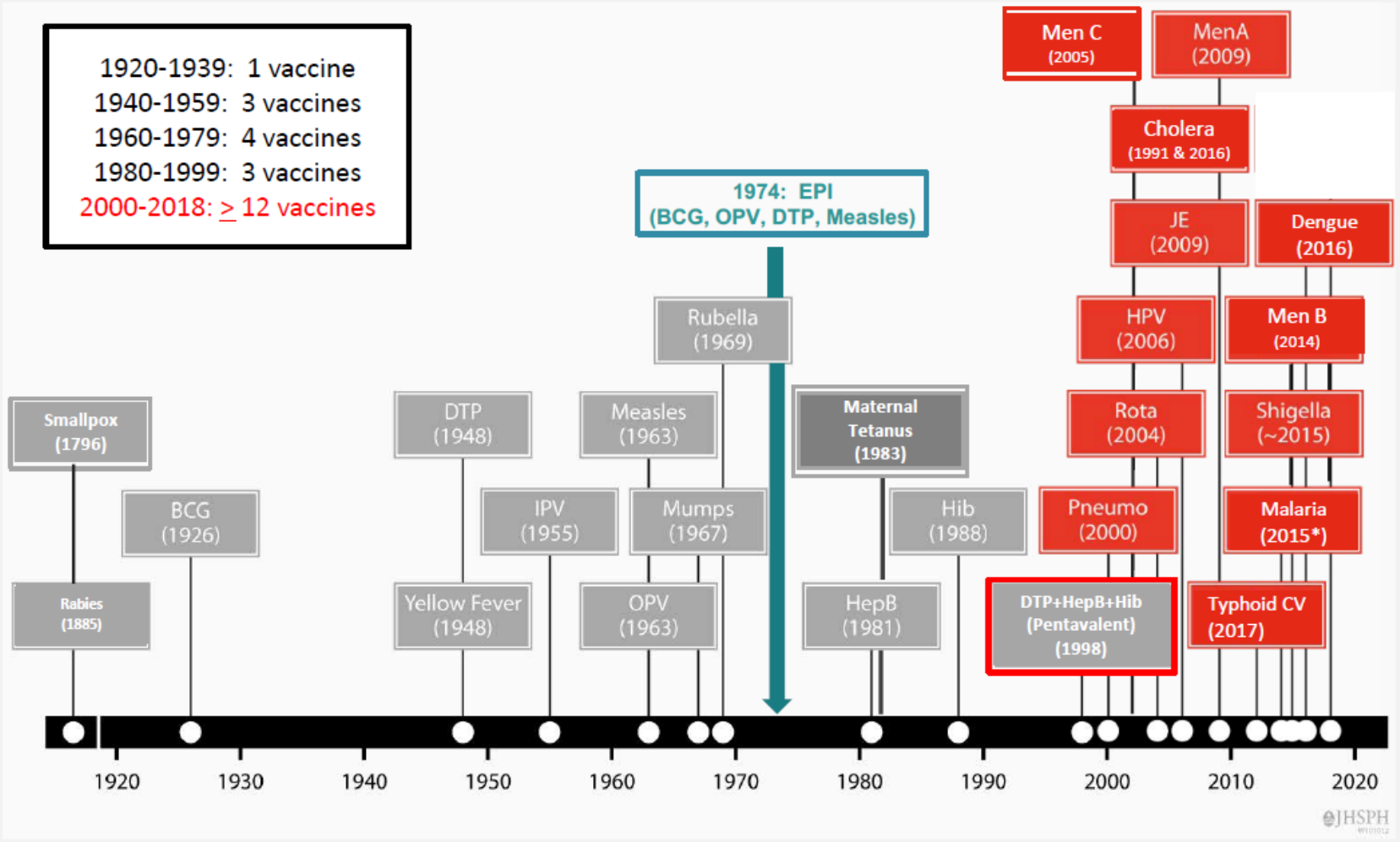
VACCINE KEY

BCG: tuberculosis
Hib: *Haemophilus influenzae* type b
HPV: human papillomavirus
MMR: measles, mumps, rubella
Tdap: tetanus, diphtheria, acellular pertussis
Varicella: chickenpox

The Immunisation Advisory Centre

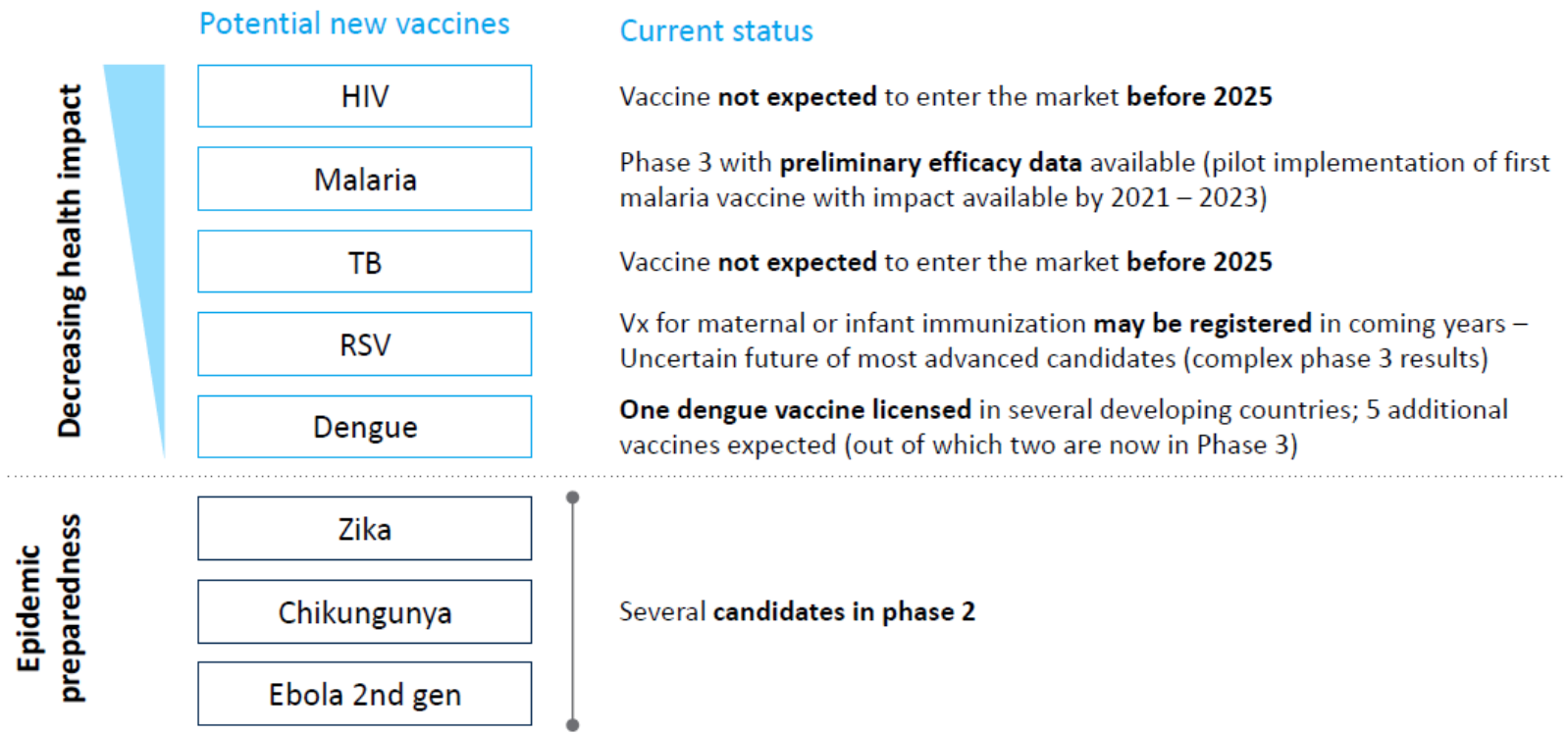
For more details, visit **immune.org.nz**

Substantial Advancement in Vaccine Innovation in last 15 years…and more to come



Slide from K O'Brien, IVB Director, WHO April 2019

Future Equity: While no blockbusters expected in the short term, several long-awaited vaccines might enter the market towards the end of the decade



Note: Several other vaccines considered as part of the VIS; the above only reflects selected examples
Source: Gavi analysis; WHO analysis

What are our current major challenges for the NZ Immunisation programme?

IMMUNISATION ADVISORY CENTRE
THE UNIVERSITY OF AUCKLAND
Te Whare Wānanga o Tāmaki Makaurau

Diseases

- Pertussis
- Influenza
  - Seasonal
  - Future Pandemics
- (Measles)

Immunisation coverage

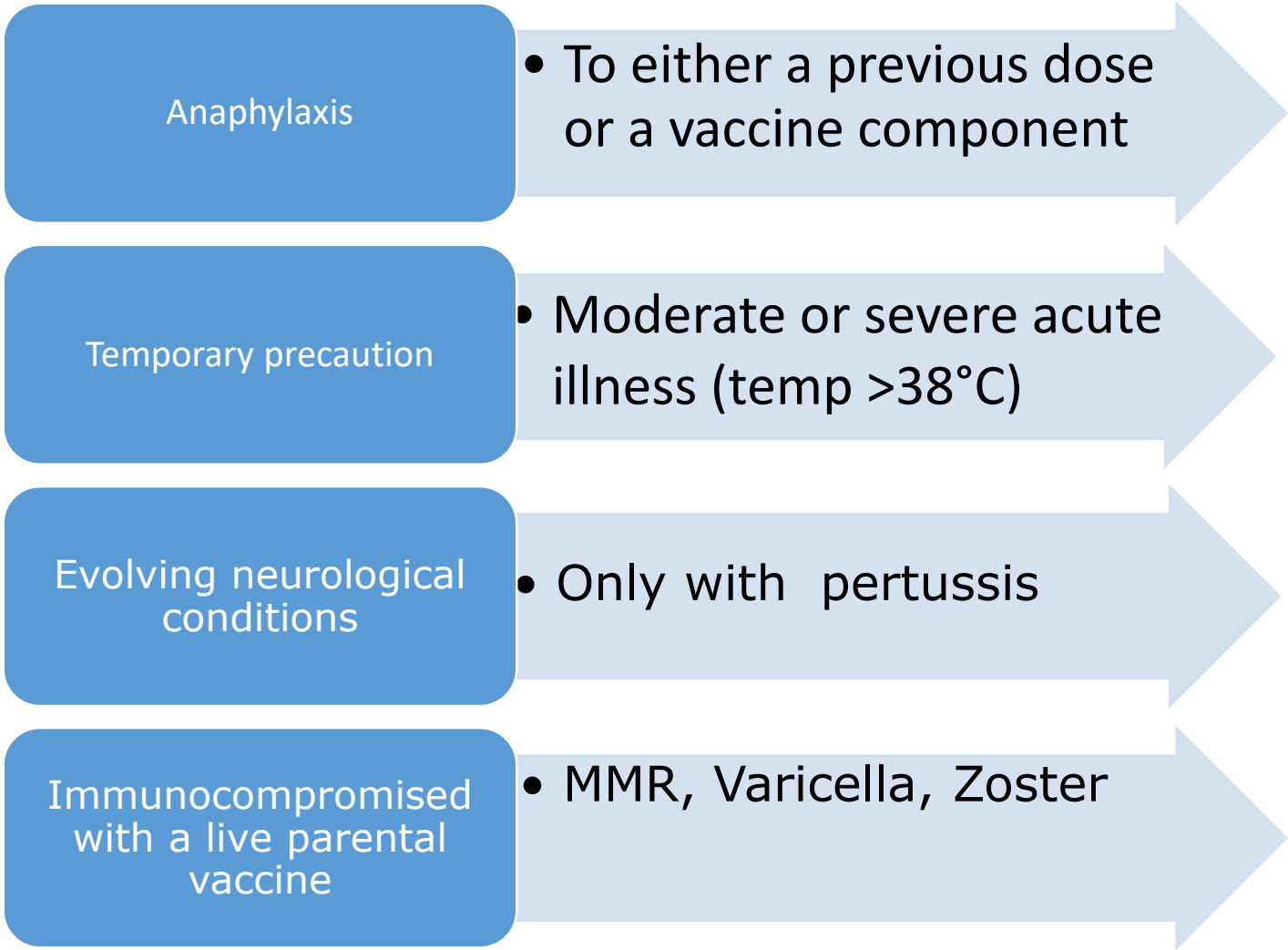
- Effective systems and providers
- Vaccine hesitancy

Areas to continue focus: Missed opportunities

My baby is ill with a cold and his asthma is playing up again. He has missed his immunisations yet again because he was in hospital with his asthma.

He is still on the pills they gave him at the hospital

Contraindications to vaccines



Rotavirus

- SCID
- Born to mother on immunosuppressive regime in pregnancy – partic. monoclonal antibody DMARD (adalimumab/humira)

Communication challenges

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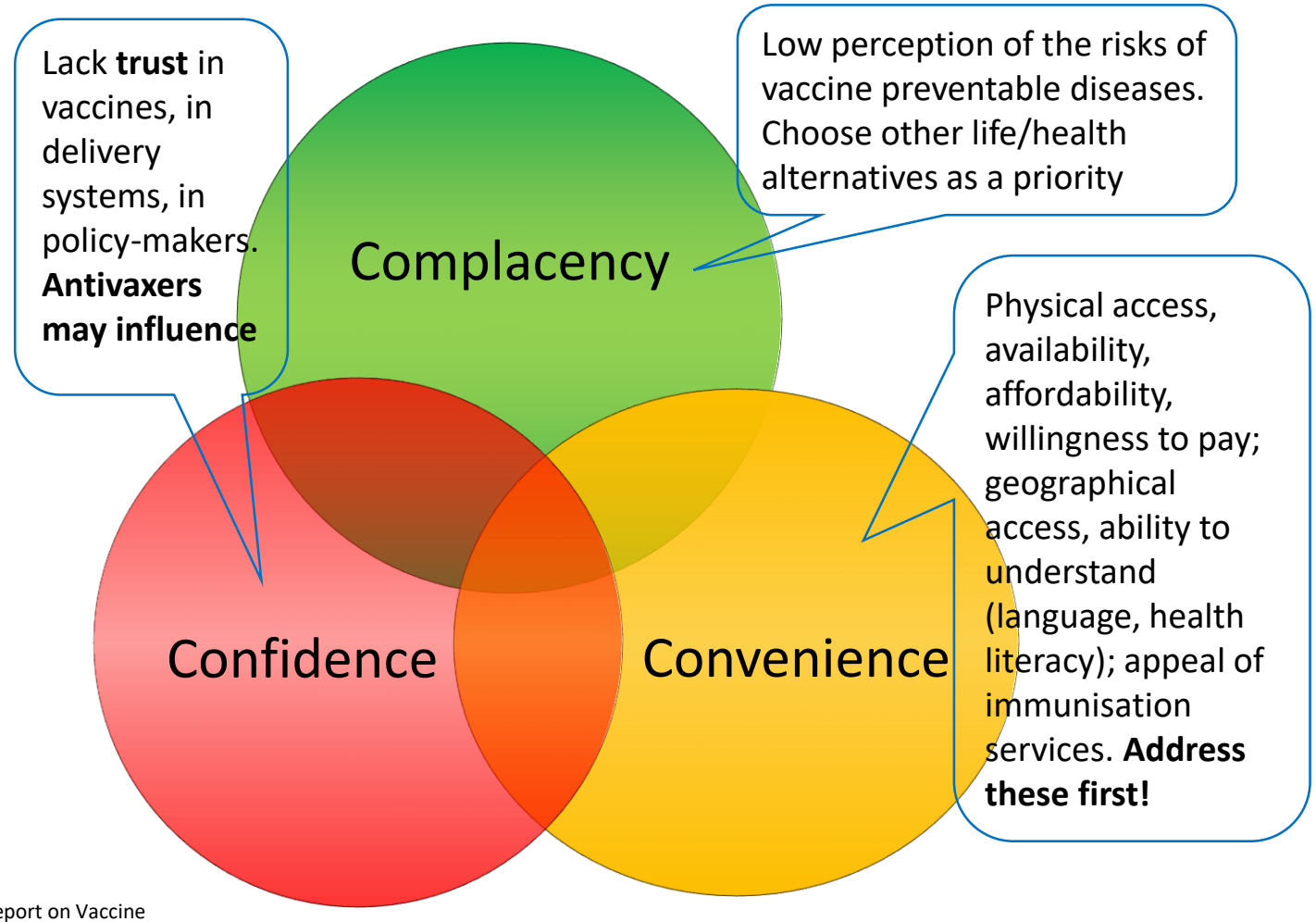
THE UNIVERSITY OF AUCKLAND
Te Whare Wānanga o Tāmaki Makaurau

There is little point in having the best science in the world if we can’t communicate it effectively

Factors influencing decisions: The WHO's 3 Cs



SAGE report on Vaccine Hesitancy

Tailoring conversations

- **Vaccine decisions are complex**
- No "one size fits all"
- Match your dialogue and time to the audience

- **Vulnerables –** refer to outreach
- **Fearfuls –** mitigate pain of vaccination
- **Unwell –** support not delaying unless contraindicated i.e. mildly unwell
- **Nurturers –** emphasise disease protection
- **Rejecters –** acknowledge, leave the door open

Guiding style

- Ask permission to discuss a parent's concerns and then utilise active listening techniques –
- Guide the conversation using open questions and reflections
- Discuss both the vaccine and disease risks and benefits, supported by easily digestible written and online resources –
- **Provide a positive recommendation to vaccinate**

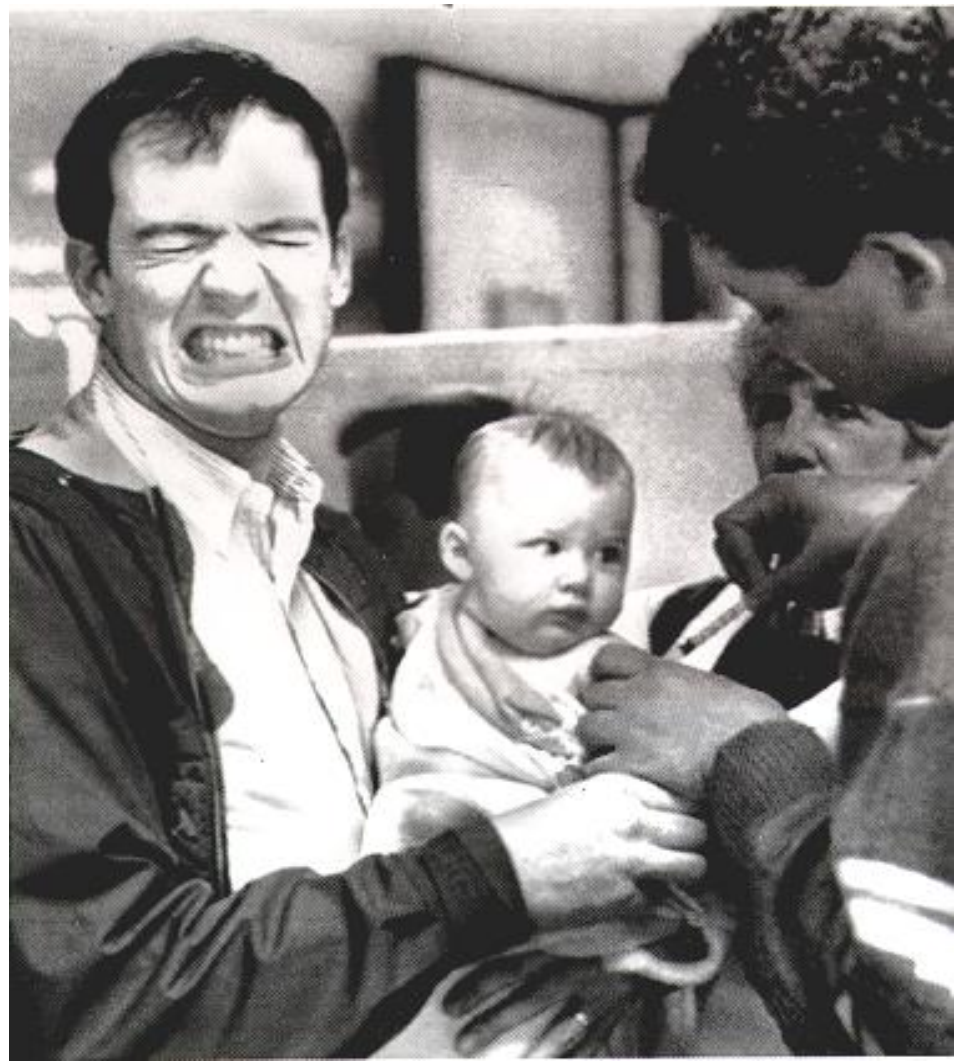
Slide from Mark Wallace-Bell,
University of Canterbury

Participatory or Presumptive

- Research shows that when providers use participatory language to initiate vaccine discussions, parents are more likely to voice resistance than when providers use presumptive language.
- An example of participatory language is asking a question like,
  - *"What do you want to do about vaccines?"*
- A presumptive approach would be to say,
  - "*Your child needs three vaccines today."*
- If parents voice resistance when you use the participatory approach, consider restating your original vaccine recommendations.
  - "*These vaccines are very important to protect him from serious diseases."*
- Data show that when restated like this, half of parents accept vaccines.

Adapted from slide from Mark Wallace-Bell,
University of Canterbury

Opel DJ, Mangione-Smith R, Robinson JD, et al. The influence of provider communication behaviors on parental vaccine acceptance and visit experience. Am J Public Health. 2015;105:1998-2004



Making a positive vaccination event

- Good preparation with parents
- Breast feeding through the event
- Cuddling
- Distraction for older infants and children
  - Canadian video
    https://immunize.ca/sites/default/files/resources/parentscanada-ad-feature-needles-dont-have-to-hurt.pdf
  - Australia video:
    http://www.talkingaboutimmunisation.org.au/

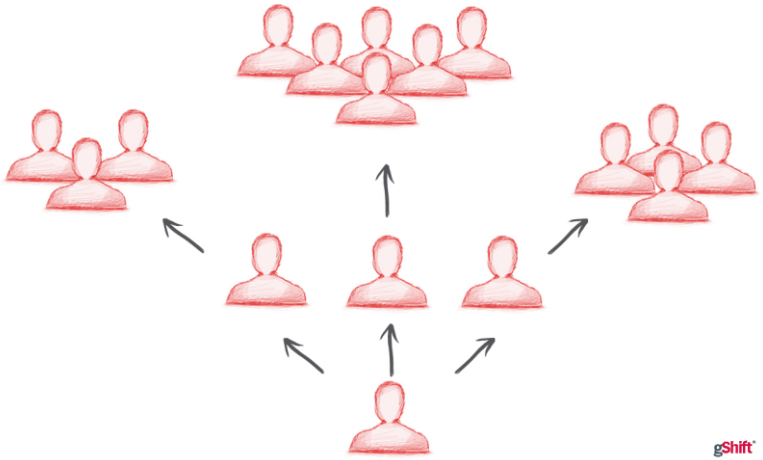
- Conversations with vaccine-hesitant parents: Australian resources (SKAI – sharing knowledge about immunisation)
  - http://www.ncirs.org.au/ncirs-seminarwebinar-series/180219--new-skai-website

…tips on misinformation

- Avoid repeating myths:
  - Countering misinformation can be counterproductive (Boomerang effect)
- Direct the conversation to the disease itself and the effective action they can take
- Before a myth is mentioned, clearly indicate the subsequent information is false
  - Provide an alternative explanation bout why the myth is wrong/or why it is being promoted

Schwarz N, Newman E (2015) *The media fuels vaccination myths – by trying to correct them* The Conversation 19 March 2015

The newbie addition - Social media both topic narrowing and amplification



Building TRUST

Our local community

Our relationships

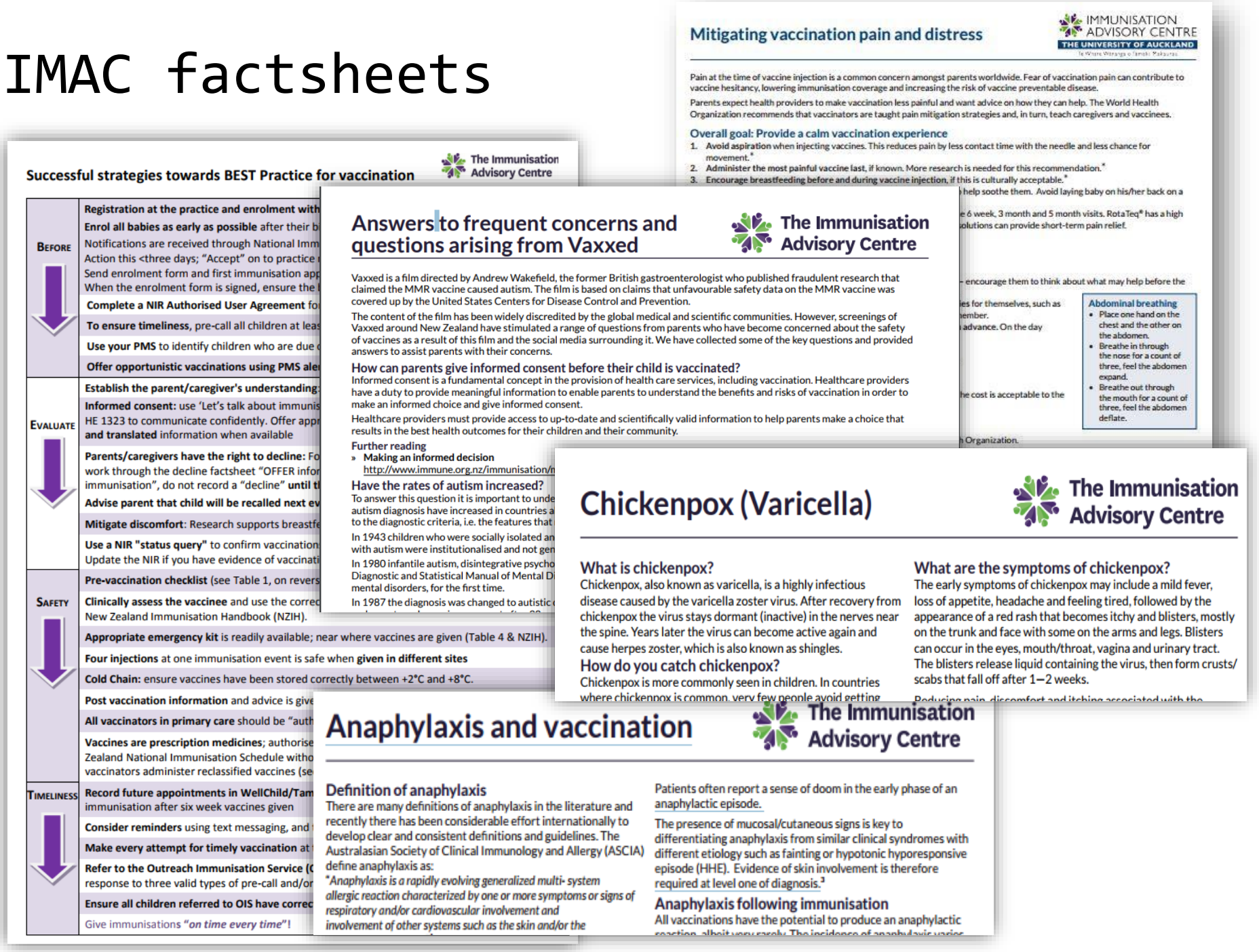
Broader community

….hmmm!

Resources

- Talking With Parents About Vaccines for Infants: http://www.cdc.gov/vaccines/hcp/patient-ed/conversations/downloads/talk-infants-color-office.pdf
- Savoy ML, Yunyongying P. Getting through to your patients. Fam Pract Manag 2013 Nov-Dec;20(6):36. (Available at http://www.aafp.org/fpm/2013/1100/p36.html)
- Standards for Practice: Vaccine Recommendation: http://www.cdc.gov/vaccines/hcp/patient-ed/adults/for-practice/standards/recommend.html
- Provider Resources for Vaccine Conversations With Parents: http://www.cdc.gov/vaccines/hcp/patient-ed/conversations/
- CDC Provider Resource Page: http://www.cdc.gov/vaccines/hcp.htm

IMAC factsheets



Successful strategies towards BEST Practice for vaccination

The Immunisation Advisory Centre

BEFORE

- **Registration at the practice and enrolment with**
- **Enrol all babies as early as possible** after their b
- Notifications are received through National Imm
- Action this <three days; "Accept" on to practice
- Send enrolment form and first immunisation app
- When the enrolment form is signed, ensure the
- **Complete a NIR Authorised User Agreement** fo
- **To ensure timeliness**, pre-call all children at leas
- **Use your PMS** to identify children who are due
- **Offer opportunistic vaccinations using PMS ale**

EVALUATE

- **Establish the parent/caregiver's understanding**
- **Informed consent:** use 'Let's talk about immunis
- HE 1323 to communicate confidently. Offer appr
- **and translated** information when available
- **Parents/caregivers have the right to decline:** Fo
- work through the decline factsheet "OFFER infor
- immunisation", do not record a "decline" **until t**
- **Advise parent that child will be recalled next ev**
- **Mitigate discomfort**: Research supports breastfe
- **Use a NIR "status query"** to confirm vaccination
- Update the NIR if you have evidence of vaccinati

SAFETY

- **Pre-vaccination checklist** (see Table 1, on revers
- **Clinically assess the vaccinee** and use the correc
- New Zealand Immunisation Handbook (NZIH).
- **Appropriate emergency kit** is readily available; near where vaccines are given (Table 4 & NZIH).
- **Four injections** at one immunisation event is safe when **given in different sites**
- **Cold Chain:** ensure vaccines have been stored correctly between +2°C and +8°C.
- **Post vaccination information** and advice is give
- **All vaccinators in primary care** should be "auth
- **Vaccines are prescription medicines**; authorise
- Zealand National Immunisation Schedule witho
- vaccinators administer reclassified vaccines (se

TIMELINESS

- **Record future appointments in WellChild/Tam**
- immunisation after six week vaccines given
- **Consider reminders** using text messaging, and
- **Make every attempt for timely vaccination** at
- **Refer to the Outreach Immunisation Service (C**
- response to three valid types of pre-call and/or
- **Ensure all children referred to OIS have correc**
- Give immunisations ***"on time every time"***!

Answers to frequent concerns and questions arising from Vaxxed

The Immunisation Advisory Centre

Vaxxed is a film directed by Andrew Wakefield, the former British gastroenterologist who published fraudulent research that claimed the MMR vaccine caused autism. The film is based on claims that unfavourable safety data on the MMR vaccine was covered up by the United States Centers for Disease Control and Prevention.

The content of the film has been widely discredited by the global medical and scientific communities. However, screenings of Vaxxed around New Zealand have stimulated a range of questions from parents who have become concerned about the safety of vaccines as a result of this film and the social media surrounding it. We have collected some of the key questions and provided answers to assist parents with their concerns.

How can parents give informed consent before their child is vaccinated?

Informed consent is a fundamental concept in the provision of health care services, including vaccination. Healthcare providers have a duty to provide meaningful information to enable parents to understand the benefits and risks of vaccination in order to make an informed choice and give informed consent.

Healthcare providers must provide access to up-to-date and scientifically valid information to help parents make a choice that results in the best health outcomes for their children and their community.

Further reading

» **Making an informed decision**
http://www.immune.org.nz/immunisation/f

Have the rates of autism increased?

To answer this question it is important to unde
autism diagnosis have increased in countries a
to the diagnostic criteria, i.e. the features that

In 1943 children who were socially isolated an
with autism were institutionalised and not gen

In 1980 infantile autism, disintegrative psycho
Diagnostic and Statistical Manual of Mental D
mental disorders, for the first time.

In 1987 the diagnosis was changed to autistic

Mitigating vaccination pain and distress

IMMUNISATION ADVISORY CENTRE
THE UNIVERSITY OF AUCKLAND

Pain at the time of vaccine injection is a common concern amongst parents worldwide. Fear of vaccination pain can contribute to vaccine hesitancy, lowering immunisation coverage and increasing the risk of vaccine preventable disease.

Parents expect health providers to make vaccination less painful and want advice on how they can help. The World Health Organization recommends that vaccinators are taught pain mitigation strategies and, in turn, teach caregivers and vaccinees.

Overall goal: Provide a calm vaccination experience

1. **Avoid aspiration** when injecting vaccines. This reduces pain by less contact time with the needle and less chance for movement.*
2. **Administer the most painful vaccine last**, if known. More research is needed for this recommendation.*
3. **Encourage breastfeeding before and during vaccine injection**, if this is culturally acceptable.*

help soothe them. Avoid laying baby on his/her back on a

e 6 week, 3 month and 5 month visits. RotaTeq® has a high
olutions can provide short-term pain relief.

- encourage them to think about what may help before the

es for themselves, such as
ember.
advance. On the day

he cost is acceptable to the

Organization.

Abdominal breathing

- Place one hand on the chest and the other on the abdomen.
- Breathe in through the nose for a count of three, feel the abdomen expand.
- Breathe out through the mouth for a count of three, feel the abdomen deflate.

Chickenpox (Varicella)

The Immunisation Advisory Centre

What is chickenpox?

Chickenpox, also known as varicella, is a highly infectious disease caused by the varicella zoster virus. After recovery from chickenpox the virus stays dormant (inactive) in the nerves near the spine. Years later the virus can become active again and cause herpes zoster, which is also known as shingles.

How do you catch chickenpox?

Chickenpox is more commonly seen in children. In countries where chickenpox is common, very few people avoid getting

What are the symptoms of chickenpox?

The early symptoms of chickenpox may include a mild fever, loss of appetite, headache and feeling tired, followed by the appearance of a red rash that becomes itchy and blisters, mostly on the trunk and face with some on the arms and legs. Blisters can occur in the eyes, mouth/throat, vagina and urinary tract. The blisters release liquid containing the virus, then form crusts/scabs that fall off after 1–2 weeks.

Reducing pain, discomfort and itching associated with the

Anaphylaxis and vaccination

The Immunisation Advisory Centre

Definition of anaphylaxis

There are many definitions of anaphylaxis in the literature and recently there has been considerable effort internationally to develop clear and consistent definitions and guidelines. The Australasian Society of Clinical Immunology and Allergy (ASCIA) define anaphylaxis as:

"Anaphylaxis is a rapidly evolving generalized multi- system allergic reaction characterized by one or more symptoms or signs of respiratory and/or cardiovascular involvement and involvement of other systems such as the skin and/or the

Patients often report a sense of doom in the early phase of an anaphylactic episode.

The presence of mucosal/cutaneous signs is key to differentiating anaphylaxis from similar clinical syndromes with different etiology such as fainting or hypotonic hyporesponsive episode (HHE). Evidence of skin involvement is therefore required at level one of diagnosis.[3]

Anaphylaxis following immunisation

All vaccinations have the potential to produce an anaphylactic

If we forget history we are doomed to repeat it.

Picture for a moment a 4-year-old boy. The poliovirus has invaded his brain and spinal cord. The muscles in his chest, legs or arms are paralyzed. A machine must breathe for him.

Now picture an infant who suddenly develops symptoms of a high fever, decreased appetite, listlessness and irritability. Within a matter of hours the infant is dead as a result of H. influenza meningitis.

Thousands of children used to die from these diseases.

Because of vaccines these and other dreaded childhood diseases are almost non-existent today. However, they will return with a vengeance if we let down our guard. We cannot allow our nation's strong commitment to the childhood immunization program, including vital research, to be undermined by inadequate funding (both public and private) or misinformation about vaccine safety.

Now is not the time for complacency or confusion. The benefits of lifesaving vaccines have significantly reduced unnecessary deaths and disabilities for millions of children. We must all make a commitment to relegate even more childhood diseases to the history books by vaccinating our children.

Vaccines prevent diseases and save lives.

American Academy of Pediatrics

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EXTRA SLIDES –RESOURCES

IMMUNISATION ADVISORY CENTRE
THE UNIVERSITY OF AUCKLAND
Te Whare Wānanga o Tāmaki Makaurau

Cancers caused by high-risk HPV types

Cervix	• >99%
Penis	• >60%
Vulva, Vagina	• >70%
Anus	• >90%
Oropharynx	• >70%

http://www.cdc.gov/hpv/parents/cancer.html

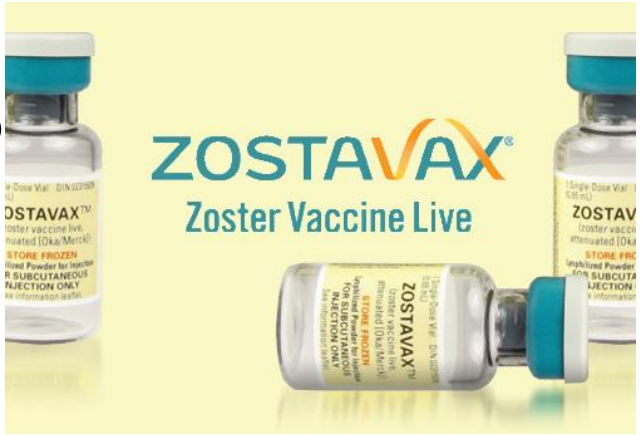
Herpes zoster vaccine

Plaque forming units (PFU) - comparison of vaccine potency	
Varilrix	PFU = 1995
Zostavax	PFU = 19,400

- ***Live, attenuated*** varicella zoster virus
- Same strain used in the varicella vaccine, but ***many times more potent***
- Licensed since 1996 (but not funded) in NZ for those who are ***50 years and older***
- ***Boosts pre-existing varicella immunity***
- ***Reduces shingles illness*** in adults > 65 years by average of 55% depending on age group
- ***Reduces severity of complications*** such as post herpetic neuralgia (PHN)
- Decreasing efficacy with ***advancing age***

Shingles - Zostavax

- VE
  - 60 yrs plus
    - Zoster reduction 51% NNT = 58
    - Post herpetic neuralgia reduction 67%
    - Longevity unclear, >5 yrs



- Contraindications
  - Anaphylaxis to any components, neomycin
  - Immunodeficiency/ immunosuppressed
  - Pregnancy
  - Active untreated Tb

- Who to advise
  - Elderly …..
  - Higher risk
    - RA, IBD, COPD, Asthma, CKD, Depression, IDDM (BMJ 2014;348:g2911)

  Aims
  - Keep independent living
  - Reduce increased frailty with onset of zoster

Herpes zoster efficacy and effectiveness

Preventing zoster in clinical trials:

- 70% (95% CI: 51-81%) adults 50 – 59 years
- 48% (95% CI: 44-52%) adults 65 – 69 years
- ? 42% (95% CI:36-47%) adults 80 years plus (but lower in original RCT 18% (-29 – 48%))

Community dwelling 60 yrs plus, over a 2 year period

- Zoster prevention 55% (95% CI 52-58%)
- Herpes zoster opthalmicus 63% (95% CI: 39 -77%)
- Zoster-related hospitalisation 65% (95% CI: 49 -76)

Duration of effectiveness – wanes over 7- 8 years

Year one: 69% (95% CI: 66-71%)

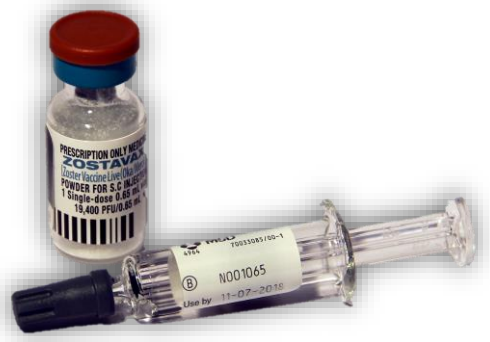
Year two: 50% (95% CI: 46-53%)

Year seven: 17% (95% CI: 1-29%)

Year eight: 4% (95% CI: -24 – 26%)

Schmader et al, 2012, Tseng et al 2016

Zostavax vaccine safety



Good safety record – used in the US since 2006

Common or very common responses (1% to 10%):

- Local pain, redness and swelling around injection site (up to 1 in 3)
- Itching or rash around injection site
- Headache

Very rare, but possible reactions:

- Vaccine related rash
  - if in contact with anyone who is immunosuppressed ***cover the rash***
- Nausea, arthralgia, & myalgia
- Anaphylaxis

Zostavax contraindications

- ***History of anaphylaxis*** to vaccine or components of the vaccine particularly gelatin and neomycin
- Those with primary/acquired ***immunodeficiency*** states/conditions, including:
  - Leukaemia, lymphoma, AIDS
  - HIV-positive status alone is not an contraindication - symptomatic HIV infection with a CD4+ lymphocyte count <200 cells/mm3, or cellular immune deficiency
- Those receiving ***immunosuppression therapy***
  - High-dose steroids, biological response modifiers, chemotherapy,
  - Persons ≥65 y.o. anticipating immunodeficiency due to initiation of treatments or progression of illness should be offered HZV
- Active untreated **tuberculosis**
- ***Pregnant women*** (avoid pregnancy for **one** month)

CDC. Prevention of Herpes Zoster. MMWR 2008. 57(RR-5): p. 1-30

Resource slides: Varicella Vaccines

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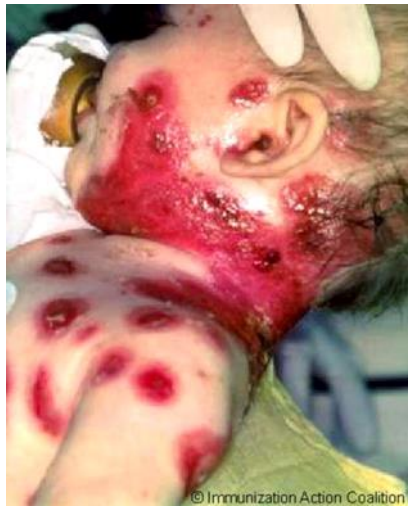


Varicella NZ epidemiology

- Ubiquitous in NZ childhood
- Hundreds hospitalized per year
  - One tenth of cases occur in immuno-suppressed children
- 1-2 per year long term disability or death
  - Most deaths in adults
- 0.5 case per year of severe congenital varicella

Ministry of Health (2016) Immunisation Handbook 2014 (2nd edition) URL: http://www.health.govt.nz/system/files/documents/publications/immunisation-handbook-2014-2nd-edn-apr16.pdf

Varicella complications

Majority of complications occur in otherwise healthy individuals

Skin/soft tissue bone joint infections	Central nervous system complications	Respiratory complications
• Secondary skin infections • Scarring • Septic arthritis • Osteoarthritis • Necrotizing fasciitis	• Acute cerebellar ataxia • Encephalitis • Meningitis • Central facial palsy • Reye's syndrome	• Pneumonia • Broncholitis

Ministry of Health (2016) Immunisation Handbook 2014 2nd Ed. Wellington: Ministry of Health.

Effectiveness

Single Dose

- Approx. 80% effective
- Against severe disease 95% plus
- Breakthrough cases less severe

Two dose

- 93% -100% against severe disease

- Breakthrough varicella in vaccinated people
  - Usually attenuated
  - Severity does not increase with time post vaccination

- Immunocompromised
  - Effectiveness unclear
  - Disease severity reduced
  - Mild immunosuppression still get seroconversion

SAGE. Systematic review of available evidence on effectiveness and duration of protection of varicella vaccines.: WHO; 2014
Available from: http://www.who.int/immunization/sage/meetings/2014/april/presentations_background_docs/en/

Duration of protection

- One dose
  - Not yet defined, but breakthrough disease does not become more severe with time
  - US study VE declined from 88.8% to 81.8% after >10 years
  - Some effect from circulating wild disease causing boosting
    - Therefore reductions in circulating disease may reduce duration of protection

- Two-dose probably long lasting
  - NB second dose also acts as a booster
    (unlike measles vaccination)
  - No breakthrough after 14 years post two doses
  - Many countries introduce a few years after starting one dose
  - Universal 2 dose in US since 2006

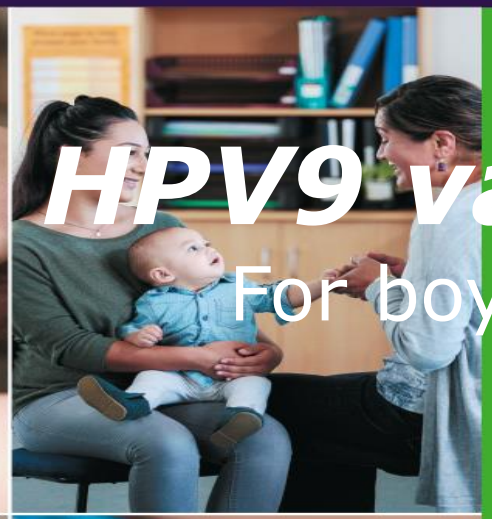
SAGE. Systematic review of available evidence on effectiveness and duration of protection of varicella vaccines.: WHO; 2014
Available from: http://www.who.int/immunization/sage/meetings/2014/april/presentations_background_docs/en/

Safety profile

Immunocompromised

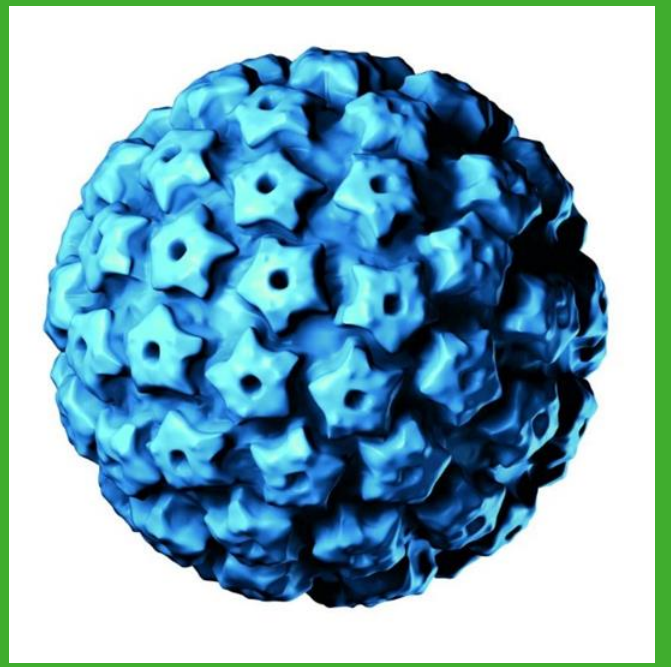
- Higher risk in children with cell-mediated immunity deficiencies
- Can use cautiously in children closely monitored oncology situations, treatments regimes for juvenile arthritis
- Undiagnosed immunocompromised – rash, vaccine strain viral reactivation and subsequent infections dissemination, pneumonitis, meningitis, hepatitis, fatal outcomes

SAGE. Safety of varicella and MMRV vaccines: A systematic review 2014 Available from: http://www.who.int/immunization/sage/meetings/2014/april/presentations_background_docs/en/

HPV9 vaccination

For boys and girls



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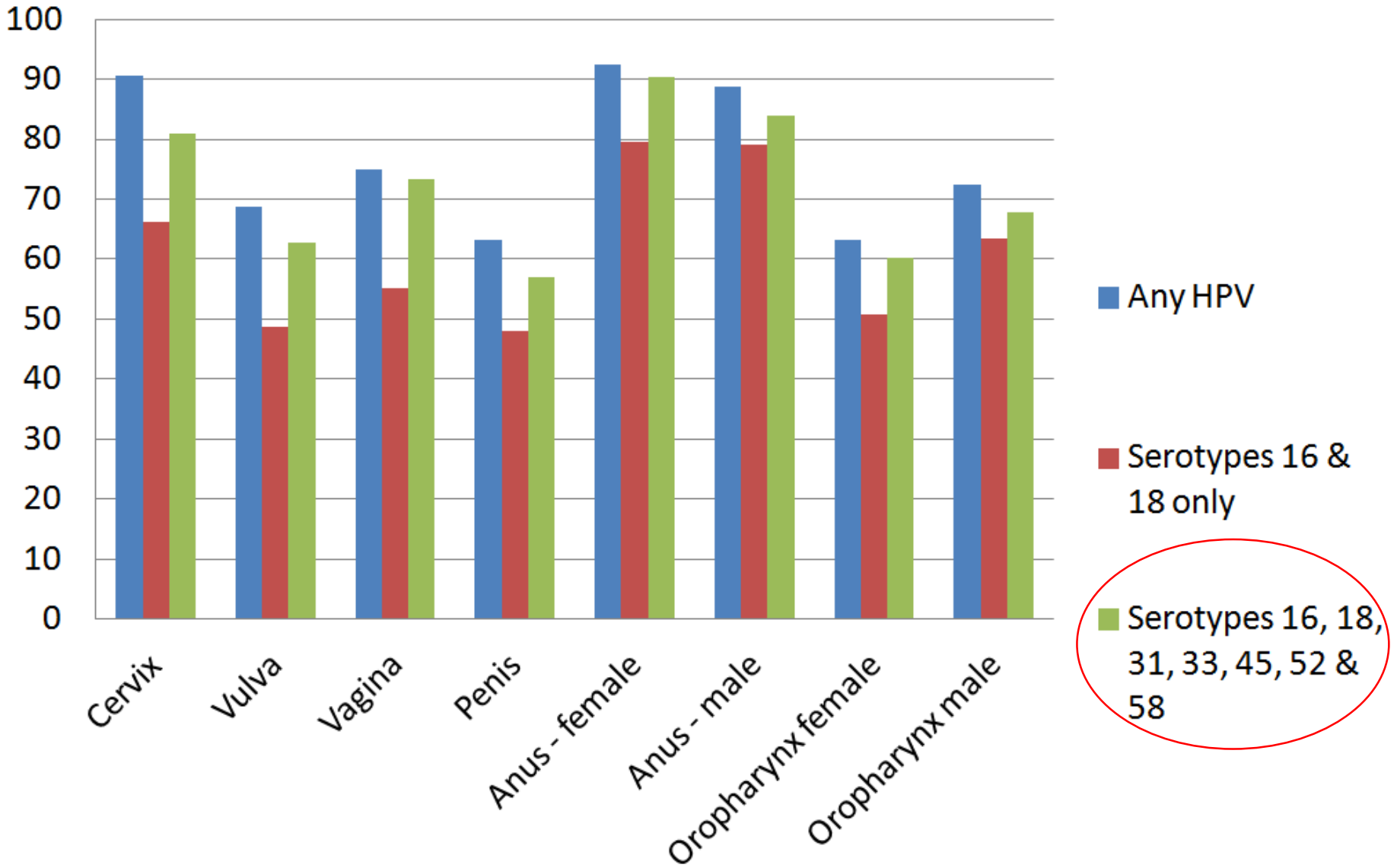
HPV9 vaccine and cervical cancer

HPV4 covers >70% of oncogenic types

HPV9 covers >87% of oncogenic serotypes

Richard Roden, Wu T (2006) How will HPV vaccines affect cervical cancer? Nature Reviews Cancer 6, 753-763 doi:10.1038/nrc1973

Average annual % of cancer cases attributable to HPV, by anatomic site and sex, United States 2008-2010



Adapted from: Saraiya M, Unger E, Thompson T, et al (2015) Assessment of HPV types in cancers: Implications for current and 9-valent HPV vaccines. *Journal of National Cancer Institute* 107 (6) Table 4

HPV vaccine profile

- Extensive post-market surveillance HPV4
  - no safety signals raised
- Summary of post-market safety associations
  - Syncope (related to injection reaction)
  - Possible skin infections (probably injection site reactions misclassified)
  - Pregnancy (contraindicated but inadvertent admin)
    - No theoretical risk (not a live vaccine)
    - No differences in outcome pregnant/non pregnant

Haupt et al An overview of Quadrivalent HPV vaccine safety 2006 – 2015 PIDJ Sept 2015

HPV9 vaccine

- 15,000 subjects in 31 countries
- HPV9 slightly more reactogenic than HPV4
  - injection site reactions: only significant difference was in injection site swelling
  - common systemic events all slightly higher e.g. headache 14.6% (13.7% with HPV4), pyrexia 5% (4.3% with HPV4)
- No serious adverse events
  - anaphylaxis is possible

Moreira E D, Block S L, Ferris D et al (2016) Safety profile of the 9-valent HPV vaccine: a combined analysis of 7 phase III clinical trials Pediatrics 2016;138 (2) e2015438

HPV Vaccines safety

- Large number of investigations for specific outcomes
  - Case reports do not equal causality
  - Extensive investigations for venous thromboembolism – do not support an association
  - MS – one study suggested an increased risk in 30 day period after vaccination, overall the data does not support this finding
  - POTS case reports. EMA review to date, no increase
  - Complex regional pain syndrome, fibromyalgia – not expected to be linked

EMA report
http://www.ema.europa.eu/ema/index.jsp?curl=pages/medicines/human/referrals/Human_papillomavirus_vaccines/human_referral_prac_000053.jsp&mid=WC0b01ac05805c516f

Effectiveness of HPV4 vaccine

- Over 130 published studies to June 2016
  - Maximal reduction of around 90% for HPV infection, genital warts and cervical abnormalities (57 studies)
- Profound reduction in genital warts (e.g. Australia and Denmark)
  - Mediocre coverage also leads to significant reductions
  - Elimination of genital warts may be possible

Garland SM, Kjaer SK, Muñoz N, et al. Impact and Effectiveness of the Quadrivalent Human Papillomavirus Vaccine: A Systematic Review of Ten Years of Real-World Experience. Clin Infect Dis 2016:ciw354.

New Zealand National Immunisation Schedule from 1 April 2018

	RV	DTaP-IPV-HepB/Hib	PCV	Hib	VV	MMR	DTaP-IPV	Tdap	HPV	Td	Influenza	HZV
Every pregnancy								Boostrix® between 28-38 weeks pregnancy			Influvac® Tetra any trimester	
6 weeks	Rotarix®	Infanrix®-hexa	Synflorix®									
3 months	Rotarix®	Infanrix®-hexa	Synflorix®									
5 months		Infanrix®-hexa	Synflorix®									
15 months			Synflorix®	Hiberix®	Varilrix®	Priorix®						
4 years						Priorix®	Infanrix®-IPV					
11 years								Boostrix®				
12 years									Gardasil® 9 two doses			
45 years										ADT™ Booster		
65 years										ADT™ Booster	Influvac® Tetra	Zostavax®

VACCINE KEY

RV: rotavirus
DTaP-IPV-HepB/Hib: diphtheria, tetanus, acellular pertussis, polio, hepatitis B, *Haemophilus influenzae* type b
PCV: pneumococcal conjugate vaccine
Hib: *Haemophilus influenzae* type b
VV: varicella (chickenpox) vaccine
MMR: measles, mumps, rubella
DTaP-IPV: diphtheria, tetanus, acellular pertussis, polio
Tdap: tetanus, diphtheria, acellular pertussis
HPV: human papillomavirus
Td: tetanus, diphtheria
HZV: herpes zoster (shingles) vaccine

The Immunisation Advisory Centre

For more details, visit **immune.org.nz**

April 2018