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Academic General Practitioner
Wellington

Overview on Vaccinations Workshop - Nurses Programme

Saturday, 22 June 2013

Start 9:30am

Duration: 60mins

Sportsdrome



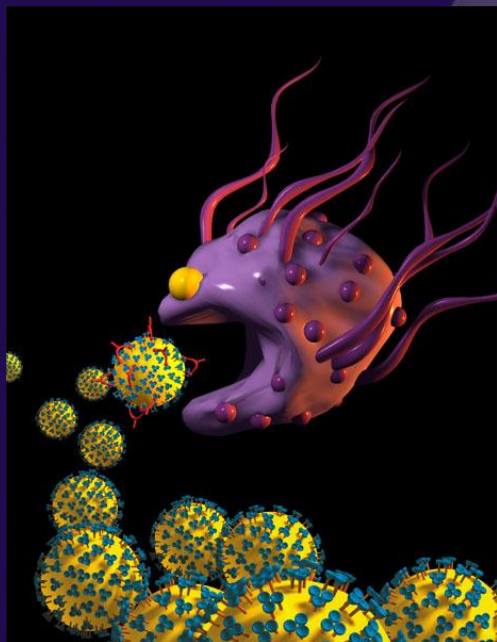
  **Rotorua GP CME 2013**

General Practice Conference & Medical Exhibition

20-23 June 2013 | Energy Events Centre | Rotorua



Overview on Vaccinations



Nikki Turner
University of Auckland
June 2013



Table 1. Historical Comparison of Morbidity and Mortality for Vaccine-Preventable Diseases With Vaccines Licensed or Recommended Before 1980: Diphtheria, Measles, Mumps, Pertussis, Poliomyelitis, Rubella, Smallpox, Tetanus^a

Vaccine-Preventable Disease	Prevaccine No. (y)				Vaccine Date(s), y ^f	Most Recent Postvaccine Reported No.		Prevaccine Estimated Annual No. vs Most Recent Reported No. (% Reduction)	
	Estimated Annual Average		Peak			Cases, 2006 ^g	Deaths, 2004 ^h	Cases	Deaths
	Cases ^b	Deaths ^c	Cases ^d	Deaths ^e					
Diphtheria	21 053 (1936-1945)	1822 (1936-1945)	30 508 (1938)	3065 (1936)	1928-1943	0	0	21 053 (100)	1822 (100)
Measles	530 217 (1953-1962)	440 (1953-1962)	763 094 (1958)	552 (1958)	1963, 1967, 1968	55	0	530 162 (99.9)	440 (100)
Mumps	162 344 (1963-1968)	39 (1963-1968)	212 932 (1964)	50 (1964)	1940s, 1967	6584	0	155 760 (95.9)	39 (100)
Pertussis	200 752 (1934-1943)	4034 (1934-1943)	265 269 (1934)	7518 (1934)	1914-1941	15 632	27	185 120 (92.2)	4007 (99.3)
Poliomyelitis, acute	19 794 (1941-1950)	1393 (1941-1950)	42 033 (1949)	2720 (1949)	1955, 1961-1963, 1987	0	0	19 794 (100)	1393 (100)
Poliomyelitis, paralytic	16 316 (1951-1954)	1879 (1951-1954)	21 269 (1952)	3145 (1952)	1955, 1961-1963, 1987	0	0	16 316 (100)	1879 (100)
Rubella	47 745 (1966-1968)	17 (1966-1968)	488 796 (1964)	24 (1968)	1969	11	0	47 734 (99.9)	17 (100)
Congenital rubella syndrome	152 (1966-1969)	Not available	20 000 (1964-1965)	2160 (1964-1965)	1969	1	0	151 (99.3)	Not available
Smallpox	29 005 (1900-1949)	337 (1900-1949)	110 672 (1920)	2510 (1902)	1798	0	0	29 005 (100)	337 (100)
Tetanus	580 (1947-1949)	472 (1947-1949)	601 (1948)	511 (1947)	1933-1949	41	4	539 (92.9)	468 (99.2)

^aFootnote letters correspond to Box 1.



www.news.stanford.edu



- **Current challenges – pertussis**
- **Influenza**
- **Pregnancy and vaccination**
- **HCW vaccination**
- **Private market vaccines**
- **Immunisation schedule – the future**
- **Immunisation coverage**
- **Communication challenges**

Current challenges

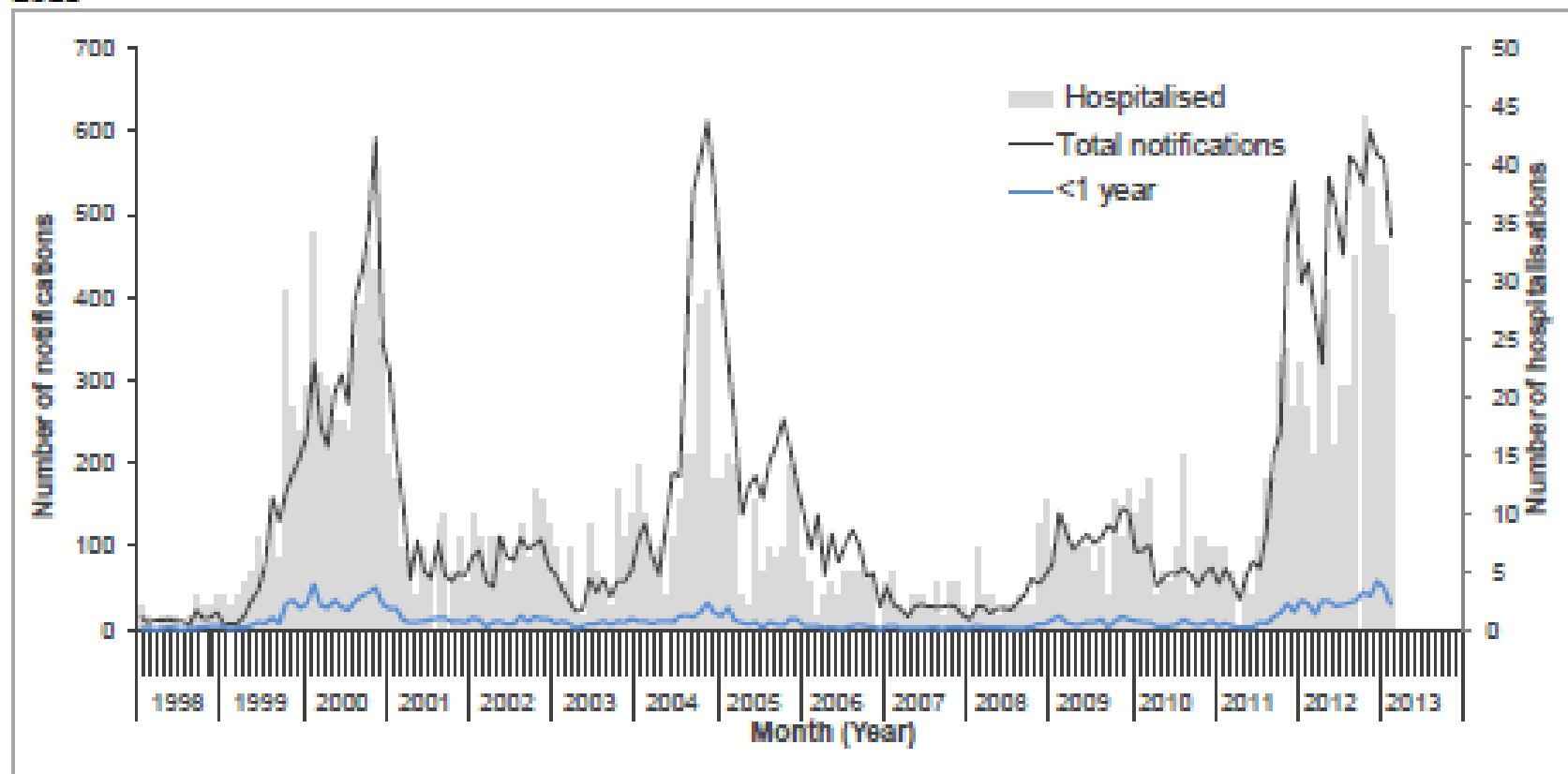


- Mrs B is 79, she has had an annoying cough for a few weeks, worse at night, comes in bouts, a little moist, no fever, overall pretty well in herself but she is fed up with coughing
- FHx: lives with daughter's family



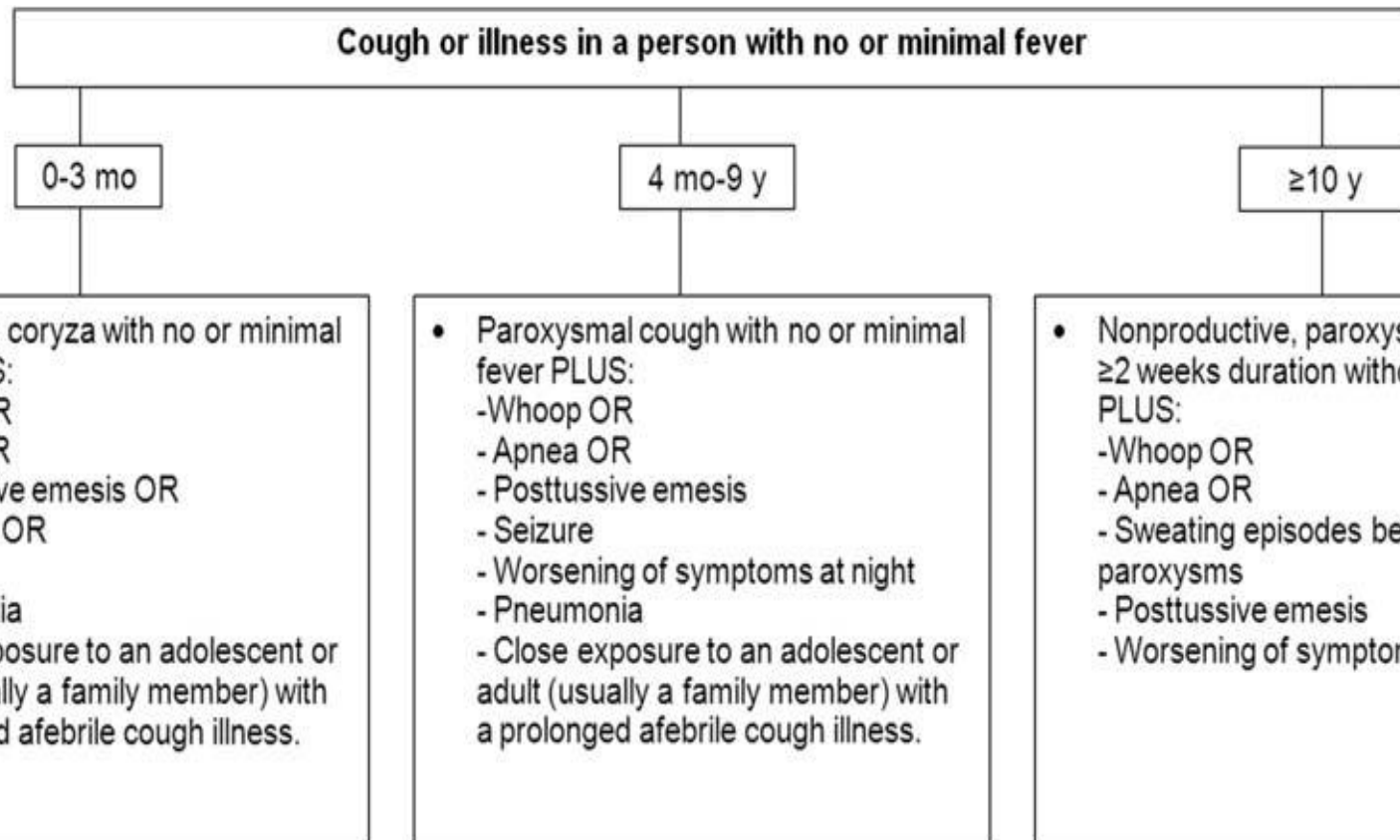


Figure 2: Pertussis notifications and hospitalisations by calendar month-year since 1998 up to 28 February 2013





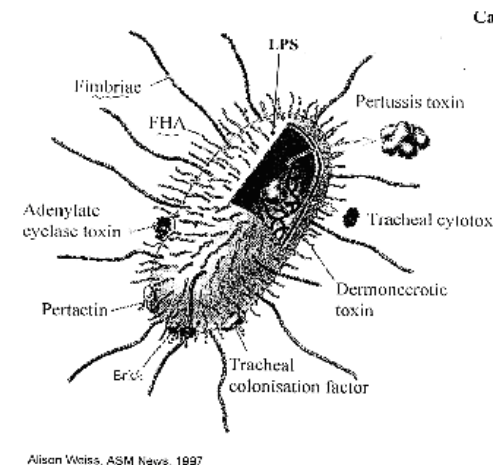
Clinical Case Definition of pertussis for surveillance purposes (reproduced from Cherry et al 2012)





Pertussis control

- Unable to eradicate from whole community
- Most severe in younger children
 - Main target of immunisation strategies
- KEY: High coverage and timeliness of delivery
- Other strategies
 - Immunising older children
 - Immunising adults
 - Cocoon strategies
 - Immunising pregnant women



FLU



NZ medical experts brace for arrival of deadly flu

NZ Herald Jan 15, 2013

Flu infections sweep America hospitalizing thousands and leaving 18 children dead of complications, and it's going to get worse...

MailOnline Feb 20 2013

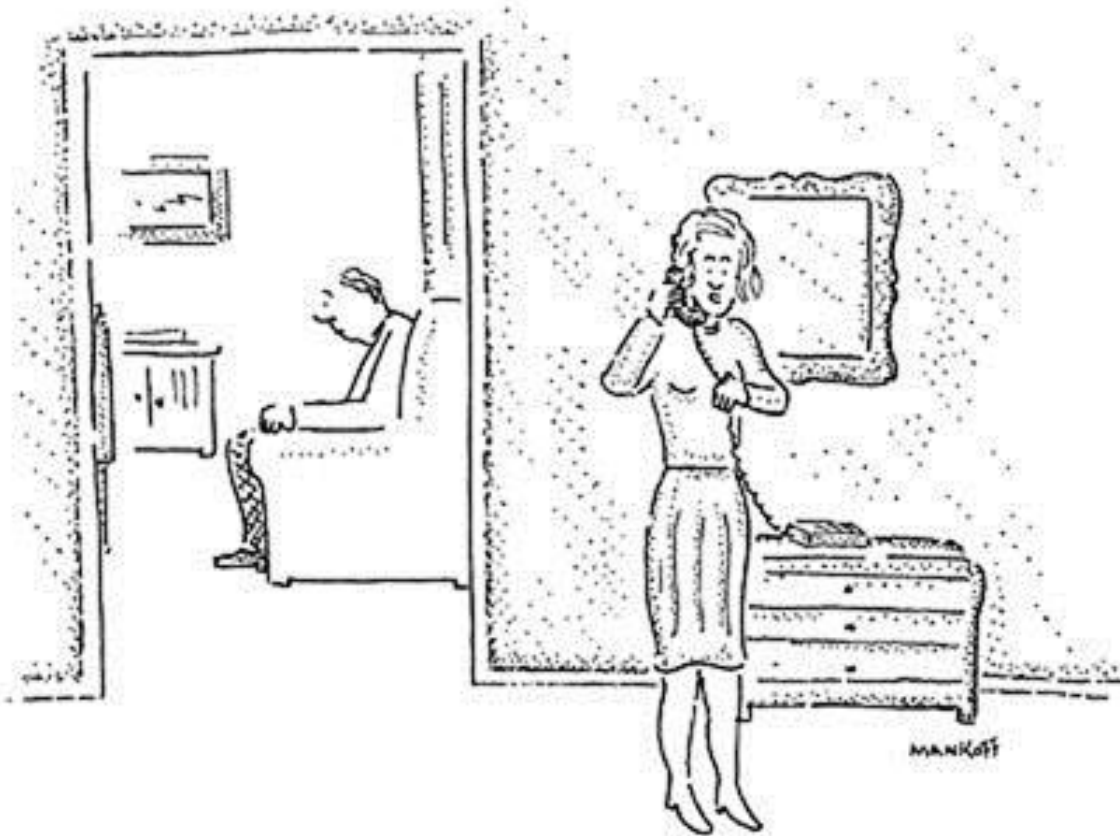
**Flu reaches epidemic level in U.S., says CDC
Jan 2013**

India swine flu 2013: Over 700 cases this year

Feb 25,2013 HealthIndia

'Dirty Brits are world's worst flu spreaders'

Daily Telegraph Oct 2012

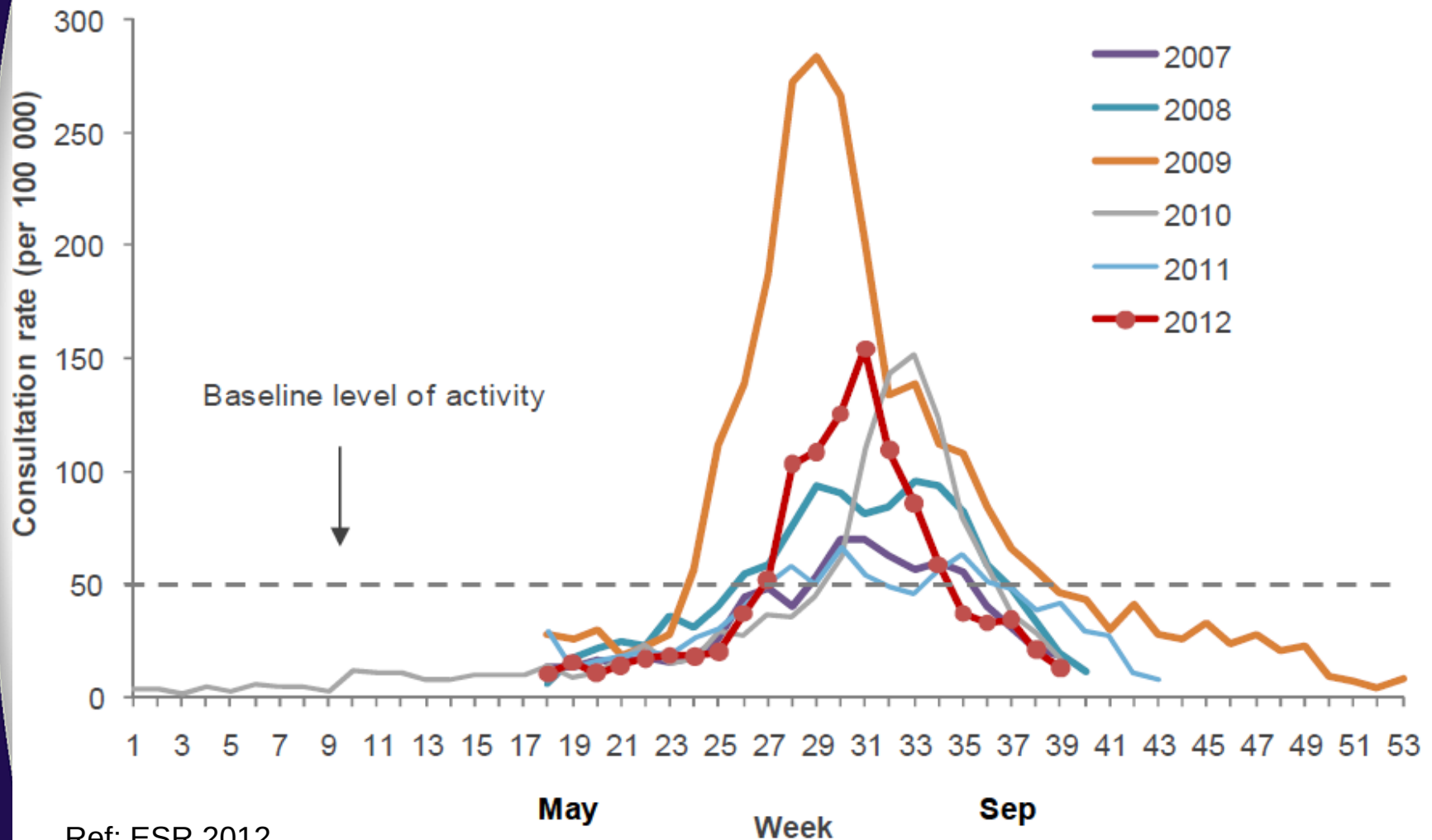


**“ We’d love to come but the flu mongers have
paralyzed us with fear.”**



Consultation rates – 2007 to 2012

Figure 1. Weekly consultation rates for ILI in New Zealand, 2007–2012





Recent TIV vaccine efficacy and effectiveness studies conducted in adults under 65 years of age.

Adapted from Plotkin 6th edition 2012 and updated.

Study	Population age	Study design	Study years	Outcomes and VE
Jefferson 2010 [14]	16-65	Meta-analysis	NA	30% (17%-41%) VE against ILI 73% (CI 54%-84%) VE against influenza symptoms
Osterholm 2012 [74]	18-65 years	Systematic review and meta-analysis	N/A	59% (CI 51%-67%) VE against influenza
Monto 2009 [75]	18-49	RPCT	2007-2008	68% VE against LCI
Beran 2009 [76]	18-64	RPCT	2006-2007	62% VE against LCI 67% VE against vaccine matched strains
Jackson 2010 [77]	18-49	RPCT	2005-6 2006-7	49% VE against CCI 63% VE against C or SCI
Barrett 2011 [78]	18-49	RPCT	2008-2009	78% VE against matched, CCI



Recent TIV vaccine efficacy and effectiveness studies conducted in infants and children.

Adapted from Plotkin 6th edition 2012 and updated.

Study	Population age	Study design	Study years	Outcomes and VE
Jefferson 2012 [15]	Under two years	Systematic review	N/A	Insufficient data to support VE
Cochran 2010 [69]	6-23 months	Retrospective cohort	2003-2006	76% VE against LCI 2005-6 No effectiveness in 2003-4 or 2004-5
Heinonen 2010 [70]	9 months to 3 years	Prospective cohort	2007-2008	66% VE against ILI
Kelly 2011 [71]	6-59 months	Case-control	2008	58% VE against medical visits;
Vesikari 2011 [72]	6-71 months	RPCT	2007-8 and 2008-9	43% (CI 15-61%) VE against PCR-confirmed influenza
Jefferson 2012 [15] [73]	Under 16 years	Systematic review and meta-analysis	N/A	59% (41% - 71%) efficacy against LCI 36% (24% - 46%) effectiveness against ILI



2013 Vaccine strains

- A/California/7/2009 (H1N1)pdm09-like virus (15 µg HA per dose)
- A/Victoria/361/2011 (H3N2)-like virus (15 µg HA per dose) *new strain*
- B/Wisconsin/1/2010-like virus (15 µg HA per dose) *new strain*



Vaccines

- **TIV (trivalent inactivated vaccines)**
 - The only current NZ vaccines
 - QIVs on the way
- **Adjuvanted**
 - Expected to have stronger immune response
 - Was used effectively in some pandemic vaccines
 - Likely better immune response in elderly ,young children
 - Safety issues – local reactions, ?narcolepsy
- **LAIV (Live Attenuated Intranasal)**
 - Broader immune response
 - Likely better for children
 - ?safety issues in children <2 yrs
 - Likely better for herd immunity
 - To be introduced to UK all children > 2 , 2014





Strategies

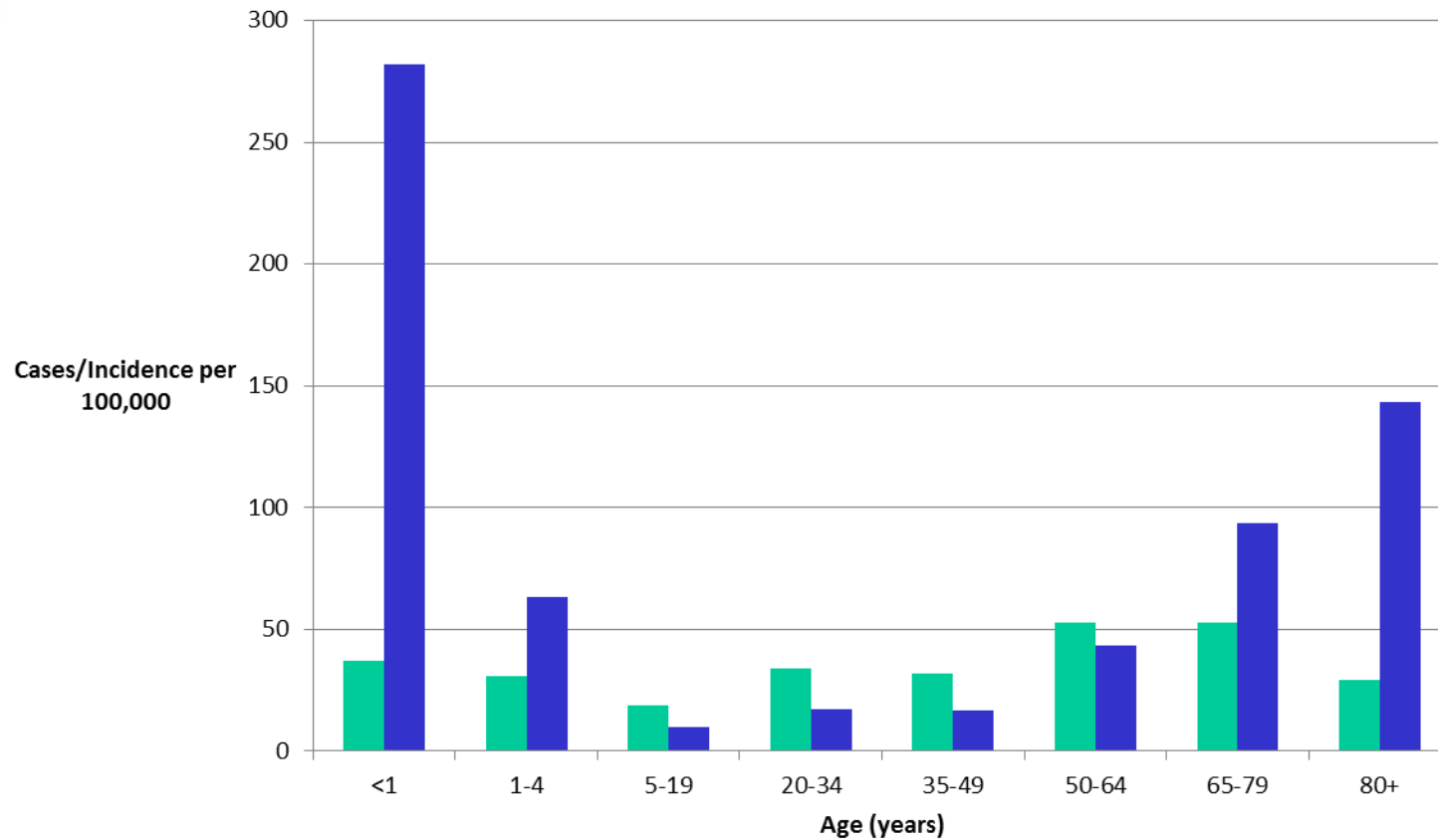
- **Targeted Individual protection**
- **Pregnancy – individual protection and fetal/infant protection**
- **Cocoon protection (not funded)**
 - Infants
 - Elderly
 - High risk patients





Hospitalisation by age

Hospitalized Influenza Cases among ADHB and CMDHB residents 30 April - 30 Sept 2012

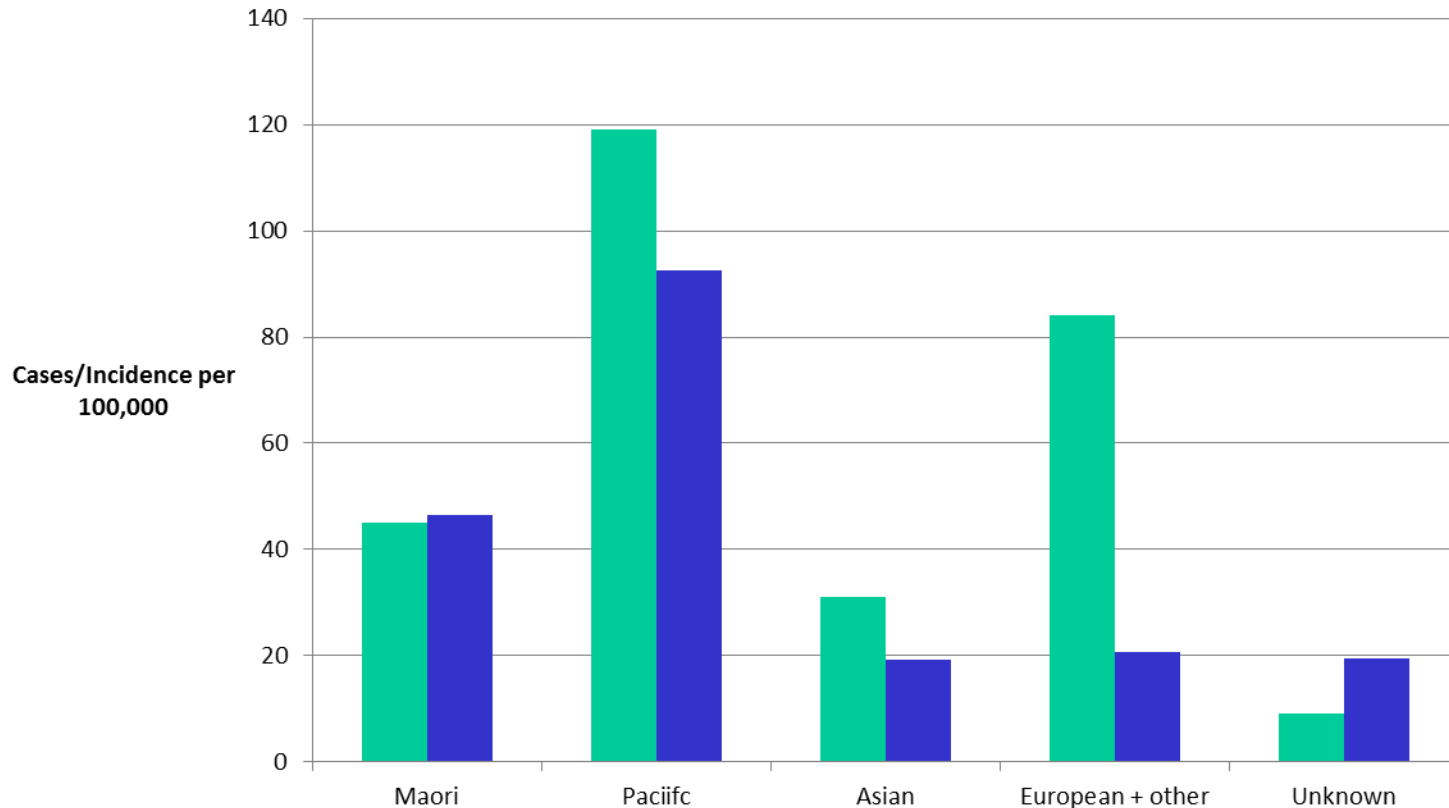


SHIVERS data 2012



Hospitalisation by ethnicity

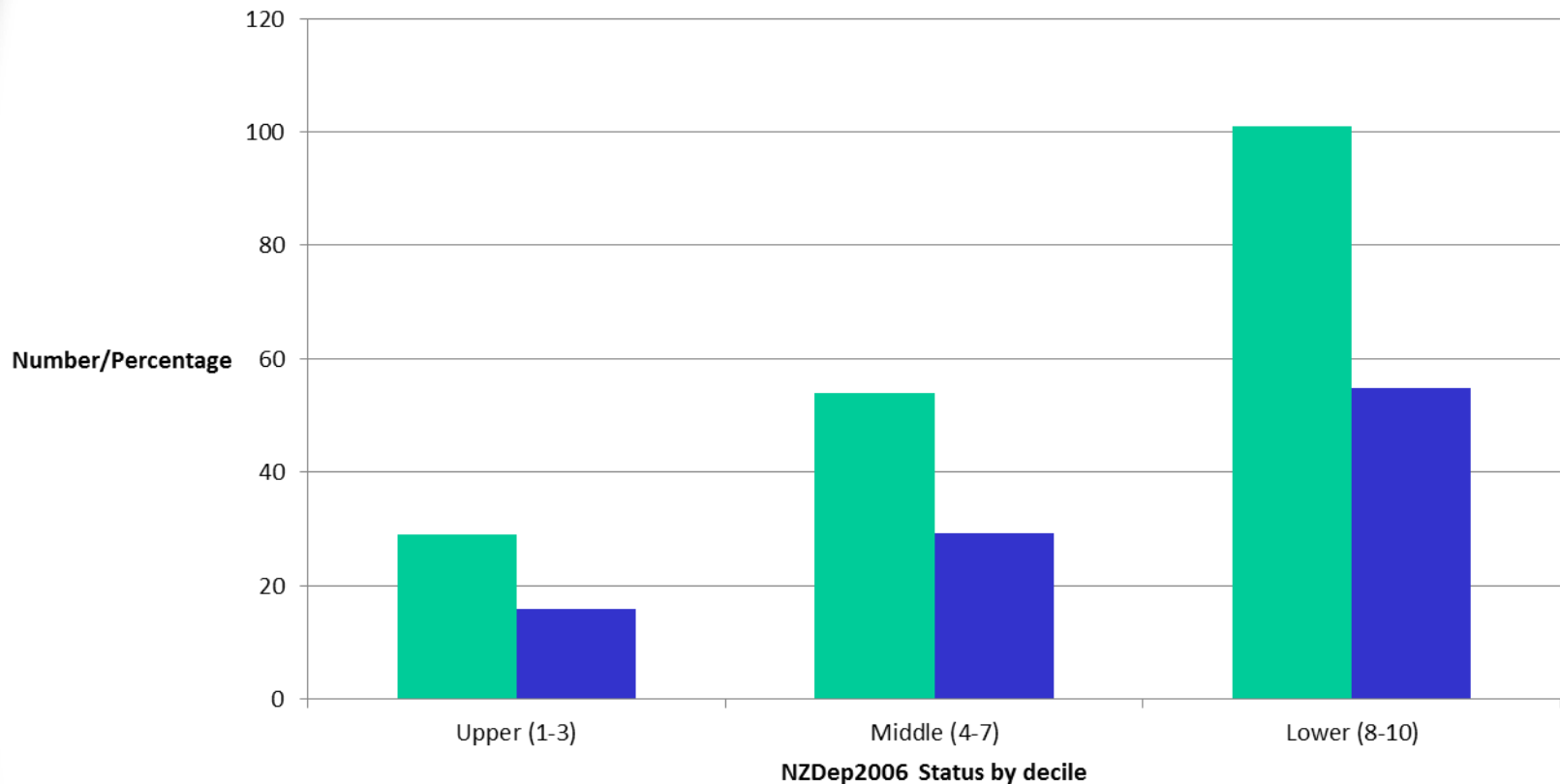
Hospitalised Influenza Cases among ADHB and CMDHB residents 30
April - 30 Sept 2012





And by socio-economic status

**Hospitalised Influenza Cases among ADHB and CMDHB residents
30 April - 30 Sept 2012**





Clinical Symptoms more likely to be associated with diagnosis of flu in hospital admissions

-SHIVERS data

Symptom	OR (95% CI)
Sore throat	1.51 (1.13-2.01)
Headache	1.88 (1.37-2.58)
Aching muscles	1.4 (1.03-1.9)
Abdominal pain	1.49(1.09-2.08)



FLU VACCINE CATEGORIES



ANY QUESTIONS?



Pregnancy and Vaccination





Flu vaccine

- Start of flu season
- Reduces maternal morbidity/mortality
- Reduces fetal mortality
 - Reduces fever
- Reduces flu in newborn
 - Ab protective for around 8 weeks
 - 91% effective in reducing flu in infants

Pertussis-containing vaccine

- 28 to 38 weeks gestation
- Reduces maternal morbidity
- Reduces risk of transfer to newborn
- Some passive protection to newborn
 - Higher Ab transfer if later in pregnancy



Influenza in pregnancy - risk to mother

- **Excess hospital admissions in healthy pregnant women**
 - Similar to non pregnant women with comorbidities
- **Excess hospital admissions in women with co-morbidities**
- **Increases with gestation**
- **More vulnerable during pandemics**
 - 1918, 27% case fatality rate
 - 1957, ½ deaths in young women who were pregnant
 - 2009, 13% of all deaths from H1N1 were pregnant women





Influenza in pregnancy - risks to fetus

1. Infection and fever

- Associated with congenital abnormalities

2. Associated with increased risk of cancer

- Neoplasms of lymphatic and haematopoietic tissue 1957 Asian influenza
- Neuroblastomas

3. Increased risk of general complications



Shiota K, Opitz JM. Neural tube defects and maternal hyperthermia in early pregnancy: Epidemiology in a human embryo population. *American Journal of Medical Genetics* 1982;12(3):281-8.

Griffiths PD, Ronalds CJ, Heath RB. A prospective study of influenza infections during pregnancy. *Journal of Epidemiology and Community Health* 1980 June 1, 1980;34(2):124-8.

Fedrick J, Alberman ED. Reported Influenza in Pregnancy and Subsequent Cancer in the Child. *BMJ* 1972 1972-05-27 00:00:00;2(5812):485-8.

Hakulinen T, Hovi L, Karkinen-Jääskeläinen M, Penttinen K, Saxen L. Association between Influenza during Pregnancy and Childhood Leukaemia. *BMJ* 1973 1973-11-03 00:00:00;4(5887):265-7.

Linós A, Kardara M, Kosmidis H, Katriou D, Hatzis C, Kontzoglou M, et al. Reported influenza in pregnancy and childhood tumour. *European Journal of Epidemiology* 1998 1998/07/01;14(5):471-5.

Irving WL, James DK, Stephenson T, Laing P, Jameson C, Oxford JS, et al. Influenza virus infection in the second and third trimesters of pregnancy: a clinical and seroepidemiological study. *BJOG: An International Journal of Obstetrics & Gynaecology* 2000;107(10):1282-9.



Influenza vaccine in pregnancy - effectiveness

- **Immunogenicity of TIV**
 - Similar to non pregnant women
- **28% efficacy against febrile illness in pregnant women**
- **High transplacental transfer of maternal Ab**
 - Half life 43-53 days
 - Protective for around 8 weeks (61%)

Mak TK, Mangtani P, Leese J, Watson JM, Pfeifer D. Influenza vaccination in pregnancy: current evidence and selected national policies. *The Lancet Infectious Diseases* 2008;8(1):44-52.

Jefferson TO, Rivetti D, Di Pietrantonj C, Rivetti A, Demicheli V. Vaccines for preventing influenza in healthy adults.[update of Cochrane Database Syst Rev. 2004;(3):CD001269; PMID: 15266445]. *Cochrane Database of Systematic Reviews* 2007(2):CD001269.

Zaman K, Roy E, Arifeen SE, Rahman M, Raqib R, Wilson E, et al. Effectiveness of Maternal Influenza Immunization in Mothers and Infants. *N Engl J Med* 2008 October 9, 2008;359(15):1555-64.



Effectiveness of flu vaccine given during pregnancy in preventing hospitalisation for flu in infants

91% effective

Measure	Subjects aged <6 months	Subjects aged ≥6 months
No. (%) of case infants; no. (%) of control infants		
Mother was vaccinated	2 (2.2); 31 (19.9)	1 (4.6); 2 (5.6)
Mother was not vaccinated	89 (97.8); 125 (80.1)	21 (95.5); 34 (94.4)
Vaccine effectiveness (95% CI), %		
Unadjusted	90.7 (59.9–97.8) ^a	–41.4 (–2257.3 to 91.5) ^b
Adjusted ^c	91.5 (61.7–98.1) ^a	...

NOTE. CI, confidence interval.

^a $P = .001$.

^b $P = .809$.

^c The adjusted model for subjects aged <6 months retained vaccination of household contacts and prematurity.

Benowitz I, Esposito DB, Gracey KD, Shapiro ED, Vazquez M. Influenza vaccine given to pregnant women reduces hospitalization due to influenza in their infants. *Clinical Infectious Diseases* 2010 Dec 15;51(12):1355-61.



Influenza vaccine in pregnancy – safety

- **Several studies and no indication of increased risk to fetus e.g.:**
 - 2291 vaccinated in cohort of 51000 no evidence for excess of childhood malignancies (Heinonen 1973)
 - 41 vaccinated in cohort of 517 no excess physical or neurological, perinatal complications, no serious events (Deinard 1981)
 - 1006 vaccinated and 1495 unvaccinated, no adverse events Also passive reporting systems
 - i.e. UK Yellow Card reporting 1994-2004

HEINONEN OP, SHAPIRO S, MONSON RR, HARTZ SC, ROSENBERG L, SLONE D. Immunization During Pregnancy Against Poliomyelitis and Influenza in Relation to Childhood Malignancy. *International Journal of Epidemiology* 1973 September 21, 1973;2(3):229-36.

Deinard AS, Ogburn P, Jr. A/NJ/8/76 influenza vaccination program: effects on maternal health and pregnancy outcome. *Am J Obstet Gynecol* 1981 Jun 1;140(3):240-5.

Tamina PD, Ault KA, del Rio C, Steinhoff MC, Halsey NA, Omer SB. Safety of influenza vaccination during pregnancy. *American Journal of Obstetrics and Gynaecology* 2009;201(6):547-52.



Neonatal outcomes - RCT

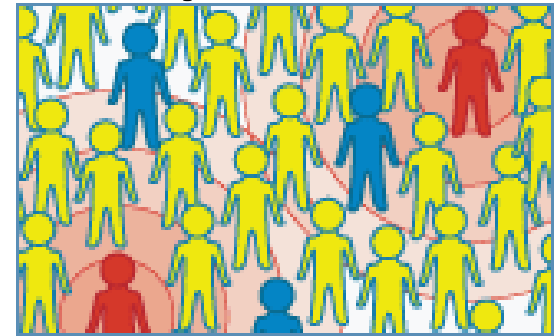
- **340 pregnant women randomised to TIV or PPV-23**
- **During period with circulating influenza maternal influenza vaccination associated with**
 - Fewer small for gestational age infants
 - Increase in mean birth weight
 - Less incidence of fever and respiratory illness in mother

Steinhoff MC, Omer SB, Roy E, Arifeen SE, Raqib R, Dodd C, et al. Neonatal outcomes after influenza immunization during pregnancy: A randomized controlled trial. Cmaj 2012;184(6):645-53.



Two important points for pertussis control

- **Pertussis immunity wanes – not life long**
 - Natural infection AND vaccine induced
- **High vaccination coverage alone will not protect infants**
 - Mechanism of protection
 - Not completely understood
 - Ab directed at a range of antigens
 - No serological correlate for protection
 - Higher Ab levels to above less likely to develop clinical disease





Immunity to pertussis



- **Most infants not born with serum Ab against pertussis**
- **Lack of maternal antibody an explanation for pertussis susceptibility in very young infants**
- **Maternal antibodies probably offer short lived protection against lethal pertussis**
- **The higher the cord blood Ab concentration, the longer new born protected**
- **Babies born to mothers recently vaccinated have higher circulating Ab**

Francis P., Mooi F., de Greeff S. Maternal vaccination against pertussis/Authors' reply. The Lancet Infectious Diseases. 2008 Apr 1;8(4): 214-215.

Bechini A, Tiscione E, Boccalini S, Levi M, Bonanni P. Acellular pertussis vaccine use in risk groups (adolescents, pregnant women, newborns and health care workers): A review of evidences and recommendations. Vaccine (in press).



Transplacental maternal antibodies

- Efficiently transferred
- Cord blood from infants whose mothers vaccinated during or before pregnancy have higher titres
- Half life of maternal Abs in infant ~6 weeks
- Effectiveness of these Abs in preventing disease not yet known
- Vaccinated woman likely protected herself and not transmit to infant
- Optimise transfer by vaccinating late 2nd or early 3rd trimester as circulating Abs peak after 14 days then decline.

Gall SA, Myers J, Pichichero M. Maternal immunization with tetanus-diphtheria-pertussis vaccine: effect on maternal and neonatal serum antibody levels. *Am J Obstet Gynecol* 2011;204:334.e1--5.

Leuridan E, Hens N, Peeters N, de Witte L, Van der Meeren O, Van Damme P. Effect of a prepregnancy pertussis booster dose on maternal antibody titers in young infants. *Pediatr Infect Dis J* 2011;30:608--10.

Van Rie A, Wendelboe AM, Englund JA. Role of maternal pertussis antibodies in infants. *Pediatr Infect Dis J* 2005;24(5 Suppl):S62--5.



Safety of Tdap in pregnant women

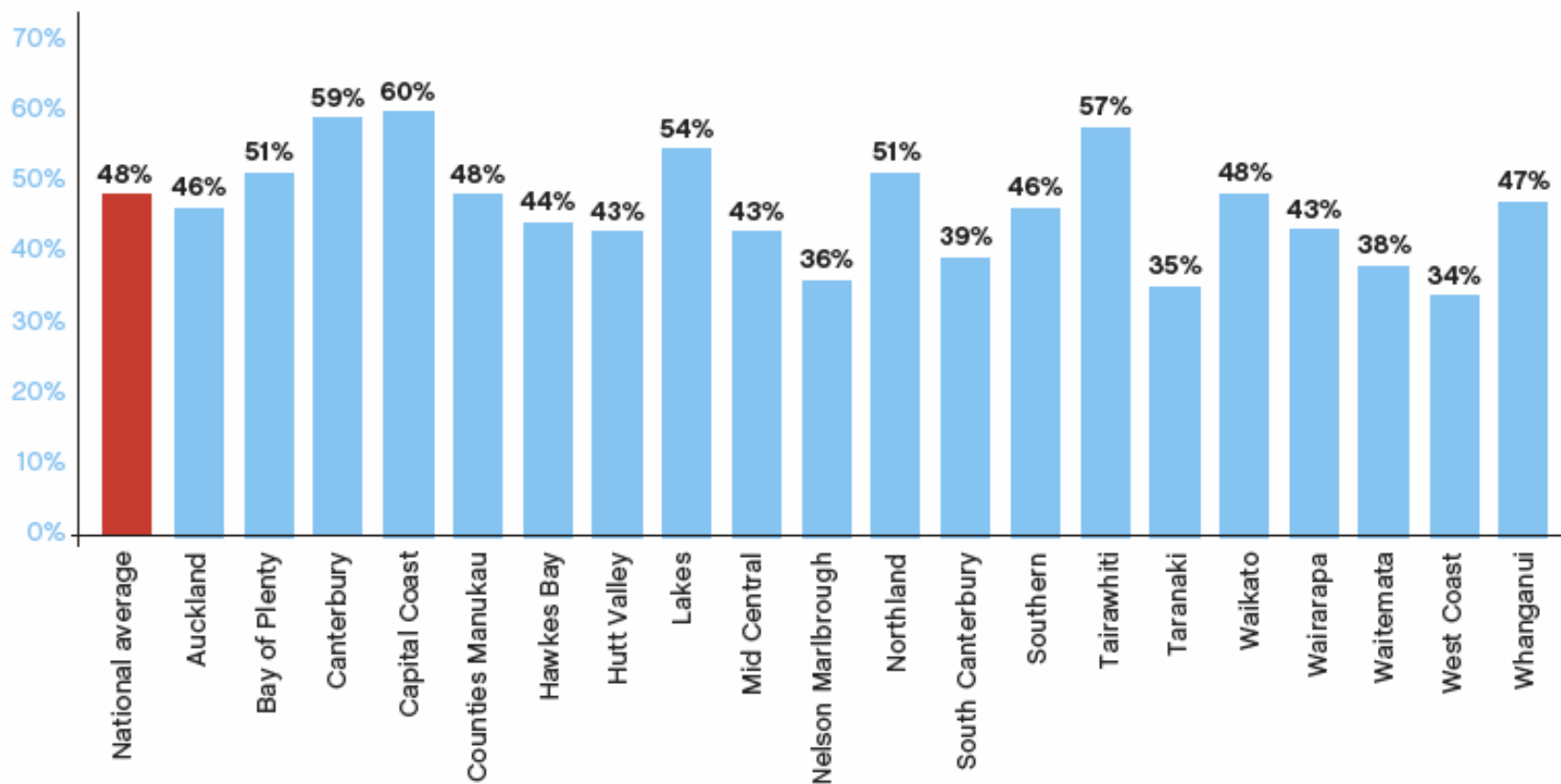
- **Pregnancy registers established by manufacturers**
 - sanofi pasteur (Adacel®) and GSK (Boostrix®)
- **Data from passive reporting systems evaluated**
 - VAERS
 - The few serious events unlikely to be caused by the vaccine
- **No elevated frequency or unusual patterns of AEFI in pregnant women**
 - after 20 weeks' gestation is preferred to minimise the risk for any low-frequency adverse event and the possibility that any spurious association might appear causative.

HealthCare Professional Vaccination?



HOW ARE WE DOING IN NEW ZEALAND?

Influenza vaccination of hospital staff by DHB in 2012



Source: 2012 Workplace Immunisation Cover, Ministry of Health, November 2012.



LANCET Editorial 2010

- **Vaccination is a duty one assumes in becoming a healthcare provider**
- **Mandating vaccination is consistent with professional ethics, benefits many, including those who must rely on HCW to protect them, maintains a stable workforce.....**



NACI

(National Advisory Committee on Immunisation – Canada)

- **HCWs who have direct patient contact should consider it their responsibility to provide the highest standard of care which includes influenza vaccination.**
- **In the absence of contraindications, refusal of HCWs who have direct patient contact to be immunized implies failure in their duty of care to patients.**



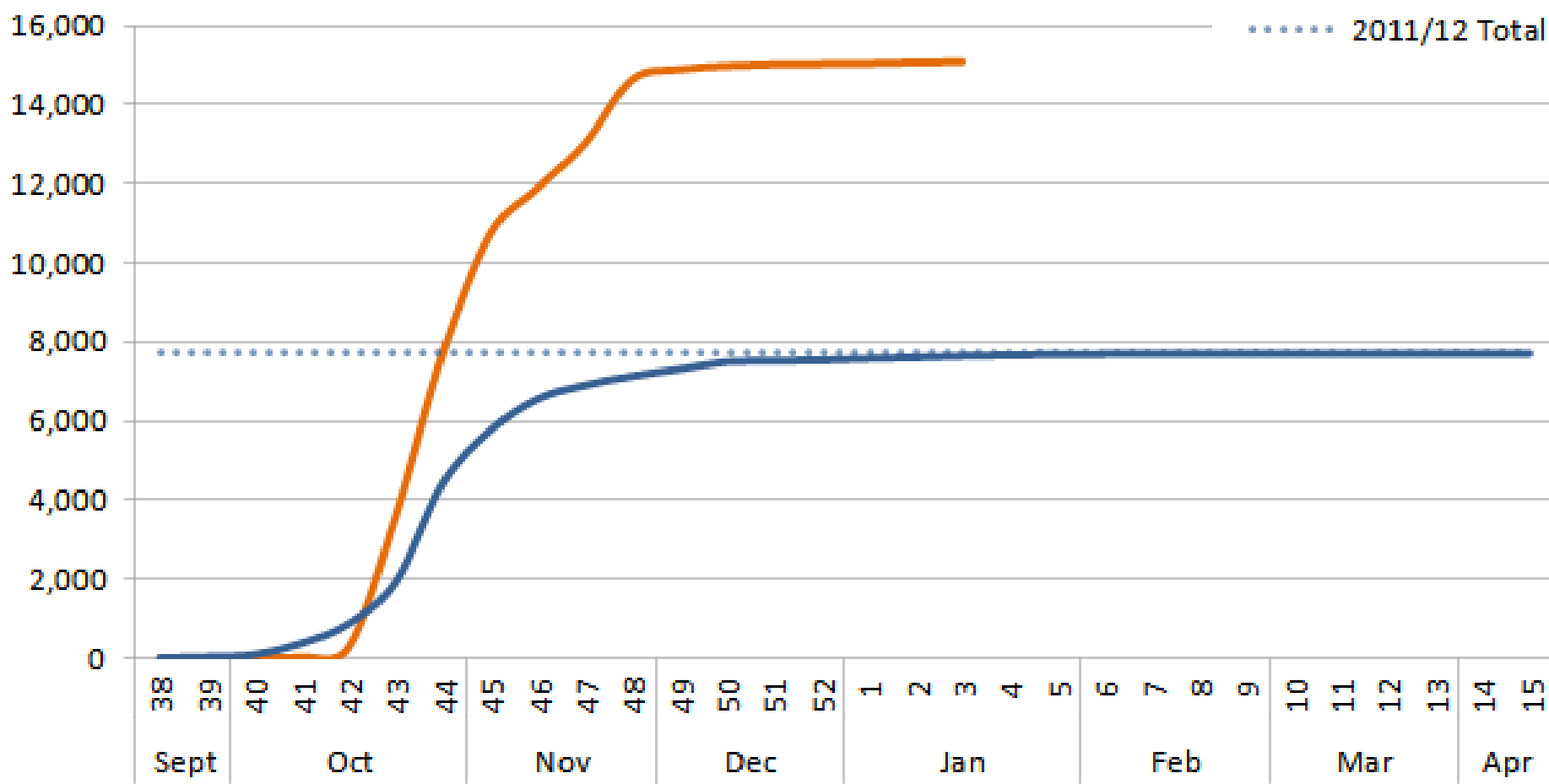
BC 2012 Policy

- **Fall 2012 HCW in BC must be vaccinated against influenza as a condition of service**
- **If unable/unwilling must wear a mask**
 - throughout influenza season
 - while in facilities where patient care is given
 - includes physicians, RNs, students, volunteers and contracted workers
 - regardless of reason for not immunising



Employee Vaccinations, 2011/12 & 2012/13

- 2012/13
- 2011/12
- 2011/12 Total



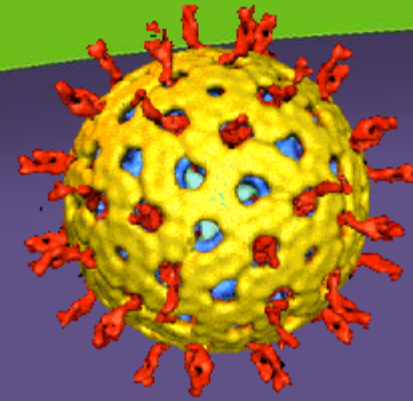


Protect ourselves and others

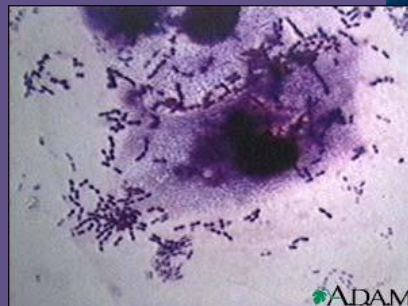
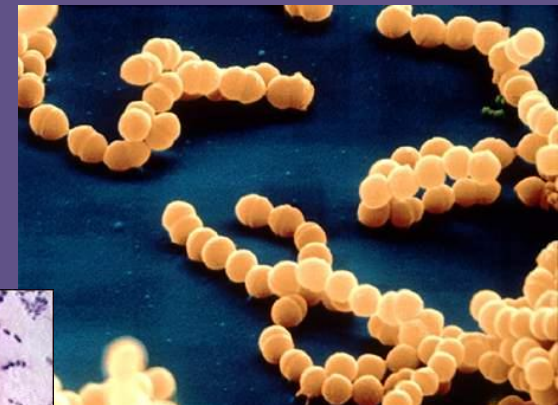
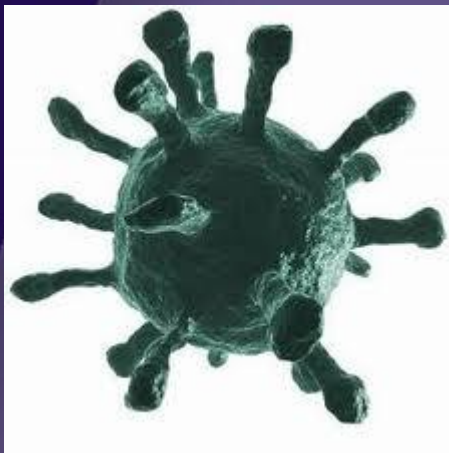
- our ethical obligations to our patients

- **Am I vaccinated as a health professional?**

- Flu
- Pertussis
- Measles
- Hepatitis B
- MMR
- Varicella



Private Market Vaccines





- **Cory has been brought in for his 6 week immunisations. His Mum wants to give him all the full protection she can. Should she have the 'better' pneumococcal vaccine that she was told about in her antenatal group.**



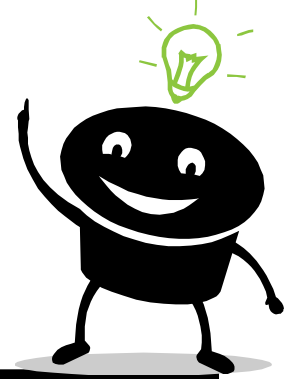
What would I currently recommend to patients?

Cost versus effectiveness : balance....not simple

- Rotavirus 2 doses 6 and 10 weeks
- Varicella
 - 2 dose from 9m or ?one dose at a year of age (assume wild boosting)
 - Adolescents/adults with no history of disease 2dose
- Meningococcal
 - Conjugate C 2+ 1, or single dose >1 year
 - Conjugate C or quadrivalent at mid teenager
- Pertussis and influenza: pregnancy (funded)/cocoon
 - Occupational Tdap/flu
- HPV boys
- At risk occupations/travellers – hepatitis B, hepatitis A



Private market vaccines to consider



Patient	Vaccine
Infants	Rotavirus vaccine Meningococcal C conjugate vaccine
Older infants/toddlers	Varicella, meningococcal conjugate
Adolescents/young adults	4-valent Meningococcal conjugate (polysaccharide cheaper for short duration immunity)
Cocoon protection	Pertussis and influenza
MSM	HPV
Boys/young men	HPV
Elderly	Pneumococcal conjugate + polysaccharide
You	Pertussis and influenza





Rotavirus

- **Death rare**
- **1 in 43 children hospitalised by 5 yrs in NZ**
- **For each hospitalisation 8 children seen in primary care**
- **> 90% children have RV by 3 yrs**
 - no strong ethnic or se gradient, a universal bug!
- **Vaccine 85% efficacy against RV hospitalisation**
 - 2 doses 4 weeks apart, complete by 24 weeks
 - \$100 (currently) - \$160 course exc GST and delivery

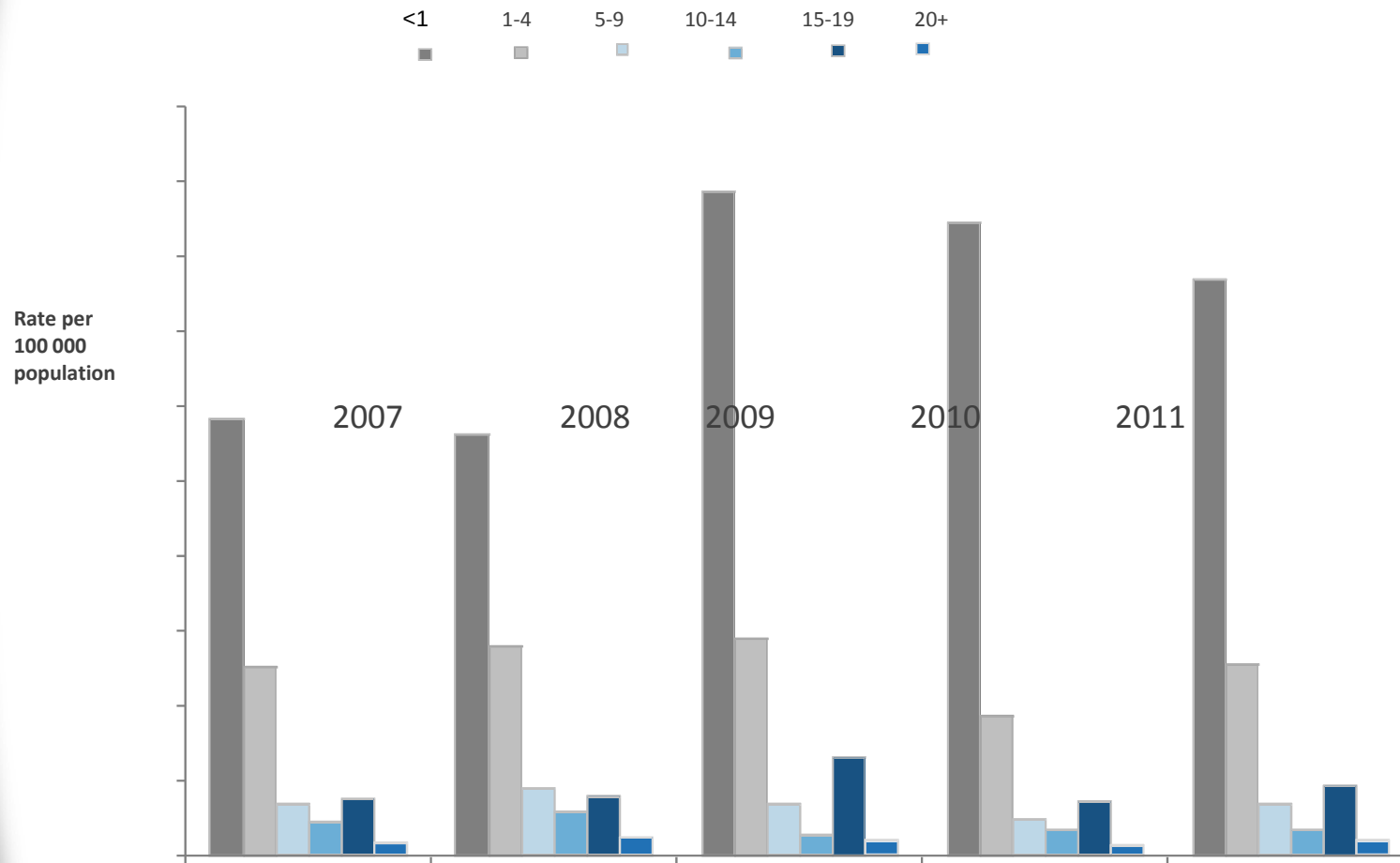
Lepage P. *Pediatr Infect Dis J* 2006;25:S5–S6.

Grimwood K, Lambert SB. *Hum Vaccine* 2009;5:57–69

Milne RJ, Grimwood K. *Value Health* 2009;12:888–898



Meningococcal disease rates by age group, 2007–2011





Distribution of strain types among meningococcal disease cases 2011

Strain group	Number of cases
Group B	62
P1.7-2,4	37
Other group Bs	25
Group C	38
P1.5-1,10-8	27
Other group Cs	5
Other	6
Group Y	3
Group W135	2
Non-groupable	1

From: *The Epidemiology of Meningococcal disease in New Zealand in 2011* ESR June 2011



Meningococcal vaccines

Currently only private market and outbreak use in NZ

- **Polysaccharides** – A, C, Y, W-135
 - Ineffective in younger children
 - Short duration of immunity
 - Possible hyporesponsiveness with multiple use
 - **Conjugates** –C, Quadrivalent
 - Effective in younger children
 - Herd immunity effects
 - B vaccine.....close
- (NB unlikely to be any individual protection left now in NZ community from MeNZB vaccine)

Private purchase of non-funded vaccines (excl GST and delivery) March 2013



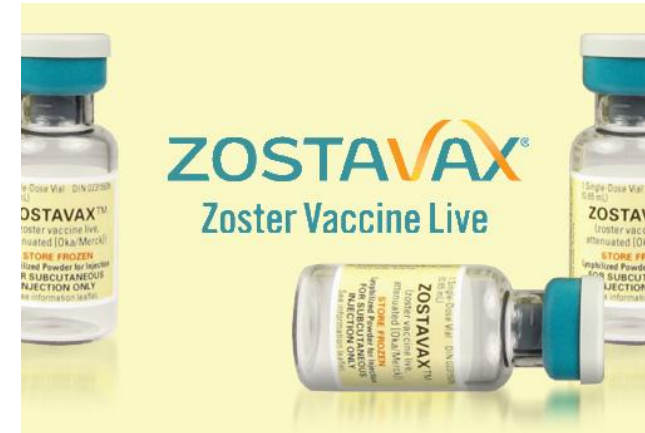
Vaccine	Protects against	Manufacturer	Price per dose ¹	Number of doses required
Adacel®	pertussis, tetanus and diphtheria	Sanofi-Pasteur	\$25.00	1 dose as a booster Can be offered to adults for pertussis protection
Boostrix™	pertussis, tetanus and diphtheria	GSK	\$25.00	1 dose as a booster Can be offered to adults for pertussis protection
Gardasil®	human papillomavirus 6,11,16 and 18	CSL	\$128.50	3 doses for females 9-45 yrs and males 12-15 yrs NB funded for girls born after 1.1.90
Intanza®	Influenza	Sanofi-Pasteur	\$150/10	Intradermal vaccine
IPOL®	polio	Sanofi-Pasteur	\$35.32	1 dose as a booster
Meningitec®	meningococcal disease group C	Pfizer (Wyeth)	\$75.00	3 doses before 12 months or 1 dose if given after 12 months
NeisVac-C™	Meningococcal disease group C	Baxter	\$43.00	2 doses before 12 months or 1 dose after 12 months
Menactra®	Meningococcal disease groups A,C,Y, W135	sanofi-aventis	\$89.95	Single dose aged 2 – 55 years Booster dose ever 5 years if risk continues
Mencevax™ ACWY	meningococcal A, C, W ₁₃₅ and Y	GSK	\$30.00	1 dose. Do not use before 2 years
Menomune™ ACYW-135	meningococcal A, C, W ₁₃₅ and Y	Sanofi-Pasteur	\$30.00	1 dose. Do not use before 2 years
Pneumovax®23	pneumococcal disease	MSD	\$40.00	1 dose. Do not use before 2 years
Prevenar 13®	pneumococcal disease	Pfizer (Wyeth)	\$168.20	1 dose if given after 2 years NB funded for children born after 1.1.08
Rotarix®	rotavirus	GSK	\$80.00	2 doses (before 24 weeks)
Varivax®	varicella (chickenpox)	MSD	\$50.00	1 dose 12 months-12 years or 2 doses if given from 13 years
Varilrix™	varicella (chickenpox)	GSK	\$50.00	1 dose 9 months-12 years or 2 doses if given from 13 years
Zostavax™	Varicella (zoster)	MSD	\$172.42	1 dose from 50 years



Shingles - Zostavax

- VE
 - Zoster reduction 51%
 - Post herpetic neuralgia reduction 67%
- Contraindications
 - Anaphylaxis to any components, neomycin
 - Immunodeficiency/ immunosuppressed
 - Pregnancy
 - Active untreated Tb
- Who to advise
 - Elderly

Aims



NZ Immunisation Schedule ? the future....



Vaccines: What is next.....

- **Always the possibility of future flu pandemics**
- **Next vaccines recommended for the schedule**
 - Rotavirus
 - Varicella
- **To consider after that**
 - Meningococcal Vaccines
 - Conjugates C and quadrivalent
 - B
 - Better flu vaccines: live attenuated (kids), adjuvanted(elderly)
 - HPV for boys/men
 - Shingles vaccines (over 50 yrs)
 - Pertussis vaccines in older age groups



Delivery issues....

- **MMRV versus monovalent Varicella**
- **?extra injections in 15 month visit or**
- **?an extra visit in Year two**
- **Adult vaccination schedule ?**
- **?Children and annual flu vaccination (LAIV)**



Slightly more distant horizon

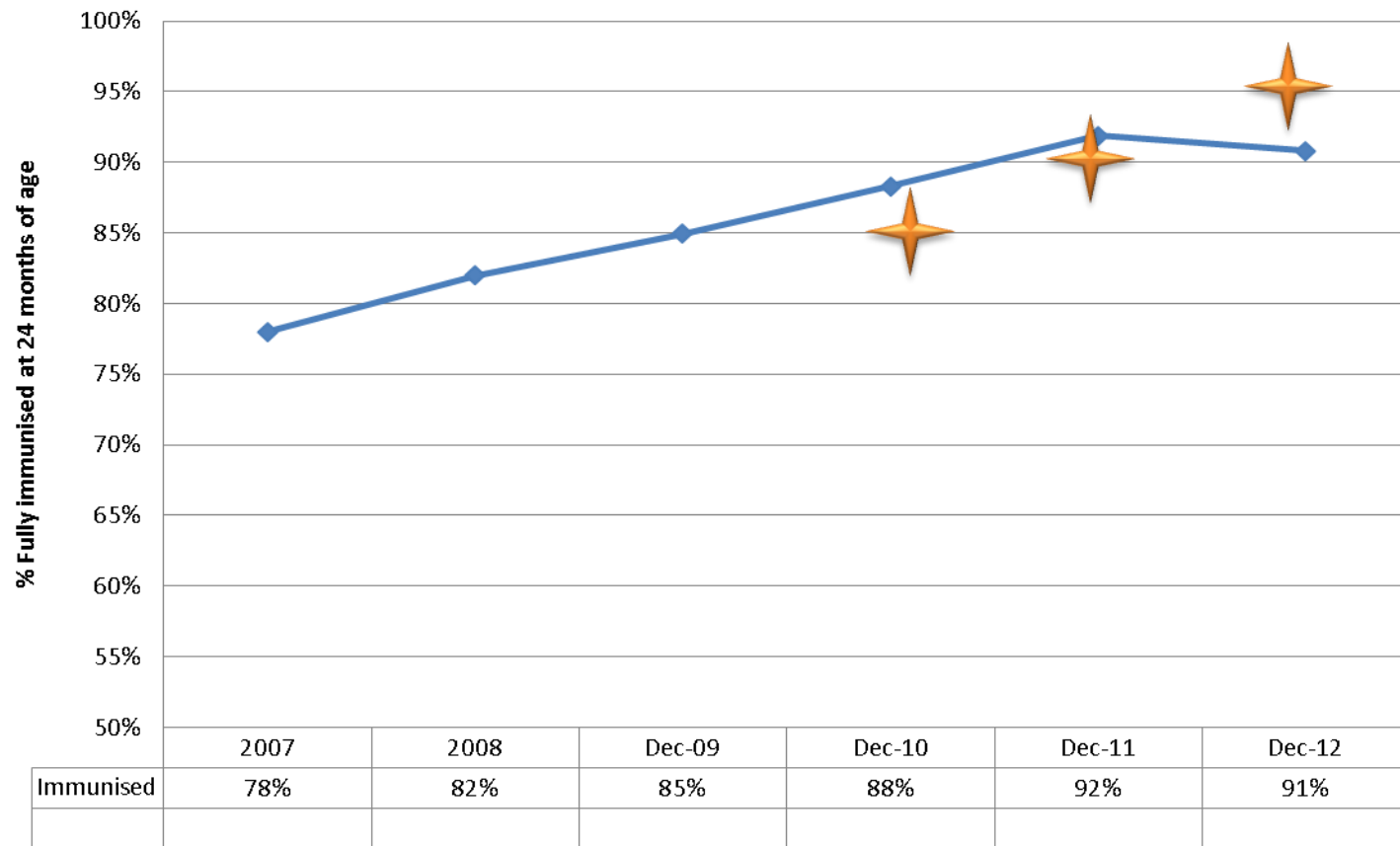
- **Better adjuvants**
- **Delivery mechanisms**
 - More intranasal eg live influenza vaccine
 - Aerosol eg measles, rubella
 - Oral eg transgenic plants
 - Transcutaneous eg hepB, anthrax
 - More thermostable
- **New targets.....**



Coverage



Fully Immunised at age of 2 years 2007 to 2012





Why are we improving

- Commitment at all levels – national target
- Feedback loops – DHBs and PHOs
- General Practice engagement and confidence
 - More focus , higher priority
 - Less missed opportunities
- **SYSTEMS**
 - Early ENROLMENT! - and follow up
 - Precalls/recalls/audits
 - PMS/NIR
 - Providers to OIS : effective interface
- Confident health sector spills over to confident public
 - Less anti-science in the media



Areas to continue focus: Missed opportunities





True contraindication

- Anaphylaxis to any component of the vaccine
- Acutely unwell: high fever, toxic etc

Immunocompromised with a live vaccine

(MMR, Varicella)

Evolving neurological conditions with pertussis

Anaphylaxis to egg with flu vaccine



False....

X

- MMR vaccine causes autism
- Egg allergy cannot vaccinate with MMR
- Availability of single vaccines eg tetanus
- 3 injections at 15 months is too hard
- Can't vaccinate while breast feeding



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Communicating



Typologies

- **Nuturers – children at low risk of disease**
- **Fearfuls – experience emotionally distressing**
- **Vulnerables – barriers to access**
- **Unwell - child poor health**
- **Rejectors - opposed**

Communication challenges



Lack of understanding of immunology

- Baby's system is too young
- Overloaded immune systems
- Skewering of the immune system
- Too many antigens in each vaccine



Myth: Vaccines reactions are underreported

Adverse Event reporting via CARM is for signal generation for anything new or unexpected eg febrile convulsions and Fluvax

- is not designed to account for all adverse events

Active surveillance occurs internationally in many different formats

eg vaccine safety data links - matching hospital records, GP records to imms records; prevalence studies; case control; independent reviews



US Vaccine Safety Datalink Group

Ray et al PIDJ 2006

<http://www.ncbi.nlm.nih.gov/pubmed/16940831>

*“In this study of more than 2 million children
DTP and MMR vaccines were not associated with
an increased risk of encephalopathy after
vaccination”.*



Science

Vaccinated people slightly less likely to have allergic disease

Vaccinated babies less likely to die of cot death

Vaccinated people no more likely to develop:

Autism

Diabetes

Multiple sclerosis...

In the 1970s a swine flu vaccine used in the USA had an increased risk of Guillain-Barre Syndrome

- One brand of 2009 influenza vaccine associated with 2 cases per 1 million doses in older adults.
- Influenza infection is associated with GBS

MMR 1/30,000 ITP

A recent monovalent adjuvanted flu vaccine was associated with an increase in narcolepsy (not used in NZ)



Coincidence vs. Causality

“Regardless of what the research tells us, I know what I saw.”

Dr. Kathy Pratt, April 25th, 2001, during a hearing by the Office of Government Reform to investigate MMR and autism



The importance of knowing background rates of disease in assessment of vaccine safety

If a cohort of 10 million individuals was vaccinated with a hypothetical vaccine, the medical events that would be expected to occur within 6 weeks post hypothetical vaccine dose:

21.5 cases of Guillain-Barré Syndrome

5.75 cases of sudden death

In a cohort of 1 million vaccinated pregnant women, within 1 day of hypothetical vaccination:

397 would be predicted to have a spontaneous abortion



Paediatric Vaccines Research Review

Making Education Easy

Issue 5 - 2011

In this issue:

- *Pay-for-performance programme increases timely childhood immunisation*
- *Adverse events in pregnant women after influenza vaccination*
- *Helping mothers prevent influenza illness in their infants*
- *Effectiveness of influenza vaccination delivered to children at school*
- *Efficacy of quadrivalent HPV vaccine in males*
- *Local reactions to fifth dose of DTap vaccine*
- *Pneumococcal conjugate vaccine suppresses asthma in mice*
- *Recombinant MenB vaccine in infants*
- *Imperfect vaccine-induced whooping cough immunity*
- *Immunisation arguments in NZ print media: fact or fallacy?*

Welcome to the latest edition of *Paediatric Vaccines Research Review*, a quarterly New Zealand publication bringing you some of the most important paediatric vaccine research from around the world. The Review provides summaries of 10 recent studies, each accompanied by a comment from either Dr. Nikki Turner or Helen Petousis-Harris on why it is important and how it can potentially affect practice. The Review also provides website links to the abstract or fully published paper so you can make your own judgements.

Highlights this month include reassuring data of the safety of the influenza vaccine in pregnant women, impressive results from a study of the quadrivalent HPV vaccine in males, and exciting signs that intranasal PCV7 vaccine might suppress asthma.

If you have colleagues within New Zealand who would like to receive *Paediatric Vaccines Research Review*, please send us their contact email and we will include them next time. We hope you find this edition interesting and look forward to hearing your comments.

Kind regards,

Dr Chris Tofield

Medical Advisor, Research Review
christofield@researchreview.co.nz

Improving timely childhood immunizations through pay for performance in Medicaid-managed care

Authors: Chien AT et al

Summary: This study evaluated the impact of a pay-for-performance (P4P) programme designed to reward timely immunisation delivery to 2-year-olds. In 2003 the Hudson Health Plan (a not-for-profit Medicaid-focused managed care plan) introduced a scheme whereby it paid a bonus of \$US200 for each fully immunised 2-year-old. Immunisation rates within Hudson Health Plan rose at a higher rate than those in comparison health plans. Supplementary analyses found that children with chronic conditions were more likely to be fully immunised during the study period as a result of the programme. In conclusion, a P4P programme can improve childhood immunisation rates.

Comment: Payment for performance (incentives) has been shown internationally to be effective in many contexts in healthcare. However in immunisation there is limited research published on effective strategies and designs. This study capitalised on a natural experiment in New York State, USA where one healthcare plan offered providers large financial remuneration and administrative support for timely immunisation rates, while others in the same region did not. These reimbursements amounted to 15–25% above base reimbursement for the care of 0- to 2-year-olds. It is no surprise that this was effective, however it was modest. Importantly it did not also exacerbate disparities. However the question for me would be whether this is the best use of a considerable amount of resources, and how effective interventions of this nature would be if they were of a lesser amount? NT

Reference: *Health Services Research* 2010;45 (6p2):1934-1947

<http://dx.doi.org/10.1111/A.1475-6773.2010.01168.x>

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EXTRA SLIDES



Long term follow up of vaccines

- Difficult to follow up large cohort of millions long term. (very large numbers required for rare risks)
- Instead use a mixture of methods
 - Hypothesis generate i.e. do vaccines cause cot death
 - No one study answers all your questions
 - Beware of poorly designed studies creating bias
 - Several studies, range of methods such as
 - Case-control studies
 - Cohort studies
 - Prospective
 - Retrospective
 - Cross-sectional
- For example - all these these have been used to explore and reject the hypothesis that MMR causes Autism



Examples of safety evaluation

- Vaccine safety datalinks
 - E.g. encephalopathy MMR, wPertussis
 - US CDC and HMOs collaboration
 - autism/MMR, rotavirus/intussusception, hepB/MS, thiomersal
- Matching hospital records to immunisation records
 - UK MMR/autism
- prevalence studies
 - MMR autism, Denmark, whole birth cohort
- case control
 - neurological damage and pertussis vaccine (UK)
- independent reviews e.g. IOM reviews
 - Thiomersal, multiple antigens, influenza vaccine / neurological disorders....



Varicella vaccines



- Why use
 - >90% children catch varicella
 - 150-200 hospitalisations/year (2/3 otherwise healthy)
 - 1-2 long term disability
 - Death occasional
 - Skin sepsis ?rates
- When to start
- 1 dose or 2?
 - Wild boosting in NZ current context
- Role of MMRV (not yet available in NZ)
 - 12- 23 months: = 1 extra febrile seizure for every 2300 doses over

MMRV + Varicella vaccine.