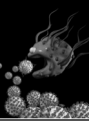


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Outbreaks of vaccine preventable diseases – communicating the science and closing the gaps

Dr Nikki Turner
University of Auckland


Hosted by Jane Barnett
jane@webbertraining.com

www.webbertraining.com February 15, 2012

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

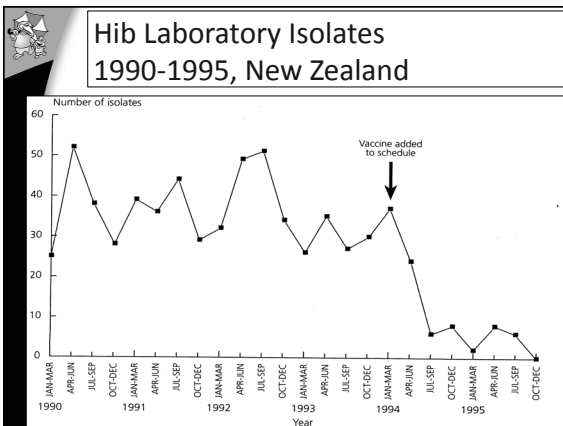
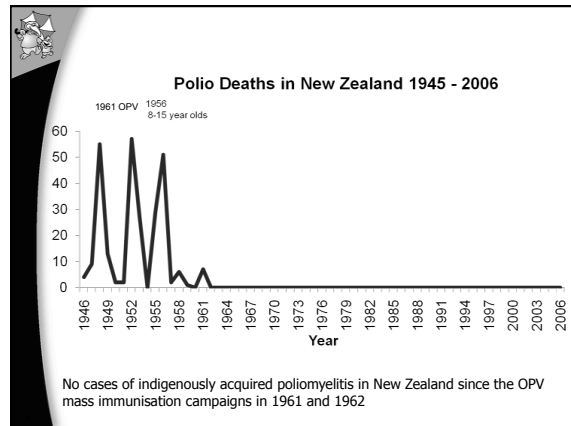
World Health Organization



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Diseases vaccination has significantly impacted upon

- Smallpox - eradication 1977
- Diphtheria - control
- Tetanus - (personal protection only)
- Yellow Fever - control
- Pertussis (whooping cough) - control
- Haemophilus influenza type b disease - control
- Poliomyelitis - close to eradication
- Measles - possible eradication
- Mumps - possible eradication
- Rubella - possible eradication



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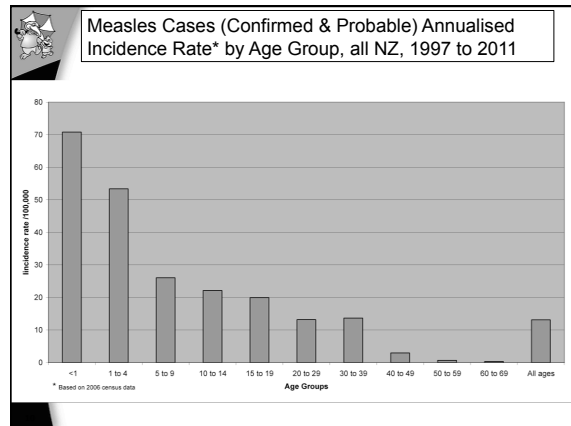
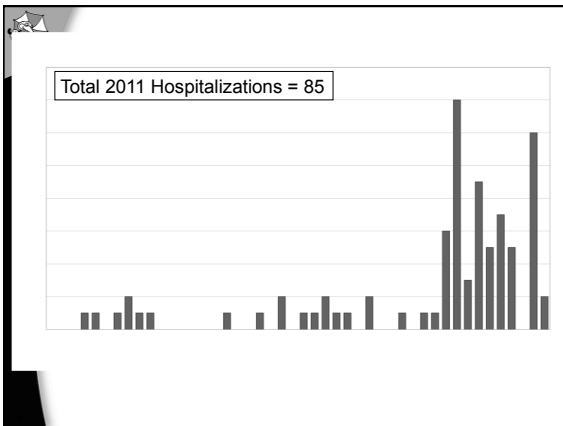
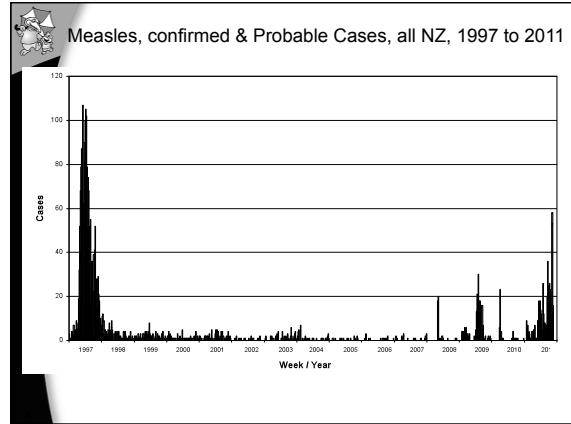
- Disease outbreaks and the NZ context : measles, pertussis, meningococcal disease
- Immunisation coverage and equity gaps in NZ
- Challenges around communicating the science
- Occupational health vaccines and other private market vaccines in NZ


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Disease outbreaks in NZ

- Measles
- Meningococcal disease
- Pertussis

7



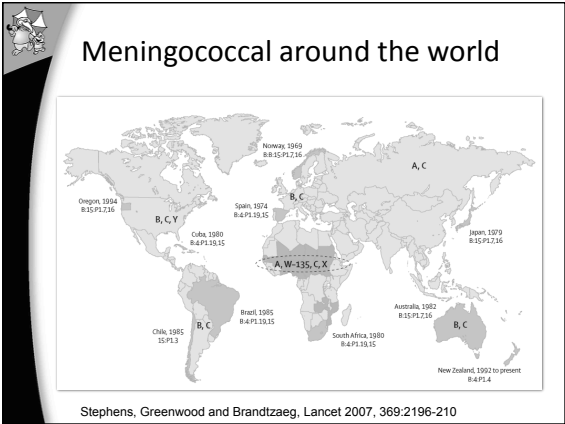
Measles control

- Those born prior to 1969 in NZ: assume to have been exposed to wild measles
- All others: 2 doses for all over 12 months of age
- If unknown vaccination history or in doubt vaccinate
- No concerns about overdosing on MMR

?need for a national campaign

Types of meningococcal disease

- Six capsular groups associated with invasive disease: A, B, C, Y, W-135, X
- Differ by their exterior polysaccharide capsule
- The frequency of different types differs from country to country
- NZ currently major types – B and C
- Is in the community all the time in low numbers
 - Occasional outbreaks



Nasopharyngeal carriage

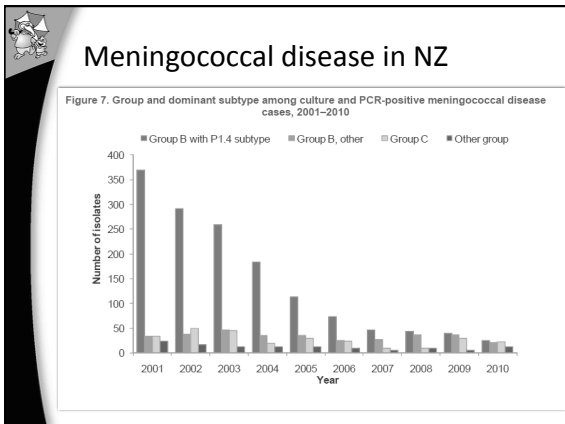
- Can be in the nose/throat for weeks to months
- Usually cleared by your immune system without getting sick
- Occasionally invades the bloodstream and causes disease

- Carriage rate
 - <3% children under 5 years of age
 - 25-35% adolescents 15 – 24 yrs
 - <10% older ages
 - Higher rates in lower se groups, confined or linked populations eg military recruits, pilgrims, boarding schools, prisoners

Lancet Infect Disease 2010;10:853-861
Thomas MG. New Zealand Medical Journal (2004) 117:1200.

Risk factors for meningococcal disease

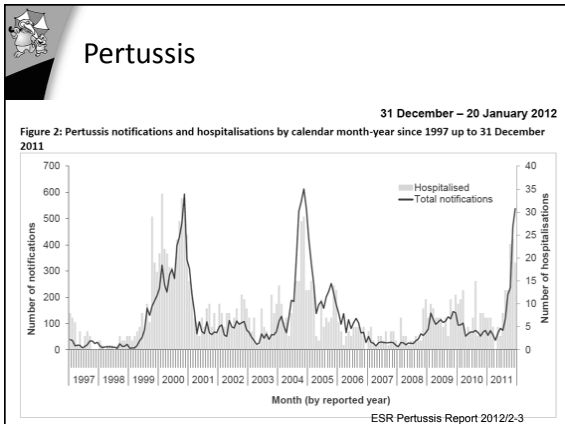
- Crowded living conditions, e.g. home or hostel
- Recent respiratory infection
- Exposure to cigarette smoke
- Poor nutrition
- Inherited (genetic) factors

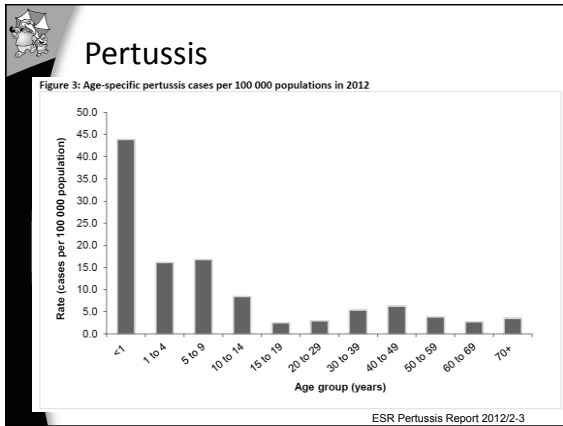


Meningococcal vaccines

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 – in NZ currently C, soon quadrivalent
 - Effective in younger children
 - Herd immunity effects
- B vaccine.....Phase 3 Trials





- ### 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

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Private Market Vaccines -Occupational Health

21

- ### Remember...
- **Rotavirus**
 - **Varicella**
 - **Meningococcal C Conjugate Meningitec®)**
(different from the polysaccharides: Menomune®, Mencevax®)
 - **HPV vaccine for men**
 - **Adult pertussis protection: Boostrix**
 - **Pneumococcal : PPV23 and PCV13**

Private purchase of non-funded vaccines in NZ

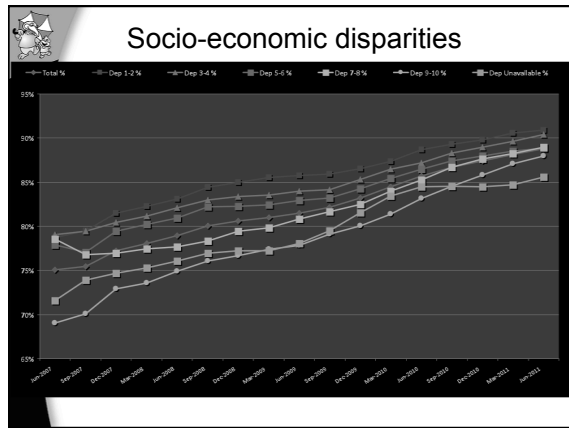
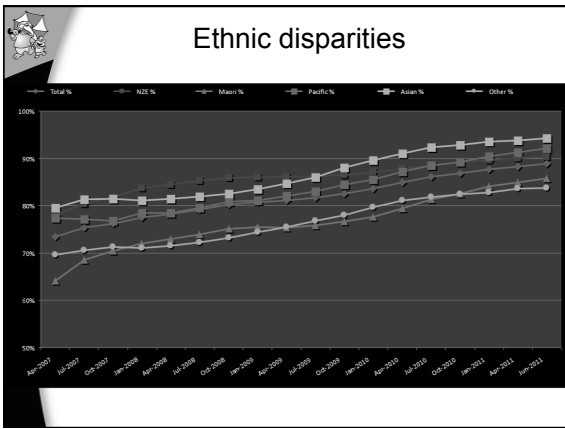
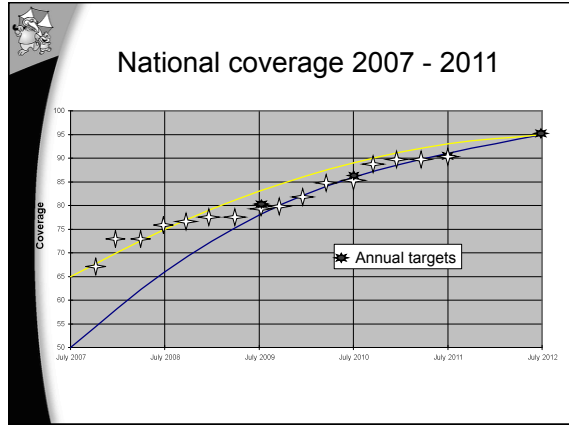
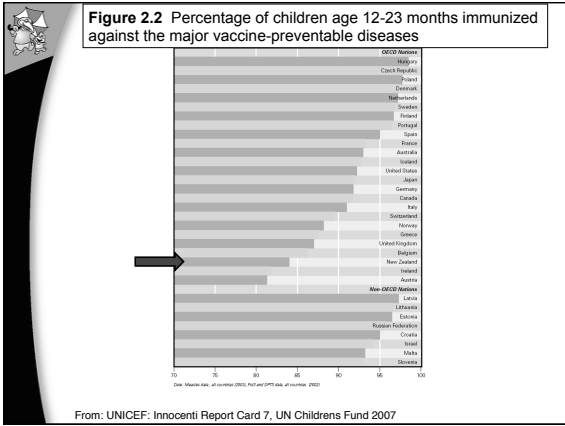
Price excludes GST and delivery

Name	Manufacturer	Product	Price	Notes
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 12 years
Varilrix®	varicella (chickenpox)	GSK	\$50.00	1 dose 9 months-12 years or 2 doses if given from 12 years
Prevenar®	pneumococcal disease	Pfizer (Wyeth)	\$112.00	1 dose if given after 2 years (80 funded for children born after 1.1.08)
Meningitec®	meningococcal disease group C	Pfizer (Wyeth)	\$75.00	1 dose before 12 months or 1 dose if given after 12 months
Gardasil®	human papillomavirus 6, 11, 16 and 18	CSL	\$128.50	1 dose for females 9-26 yrs and males 12-15 yrs 1st funded for girls born after 1.1.09
Boostrix®	pertussis, tetanus and diphtheria	GSK	\$25.00	1 dose as a booster ^{1,2}
Adacel®	pertussis, tetanus and diphtheria	SanoR-Pasteur	\$25.00	Can be offered to adults for pertussis protection
IPOL®	polio	SanoR-Pasteur	\$35.12	1 dose as a booster
Adacel® Polio	pertussis, tetanus and diphtheria and polio	SanoR-Pasteur	\$54.00	1 dose as a booster Can be offered to adults for pertussis protection with polio
Mencevax® ACW	meningococcal A, C, W135 and Y	GSK	\$20.00	1 dose. Do not use before 2 years
Menomune® ACW135	meningococcal A, C, W135 and Y	SanoR-Pasteur	\$30.00	1 dose. Do not use before 2 years
Intanza®	Influenza	SanoR-Pasteur	\$150/150	Intradermal vaccine
Pneumovax®23	pneumococcal disease	MSD	\$40.00	1 dose. Do not use before 2 years

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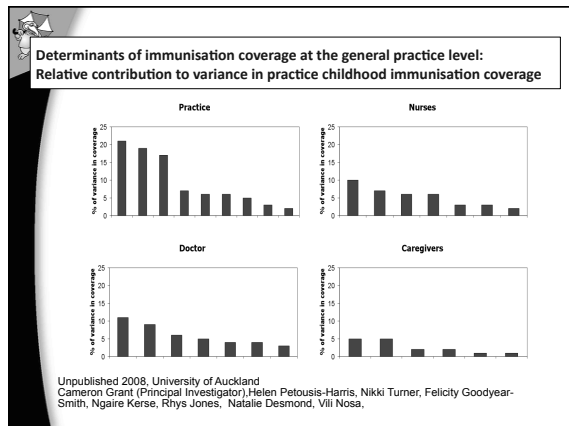
Immunisation Coverage in NZ

24



Factors that affect coverage/timeliness

NZ Environment



Practice

- Early enrolment and good relationships
- Effective Practice Management systems
- Stable practice teams
- Effective and timely precall
- Reducing missed opportunities

Grant C et al Factors associated with immunisation coverage and timeliness in New Zealand BJGP March 2010
Turner N et al Later the moment: missed opportunities to immunise at the family practice level? Family Practice May 2009
Goodman-Smith F et al paper in preparation University of Auckland 2011.

Providers

General practitioners/practice nurses

- knowledge
- confidence
- focus on population health for their community
- lower ratio of nurses to children in the practice
- perceptions of parental barriers

Goodman-Smith F et al Immunisation: Challenge Human Vaccines June 2009
Dunsmuir N et al Nurses make a difference in immunisation service delivery Aus J Advanced Nursing 2011.

Parents/caregivers

- Effective antenatal information
- Supported antenatal decision-making
- Early Enrolment and engagement with general practice

Wise A et al "Understanding and predicting parental decisions about early childhood immunisations" Health Psychology 2004;23,1:33-41
Petousis-Harris H et al Immunisation education in the antenatal period NZFP 31,5:303-306 2004
Goodyear-Smith et al paper in preparation University of Auckland 2011.

Environment

- Confidence/ trust in the science
- Working well with media
- Communication approaches appropriate to audiences

Petousis-Harris H et al Fact or fallacy? Immunisation arguments in the New Zealand print media Aust NZ J Pub Health April 2010
Goodman-Smith F et al Immunisation in the Print Media—Perspectives Presented by the Press J of Health Communication Nov 2007
Turner N et al "The use and misuse of media headlines: lessons from the MeNZB" immunisation campaign" NZMJ March 2009
Litmus Immunisation Audience Research unpublished report for the Ministry of Health, Wellington 2011.

Why are we improving

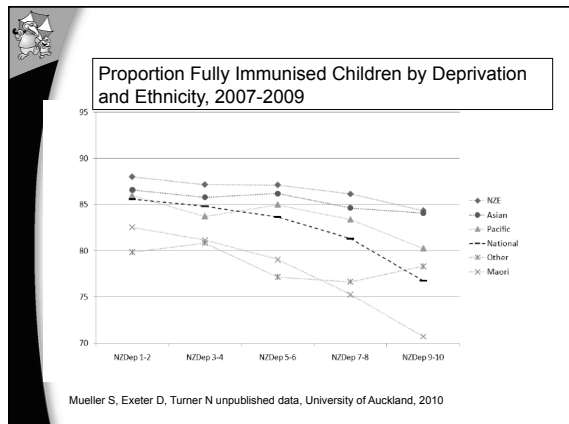
- Commitment at all levels – national target
- Feedback loops – DHBs and PHOs
- General Practice engagement and confidence
 - More focus, higher priority
 - Less missed opportunities
- SYSTEMS
 - Early ENROLMENT! - and follow up
 - Precalls/recalls/audits
 - PMS/NIR
 - Providers to OIS: effective interface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

Waiting for polio immunisation USA 1962



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Who is missing out?



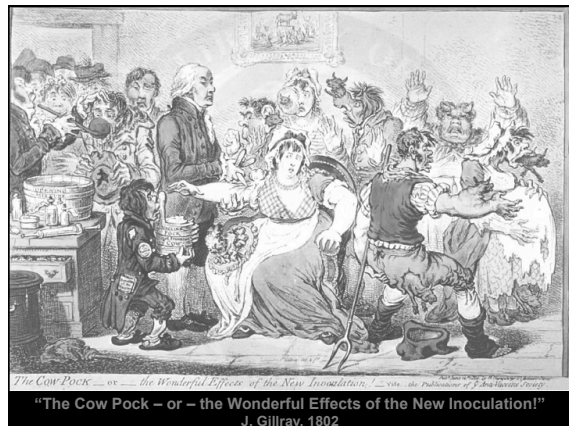
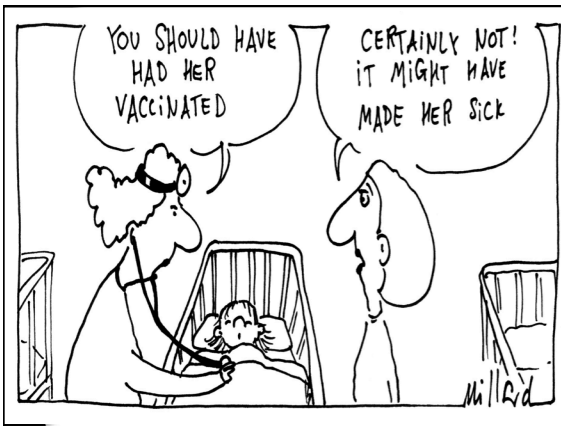


Association with independent risk factors

- Ethnicity is the most significant association
- Bigger households, single parents, income from benefit, derivation status, household income.
- No association with education variables
- Rural: increased odds of being immunised, except for highly rural/remote.
- A trend towards improving coverage for the children of highly mobile families since 2005



Myths and Fears



International Examples leading to reduction in coverage

- Polio vaccine and contraceptives – Nigeria 2004
- Multiple sclerosis and HepB vaccine – France
- Pertussis vaccine and brain damage internationally 1980s
- MMR and autism – UK, 1998.....




UK 1998



The Wakefield "Study"

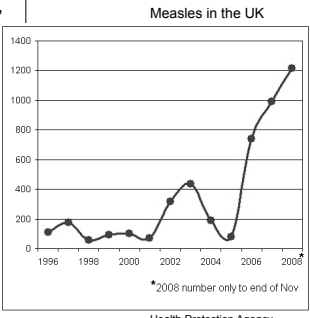
- Theory:** The MMR vaccine induces a series of events that includes bowel problems and subsequent development of autism.
- Study design:** 12 children (8 with autism) in the United Kingdom who recently received the MMR vaccine.
 - 5/8 of those children clients of personal injury lawyer
 - That lawyer paid Wakefield, not disclosed.



The legacy of Wakefield's study

Recent outbreaks of measles in the United Kingdom. Three children in Ireland died of measles.

In the United States some parents still refuse the MMR vaccine for their children or ask that the vaccine be separated into its component parts.



Year	Number of Cases
1996	100
1997	150
1998	100
1999	100
2000	100
2001	100
2002	200
2003	400
2004	200
2005	100
2006	500
2007	1000
2008	1200

Health Protection Agency


Andrew Wakefield found 'irresponsible' by UK General Medical Council over MMR vaccine scare March 2010

Last week, the GMC ruled that Dr Wakefield had shown a "callous disregard" for children and acted "dishonestly" while he carried out his research. It will decide later whether to strike him off the medical register.

BBC News 2/3/10


45

Sir Peter Medawar - Nobel Prize in Physiology or Medicine 1969



"I cannot give any scientist of any age better advice than that the intensity of the conviction that a hypothesis is true has no bearing on whether it is true or not".

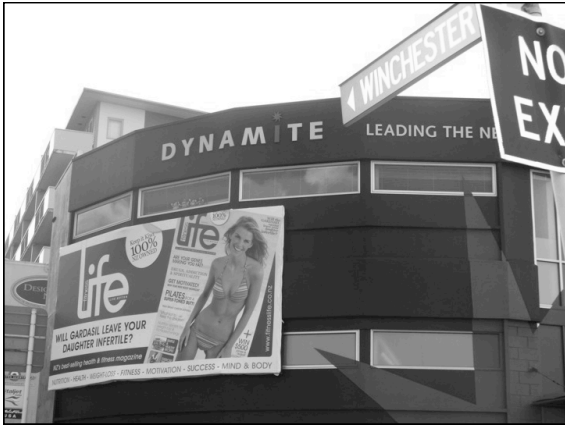
1973



Power of the media

"Our job is to be interesting. If the story also happens to be true — great."

Junior producer, NBC's Dateline



'SUNDAY' 24 July 2011

Two young adults with brain damage post receiving the whole cell pertussis vaccination who have been given ACC payouts.

- ACC is no fault compensation
 - It is not proving causal links
- Whole cell vaccine changed to acellular in 2000
- History of whole cell pertussis vaccine:
 - ?links to encephalopathy in 1980s
 - more recent large studies showing no link

If the pertussis vaccine increases the risk of brain damage it has to be so rare an event that despite the huge studies over the years that have been performed that have included millions of people comparing vaccinated with unvaccinated children, no difference between the groups can be found.

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".

52

The third story presented of a case of a young woman who died 6 months after receiving HPV vaccine,

– from the publically known data there does not appear to have any biologically plausible link to the vaccine at all

53

WHY IS THERE A PROBLEM?

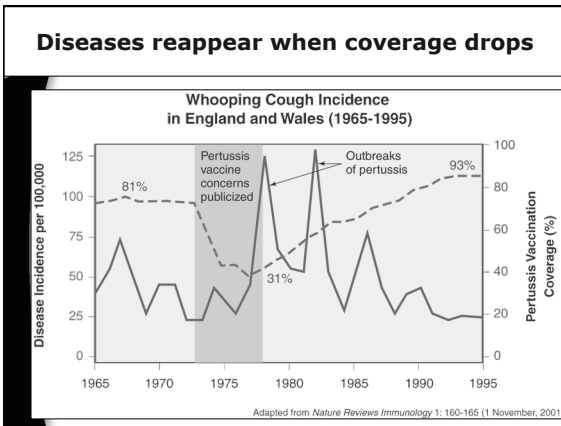
54

Absence of disease is not a great marketing line

Overcoming 'Out-of-sight-out-of-mind'

Estimated Incidence of severe measles reactions in the absence of an immunisation programme for NZ 1990 - 2000

- 600 000 cases
- 200 - 600 deaths
- 600 cases encephalitis
- 300 permanent brain damage



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

Black S, Eskola J, Siegrist C-A, Halsey N, MacDonald N, Law B, et al. *The Lancet* 2009 2010/1/1;374(9707):2115-22.

Misunderstanding of safety surveillance

- passive versus active surveillance
- CARM (Centre for Adverse Reaction Monitoring), University of Otago, Dunedin
 - Looking for warning signals
 - No denominator data

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....

Poor understanding of the scientific method

Systematic Reviews and Meta-analyses

Randomized Controlled Double Blind Studies

Cohort Studies

Case Control Studies

Case Series

Case Reports

Ideas, Editorials, Opinions

Animal research

In vitro ('test tube') research

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**

Do multiple vaccines overload the infant immune system?


- More T and B cells per cc of blood than adults
- 10^{16} possibilities!
- Huge Capacity

- Genital tract flora – 18 species
- Faecal flora – 400 species
- Breast milk – 8 species
- = > 10^6 different foreign proteins

We're concerned about overwhelming Johnny so he's getting his car seat and vaccines in staged installments.




Multiple vaccines




Year Antigen

- 1900 ~200 (Smallpox vaccine)
- 1960 ~3217 (included smallpox vaccine and wPertussis)
- 1980 ~3041 (Included whole cell pertussis vaccine)
- 2000 ~50
- Currently infants receiving NZ scheduled vaccines receive around 50 different antigens at one time.




Skewers towards autoimmunity
The diseases were going away anyway
 - natural is best
Nasty products in the vaccines –
 aluminium, mercury...
Corrupt pharmaceutical companies





Vaccine safety concerns and zero tolerance

“A one in a million risk”

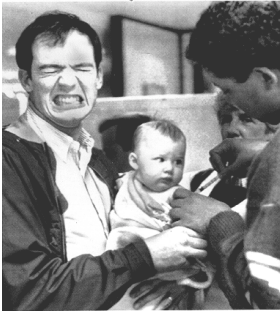
But what if that one in a million was my child?



Assessing Risk

A deep-rooted fear of needles!




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Different needs for different people

Typologies

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

Litmus: Immunisation Audience Research, Feb 2011

Communicating

"I do not believe in vaccines"

1st: open approach..... e.g.

- Have you got any specific concerns around vaccines you wish to discuss?
- Would you like to talk further or receive further information

2nd if appropriate raise a bit of dissonance

- Do you have any concerns about any of these diseases
- Are you aware XXX will need to show an immunisation certificate when they start preschool/school

• 3rd if hitting a brick wall stop digging



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 she could be dead as a result of a bacterial 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 still exist with a vengeance if we let down our guard. We cannot allow our nation's young citizens to meet the childhood immunization challenges, including non-response, to be understood by stakeholders funding their public and private or non-profit or non-governmental health care units.

Now is not the time for complacency or confusion. The benefits of increasing vaccines have significantly reduced morbidity, disability and deaths for millions of children. We must all make a commitment to reengage even more children to the history books by vaccinating our children.

Vaccines prevent diseases and save lives.

American Academy of Pediatrics

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Phone: 202/638-8000 Fax: 202/638-8432
E-mail: info@aaap.org • Web site: www.aaap.org



2011 NZ Immunisation Schedule

	DTaP-IPV- HepB/Hib	PCV	Hib	MMR	DTaP-IPV	dTap	HPV	Td	Influenza
6 weeks	Infanrix hexa™	Synflorix™							
3 months	Infanrix hexa™	Synflorix™							
5 months	Infanrix hexa™	Synflorix™							
15 months		Synflorix™	Act-HIB™	MMR II™					
4 years				MMR II™	Infanrix™ - IPV				
11 years						Boostrix™			
12 years							3 doses Gardasil™		
45 years								ADT- Booster™	
65 years								ADT- Booster™	Fluvax® or Fluarix™

Targeted programmes

- BCG for high risk infants
 - List of high-incidence countries:
 - www.moh.govt.nz/immunisation
 - www.bcgatlas.org/index.php
- Neonatal hepatitis B and HBIG for infants of hepatitis B carrier mothers
 - P 133 Handbook
- Influenza for those at high risk
 - <http://www.influenza.org.nz/?t=887>
 - P 263 handbook
 - Pneumococcal programme for high risk children
 - P 321 handbook
- Splenectomised older children/ adults

Coming Soon

15 February **The Biofilm Hypothesis of Chronic Infection**
 Speaker: Dr. Phillip Stewart, Center for Biofilm Engineering, University of Montana

01 March 12 **Developing a Sustainable and Effective Approach to Hygiene and Infection Prevention in Home and Everyday Life Settings**
 Speaker: Dr. Sally Bloomfield, International Scientific Forum on Home Hygiene

07 March 12 **(FREE ... WHO Teleclass - Europe) Achievements in Improving Injection Safety Worldwide**
 Speaker: Prof. Chuck Gerba, University of Arizona
 Sponsor: World Health Organization First Global Patient Safety Challenge

29 March 12 **Water and Infection Control**
 Speaker: Andrew Streifel, University of Minnesota

www.webbertraining.com/schedule1.php

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2012



NOTICE
 Look for additional teleclass lectures broadcast live from South Pacific conferences.
www.webbertraining.com

February 12
Outbreaks of Vaccine Preventable Diseases - Communicating the Science and Closing the Gaps
 Dr Nikki Turner, University of Auckland, New Zealand

April 18
Central Line Associated Infection in ICU
 Professor M.L. McLaws, University of New South Wales, Australia

June 13
Hand Hygiene Initiatives in Australia
 Phil Russo, Hand Hygiene Australia

October 18
Meningococcal Disease and the New Zealand Experience - Where to From Here
 Dr Tony Walls, University of Otago, New Zealand

December 5
(WHO Teleclass) New Developments in Infection Control for Renal Dialysis
 Prof. W.H. Seto, Queen Mary Hospital, Hong Kong