

Influenza vaccination: myths and evidence

Allen Cheng

Declarations

- Director of Infection Prevention; responsible for staff vaccination at Alfred Health
- Chief investigator, FluCAN surveillance system; member of National Influenza Surveillance Committee
- Chair, Advisory Committee for Vaccines (advising Therapeutic Goods Administration)
- Chair, Influenza Working Group for Australian Technical Advisory Group on Immunisation (advising Department of Health)
- No receipt of funding from pharma; institution involved in pharma-sponsored studies

Common objections to influenza vaccination

- I don't get sick
- Flu isn't a serious disease
- The vaccine doesn't work
- The vaccine gives me the flu
- The vaccine causes serious side effects
- You're better off getting the flu
- There's no evidence that staff vaccination protects patients

“I’m not at risk of getting influenza”

OPEN ACCESS Freely available online

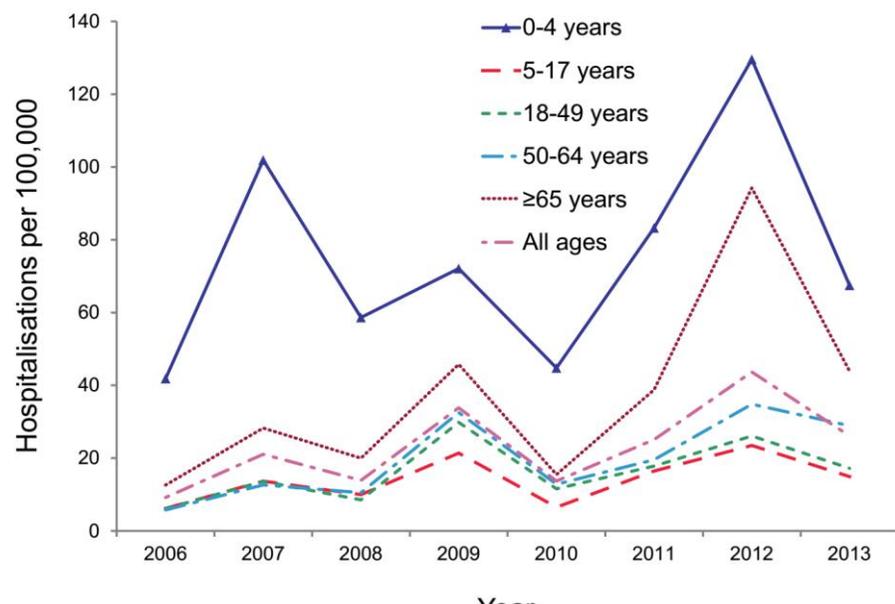


Incidence of Influenza in Healthy Adults and Healthcare Workers: A Systematic Review and Meta-Analysis

Stefan P. Kuster^{1,2}, Prakesh S. Shah^{1,2}, Brenda L. Coleman^{1,2}, Po-Po Lam^{1,2}, Agnes Tong³, Anne Wormsbecker^{1,2,4}, Allison McGeer^{1,2*}

- Risk of influenza infection (varies by definition)
 - Working adults – unvaccinated 5.4%, vaccinated 1.2%
 - Adults with young children – unvaccinated 24%
 - Healthcare workers – unvaccinated 18.7%, vaccinated 6.5%

“Influenza isn’t a serious disease”



- Hospitalisation rate in non-elderly adults 10-30 per 100,000
- Much higher when estimate of indirect burden accounted for
- Commonest fatal vaccine preventable disease in children

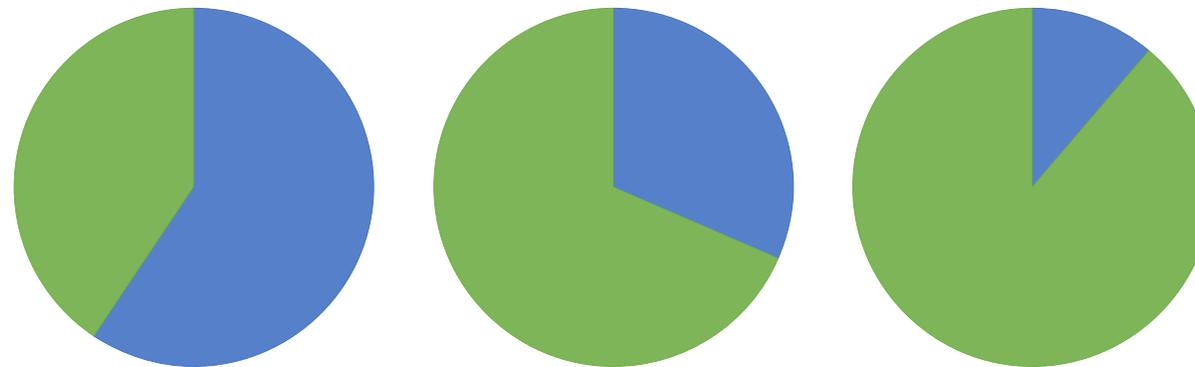
Table 1 Estimated excess hospitalisations attributed to influenza in Australians aged 50–64 years and those aged ≥65 years

| | Proportion of hospitalisations associated with influenza (95%CI) | Annual no. of excess hospitalisations (95%CI) | Excess hospitalisations per 100,000 population (95%CI) |
|---------------------|--|---|--|
| 50–64 years | | | |
| Influenza/pneumonia | 0.123 (0.086 to 0.161) | 1057.7 (737.1 to 1378.3) | 33.3 (23.2 to 43.4) |
| Other respiratory | 0.055 (0.031 to 0.078) | 1828.3 (1030.7 to 2626.0) | 57.6 (32.5 to 82.8) |
| Circulatory | −0.0004 (−0.017 to 0.016) | −47.6 (−1866.9 to 1771.7) | −1.5 (−58.8 to 55.8) |
| ≥65 years | | | |
| Influenza/pneumonia | 0.124 (0.086 to 0.163) | 3894.5 (2681.3 to 5107.7) | 157.4 (108.4 to 206.5) |
| Other respiratory | 0.090 (0.059 to 0.122) | 6976.5 (4545.4 to 9407.7) | 282.0 (183.7 to 380.3) |
| Circulatory | 0.004 (−0.011 to 0.019) | 979.2 (−2842.1 to 4800.5) | 39.6 (−114.9 to 194.1) |

Li-Kim-Moy CDI 2016
Newall Vaccine 2008

Proportion of hospitalisations with chronic medical conditions

<18 years 18-64 years 65+ years



■ No comorbidities ■ Co-morbidities

Graphs by agegroup

Source: FluCAN surveillance data

“There isn’t good evidence that the vaccine works”

Efficacy and effectiveness of influenza vaccines: a systematic review and meta-analysis

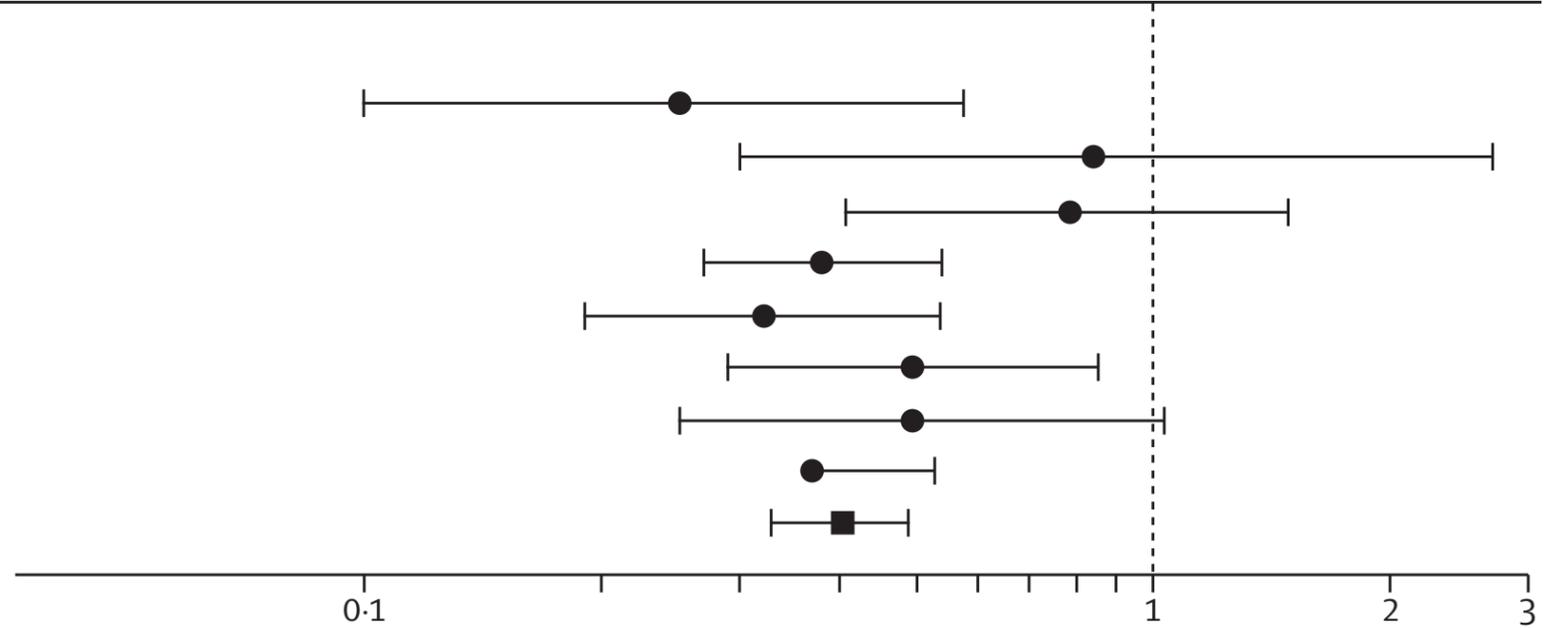
Michael T Osterholm, Nicholas S Kelley, Alfred Sommer, Edward A Belongia

- Meta-analysis of studies using PCR endpoints
- Clinical trials (and observational data)
- Osterholm Lancet ID 2011

Treatment group (n/N) Control group (n/N)

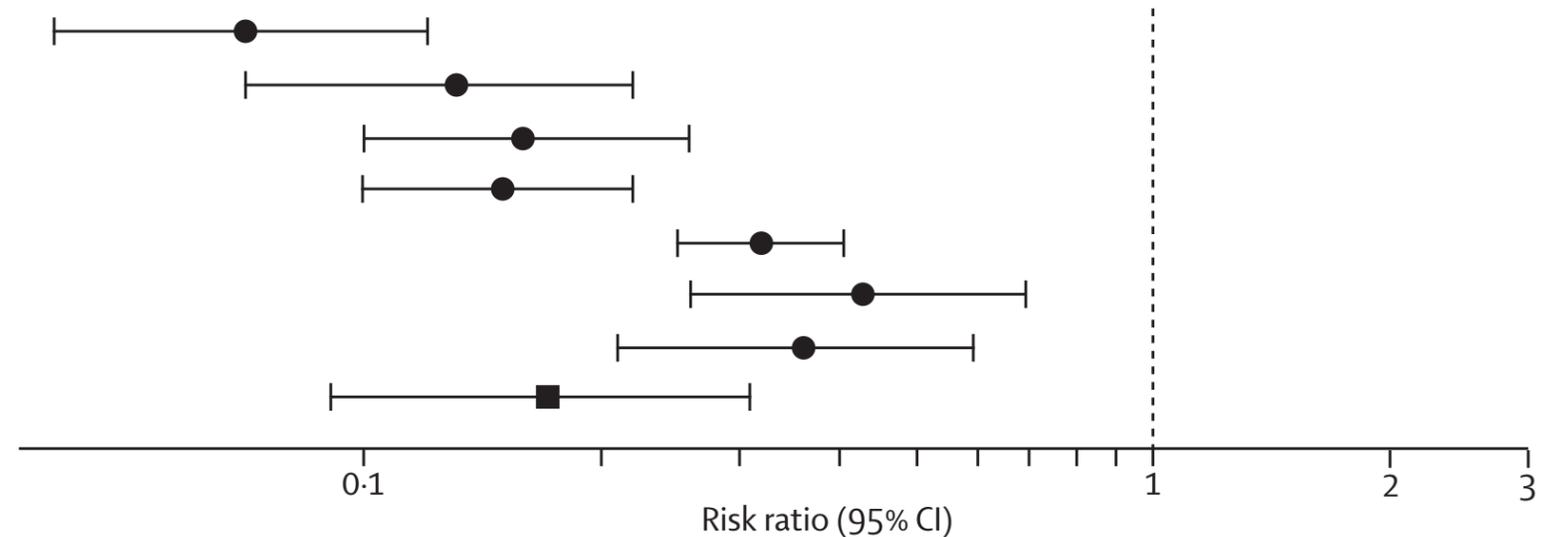
A TIV in adults 18-64 years

| Study | Treatment group (n/N) | Control group (n/N) |
|------------------------------|-----------------------|---------------------|
| Ohmit (2006) ²⁴ | 10/522 | 16/206 |
| Ohmit (2008) ²⁵ | 13/867 | 6/338 |
| Beran (2009) ²⁶ | 28/4137 | 18/2066 |
| Beran (2009) ²⁷ | 63/5103 | 82/2549 |
| Monto (2009) ²⁸ | 28/813 | 35/325 |
| Jackson (2010) ²¹ | 19/1706 | 38/1725 |
| Jackson (2010) ²¹ | 11/2011 | 22/2043 |
| Frey (2010) ²⁹ | 49/3638 | 140/3843 |
| Pooled | 221/18797 | 357/13095 |



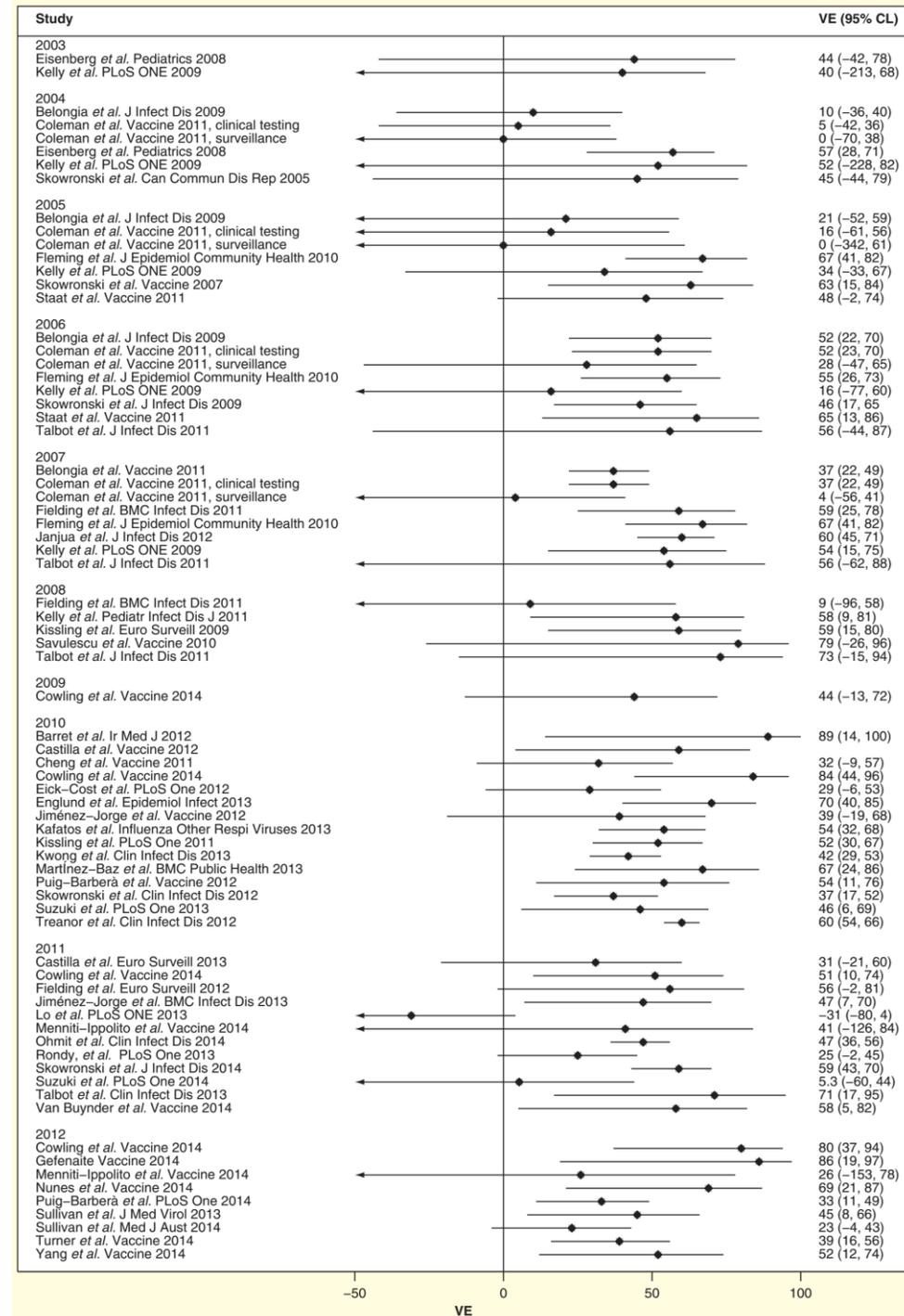
B LAIV in children 6mo-7 years

| Study | Treatment group (n/N) | Control group (n/N) |
|-----------------------------------|-----------------------|---------------------|
| Belshe (1998) ³² | 14/1070 | 94/532 |
| Belshe (2000) ³³ | 15/917 | 56/441 |
| Vesikari (2006) ³⁴ (1) | 23/1059 | 97/725 |
| Vesikari (2006) ³⁴ (2) | 31/658 | 148/461 |
| Tam (2007) ³⁵ | 98/1900 | 204/1274 |
| Tam (2007) ³⁵ | 26/503 | 59/494 |
| Lum (2010) ³⁶ | 28/819 | 39/413 |
| Pooled | 235/6926 | 667/4340 |



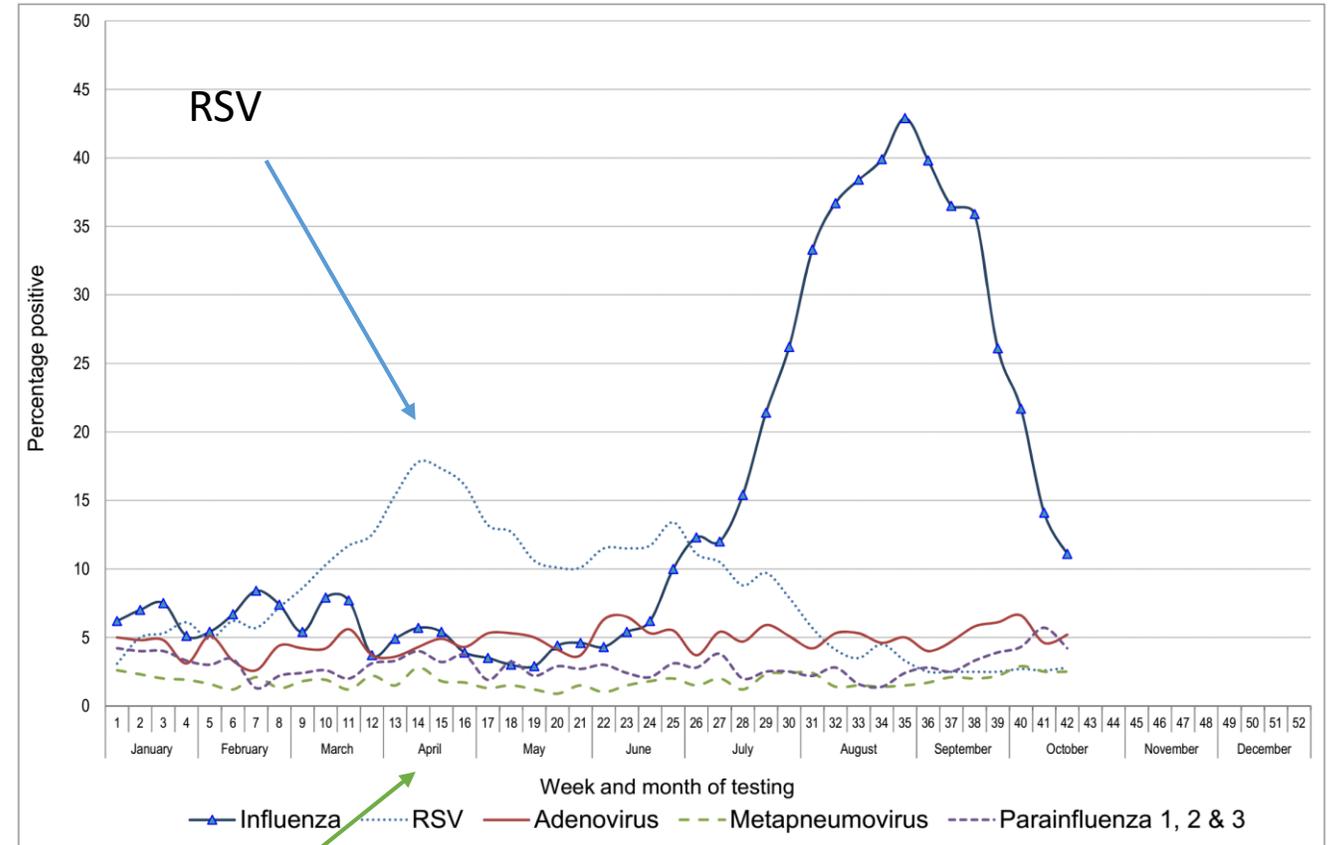
Effectiveness in observational studies

- Systematic review of test negative studies estimating vaccine effectiveness
- 85 studies
- Variety of settings – hospital inpatients, ED, outpatients, GP clinics
- North America, Europe, Asia, Australia
- Sullivan ERV 2014



“The vaccine gives me the flu”

- Subunit or split virion vaccine – no live virus
- RSV commonly circulates in April-May
- Many other respiratory viruses



April

Qld surveillance report, 2017

“Influenza vaccine causes serious side effects”

Vaccine 27 (2009) 2114–2120



Safety of trivalent inactivated influenza vaccines in adults: Background for pandemic influenza vaccine safety monitoring

Claudia Vellozzi^{a,b,*}, Dale R. Burwen^c, Azra Dobardzic^c, Robert Ball^c, Kimp Walton^a, Penina Haber^a

^a Immunization Safety Office (ISO), Office of the Chief Science Officer (OCSO), Centers for Disease Control and Prevention, Atlanta, GA, United States

^b National Center for HIV, Hepatitis, STD and TB Prevention, Centers for Disease Control and Prevention, Atlanta, GA, United States

^c Office of Biostatistics and Epidemiology, Center for Biologics Evaluation and Research, Food and Drug Administration (FDA), Rockville, MD, United States

- All reports to Vaccine Adverse Event Reporting System (VAERS), United States 1990-2005
 - 24-71 million doses administered per year
- Rate of all serious adverse events: 3.4 per million vaccinations
- Guillain Barre syndrome 0.7 per million vaccinations

Guillain Barre Syndrome

Risk of Guillain-Barré syndrome after seasonal influenza vaccination and influenza health-care encounters: a self-controlled study



Jeffrey C Kwong, Priya P Vasa, Michael A Campitelli, Steven Hawken, Kumanan Wilson, Laura C Rosella, Therese A Stukel, Natasha S Crowcroft, Allison J McGeer, Lorne Zinman, Shelley L Deeks

- Self-controlled case series in Ontario, Canada
- Estimated risk of GBS following vaccination: 1.03 per million vaccinations
- Estimated risk of GBS following influenza consultation: 17.2 per million healthcare encounters

Narcolepsy

AS03 Adjuvanted AH1N1 Vaccine Associated with an Abrupt Increase in the Incidence of Childhood Narcolepsy in Finland

Hanna Nohynek^{1*}, Jukka Jokinen¹, Markku Partinen², Outi Vaarala¹, Turkka Kirjavainen³, Jonas Sundman¹, Sari-Leena Himanen⁴, Christer Hublin⁵, Ilkka Julkunen⁶, Päivi Olsén⁷, Outi Saarenpää-Heikkilä⁸, Terhi Kilpi¹

Risk of narcolepsy in children and young people receiving AS03 adjuvanted pandemic A/H1N1 2009 influenza vaccine: retrospective analysis

- Sleep disorder, associated with adjuvanted pandemic vaccine in 2009
- AS03-adjuvanted A/H1N1pdm vaccine
- Increase in narcolepsy rate, risk estimated at 1:52,000 doses
- No association with other vaccine types
 - AS03-adjuvanted vaccines never available in Australia (MF59 vaccine being considered for use in elderly)

Febrile convulsions

Open Access

Research



Epidemiological study of severe febrile reactions in young children in Western Australia caused by a 2010 trivalent inactivated influenza vaccine

P K Armstrong,¹ G K Dowse,¹ P V Effler,² D Carcione,¹ C C Blyth,³
P C Richmond,³ G C Geelhoed,⁴ F Mascaro,⁵ M Scully,¹ T S Weeramanthri⁶

- High rates of febrile convulsions in young children (n=63) in WA associated with CSL Fluvax
 - Includes several cases with poor neurological outcomes
- Thought to relate to high lipid content due to manufacturing problem
- Vaccine recalled, no subsequent problems

[Analysis and reporting of adverse events data](#)

[Research studies in vaccine safety](#)

AusVaxSafety

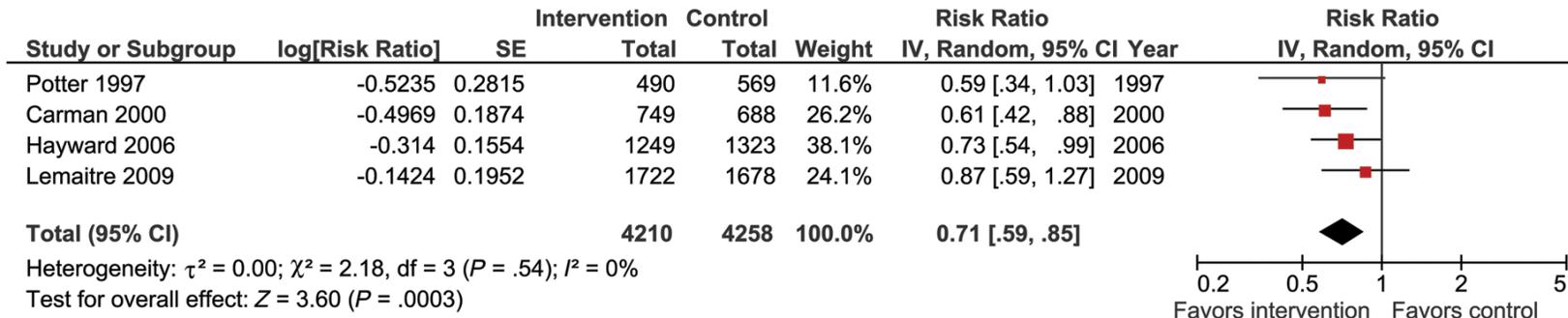
- Active surveillance systems to detect common and less common adverse events following vaccination.
 - SMS/email based follow up
 - >70,000 responses analysed
- Complements other adverse event reporting systems

“There’s no evidence that vaccinating staff protects patients”

- Ahmed (CID 2013) – 4 cluster RCTs, 4 observational studies
 - Seroprotection impaired in many patient groups
 - Influenza vaccination of staff reduced influenza in patients by 42%
 - Influenza vaccination in staff reduced mortality in patients by 29%
- Results of studies controversial - magnitude of benefit seems implausible, poor quality studies
- Push for mandatory vaccination policies in some countries

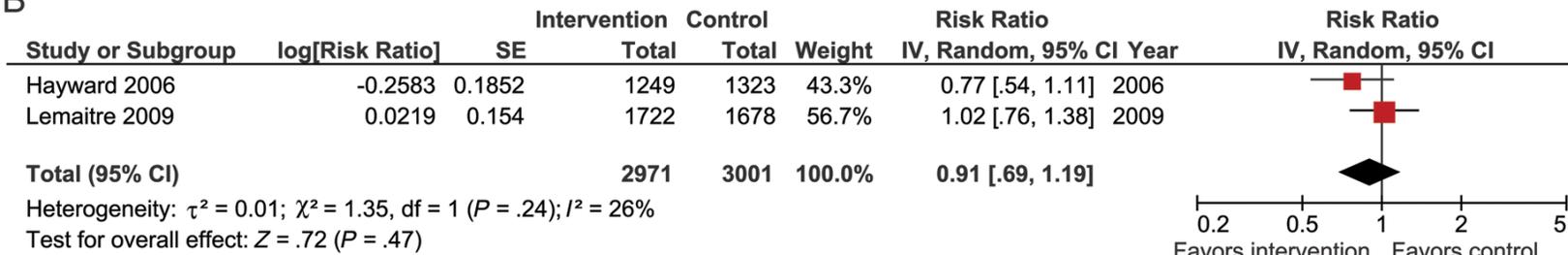
All cause mortality

A



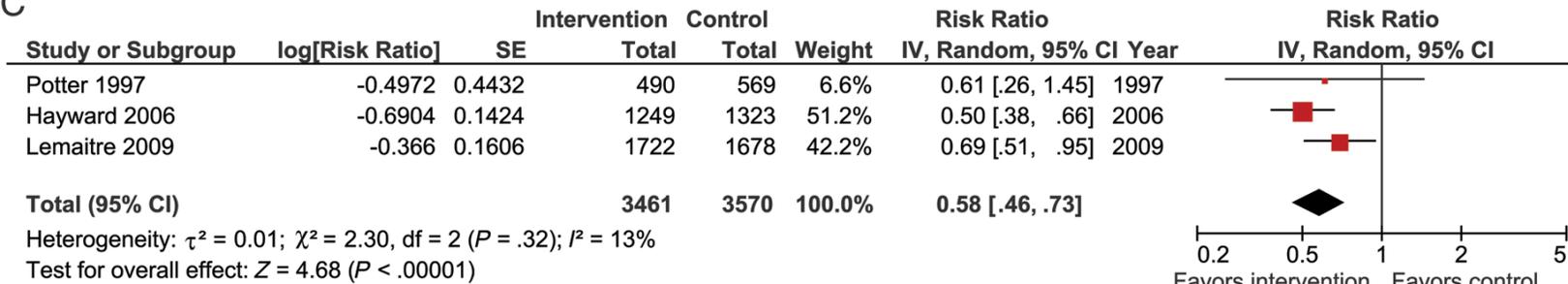
All cause hospitalisation

B



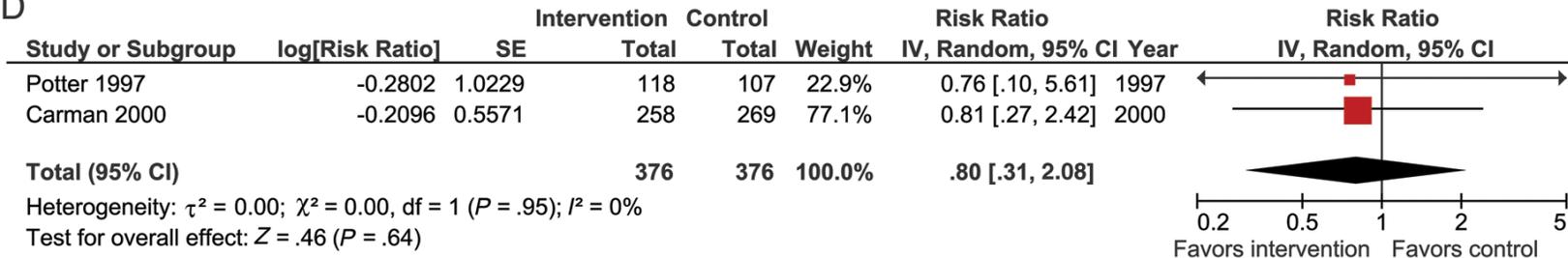
Influenza like illness

C



Lab-confirmed influenza

D



RESEARCH ARTICLE

Influenza Vaccination of Healthcare Workers: Critical Analysis of the Evidence for Patient Benefit Underpinning Policies of Enforcement

Gaston De Serres^{1,2}*, Danuta M. Skowronski^{3,4}, Brian J. Ward⁵, Michael Gardam⁶,
Camille Lemieux⁶, Annalee Yassi⁴, David M. Patrick^{3,4}, Mel Krajden^{3,4}, Mark Loeb⁷,
Peter Collignon^{8,9}, Fabrice Carrat^{10,11,12}

- “Although current scientific data are inadequate to support the ethical implementation of enforced HCW influenza vaccination, they do not refute approaches to support voluntary vaccination or other more broadly protective practices, such as staying home or masking when acutely ill”

“Repeated vaccination reduces effectiveness”

Clinical Infectious Diseases

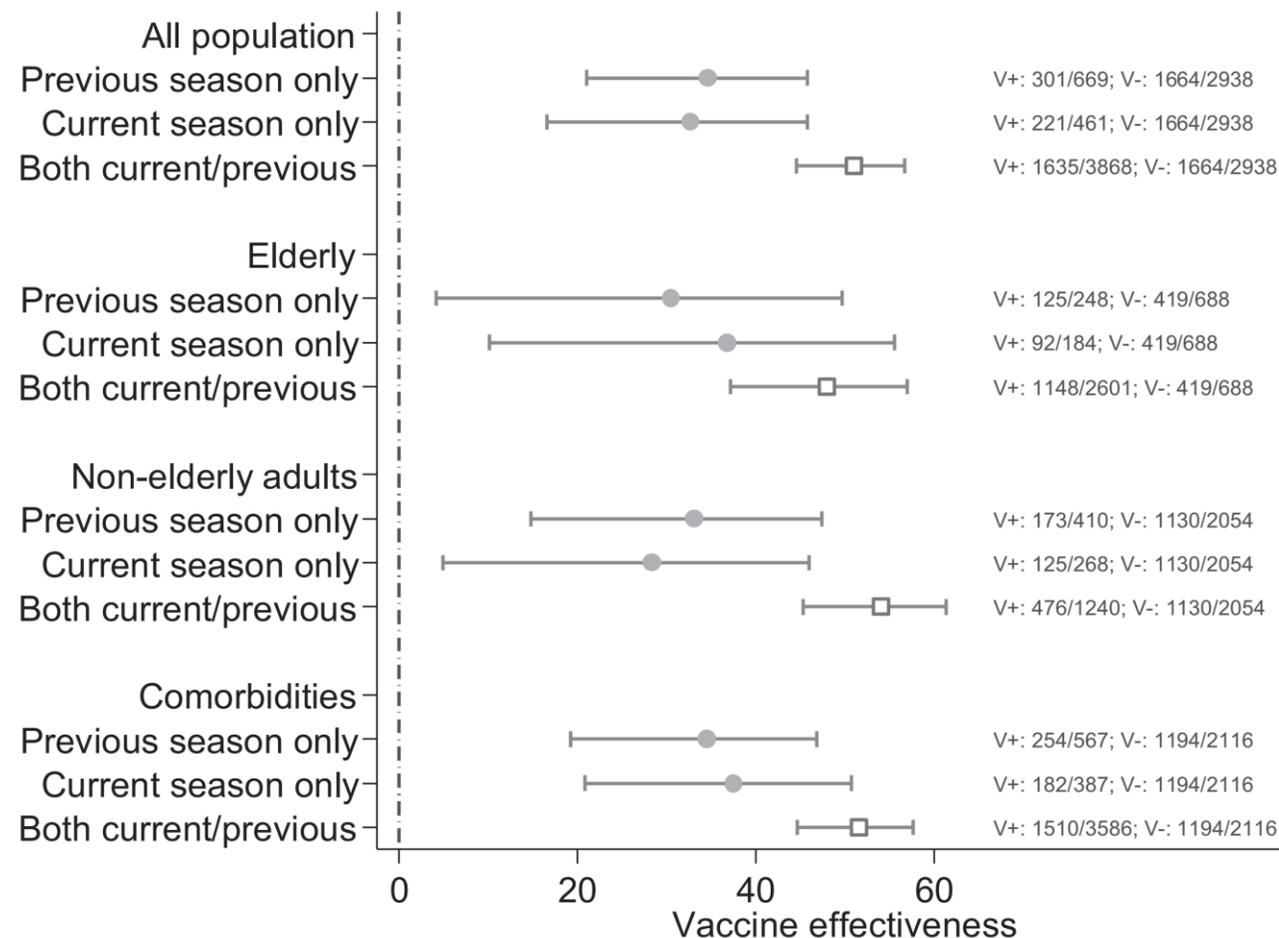
MAJOR ARTICLE



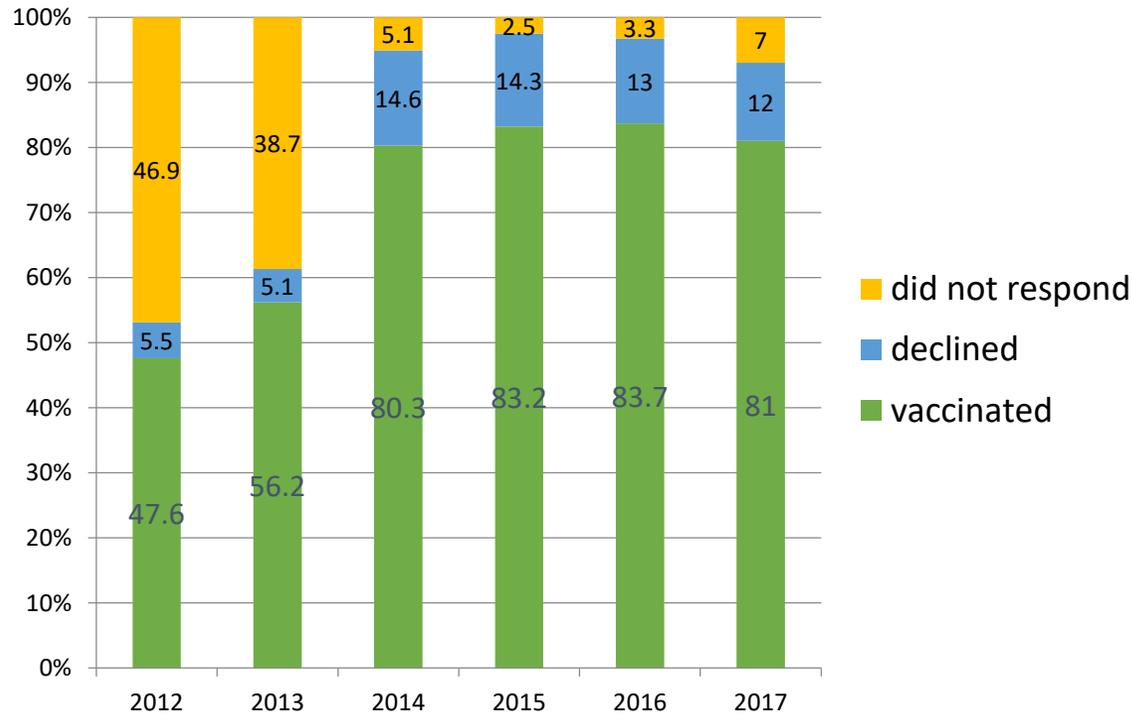
Repeated Vaccination Does Not Appear to Impact Upon Influenza Vaccine Effectiveness Against Hospitalization With Confirmed Influenza

Allen C. Cheng,^{1,2} Kristine K. Macartney,^{3,4} Grant W. Waterer,^{5,6} Tom Kotsimbos,⁷ Paul M. Kelly,^{8,9} and Christopher C. Blyth^{10,11,12}; for the Influenza Complications Alert Network (FluCAN) Investigators⁸

- Case control study 2010-15
- Protection against hospitalisation in current year, previous year or both (vs no vaccination)



“Staff don’t get vaccinated because they refuse”



Alfred Health (all campuses) 2012-17

Heinrich-Morrison et al. *BMC Infectious Diseases* (2015) 15:42
DOI 10.1186/s12879-015-0765-7



RESEARCH ARTICLE

Open Access

An effective strategy for influenza vaccination of healthcare workers in Australia: experience at a large health service without a mandatory policy

Kristina Heinrich-Morrison^{1*}, Sue McLellan¹, Ursula McGinnes², Brendan Carroll², Kerrie Watson¹, Pauline Bass¹, Leon J Worth¹ and Allen C Cheng^{1,3}



Conclusions

- Many myths around influenza vaccination
- Need to address misconceptions head-on
 - Obligation to provide evidence to protect individuals and patients
 - Evidence supports voluntary immunisation program
- Can use evidence in social marketing campaigns

- Highlights need for better influenza vaccines
- Need to support surveillance for vaccine effectiveness and adverse events

Targeted messages to address barriers to influenza vaccination

It's a fact
You have a higher risk of influenza...

85% VACCINATED

be influential
get vaccinated

Protect yourself, colleagues

... see ya next year

Vaccination days: 2015
7:30am - 5:30pm
Free of charge
100% effective against the virus

EXIT
I'll be Back
GERMINATOR VACCINATION DAY

sharing is not caring

Flu fact
Getting vaccinated each year provides the best possible protection against the virus.

sharing is not caring

contact
Influenza Clinic on **63323** AlfredHealth

sharing is not caring

15,000 Australians hospitalised in 2014 for influenza.¹

15,000 hospitalisations

65 YEARS: 42.8%⁴

UNDER 16 YEARS: 19.6%⁴

OVER 65 YEARS: 37%⁴

ated
Each year greatly decreases the risk of influenza. 95% protection against the virus

- The flu vaccine is not a live virus which means you cannot get influenza from the vaccine

Marketing of Mass Influenza Vaccination

100% REPORTING

Staff

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It's a fact

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#(Cheng Com.)

sharing is not caring

Vaccinated 2015

I'm influential

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I'm influential 2015

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Acknowledgements

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- Public Affairs Unit

- FluCAN investigators; Jill Garlick, Janine Roney