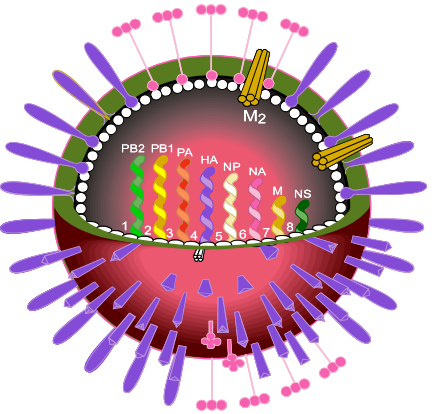
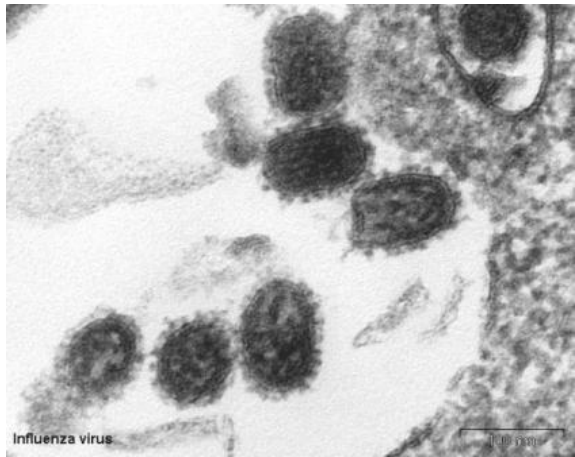
What is the evidence that HCW influenza vaccination is a patient safety issue?



Allison McGeer, MSc, MD, FRCPC

Mount Sinai Hospital

University of Toronto



Expert Consensus

- For all adults, getting vaccinated against influenza is a safer and healthier choice than not getting vaccinated
  - Influenza vaccines are of limited efficacy (~60% in healthy adults), but their benefits are greater than their risks

- All healthcare workers should be vaccinated: there is a direct benefit to each worker, and there is some evidence of a benefit to their patients

Cluster randomized trials of the impact of HCW influenza immunization on patient mortality

Study	Journal/ Year	Setting	Crude mortality difference	Adjusted risk ratio
Potter *et al.*	JID 1997	1059 residents in 12 LTCFs in Glasgow	17% vs 12%	0.6 (0.4,0,8)
Carman *et al.*	Lancet 2000	1437 patients in 20 elderly-care hospitals in UK	22% vs 14%	0.6 (0.4,0.8)
Hayward *et al.*	BMJ 2006	2604 residents in 44 LTCFs in UK	15% vs 11%	0.6 (0.4, 1.0)
Lemaitre *et al.*	J Am Ger Soc 2009	3483 residents in 40 nursing homes in France	6.0% vs. 5.2%	0.8 (0.7,1.0)

Outcomes associated with influenza vaccination of HCWs, meta-analysis of RCTs in long term/chronic care

		Cochrane review	CDC review
Outcome	**No. Pts**	**Adjusted pooled OR (95% CL)**	**Adjusted pooled OR (95% CL)**
Mortality	8468	0.68 (0.55, 0.84)*	0.71 (0.59, 0.85)*
Influenza-like illness (ILI)	7031	0.71 (0.58, 0.88)*	0.58 (0.46, 0,73)*
GP consult for ILI	2572	0.48 (0.33, 0.69)*	
Death from ILI	2572	0.72 (0.31, 1.70)	
Lab confirmed influenza	752	0.87 (0.38, 1.99)	0.80 (0.31, 2.1)
Pneumonia	1059	0.71 (0.29, 1.71)	
Deaths from pneumonia	4459	0.87 (0.47, 1.64)	
Hospital admission	5972	0.90 (0.66, 1.21)	0.90 (0.69, 1.2)

*=statistically significant result

Cochrane criticisms

- ILI and mortality are non-specific outcomes
- Effect size is too large to be true
- One would expect to see a larger effect on more specific outcomes like influenza and pneumonia than on mortality
- Studies are of low quality
- There is no comparison to a study that fully implements other interventions

What about acute care hospitals?

Acute care hospital acquired influenza – recent case series

Study1	Site	Year	No. cases	% hosp. cases	Rate	Case fatality Rate
Veenith 2012	Single hospital, UK	2009	10	12%	N/A	2/10 (20%)
Jhung 2014	ABC surveillance, US	2010/11	171	3%	(pop 29M)	27/171 (16%)
Macesic 2013	FluCAN, Australia	2010 & 2011	26	4%	(23 hospitals)	1/26 (4%)
Vaisman (unpub)	TIBDN, Canada	2005-12	328	9.2%	0.12 per 10,000 pt-days	57/328 (12%)
*Vanhems 2011	Single hospital, France	2004-6	37	-	0.7 per 1000 patients	-
*Iten 2013	Single hospital, Switzerland	2011-13	56	23%	0.5 per 1000 pt-days	-
Taylor 2014	CNISP, Canada	2006-12	225	7%	0.3 per 1000 admissions	20/225 (9%)

Risk factors for hospital acquired influenza

Characteristic	Adjusted OR (95% CI)
Age, per year older	1.03 (0.99-1.07)
Influenza source (patient or HCW) on unit	5.22 (1.08-25.2)
Proportion of HCW vaccinated above median (35%)	0.07 (0.005-0.98)

Benet BMCID 2012;12:30

Cluster randomized trial of hospital HCW vaccination

	Control	Intervention	P value
Percent HCWs vaccinated	17.8%	28.6%	<.001
Influenza or pneumonia during hospitalization			
Adults	9.6%	3.9%	0.015
Children	1.9%	3.6%	0.19
Pneumonia during hospitalization			
Adults	8.5%	1.4%	0.03
Children	1.1%	1.3%	0.65

Riphagen-Dalhuisen et al. Eurosurveillance 2013;18(26)

Are masks a reasonable alternative to vaccine?

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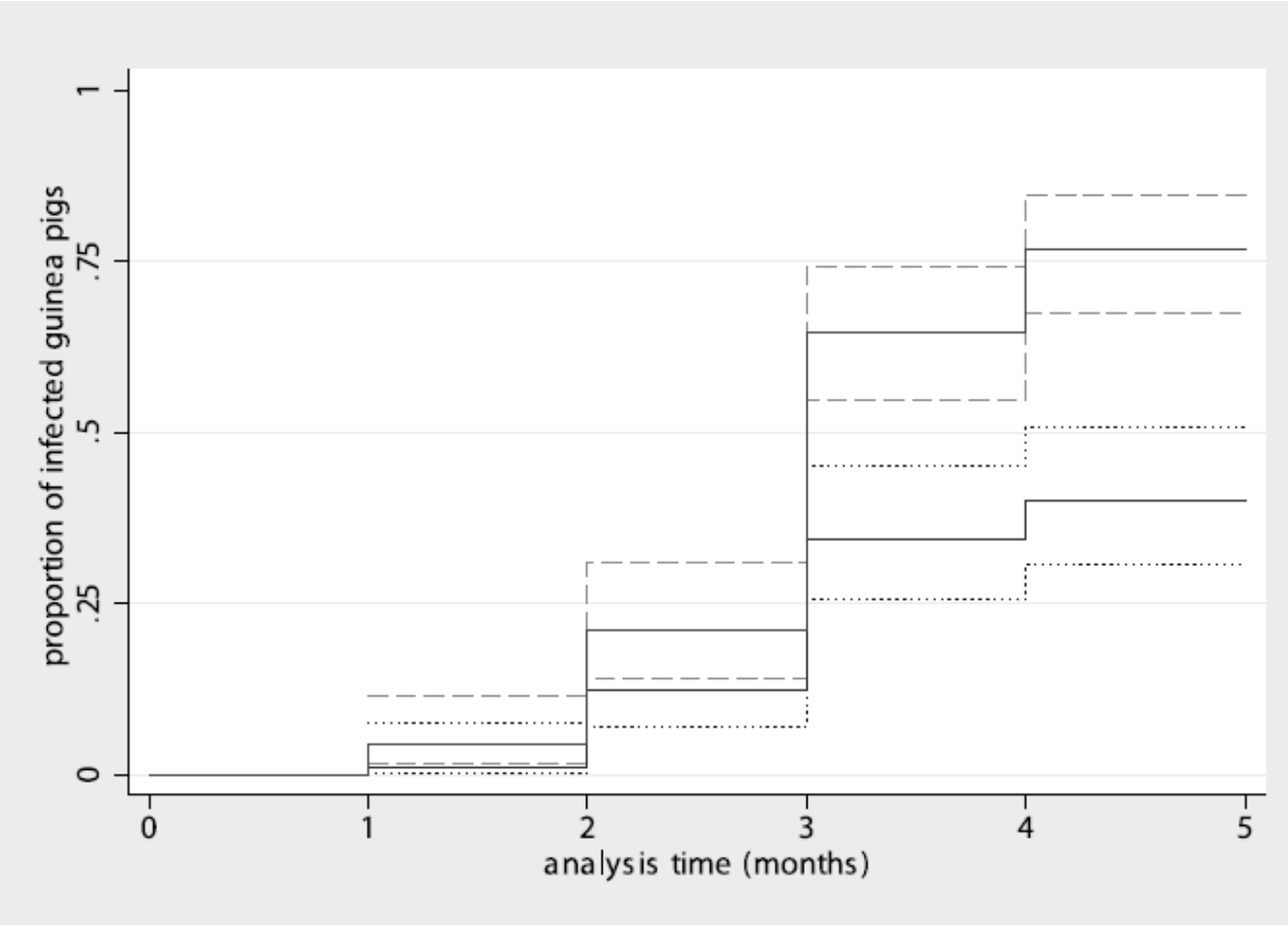
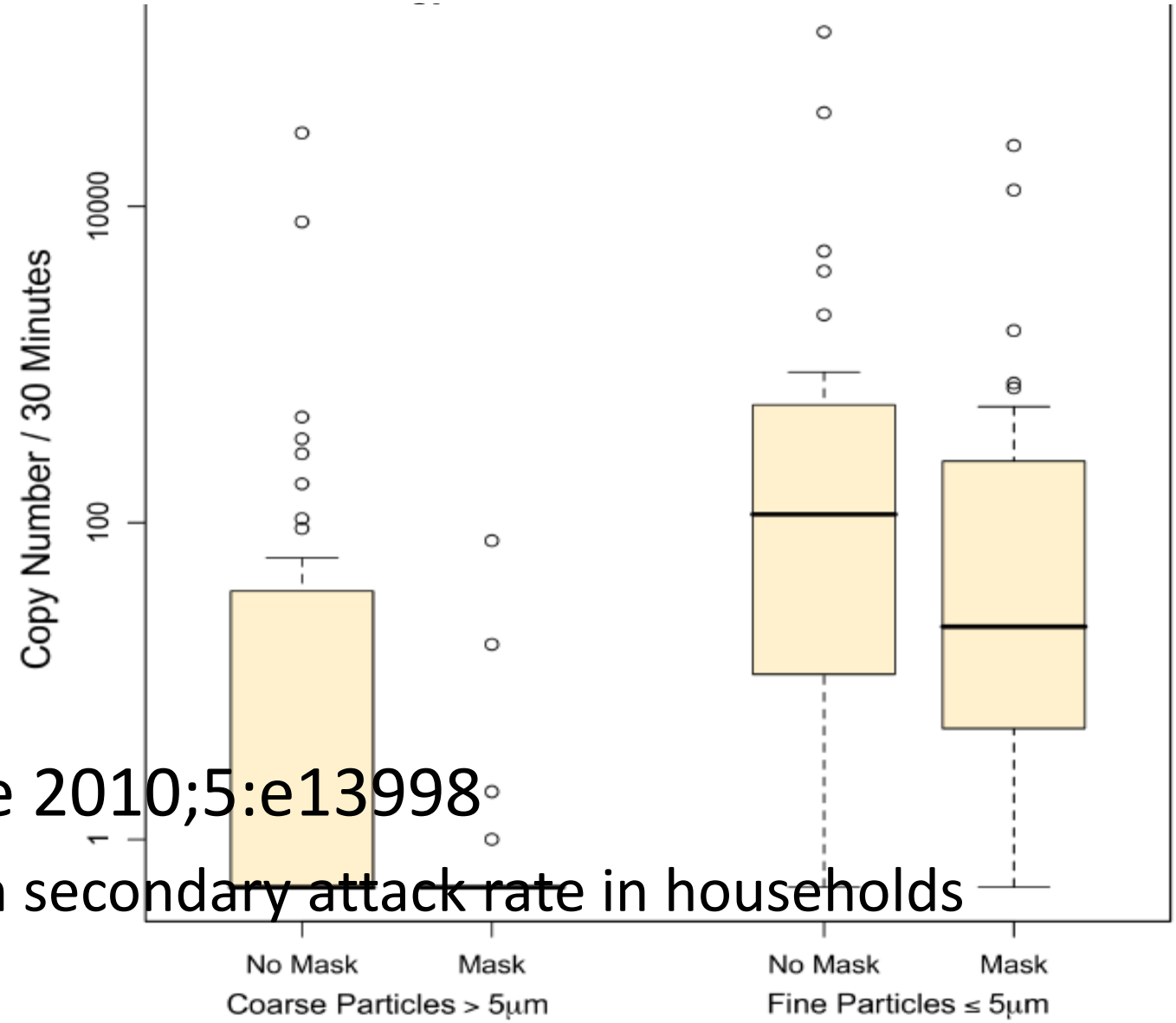


Skaria Ann Occup Hyg
Dharmadhikari AJRCC

Do masks worn by infected persons reduce exp

- Johnson CID 20(
  - Either mask or
    to zero (coughi
- Milton PLoS Pat
  - Masks produce



- Canini PLoS One 2010;5:e13998
  - No reduction in secondary attack rate in households

Experimental data: masks, respirators and protection from influenza aerosols

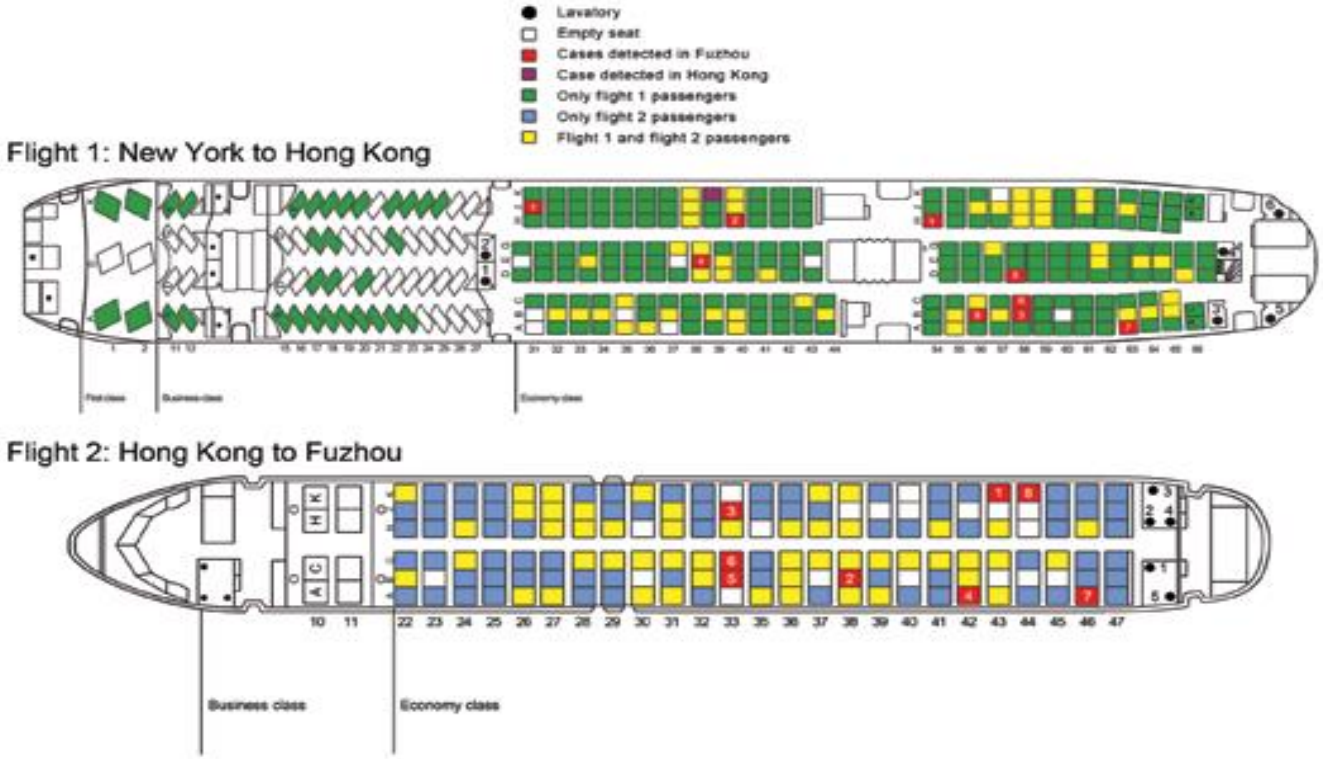
- Noti et al. CID 2012;54:1569
  - Reductions in influenza virus penetration
    - Sealed mask (silicone seal) – 94.8%
    - Sealed N95 respirator (silicone seal) – 99.5%
    - Mask, no seal – 57%
    - N95 respirator (poor fit) – 67%
- Makison-Booth JHI 2012;84:22
  - Influenza plaque reduction factor 1.1-55 with different surgical masks

Clinical data - masks, respirators and protection from influenza for wearer

Study	Design	Primary outcome – effect of masks
MacIntyre	Household	No sig difference
Cowling	Household	No sig difference
Simmerman	Household	No sig difference
Seuss	Household	No sig difference
Larson	Community	No sig difference
MacIntyre	Hospital	No sig difference
Aiello	University residence	No sig difference

Protection by Face Masks against Influenza A(H1N1)pdm09 Virus on Trans-Pacific Passenger Aircraft, 2009

Lijie Zhang,[1] Zhibin Peng,[1] Jianming Ou,[1] Guang Zeng,[1] Robert E. Fontaine, Mingbin Liu, Fuqiang Cui, Rongtao Hong, Hang Zhou, Yang Huai, Shuk-Kwan Chuang, Yiu-Hong Leung, Yunxia Feng, Yuan Luo, Tao Shen, Bao-Ping Zhu, Marc-Alain Widdowson, and Hongjie Yu



- Wore a face mask for entire flight:
  - 0/9 cases
  - 15/32 controls
  - (P=.02)

In sum

- In both acute and long term care, there is evidence that the burden of institutionally acquired influenza is significant

- There is now RCT evidence in both LTC and acute care that influenza vaccination of HCWs reduces serious outcomes in patients

- There is some evidence that HCWs wearing masks will reduce influenza exposure to patients