

**Clinical Issues II:
Infection Prevention & Control
Occupational Health &
Hygiene Issues**

**Lynn Johnston MD FRCPC
Dalhousie University, Halifax
Chair, PHAC IC Expert Advisory Group**

Objectives

- Understand H1N1 epidemiology related to nosocomial & occupational transmissions
- Exchange best practices for IP&C management of patients with H1N1
- Identify key ICU IP&C challenges/shortfalls & review mitigating strategies
- Foster connections between IP&C/OH&H and intensive care communities
- Research collaboration

Outline

- HCW & nosocomial transmission
 - ❖ Lessons from seasonal influenza
 - ❖ What we have learned from pH1N1
- Exposure and prophylaxis
 - ❖ Influenza exposures (seasonal and pH1N1)
 - ❖ Lessons from SARS (& elsewhere)
- View of the PHAC IP&C/OH&H guidance

Clinical Issues II

HCWS AND NOSOCOMIAL TRANSMISSION - IS THE RISK REAL?

Nosocomial Influenza (NI)

- A female inpatient developed influenza 21 d after admission in the setting of an influenza outbreak among nursing students

Am J Med Technol 1980; 46:318-20

- 20% of inpatients developed NI in the weeks following high absenteeism among HCW due to ILI

Ann Intern Med 1982; 96:153-8

Nosocomial Influenza (NI)

- Index ICU patient developed influenza 12d after admission. 2 long term vent patients subsequently ill. Nurse who looked after all three went off with ILI:

Pt → HCW → Pt

MMWR 1988; 37:3-4

Table 1 Number of patients, number of clinical and confirmed cases, number of nosocomial clinical and confirmed cases, and number of deaths

Study by alphabetical order (reference)	Patients	Observed cases		Nosocomial cases		Deaths related to influenza
		Clinical	Laboratory-confirmed ^a	Clinical	Laboratory-confirmed ^a	
Andrieu <i>et al.</i> ¹	123 ^b	19	3/19 (A)	19		0
Aschan <i>et al.</i> ²		6	6 (B)			1
Barlow and Nathwani ³		3	2 (A)		2 (A)	
Bauer <i>et al.</i> ⁴		3	2 (A)	3		0
Berg <i>et al.</i> ⁵	22	13	0/3 ^c 9/9 ^d	13		0
Blumenfeld <i>et al.</i> ⁶	29	15	1/5 ^c (A) 12/15 ^d	13		
Brocklebank <i>et al.</i> ⁷		329	77 (A)		16	2 ^e
Carnicer-Pont <i>et al.</i> ⁸		16	11/14 (A)	16		
Cunney <i>et al.</i> ⁹	54	6/54	19/54 (A)			1
Horcajada <i>et al.</i> ¹⁰	23	8	3 (A)	8		1/8
Kapila <i>et al.</i> ¹¹		9	4 (A)	6		6
Karlsson <i>et al.</i> ¹²	15	5	8 (A)			
Kashiwagi <i>et al.</i> ¹³	394		133/379 (A)			15
Malavaud <i>et al.</i> ¹⁴		4	4 (A)	4		0
Mathur <i>et al.</i> ¹⁵		71 ^f	24/71 (A)			0
Meibalane <i>et al.</i> ¹⁶		8	5 (A)			0
MMWR ²⁸		3	3 (A)		3 (A)	1
Munoz <i>et al.</i> ¹⁷	15	4	3/4 (A)	4		1/4
Pachucki <i>et al.</i> ¹⁸		49	6 (A)			
Sagrera <i>et al.</i> ¹⁹	95		30/95 (A)		30 (A)	0
Sartor <i>et al.</i> ²⁰	23	9/22 ^g	2 (A)	9		0
Serwint <i>et al.</i> ²¹		790 ^h	112 ⁱ (A and B)		8	3 ^e
Van Voris <i>et al.</i> ²²		29	10/28 ^c (B) 18/28 ^d (B)	29		0
Weingarten <i>et al.</i> ²³	663	112	26/112 (A)		2	0
Weinstock <i>et al.</i> ²⁴			25 (A)		7 (A)	
Whimbey <i>et al.</i> ²⁵	68	28	8/28 (A)		5/8 (A)	1 ^e
Yonezawa <i>et al.</i> ²⁶		28	28 (A)			
Yousuf <i>et al.</i> ²⁷		45	15 (A) ^j		2 (A)	4/15

^a The virus type appears in parentheses. When available, the number of samples was reported.

^b At the beginning of the outbreak.

^c Virus isolation.

^d Antibody titres.

^e Among virologically confirmed cases.

^f Upper respiratory tract infections.

^g Twenty-three minus the community index case.

^h Respiratory cultures.

ⁱ Cultures among 99 patients.

^j One sporadic case was detected after the outbreak.

JHI 2009; 71:1-14

Limitations with NI Literature

- 28 NI outbreak reports evaluated using ORION framework
- None of the studies defined or outlined method of outbreak ascertainment
- Only 1 study provided definition of contact or infectious contact
- So, even if NI, who/what was the source?

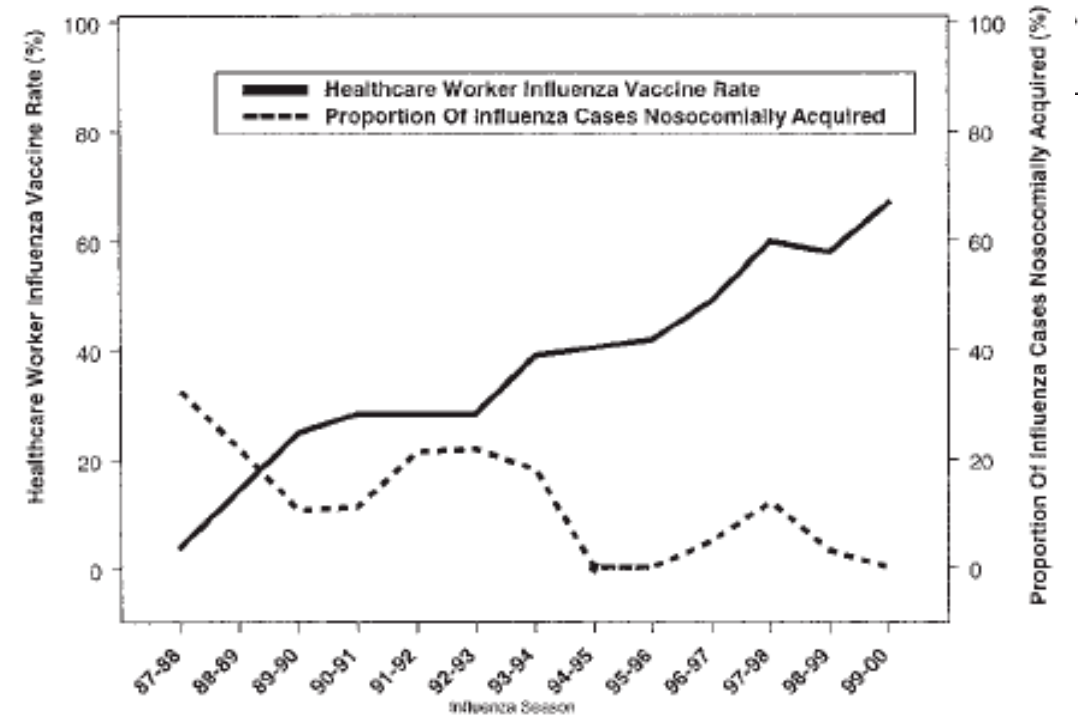
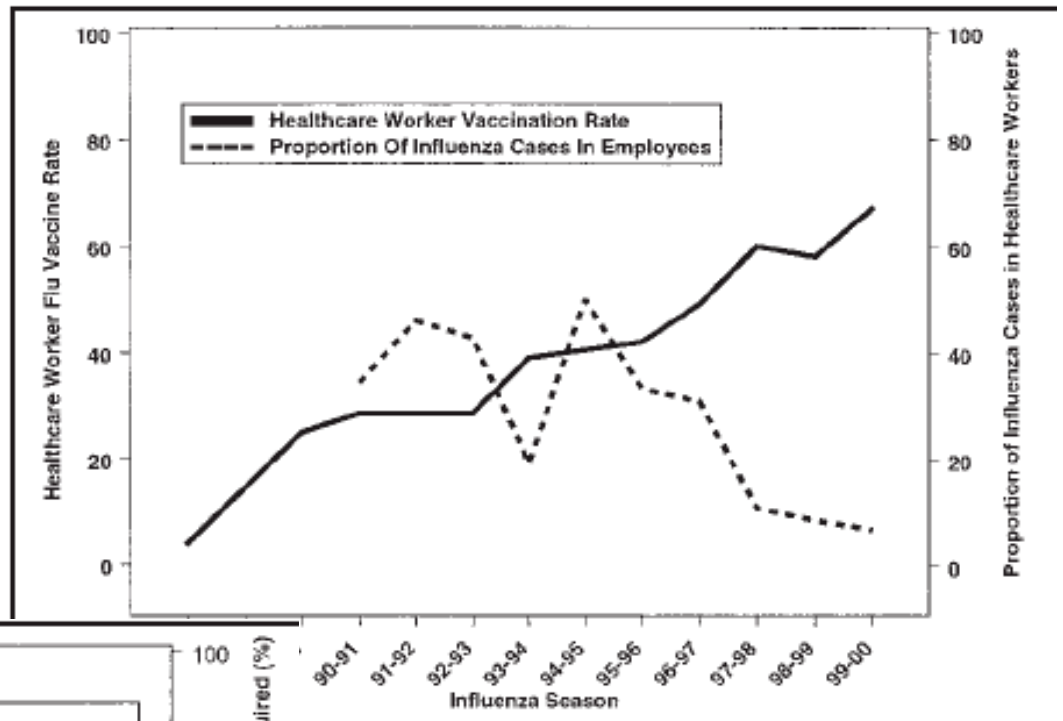
Influenza in HCWs

- Before & after serosurvey in 518 unvaccinated HCW in Glasgow (1993)
- 23.2% had significant rise in influenza IgG
- ILI in primary care was 0.2%
- 41% with influenza could recall having had clinical influenza
- 28% without influenza thought they had it

BMJ 1996;313:1241-2

Influenza in HCWs

- 203 Sao Paolo hospital employees
- June 2001-September 2003
- 19.7% vaccination rate
- 12.3% culture positive for influenza A/B
- 37.7% culture positive for RSV (49.5% of whom reported ILI)



ICHE 2004;25:923-8

Nosocomial & Occupational H1N1 2009

- 1 (?2) reports of nosocomial transmissions to 4 patients in Germany
- As of May 13, CDC received 48 reports of H1N1 in HCW (4% of reports)
- 9% of working adults in US employed in the health care setting

MMWR 2009; 58:641-5

HCWs and Nosocomial Transmission

- Is the risk Real?

- Yes, both patients & health care workers appear to acquire seasonal influenza in the health care setting
- HCWs have acquired H1N1 2009 influenza at work and probably/may have a higher risk of seasonal influenza than non-HCW
- The risk is not quantified (to patients & HCW)

Clinical Issues II

EXPOSURE & PROPHYLAXIS: HCW ISSUES

Some interesting features (& recurring themes) of NI outbreaks

- Delayed diagnosis
- No IC procedures (single room, gloves or masks)
- Low vaccination rates
- Staff working while ill

ICHE 2002; 23:615-9

J Infect 2003;

46:129

Transplantation 2001;

72:535

HCW and H1N1 2009

MMWR 2009; 58:641-5

Job	Facility	Gloves	Gown	Mask	N95	Eye
NA	inpatient	X	X	X	X	X
MA	outpatient	X	X	S	X	X
LPN	outpatient	X	X	X	X	X
PA	outpatient	A	X	X	X	X
RN	outpatient	X	X	S	X	X
NA	inpatient	A	S	X	S	X
MD	outpatient	A	?	no info	A	no info
LPN	inpatient	S	S	S	X	X
NAnaest	inpatient	A	S	A	S	S
RN	inpatient	A	X	A	X	X
MA	outpatient	X	X	X	X	X
MD	inpatient	no info	no info	no info	no info	No info

Lessons from SARS

- Following hospitalization of single patient in Viet Nam, 11.4% HCW/employees developed SARS
- AR highest in outpatients and wards
- AR lowest in ICU and OR
- Insufficient power to identify risks for infection

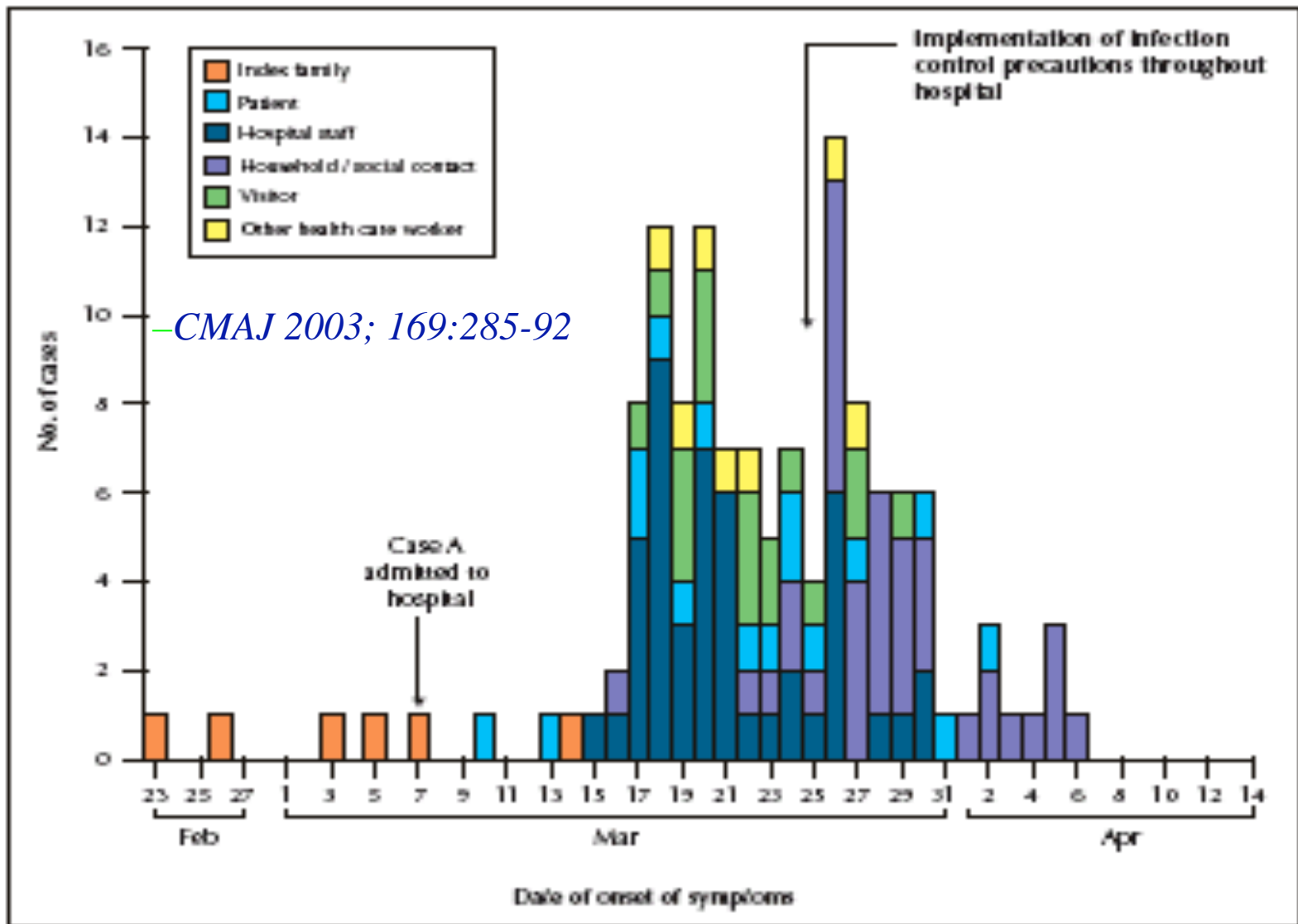


Fig. 1: Reported probable and suspect cases of severe acute respiratory syndrome (SARS) associated with the index case and her family ($n = 6$) and a nosocomial outbreak at a secondary care community hospital in Toronto ($n = 12$), by date of onset of symptoms and type of case, from Feb. 23 to Apr. 15, 2003. (Two of the cases in the nosocomial outbreak are not included in this figure because their dates of symptom onset are unknowns.)

SARS Transmission Among HCW, Hong Kong

- Risk of SARS among HCW with ≥ 2 h IC training
> 0.03 (0.001-0.20)
- Risk of SARS among HCW who did not
understand IC measures
> 3.13 (1.35 –7.73)

EID 2004; 10: 280-6

Repeated themes around exposures

- Need to recognize the infected patient (inpatient & outpatient settings)
- Patient self-screening, triage
- Provision of IP&C resources
- Training in IP&C practices
- Correct use of PPE
- Identify and furlough ill HCW
- Support for practices at all levels

Table 2. Infection control knowledge, attitudes, and organizational factors

	Nurses (n = 91)	RCPs (n = 44)	Housestaff (n = 82)	PCCM Faculty/Fellows (n = 39)	Total (n = 256)
Knowledge					
I know when patients are on influenza precautions (% agree/strongly agree) ^a	79	72	95	97	85
Knowledge of Correct PPE ^b					
All	63	70	58	69	63
Gowns	76	74	65	78	73
Gloves ^a	93	95	76	97	89
Masks	87	95	87	92	89
Attitudes Toward PPE (% agree/ strongly agree)					
PPE use keeps me from getting flu	79	86	79	77	80
PPE use keeps patients from getting flu	70	72	79	89	76
It is inconvenient to use recommended PPE when taking care of flu patients ^a	42	36	58	64	49
Using recommended influenza PPE interferes with patient care	22	9	25	22	21

Table 3. Reported infection control behaviors

	Nurses (n = 91)	RCPs (n = 44)	Housestaff (n = 82)	PCCM Faculty/ Fellows (n = 39)	Total (n = 256)
Received flu vaccine ^a	74	66	91	87	80
High adherence (>80%) with recommended PPE ^a	76	84	45	37	62
My colleagues often forget to use recommended PPE when taking care of influenza patients	52	44	58	53	53
I remove my PPE immediately when I leave my patients room	98	98	91	100	96
I believe I can improve my use of recommended influenza PPE ^b	79	60	80	86	77
I often forget to change PPE between patients ^b	4	5	16	3	8

IP&C Guidance for the Acute Care Setting

- Source control
- Respiratory hygiene
- Hand hygiene
- Accommodation
- Contact precautions
- Droplet precautions/respiratory protection
- Reporting

OH Guidance for the Acute Care Setting

- Organizational OH&H planning
- Education
- Self-assessment
- Hand hygiene
- Respiratory hygiene
- Fitness-for-work
- Occupational exposures
- Influenza immunization
- Antiviral treatment & prophylaxis

Member	Province	Expertise
Dr. Lynn Johnston (chair)	NS	ID(adult)/IC
Dr. George Astrakianakis	BC	OHH
Dr. Liz Bryce	BC	MM/IC
Dr. Maureen Cividino	ON	OH
Dr. Joanne Embree	MB	ID (peds)/IC
Dr. Charles Frenette	QC	ID(adult)/MM/IC
Mr. Bruce Gamage	BC	IC
Dr. Bonnie Henry	BC	PH/IC
Dr. Joanne Langley	NS	ID(peds)/IC
Ms. Colette Ouellet	ON	IC
Dr. Kathy Suh	ON	ID(adult)/IC
Dr. Geoff Taylor	AB	ID(adult)/IC
Dr. Mary Vearncombe	ON	MM/IC

PHAC Members

Ms. Luna Bengio

Ms. Kathy Dunn

Ms. Denise Gravel

Ms. Kristalyn Laryea

Ms. Laurie O'Neil

Ms. Shirley Paton

Thank you,

now your turn.....