



Active surveillance and Point-of-Care testing (POCT) allows early intervention for influenza outbreaks in nursing homes

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Introduction

Seasonal influenza outbreak detection in nursing homes (NHs) is often delayed, hampering timely outbreak control.

A three year cluster-randomized controlled trial (2006-08) is underway to compare the use of oseltamivir (OTV) for treatment only, versus OTV for both treatment and prevention in influenza outbreaks in NHs.

In this trial, health, social and economic terms are being measured, as well as the impact of active surveillance and on-site rapid antigen or point of care testing (POCT) for identifying outbreaks.

Objective

We analysed the impact of active surveillance with on-site POCT for identifying outbreaks of influenza-like-illness (ILI) in NH, and guiding timely use of oseltamivir in NH influenza outbreak control.

Methods

Active surveillance for ILI in staff and residents has been undertaken in 16 NHs ('Study Facilities') over two winters (2006 and 2007), using telephone contact 3x/week and/or self-reporting of outbreaks. Data was also collected from NHs that were not part of the study ('Non-study Facilities') where usual passive surveillance (self-reporting of ILI outbreaks to public health authorities) was in place.

ILI in a NH resident (or staff) was defined as acute onset of fever with temperature $\geq 38^{\circ}\text{C}$, associated with newly-acquired cough or another respiratory symptom or sign (e.g. sore throat, shortness of breath, tachypnoea), irrespective of the presence of any other systemic symptoms.

An outbreak was defined as 2 people with ILI within a 3-day period, or 3 people meeting these criteria within 7 days.

POCT (QuickVue Influenza A+B, Quidel Corp., San Diego CA) was performed by NH staff on-site for the initial diagnosis of influenza, and confirmed by a direct immunofluorescence assay (IFA), or nucleic acid testing and serology. NH staff were trained in the collection of combined nose and throat samples, and performance of the POCT prior to each winter. NHs with POCT positive for influenza were randomized to receive OTV treatment for ill residents and staff (≤ 48 hours of ILI onset), or OTV treatment plus contact prophylaxis.

Results

Twelve NH respiratory outbreaks were identified in nursing homes enrolled in the trial ('Study Facilities') over two winters, with six outbreaks occurring in each year. Six were due to influenza A (Table 1), and six were due to other pathogens (Table 2). In 2007, a busy influenza season in the southern hemisphere, 5/16 Study Facilities (32%) reported an influenza A outbreak. Overall influenza vaccination rates in residents of Study Facilities with influenza A outbreaks was 78% (range 60-86%).

The influenza A attack rate in Study Facilities was 95/442 residents (average 21%, range 13-33%), compared to 240/579 (42%, range 35-50%) in Non-study Facilities. The average attack rate in staff from five Study Facilities was 10% (29/284).

The average time from the first ILI case to influenza A outbreak declaration and OTV intervention in Study Facilities was 8 days (range 4-22 days), compared to 15 days (range 8-24) in other NHs. The median influenza outbreak duration for the Study Facilities was 11.5 days, compared to 22 days for the Non-study Facilities.

In the 12 outbreaks, POCT was performed on-site by NH staff in 86 cases of ILI. The sensitivity and specificity of the Quidel QuickVue rapid antigen test compared to IFA was 76% and 96%, with positive and negative predictive values of 94% and 84% (Table 3). Of the 2 samples that were POCT positive, but IFA negative, one seroconverted to influenza A. This compares favourably with laboratory "out of hours" testing during the 2007 influenza season where a sensitivity and specificity of 84% and 97% were obtained.

Table 1. Influenza A outbreaks

	Study facility A	Study facility B	Study facility C	Study facility D	Study facility E	Study facility F	Non-study facility V	Non-study facility W	Non-study facility X	Non-study facility Y	Non-study facility Z
Causative agent	Influenza A	Influenza A	Influenza A	Influenza A	Influenza A	Influenza A	Influenza A	Influenza A	Influenza A	Influenza A	Influenza A
No. of symptomatic /total residents (attack rate)	12/92 (13%)	7/23 (30%)	14/98 (14%)	23/69 (33%)	20/62 (32%)	30/98 (31%)	55/132 (42%)	132/324 (41%)	17/49 (35%)	16/32 (50%)	20/42 (48%)
No. of symptomatic /total staff (attack rate)	4/na	1/29 (3%)	4/92 (4%)	2/38 (5%)	12/42 (29%)	10/83 (12%)	22/173 (12%)	na	9/41 (21%)	13/31 (42%)	6/29 (21%)
Days between first case and outbreak declaration	6	7	4	5	4	22	21	24	8	8	15
Days from first case to first test result	6	6	4	5	4	22	data n/a	data n/a	6	5	13
Duration of outbreak	18	8	5	8	15	31	56	42	22	9	18
Days to OTV started	7	7	4	5	4	22	21	data n/a	8	not used	17

Table 2. Non-influenza outbreaks in Study Facilities

	Study facility G	Study facility H	Study facility I	Study facility J	Study facility K	Study facility L
Causative agent	Unknown	Unknown	Unknown	RSV	PIV-1	RSV
No. of symptomatic /total residents (attack rate)	18/74 (24%)	10/159 (6%)	28/144 (19%)	13/145 (9%)	11/78 (14%)	21/79 (27%)
Days between first case and outbreak declaration	11	4	4	11	4	5
Days from first case to first test result	na	na	na	12	5	6
Duration of outbreak	17	20	19	18	10	19

Table 3. Comparison of Quidel QuickVue POCT and IFA

	IFA Positive	IFA Negative	
POCT Positive	29	2	Sensitivity = 76%
POCT Negative	9	46	Specificity = 96%
			PPV = 94%
			NPV = 84%

Conclusions

Influenza outbreaks are a major burden in nursing homes, with high attack rates in residents and a high proportion of NHs affected.

Despite limitations in timely case identification, active surveillance for ILI in NHs facilitates early detection and management of respiratory outbreaks.

POCT (Quidel QuickVue) for influenza performed by NH nurses 'on-site' is sensitive and highly specific, and allows more rapid recognition of outbreaks and intervention with antiviral therapy.

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