

Pre-symptomatic Healthcare Worker Transmission of Pandemic (H1N1) Influenza in Acute Care Settings, Los Angeles County, 2009



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Background

- Asymptomatic or pre-symptomatic transmission of influenza is not well understood, but believed to be possible and of concern in healthcare settings
- Pandemic (H1N1) influenza was first seen in Los Angeles County (LAC) in April 2009
- Department of Public Health (DPH) staff investigated several hospital outbreaks of pandemic (H1N1) influenza
- Two outbreaks were hypothesized to involve pre-symptomatic healthcare worker (HCW) transmission to high-risk patients in acute care settings
- Outbreaks occurred prior to the release of pandemic (H1N1) influenza vaccine
- We describe two outbreaks investigated in July and October 2009 in two separate LAC acute care hospitals

Facility A – July 2009

- Infection preventionist (IP) called to notify DPH of pandemic (H1N1) influenza outbreak in pediatric hematology-oncology unit in patients admitted for chemotherapy
- Case defined as patient in hematology-oncology unit positive for H1N1 influenza via real-time reverse transcriptase polymerase chain reaction (rt-PCR)
- Two cases initially met case definition (Table 1)
- Cases resided in adjacent rooms on the same floor with symptom onset 5 days apart
- Later in investigation, Index Case identified
- Index Case admitted to Facility A symptomatic with influenza-like illness (ILI) 7 days prior to onset of symptoms in Case 1 (Fig. 1)
- Progression of infection to respiratory distress required all three case to be transferred to the pediatric intensive care unit (PICU)
- All three case were treated with oseltamivir while in the PICU
- All three case subsequently expired in the PICU from complications of influenza
- HCW 1 identified with ILI – provided direct patient care to index case, Case 1 and 2
- HCW 1 symptom onset same day as Case 1
- HCW 1 was clinically diagnosed with influenza A by an outside provider; no specimen was obtain for testing by DPH
- HCW 1 provided care to Index Case, Case 1 and Case 2 three days before her symptom onset
- No contact between HCW 1 and patients occurred while HCW 1 was symptomatic; HCW 1 did not return to work until symptoms resolved and treatment with oseltamivir completed
- Case 1 and 2 were not exposed to any other known symptomatic or pre-symptomatic visitors or staff

Table 1. Case characteristics for Facility A

	Index Case	Case 1	Case 2
Age	8 years	15 months	3 years
Underlying chronic condition	Chronic Langerhans histiocytosis	Down syndrome/ Acute myelogenous leukemia	Down syndrome/ Acute myelogenous leukemia
Admission diagnosis	Fever/neutropenia	Chemotherapy treatment	Chemotherapy treatment
Days in facility prior to onset	0	27	7
Symptoms:			
Cough	Yes	Yes	Yes
Fever	Yes	Yes	Yes
Respiratory distress	Yes	Yes	Yes
Diarrhea	Yes	Yes	Yes
Vomiting	No	Yes	No

Table 2. Case characteristics for Facility B

	Case 1	Case 2	Case 3
Gestational age (weeks)	37	27	32
APGAR score ^a	7, 8, N/A	5, 6, 9	8, 9, N/A
Underlying medical condition	Gastroschisis	Respiratory distress	Respiratory distress
Ventilator dependent	Yes	Yes	Yes
Days in NICU prior to onset	148	125	44
Symptoms:			
Cough	No	Yes	No
Fever	Yes	No	No
Increased secretions	No	Yes	Yes
Vomiting	Yes	No	Yes
Poor feeding	Yes	Yes	Yes

^a At one, five and 10 minutes

Fig. 1 Timeline of Infections in Facility A among Patients and Healthcare Worker in the Hematology-Oncology Unit

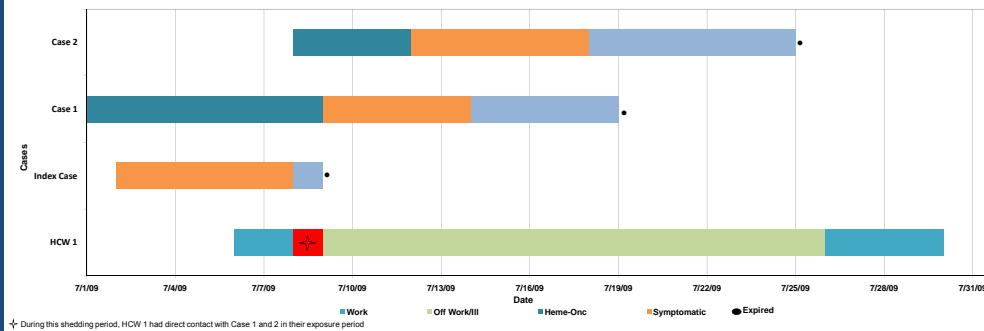
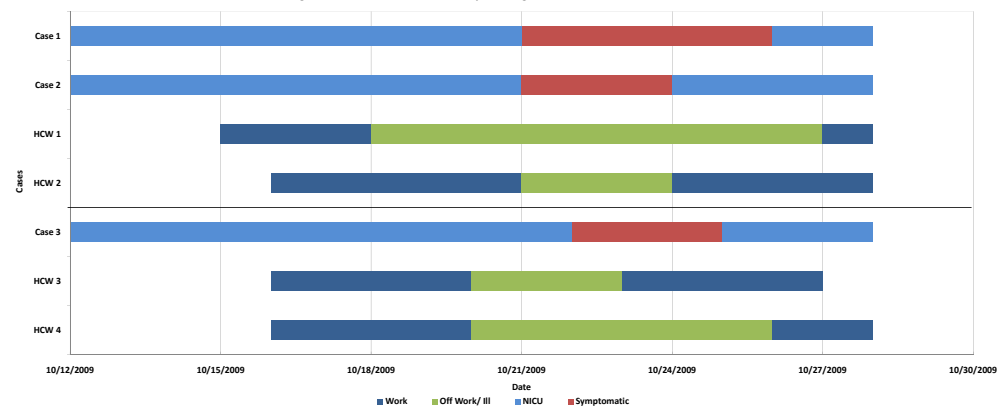


Fig. 2 Timeline of Infections in Facility B among Patients and Healthcare Workers in the NICU



Facility B – October 2009

- IP called to notify DPH of one infant symptomatic with ILI and two infants with non-specific symptoms (Table 1) in the neonatal intensive care unit (NICU) with positive rt-PCR influenza tests within a 24 hour period
- Case defined as patient residing in the NICU who was positive for pandemic (H1N1) influenza via rt-PCR
- Three patients met the case definition
- Interviews with NICU staff revealed four HCWs on the same shift who cared for the three case patients
- These HCWs subsequently became ill (Fig. 2)
- While potentially shedding the virus, HCW 1 provided care to Case 1 and 2 during the exposure interval for the infants
- HCW 1 experienced a mildly achy prodrome at the end of her shift on the third day and did not return to work
- HCWs 2, 3 and 4 became symptomatic with ILI 2-3 days after HCW 1
- HCW 2 provided care to Case 1 and Case 2 while pre-symptomatic
- HCWs 3 and 4 provided care to Case 3 while pre-symptomatic
- No HCWs cared for patients while symptomatic
- Facility B has strictly enforced visitor policy excluding sick visitors from the NICU; there were no known ill visitors
- None of the HCWs were tested for influenza by Facility B or their primary medical doctors
- All infants and HCWs recovered from their illness

Conclusions

- Influenza patients are considered most infectious during the 24 hours before the onset of symptoms and during the most symptomatic period
- Though transmission cannot be proven in both reported outbreaks, HCWs in their pre-symptomatic phase, had direct contact with patients who subsequently developed influenza
- A limitation of these investigations is the lack of diagnostic testing of HCWs; ill HCWs were clinically diagnosed only
- Both outbreaks occurred in areas with severely immunocompromised patients; HCWs place their patients at high risk of infection if not properly immunized
- Annual vaccination against influenza is recommended for all HCWs as it continues to be the primary method to prevent infection and transmission
- Exposure of HCWs to ill patients, and exposure of vulnerable patients to ill HCWs, is an occupational hazard that can be prevented via influenza vaccination
- We hypothesize that had vaccine been available at the time, and HCWs vaccinated, both outbreaks would have been avoided

Acknowledgements

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