

# Patterns of Medical Care for Patients with Influenza-Like Illness

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## Background

- Population-based disease surveillance can identify episodes of excess disease activity
  - could inform public health and health system responses
- Currently, limited information on:
  - how patients with influenza-like illness (ILI) access health care
  - amount of testing and prescriptions received
- Improved understanding of points of access and resource use could inform surveillance efforts using multiple clinical data streams
  - influenza-related encounters in a large, integrated health care delivery system

## Goals

- To examine patterns of health care use by patients with suspected influenza illness
- To better understand the relationships among different influenza-related data streams

## Data

- Eight types of influenza-related patient encounters
- 2007/08 flu season (Sept. 30, 2007 – May 17, 2008)
- 3.3 million members
- 18 medical centers, Kaiser Permanente Northern California (KPNC)
  - implementation of electronic medical record complete

## Types of Encounters (1)

- Ambulatory clinic (AC) visit with ILI defined by ICD-9 codes
  - with ICD-9 code for fever, temp $\geq$ 100°F, or both (AC+F)
  - no indication of fever (AC-F)
- Emergency department (ED) visit with ILI defined by ICD-9 code
  - with ICD-9 code for fever, temp $\geq$ 100°F, or both (ED+F)
  - no indication of fever (ED-F)

## Types of Encounters (2)

- Inpatient admissions
  - Pneumonia or influenza (ADMIT)
- RT-PCR tests
  - Positive for influenza type A or B (TEST+)
  - Negative for influenza types A and B (TEST-)
- Antiviral prescriptions
  - Oseltamivir, amantadine (Rx)

Table 1. Distribution of Influenza-Related Encounters, by Type, KPNC, 2007/08 Influenza Season

Encounter Type	Number	% of 729,038 Encounters
AC+F	61,895	8.5%
AC-F	577,093	79.2%
ED+F	8,381	1.1%
ED-F	27,607	3.8%
ADMIT	10,752	1.5%
TEST + or -	33,048	4.5%
Rx	10,262	1.4%
<b>Total</b>	<b>729,038</b>	<b>100.0%</b>

## Initiating vs. Follow-Up Encounters

- **Initiating** encounters: no influenza-related encounter in prior 6 weeks
  - Most timely indicator of influenza activity
- **Follow-up** encounters: with a prior influenza-related encounter in prior 6 weeks
  - Less timely indicator of influenza activity
- An AC or ED visit is generally the gateway to testing, prescriptions, and hospitalizations

Table 2. Percentage of Initiating Encounters, by Type, KPNC, 2007/08 Influenza Season

Encounter Type	Total Encounters	Initiating Encounters	Row %
AC+F	61,895	50,480	81.6%
AC-F	577,093	464,973	80.6%
ED+F	8,381	6,171	73.6%
ED-F	27,607	20,271	73.4%
ADMIT	10,752	1,654	15.4%
TEST + or -	33,048	4271	12.9%
Rx	10,262	2,938	28.6%
Total	729,038	550,758	75.6%

### Initiating Encounters in the AC and ED

- Percentage of patients with subsequent ADMIT, TEST, TEST +, and Rx
- Time lag from initiating to follow-up encounters

**Table 3. Admissions Following AC and ED Initiating Encounters**

		Follow-up within 42 days		
	Initiating Encounters	<b>ADMIT</b>	%	Mean Lag (days)
AC+F	50,480	263	0.5	7.6
AC-F	464,973	936	0.2	11.7
ED+F	6,171	686	11.1	6.3
ED-F	20,271	3,003	14.8	7.1

**Table 4. Tests Following AC and ED Initiating Encounters**

		Follow-up within 42 days		
	Initiating Encounters	<b>TEST</b>	%	Mean Lag (days)
AC+F	50,480	4,933	9.8	1.4
AC-F	464,973	12,328	2.6	4.2
ED+F	6,171	917	14.9	1.5
ED-F	20,271	1,531	7.6	2.4

**Table 5. Tests + Following AC and ED Initiating Encounters**

		Follow-up within 42 days		
	Initiating Encounters	TEST +	%	Mean Lag (days)
AC+F	50,480	2,350	4.7	0.8
AC-F	464,973	3,284	0.7	3.3
ED+F	6,171	322	5.2	1.4
ED-F	20,271	363	1.8	1.7

**Table 6. Rx Following AC and ED Initiating Encounters**

		Follow-up within 42 days		
	Initiating Encounters	Rx	%	Mean Lag (days)
AC+F	50,480	1,534	3.0	1.0
AC-F	464,973	2,101	0.5	3.4
ED+F	6,171	113	1.8	2.6
ED-F	20,271	98	0.5	3.7

## Summary (1)

- Patients with influenza-like illness initially presented in a number of settings
  - Vast majority initially received care in AC or ED
  - Small percentage initially received tests or Rx

## Summary (2)

- Follow-up admissions, testing and prescriptions had additional lag subsequent to initiating AC and ED encounters
  - ADMIT: most substantial lag
  - Rx: somewhat less lag
  - TEST and TEST +: smallest lag
- Having fever associated with follow-up encounter
- Initiating care in the ED associated with subsequent admission

## Conclusions

- The eight encounter types differed with respect to:
  - level of activity (sample size)
  - timing (timeliness)
  - sensitivity and specificity for influenza (signal : noise ratio)
- Next step: power analyses to better understand how to take advantage of multiple types of encounter data to optimize surveillance