Characteristics of Pandemic H1N1 (PanH1) Influenza Virus Cases in Washington, 2009

Communicable Disease Epidemiology

Washington State Department of Health

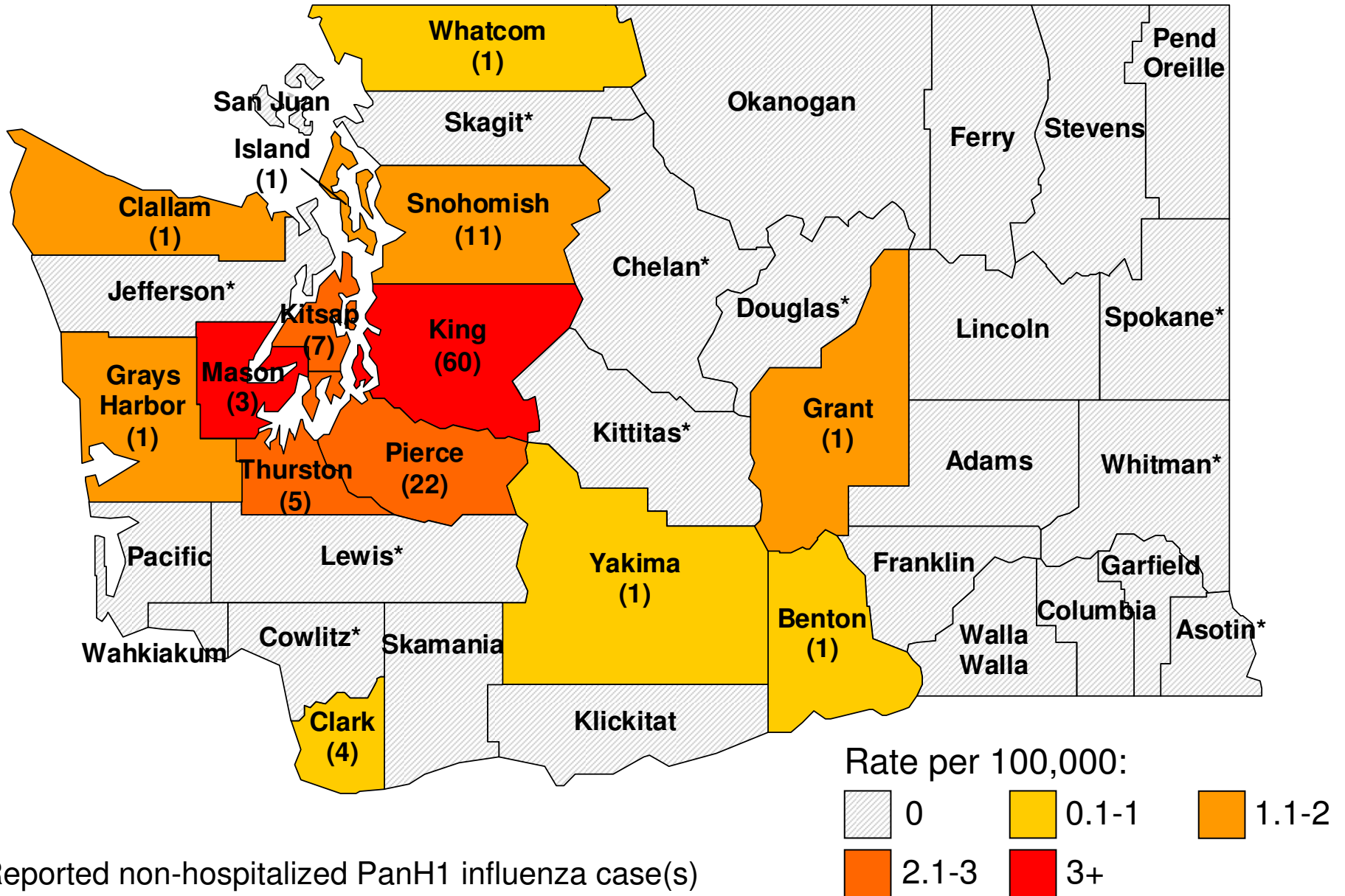# Epidemiology of Hospitalized & Fatal Cases of PanH1 Influenza Virus

Surveillance Methods

- Cases reported to Washington DOH, 4/26–7/14/09

- All are "positive" using rtPCR for PanH1 influenza virus

  – Nasopharyngeal, tracheal, or broncho-alveolar lavage samples tested

  – Testing conducted at Washington PHL or CDC

- Cases tested and reported 4/26–5/23: Clinical syndrome or severity not used to screen before testing

- Cases tested and reported 5/24–7/14 limited to:

  – Deceased or hospitalized persons with influenza-like illness (ILI) or severe acute respiratory illness (mandated reporting) **OR**

  – Healthcare workers and pregnant women with ILI seen in outpatient settings (voluntary reporting)

- Investigations performed by local health jurisdictions

Hospitalized or fatal cases of PanH1 influenza by onset date, Washington, 2009 (n=119)
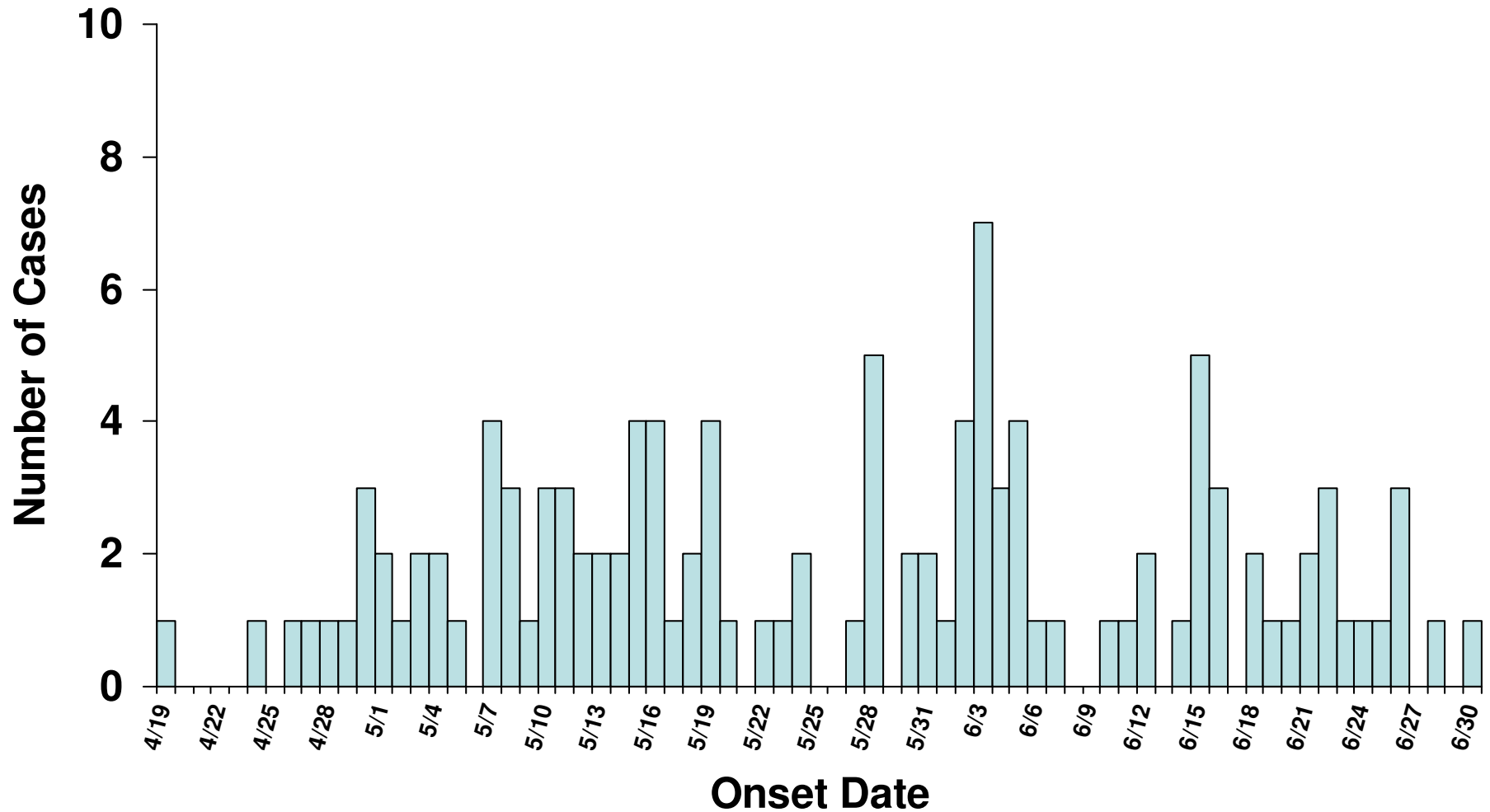
Rate & number (in parentheses) of hospitalized or fatal cases of PanH1 influenza by county, 2009 (n=119)

Whatcom (1)

San Juan

Island (1)

Skagit*

Okanogan

Pend Oreille

Ferry

Stevens

Clallam (1)

Snohomish (11)

Chelan*

Jefferson*

Kitsap (7)

King (60)

Douglas*

Lincoln

Spokane*

Grays Harbor (1)

Mason (3)

Grant (1)

Kittitas*

Adams

Whitman*

Thurston (5)

Pierce (22)

Pacific

Lewis*

Yakima (1)

Franklin

Garfield

Wahkiakum

Cowlitz*

Skamania

Benton (1)

Walla Walla

Columbia

Asotin*

Clark (4)

Klickitat

*Reported non-hospitalized PanH1 influenza case(s)

Rate per 100,000:

0	0.1-1	1.1-2
2.1-3	3+	

All PanH1 cases by age group & hospitalization status

Age Group (years)	Non-hospitalized*		Hospitalized/Fatal		All Cases	
	n	Rate**	n	Rate**	n	Rate**
0–4	71	16.4	28	6.5	99	22.9
5–17	316	27.6	30	2.6	346	30.2
18–49	187	6.3	40	1.3	227	7.6
50–64	17	1.4	16	1.3	33	2.6
65+	2	0.3	5	0.7	7	0.9
Total	593	9.0	119	1.8	712	10.8

* 2 cases missing age
** Rate per 100,000 population

Hospitalized or fatal cases of PanH1 influenza by age and critical care status

Age Group (years)	No critical care*		Critical care/fatal	
	n	Rate**	n	Rate**
0–4	24	5.6	4	0.9
5–17	25	2.2	5	0.4
18–49	20	0.7	20	0.7
50–64	11	0.9	5	0.4
65+	4	0.5	1	0.1
Total	84	1.3	35	0.5

* Includes 8 cases with unknown ICU status

** Per 100,000 population

Symptoms of hospitalized/fatal cases of PanH1 influenza

Symptoms (n*)	Hospitalized or Fatal	
	Symptom Present	%
Fever (111)	105	95
Cough (111)	105	95
Shortness of breath (70)	49	70
Sore throat (69)	35	51
Vomiting (90)	35	39
Diarrhea (90)	23	26

* Number of records where presence or absence of symptom specified

Pre-existing conditions in hospitalized or fatal PanH1 influenza, Washington, 2009

| Condition	Hospitalized or Fatal (N=111*)	
	n	%
Lung diseases/conditions	39	35
Asthma	24	22
Smoking	11	10
Chronic lung disease	9	8
Diabetes	16	14
Heart disease	14	13
Steroid therapy	8	7
Pregnancy	6	5
Chemotherapy/cancer in last year	5	5

*6 incomplete or missing case reports, 2 case investigations in progress

Clinical findings in hospitalized or fatal PanH1 influenza, Washington, 2009

Clinical condition (n*)	Hospitalized or Fatal	
	Present	%
Pneumonia (95)	47	50
Hypoxia (77)	34	44
ICU admission (107)	33	31
Mechanical ventilation (32)	23	
Adult respiratory distress syndrome (25)	17	
Received antiviral medication (104)	81	78

* Number of records where presence or absence of condition specified

Duration of hospital stay amongst hospitalized persons with PanH1 influenza*
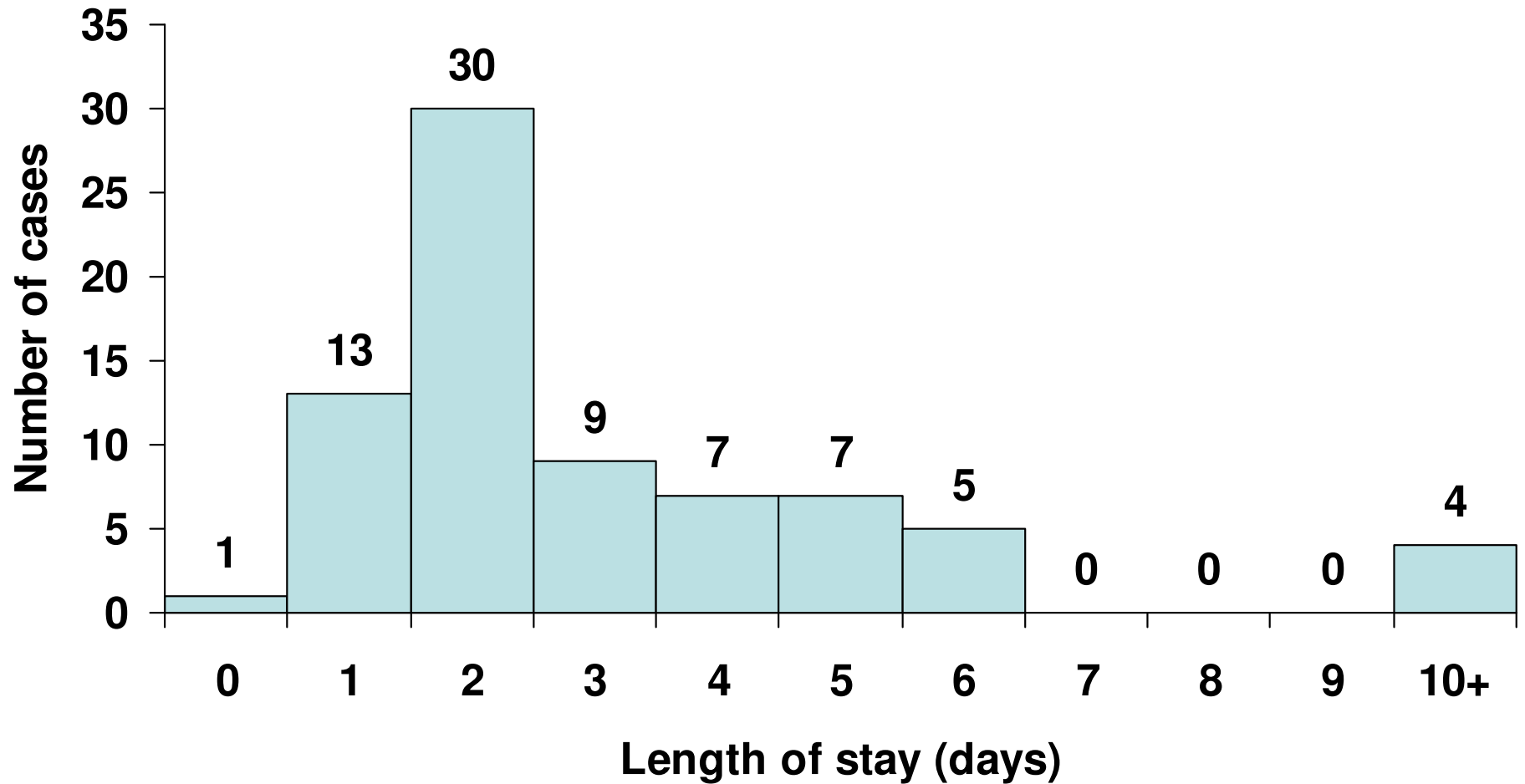
*Incomplete reports on 43 cases

Characteristics of all pregnant PanH1 cases (n=20)

Age range (years)	16–34
Age group	
0–17 years	1
18–49 years	19
Symptoms	
Cough	20/20 (100%)
Fever	18/19 (95%)
Sore throat	11/18 (61%)
Vomiting	3/18 (17%)
Diarrhea	2/18 (11%)
Any pre-existing condition present (besides pregnancy)	3 (15%)
Hospitalized	6 (30%)

Characteristics of hospitalized or fatal pregnant PanH1 cases (n=6)

Age range (years)	16–34
Age group	
0–17 years	1
18–49 years	5
Any pre-existing condition present	1 (17%)
Admitted to ICU	2 (33%)
Mechanical Ventilator	2 (33%)
Adult respiratory distress syndrome	1 (17%)
Fatal cases	1 (17%)

Characteristics of fatal PanH1 cases (n=6*)

Age range (years)	21–76
Age group	
0–17 years	0
18–49 years	4
50–64 years	1
65+ years	1
Adult respiratory distress syndrome* (%)	4 (67%)
Pregnancy*	1
Median days from onset to death (range)	10.5 (8–18)

* One case investigation in progress

Summary

- ~80% of hospitalized & fatal cases of PanH1 flu were in WA's three largest counties (King, Pierce, & Snohomish Cos.)

- Higher rates of hospitalized & fatal cases (> 2 cases per 100,000) also occurred in Kitsap, Thurston & Mason Cos.

- 83% of hospitalized & fatal cases in persons < 50 years old

- Rate of hospitalized cases was highest in persons < 18 years old but, the highest rates of illness requiring critical care were in persons 0–4 & 18–49 years old

- ~35% of these critical care cases had pre-existing lung diseases or were smokers

- Asthma was the most commonly reported pre-existing condition

- ARDS was present in two-thirds of fatal cases

Comparisons of PanH1 Influenza Cases Aged 0–17 Years & Cases Aged 18 Years or Older

Analysis Methods

- 119 hospitalized/fatal cases included in analysis
- 532 non-hospitalized cases reported from 4/19-5/23/09 included
- Cases divided into four age groups to study the proportion of cases hospitalized and not hospitalized
- Hospitalized/fatal cases separated into two age strata, 0–17 years and 18+ years, to examine symptoms, pre-existing conditions, and clinical severity
- Chi-square tests used to look for associations
  – Fisher exact test used when expected cell count<5

All PanH1 cases by age group & hospitalization status
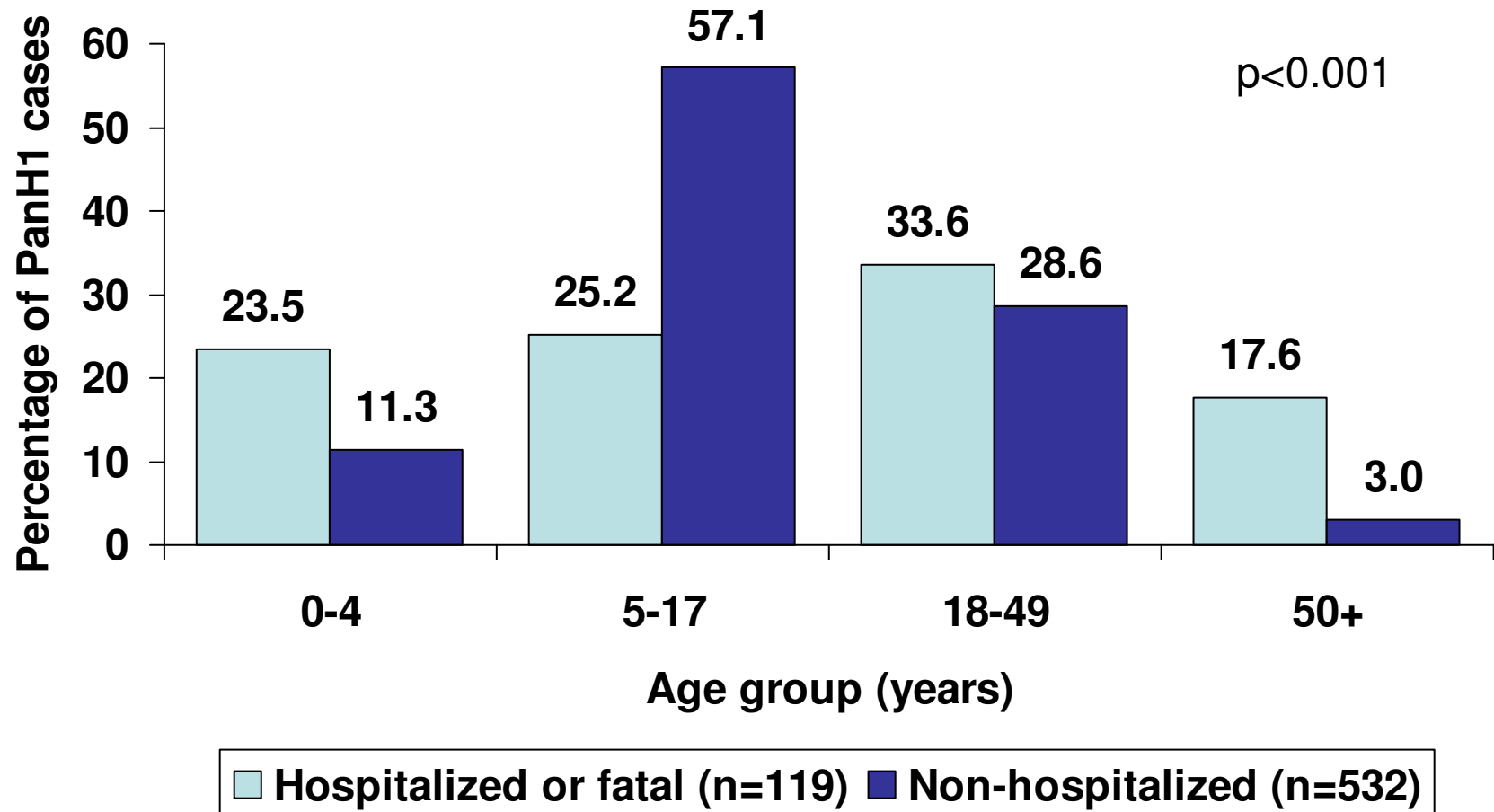
Symptoms of hospitalized or fatal cases of PanH1 influenza by age group

Symptoms	Hospitalized/Fatal Age 0–17 (N=58)		Hospitalized/Fatal Age 18+ (N=61)		
	Symptom Present*	%	Symptom Present*	%	p
Fever	49/54	91	56/57	98	0.35
Cough	50/54	93	55/57	97	0.43
Shortness of breath	15/31	48	34/39	87	<0.001
Sore throat	13/35	37	22/34	65	0.02
Vomiting	21/47	45	14/43	33	0.24
Diarrhea	9/45	20	14/45	31	0.23

* Number of records where presence or absence of symptom specified

Pre-existing conditions of hospitalized or fatal PanH1 influenza by age group, Washington, 2009

Condition	Hospitalized/Fatal Age 0–17 (N=54*)		Hospitalized/Fatal Age 18+ (N=57*)		
	n	%	n	%	p
Lung diseases/conditions	14	26	25	44	0.05
Asthma	10	19	14	25	0.44
Smoking	0	0	11	19	
Chronic lung disease	5	9	4	7	0.74
Diabetes	1	2	15	26	
Heart disease	4	7	10	18	0.11
Steroid therapy	2	4	6	11	0.27
CTX/cancer in last year	2	4	3	5	1.00

*3 incomplete or missing case reports, 1 case investigation in process in each stratum

Clinical findings in hospitalized or fatal PanH1 influenza, Washington, 2009

Clinical condition	Hospitalized/Fatal Age 0–17 (N=58)		Hospitalized/Fatal Age 18+ (N=61)		
	Present*	%	Present*	%	p
Pneumonia	16/44	36	31/51	61	0.02
Hypoxia	8/31	26	26/46	57	0.008
ICU admission	9/51	18	24/56	43	0.004
Mech. ventilation	4/9		19/23		
ARDS	0/5**		17/20		
Received antiviral meds	33/48	69	49/53	93	0.002

* Number of records where presence or absence of condition specified
** 3 of 4 cases on mechanical ventilation did not respond about ARDS status

Summary

- Of hospitalized persons, roughly half < 18 years old and half ≥ 18 years old

- Compared to persons < 18 years old, fatal/hospitalized cases ≥ 18 years old had higher rates of admission to the ICU and higher rates of:
  - Shortness of breath
  - Pneumonia
  - Hypoxia

- Although the attack rate of PanH1 influenza virus appears to be greater in younger persons, older persons admitted to the hospital appear to have more severe illness

- Unclear as to why younger persons admitted to hospitals

Comparison of Hospitalized/Fatal PanH1 Influenza Cases & Non-Hospitalized Cases

Analysis Methods

- 119 hospitalized or fatal cases included in the analysis
  - 48 from 4/26–5/23 timeframe
  - 71 from 5/24–7/14 timeframe
- Of 532 non-hospitalized persons reported from 4/26-5/23/09, 200 selected based on age
  - All cases aged 0–4 and 50+ years included
  - Cases aged 5–17 and 18–49 randomly selected based on frequency matching
- Chi-square tests used to look for associations
  - Fisher exact test used when expected cell count<5

Hospitalized/fatal and non-hospitalized PanH1 cases by gender, race, & ethnicity

	Hospitalized/Fatal (N=119)		Non-Hospitalized (N=200)		
	n	%	n	%	p
Male	52/116	45	109/200	55	0.10
Female	64/116	55	91/200	45	
Race					
White	35/75	47	50/104	48	0.85
Black / African Am.	23/75	31	20/104	19	0.08
Asian	9/75	12	16/104	15	0.52
Native HI / Other PI	7/75	9	4/104	4	0.12
Am. Indian / AK Native	1/75	1	1/104	1	0.66

Symptoms of hospitalized/fatal and non-hospitalized PanH1 cases

Symptoms	Hospitalized/Fatal		Non-hospitalized		
	Present	%	Present	%	p
Fever	105/111	95	194/199	98	0.21
Cough	105/111	95	180/196	92	0.37
Sore throat	35/69	51	91/161	57	0.42
Vomiting	35/90	39	43/175	25	0.02
Diarrhea	23/90	26	47/173	27	0.78

Pre-existing conditions among hospitalized/fatal and non-hospitalized PanH1 cases

Condition	Hospitalized/Fatal		Non-Hospitalized		
	n	%	n	%	p
Any pre-existing	81/110	74	43/193	22	<0.001
Lung condition/disease	39/110	35	29/193	15	<0.001
Asthma	24/110	22	22/193	11	0.02
Smoking	11/110	10	9/193	4	0.08
Chronic lung disease	9/110	8	0/193	0	<0.001
Diabetes	16/110	14	5/193	3	<0.001
Heart disease	14/110	13	0/193	0	<0.001
Steroid therapy	8/110	7	0/193	0	<0.001
Pregnancy	6/64	9	0/92*	0	0.004
CTX/cancer in last yr.	5/110	5	0/193	0	0.02
Chronic kidney disease	4/110	4	0/193	0	0.02

* No pregnant women selected in random sample

Influenza vaccination status and treatment of hospitalized/fatal and non-hospitalized PanH1 cases

	Hospitalized/Fatal		Non-hospitalized		
	Present	%	Present	%	p
Received flu vaccine in last year	36/70	51	67/148	45	0.40
Received antiviral medication	81/104	78	107/188	57	0.003

Summary

- No associations were seen between hospitalization status and gender or race.
- 39% of hospitalized/fatal cases reported vomiting compared to 25% of non-hospitalized cases.
- 74% of hospitalized cases had a pre-existing condition compared to only 22% of non-hospitalized cases.
- Of specific pre-existing conditions, compared to non-hospitalized persons, more hospitalized cases were pregnant or had asthma, chronic lung disease, diabetes, heart disease, steroid therapy, cancer or chemotherapy in the last year, and chronic kidney disease.