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Factors Associated With Death or Hospitalization Due to Pandemic 2009 Influenza A(H1N1) Infection in California

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SINCE APRIL 17, 2009, WHEN THE first 2 cases of pandemic influenza A(H1N1) virus infection were reported in California, the virus has rapidly spread throughout the world.¹ On June 11, 2009, the World Health Organization raised the pandemic alert level to phase 6, indicating that a global pandemic had begun.² Although initial reports suggested that illness associated with pandemic 2009 influenza A(H1N1) infection may be mild compared with the 1918 influenza pandemic, data on the clinical features and populations at risk of complications from pandemic 2009 influenza A(H1N1) infection are still emerging. In the United

Context Pandemic influenza A(H1N1) emerged rapidly in California in April 2009. Preliminary comparisons with seasonal influenza suggest that pandemic 2009 influenza A(H1N1) disproportionately affects younger ages and causes generally mild disease.

Objective To describe the clinical and epidemiologic features of pandemic 2009 influenza A(H1N1) cases that led to hospitalization or death.

Design, Setting, and Participants Statewide enhanced public health surveillance of California residents who were hospitalized or died with laboratory evidence of pandemic 2009 influenza A(H1N1) infection reported to the California Department of Public Health between April 23 and August 11, 2009.

Main Outcome Measure Characteristics of hospitalized and fatal cases.

Results During the study period there were 1088 cases of hospitalization or death due to pandemic 2009 influenza A(H1N1) infection reported in California. The median age was 27 years (range, <1-92 years) and 68% (741/1088) had risk factors for seasonal influenza complications. Sixty-six percent (547/833) of those with chest radiographs performed had infiltrates and 31% (340/1088) required intensive care. Rapid antigen tests were falsely negative in 34% (208/618) of cases evaluated. Secondary bacterial infection was identified in 4% (46/1088). Twenty-one percent (183/884) received no antiviral treatment. Overall fatality was 11% (118/1088) and was highest (18%-20%) in persons aged 50 years or older. The most common causes of death were viral pneumonia and acute respiratory distress syndrome.

Conclusions In the first 16 weeks of the current pandemic, the median age of hospitalized infected cases was younger than is common with seasonal influenza. Infants had the highest hospitalization rates and persons aged 50 years or older had the highest mortality rates once hospitalized. Most cases had established risk factors for complications of seasonal influenza.

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States, observations have suggested that most infections occur in younger individuals, with 40% between ages 10 and 18 years and 95% younger than 50 years; high rates (147 per 100 000) have been described in children aged 5 to 14 years.^{3,4} Persons with risk factors for severe complications from seasonal influenza established by the Advisory Committee on Immunization Practices, such as chronic lung disease, immunosuppression, and pregnancy, also appear to be at risk of severe illness from pandemic 2009 influenza A(H1N1) infection.^{3,5,6}

On April 20, 2009, the California Department of Public Health (CDPH) and 61 local health departments initiated enhanced surveillance for hospitalized and fatal cases of pandemic 2009 influenza A(H1N1) infection. Integrated epidemiologic and virologic surveillance has indicated sustained high levels of influenza activity statewide; from June

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and questions on p 1916.

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14 to July 31, 2009, the pandemic 2009 influenza A(H1N1) virus accounted for approximately 50% of cases of influenza-like illness and 92% to 100% of influenza viruses identified. In this report, we describe the clinical and epidemiologic features of the first 1088 hospitalized and fatal cases due to pandemic 2009 influenza A(H1N1) infection reported in California.

METHODS

A case was defined as a person who was hospitalized for at least 24 hours or died with laboratory results indicative of pandemic 2009 influenza A(H1N1) virus infection, including cases classified as probable (defined as detection of influenza A by polymerase chain reaction [PCR] that is nonsubtypeable for human subtypes H1 or H3) or confirmed (defined as positive by specific PCR for pandemic 2009 influenza A[H1N1]).

Hospitalized and fatal cases were reported by clinicians and hospitals to local health departments. A few cases who died outside of hospitals were reported by county coroners to the local health department. Cause of death was deter-

mined by review of death certificates by the reporting clinician or local health department. All cases were subsequently reported from local health departments to the CDPH. For both hospitalized and fatal cases, data on demographics, including race/ethnicity, clinical presentation and course, comorbid conditions, and laboratory and radiographic findings, were abstracted from medical records and, where appropriate, autopsy reports by staff at the local health department or the CDPH using the same standardized case report form.

As part of the standardized case report form, race/ethnicity data were collected from the medical record fact sheet, which included a listing of both ethnicity (Hispanic or non-Hispanic) and race (eg, white, black, Asian, Pacific Islander, Native American). Comorbidities were considered absent in cases for which records stated that the patient was previously healthy or had no underlying medical conditions or when there was no direct reference to the condition.

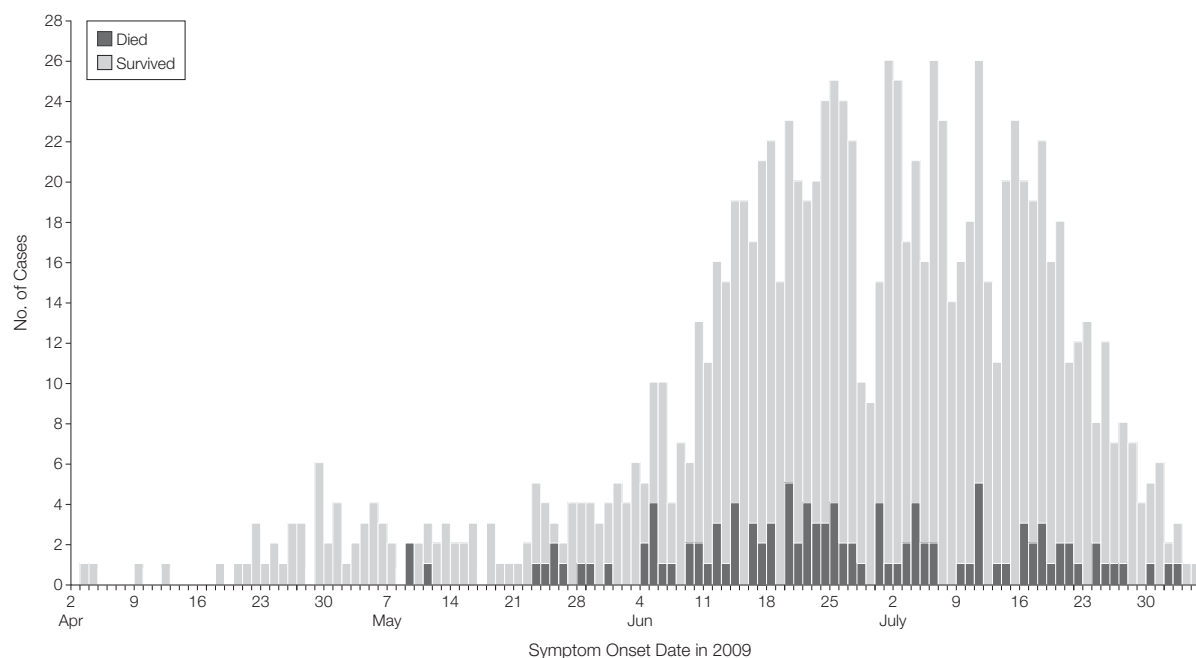
This activity was reviewed by the California Committee for the Protection of Human Subjects and determined to be a

public health response that did not require institutional review board approval.

RESULTS

Between April 23 and August 11, 2009, 1088 pandemic 2009 influenza A(H1N1) cases that led to hospitalization or death were reported in 41 of 61 local health jurisdictions in California, with most cases occurring during a wave of infection in June and July (FIGURE 1). Of these, 344 (32%) were children younger than 18 years. The median age of all cases was 27 years (range, <1-92 years) (TABLE 1). The overall rate of hospitalization and/or fatality per 100 000 for all age groups was 2.8, ranging from 11.9 in infants younger than 1 year to 1.5 in those aged 70 years or older. In infants younger than 1 year, the highest hospitalization rates per 100 000 were in infants 1 month old (35.8) and 2 months old (21.1); between 3 and 12 months of age, the hospitalization rates were lower, ranging from 4.2 to 12.6 per 100 000. Case-fatality proportions were highest in adults aged 50 years or older and lowest in children younger than 18 years (FIGURE 2).

Figure 1. Epidemiologic Curve of Date of Symptom Onset for Hospitalized and Fatal Cases of Pandemic 2009 Influenza A(H1N1) Reported in California From April 23 Through August 11, 2009



Seven hundred forty-one cases (68%), 60% of all children and 72% of all adults, had underlying conditions previously associated with severe influenza. Other underlying medical illnesses recorded included obesity, hypertension, hyperlipidemia, and gastrointestinal disease. Of the 268 adults aged 20 years or older with known body mass index (BMI; calculated as weight in kilograms divided by height in meters squared), 156 cases (58%) were obese (BMI ≥ 30). Of these, 67 (43%) were morbidly obese (BMI ≥ 40) (TABLE 2). One hundred three (66%) of the 156 adult obese cases had underlying conditions associated with influenza complications, including chronic lung disease (n=67 [65%], including 41 with asthma), cardiac disease (n=40 [39%]), immunosuppression (n=28 [27%]), diabetes mellitus (n=31 [30%]), and renal

disease (n=12 [12%]). In the 53 adult obese patients without risk factors associated with influenza complications, 13 had other comorbidities, including hypertension (n=9 [17%]), gastroesophageal reflux disease (n=4 [8%]), and hyperlipidemia (n=2 [4%]).

The median time from onset of symptoms to hospitalization was 2 days (range, 0-31 days). The most common symptoms included fever, cough, and shortness of breath. A subset of cases also presented with altered mental status due to respiratory distress and hypoxia. Of the 833 who had chest radiographs, 547 (66%) had infiltrates suggestive of pneumonia or acute respiratory distress syndrome. Four hundred ten (66%) of 618 cases evaluated were positive for influenza A by hospital rapid antigen testing; sensitivity was higher in children (181/213

[85%]) than adults (229/405 [57%]). All cases were tested by PCR at local public health laboratories, the CDPH Viral and Rickettsial Disease Laboratory, or at a commercial laboratory and had results consistent with pandemic 2009 influenza A(H1N1) infection. Three hundred forty cases (31%) were admitted to intensive care units, and of the 297 intensive care cases with available information, 193 (65%) required mechanical ventilation. Of the 884 cases with available information, 701 (79%) received antiviral treatment, including 496 patients (71%) with established risk factors for severe influenza. Three hundred fifty-seven patients (51%) received treatment within 48 hours of onset of symptoms. The mean time from hospital admission to initiation of antiviral treatment was 1.5 days (range, 0-34 days). Forty-six patients (4%) had

Table 1. Characteristics of Reported Hospitalized and Fatal Cases of Pandemic 2009 Influenza A(H1N1) Infections in California, April 23 Through August 11, 2009

	All Cases (N = 1088)	Cases Aged 0-17 Years		Cases Aged ≥ 18 Years	
		Fatal (n = 8)	Nonfatal (n = 336)	Fatal (n = 110)	Nonfatal (n = 634)
Male, No. (%)	532 (49)	3 (38)	203 (60)	56 (51)	270 (43)
Age, median (range), y	27 (<1-92)	6 (<1-14)	6 (<1-17)	46 (18-85)	38 (18-92)
Race/ethnicity, No. (%) ^a	(n = 866)	(n = 8)	(n = 280)	(n = 86)	(n = 492)
Hispanic	374 (43)	6 (75)	144 (51)	32 (37)	192 (39)
White, non-Hispanic	240 (28)	1 (13)	44 (16)	34 (40)	161 (33)
Asian/Pacific Islander	124 (14)	1 (13)	52 (19)	7 (8)	64 (13)
Black, non-Hispanic	96 (11)	0	27 (10)	11 (13)	58 (12)
Other	32 (4)	0	13 (5)	2 (2)	17 (3)
Signs and symptoms, No. (%)					
Fever	972 (89)	8 (100)	319 (95)	91 (83)	554 (87)
Cough	939 (86)	6 (75)	274 (82)	95 (86)	564 (89)
Shortness of breath	605 (56)	3 (38)	112 (33)	89 (81)	401 (63)
Nausea/vomiting	384 (35)	4 (50)	126 (38)	22 (20)	232 (37)
Muscle aches	359 (33)	2 (25)	50 (15)	36 (33)	271 (43)
Sore throat	305 (28)	2 (25)	70 (21)	21 (19)	212 (33)
Chills	221 (20)	0	25 (7)	27 (25)	169 (27)
Diarrhea	215 (20)	2 (25)	63 (19)	20 (18)	130 (20)
Rhinitis	213 (20)	2 (25)	102 (30)	10 (9)	99 (16)
Headache	211 (19)	0	46 (14)	17 (15)	148 (23)
Altered mental status	60 (6)	0	13 (4)	13 (12)	34 (5)
Conjunctivitis	21 (2)	0	13 (4)	1 (<1)	7 (1)
Clinical findings and course, No. (%)					
Positive rapid test result ^a	410/618 (66)	5/6 (83)	176/207 (85)	24/55 (44)	205/350 (59)
Infiltrates on chest radiograph ^a	547/833 (66)	4/5 (80)	134/224 (60)	91/94 (97)	318/510 (62)
Admitted to intensive care unit	340 (31)	6 (75)	84 (25)	88 (80)	162 (26)
Mechanical ventilation ^a	227/915 (25)	7/8 (88)	27/282 (10)	95/102 (93)	98/523 (19)
Secondary bacterial infections ^b	46 (4)	1 (13)	7 (2)	15 (14)	23 (4)
Antiviral treatment ^a	701/884 (79)	5/8 (63)	205/267 (77)	65/89 (73)	426/520 (82)
Received ≤ 48 h after symptom onset	357 (51)	1 (20)	117 (57)	17 (26)	222 (52)

^aIncludes cases with known information only.

^bIncludes *Staphylococcus aureus* of all susceptibility patterns, group A *Streptococcus*, *Streptococcus pneumoniae*, and gram-negative rods.

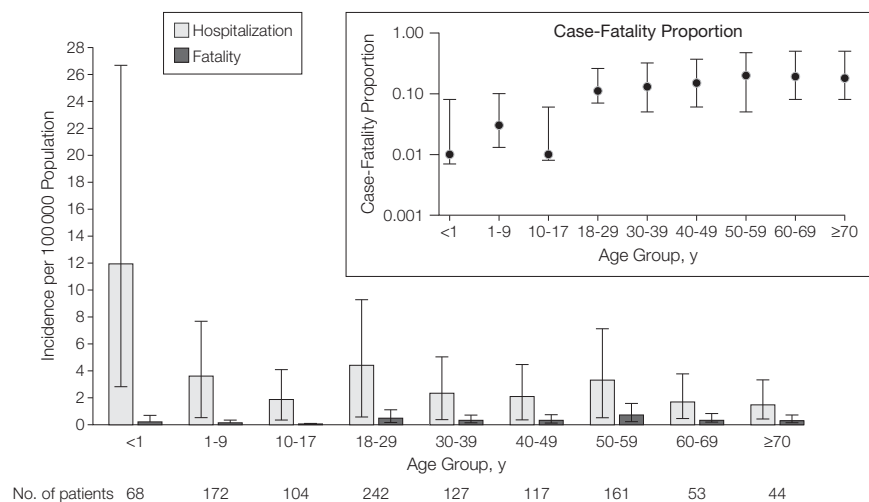
microbiologic evidence of a secondary bacterial infection, defined by isolation of bacteria from either a sterile site or a lower respiratory tract specimen in conjunction with new infiltrate on chest radiograph. The most common pathogens identified were *Streptococcus pneumoniae*,⁷ *Staphylococcus aureus*,⁸ gram-negative rods,⁹ and group A streptococcus⁵; most patients with gram-negative rod infections had underlying pulmonary disease (eg, cystic fibrosis) that may have predisposed to these infections. The median length of hospitalization among all cases was 4 days (range, 1-74 days) (Table 1).

One hundred eighteen cases (11%) died. Of the deaths, 8 (7%) were children younger than 18 years. Among fatal cases, the median time from onset of symptoms to death was 12 days (range, 1-88 days). Ten cases died at home, in the emergency department, or within 24 hours after hospital admission (Table 1).

COMMENT

In our review of a large number of hospitalized and fatal cases of pandemic 2009 influenza A(H1N1) infection in California, the median age (27 years) was younger than is commonly seen with seasonal influenza. Infants had the highest rates of hospitalization and persons aged 50 years or older had the highest rates of mortality once hospitalized. Cases presented with clinical features of acute respiratory illness, with two-thirds having radiographic confirmation of pneumonia. While gastrointestinal symptoms are observed infrequently (<5%) in adults infected with seasonal influenza, more than one-third of adult cases in our series reported nausea or vomiting and one-fifth reported diarrhea.¹⁰ More than two-thirds of cases had conditions associated with severe seasonal influenza. A striking percentage of hospitalized cases were severely ill, with more than 30% requiring intensive care; most adults and more than one-third of children required mechanical ventilation. Eleven percent died; the most common reported causes of death were viral pneumonia and acute respiratory distress syndrome. Microbiologic evidence of secondary bacterial infection was uncommon.

Figure 2. Hospitalization and Fatality Rates and Case-Fatality Proportion Among Reported Hospitalized and Fatal Pandemic 2009 Influenza A(H1N1) Cases, by Age Group—California, April 23 Through August 11, 2009



Error bars indicate 95% confidence intervals.

Our data contribute to the growing body of literature that the age distribution of disease for pandemic 2009 influenza A(H1N1) infection is markedly different from that of seasonal influenza. For seasonal influenza, persons older than 64 years, younger than 5 years, or who have specific medical conditions have higher rates of hospitalization and death.^{6-9,11-14} In contrast, the median age of hospitalized and fatal pandemic 2009 influenza A(H1N1) cases in California during our surveillance period was 27 years. The rate of hospitalization and/or fatality per 100 000 was comparable in most age groups in our series, ranging from 1.5 to 4.4, with the exception of infants, who had the highest rate at 11.9. The youngest age group, infants aged 2 months or younger, had the highest hospitalization rates but are too young to receive currently licensed influenza vaccines. These findings support the recommendation for priority vaccination of close contacts of young infants with the monovalent influenza A(H1N1) vaccine.¹⁵ Our results concur with data from Chicago, Illinois, in which hospitalization rates per 100 000 were 25 for ages 0 to 4 years and 4.0 for age older than 60 years, with a median age of 16 years.⁴ Reasons for the relative decrease in hospitalization for older individuals with pan-

dem 2009 influenza A(H1N1) infection compared with seasonal influenza are unclear. Serologic studies suggest that a higher proportion of adults aged 60 years or older may have preexisting immunity to the pandemic 2009 influenza A(H1N1) virus, possibly from previous exposure due to infection or vaccination.¹⁶

Despite having lower hospitalization rates, persons aged 50 years or older who were hospitalized with pandemic 2009 influenza A(H1N1) infection were among those most likely to die. Likewise, in Mexico, the case-fatality rate was 6% for infected persons older than 50 years, 0% to 1% among cases aged 0 to 19 years, and 2% to 4% among cases aged 20 to 49 years.¹⁷ Comorbidity may contribute to mortality; 60% of fatal cases reported worldwide older than 50 years had cardiac or pulmonary disease; similarly, in California, more than 80% of cases aged 50 years or older had other underlying medical conditions.¹⁷ Despite reports that elderly persons may be "protected" by preexisting immunity, clinicians should closely monitor and promptly treat older hospitalized patients with pandemic 2009 influenza A(H1N1) infection.

More than 70% of adult and 60% of pediatric cases had underlying medical conditions that are associated with severe

seasonal influenza. Of note, 20% of hospitalized pregnant women in our series required intensive care; most were in their second or third trimester of pregnancy. This is consistent with recent data suggesting increased hospitalization rates and severity of illness associated with pandemic 2009 influenza A(H1N1), as well as observations of influenza-associated excess deaths among pregnant women during the previous pandemics of 1918-1919 and 1957-1958, with risk increasing with advancing stages of pregnancy.¹⁸

A large proportion of our adult cases had other comorbidities that are not established risk factors for severe influenza, including hypertension and obesity. Of

adults with BMI data available, more than half were obese and one-quarter were morbidly obese. As a point of reference, the percentage of adults who are morbidly obese in the United States is 4.8%.¹⁹ Almost one-third of obese cases did not have other established risk factors for severe influenza, although 27% had other comorbidities (eg, hypertension). Others have reported this novel association in pandemic 2009 influenza A(H1N1) infection; diabetes and obesity were the most frequently identified underlying conditions in fatal cases older than 20 years worldwide, and anecdotal observations of high prevalence of obesity in severe and fatal cases have been reported from Chile,

Manitoba, and Mexico.^{17,20} In a small case series of 10 adults hospitalized in intensive care in Michigan, 9 were obese and 7 were morbidly obese.²¹ A link between obesity and severe influenza, while not proven, is plausible. As observed in our cases, obesity is associated with many comorbidities that are severe influenza risk factors, such as diabetes, cardiovascular disease, and pulmonary disease (eg, obstructive sleep apnea and obesity-hypoventilation syndrome).²²⁻²⁵ In obese patients hospitalized in intensive care units for acute lung injury, duration of mechanical ventilation and length of hospital stay are prolonged compared with nonobese patients.²⁶⁻²⁹

Table 2. Comorbid Conditions of Reported Hospitalized and Fatal Cases of Pandemic 2009 Influenza A(H1N1) Infections in California, April 23 Through August 11, 2009

	All Cases (N = 1088)	Cases Aged 0-17 Years		Cases Aged ≥18 Years	
		Fatal (n = 8)	Nonfatal (n = 336)	Fatal (n = 110)	Nonfatal (n = 634)
Chronic comorbid illness associated with severe influenza ^a	741 (68)	6 (75)	199 (59)	83 (75)	453 (71)
Chronic lung disease	403 (37)	3 (38)	126 (38)	45 (41)	229 (36)
Asthma	257 (24)	1 (13)	99 (29)	18 (16)	139 (22)
Other/unknown ^b	146 (13)	2 (25)	27 (8)	27 (25)	90 (14)
Chronic cardiac disease ^c	167 (15)	2 (25)	25 (7)	25 (23)	115 (18)
Metabolic disease	223 (20)	2 (25)	23 (7)	38 (35)	160 (25)
Diabetes mellitus	116 (11)	0	4 (1)	20 (18)	92 (14)
Renal disease	72 (7)	0	8 (2)	18 (16)	46 (7)
Other/unknown ^d	59 (5)	2 (25)	11 (3)	7 (6)	39 (6)
Immunosuppressive conditions	205 (19)	3 (38)	55 (16)	36 (33)	111 (18)
Cancer/transplant/immunosuppressive drugs ^e	155 (14)	2 (25)	42 (13)	29 (26)	82 (13)
HIV/AIDS	22 (2)	0	0	4 (4)	18 (3)
Other/unknown	31 (3)	1 (13)	13 (4)	4 (4)	13 (2)
Neuromuscular disorder ^f	115 (11)	4 (50)	45 (13)	14 (13)	52 (8)
Pregnancy ^g	97/1012 (10)	0	5 (2)	6/104 (6)	86/587 (15)
Other chronic comorbid illness ^a	370 (34)	2 (25)	45 (13)	69 (63)	254 (40)
Obesity ^{g,h}	172/361 (48)	0	15 (19)	46/68 (66)	111/212 (52)
BMI 30-34.9	55 (35)			11 (24)	44 (40)
BMI 35-39.9	34 (22)			12 (26)	22 (20)
BMI ≥40	67 (43)			23 (50)	44 (40)
Gastrointestinal tract	109 (10)	2 (25)	29 (9)	12 (11)	66 (10)
GERD	34 (3)	1 (13)	5 (2)	4 (4)	24 (4)
Other/unknown ⁱ	75 (7)	1 (13)	24 (7)	8 (7)	42 (7)
Hyperlipidemia	33 (3)	0	0	2 (2)	31 (5)
Hypertension	176 (16)	0	2 (<1)	27 (25)	147 (23)

Abbreviations: BMI, body mass index, calculated as weight in kilograms divided by height in meters squared; GERD, gastroesophageal reflux disease; HIV, human immunodeficiency virus.

^aConditions listed are not mutually exclusive because of the presence in some patients of multiple underlying chronic diseases.

^bIncludes chronic obstructive pulmonary disease, bronchopulmonary dysplasia/respiratory distress syndrome, bronchiolitis obliterans organizing pneumonia, Sjögren syndrome, and obstructive sleep apnea.

^cIncludes congenital heart disease, atrial fibrillation, status post-aortic valve replacement, congestive heart failure, hypertensive heart disease, and coronary artery disease.

^dIncludes pituitary, thyroid, and adrenal disorders.

^eIncludes immunosuppressive drugs, cancer, congenital immunodeficiency, leukemia, and organ transplantation.

^fIncludes cerebral palsy, seizure disorder, developmental delay, Parkinson disease, muscular dystrophy, quadriplegia, and mental retardation.

^gIncludes only cases with known information.

^hIncludes cases aged 2 to 19 years where BMI for age was at least 95th percentile and cases aged at least 20 years where BMI was at least 30; excludes pregnant cases (103 cases were <2 years).

ⁱIncludes status post-gastrostomy tube placement, gastritis, cholelithiasis, history of small bowel obstruction, short gut syndrome, pyloric stenosis, and Hirschsprung disease.

Nevertheless, obesity has not previously been identified as an independent risk factor for seasonal influenza complications.^{6,30} An association may have been obscured by a focus on the presence of other comorbid risk factors associated with obesity, particularly in elderly persons. Obesity may be more prominent in our series because the cohort aged 40 to 59 years, which includes the median age among the fatal cases in this series, is more likely to be obese than other age groups.¹⁹ Further investigation is needed to clarify the association between obesity and severe influenza and the pathophysiology underlying any association. Even if obesity is only a proxy measure for other underlying conditions, BMI data are an easily obtainable measurement that may be useful for quickly identifying patients to target for treatment and prevention measures, similar to age groupings.

Our profile of hospitalized cases with pandemic 2009 influenza A(H1N1) infection highlights important challenges in diagnostic testing and treatment. Hospital testing with rapid antigen tests yielded falsely negative results in 34% of cases tested; others have found similar low sensitivity rates with point-of-care testing for pandemic 2009 influenza A(H1N1) infection.^{31,32} Higher rapid test sensitivity was seen in children compared with adults; as with seasonal influenza, rapid test performance may be improved in young children, who shed higher viral loads for longer durations compared with adults.¹⁰ Clinicians should be wary of excluding a diagnosis of pandemic 2009 influenza A(H1N1) infection based solely on nonmolecular testing. One-fifth of hospitalized cases never received antiviral treatment, and about half received treatment more than 48 hours after onset of symptoms. Recent evidence suggests that even if initiated late, antiviral treatment can reduce mortality, and current national guidelines recommend that all hospitalized patients with pandemic 2009 influenza A(H1N1) infection should be treated with a neuraminidase inhibitor at standard dosing (75 mg every 12 hours) as soon as possible, regardless of when symptoms started.^{33,34} Additional data are needed on whether higher doses (eg, 150

mg every 12 hours) and longer duration of therapy can improve outcomes in critically ill patients, who may have altered absorption, distribution, metabolism, protein binding, and clearance of many drugs. Finally, a high proportion of hospitalized adults and children had immunosuppressive conditions. Pandemic 2009 influenza A(H1N1) infection in immunosuppressed patients has garnered recent increased attention because of the documentation of prolonged viral shedding in critically ill patients, with subsequent emergence of resistance to neuraminidase inhibitor drugs. These patients require strict adherence to infection control measures, as well as serial testing of respiratory specimens; multiple negative PCR results should be documented before removal of infection control precautions.³⁵

Our data are subject to several limitations. Data were extracted from non-standardized medical records. Case ascertainment was based on passive reporting by clinicians, and underreporting may have occurred because of poor recognition and the general non-specificity of influenza-like illness symptoms. The limited availability of confirmatory laboratory testing may have contributed to underdetection of cases. Height and weight data were not available for all cases; more BMI measurements were ascertained for fatal cases because of routine availability of this information on autopsy reports. In addition, it is possible that height and weight data were more likely to be recorded in obese individuals.

In the first 16 weeks of the current pandemic, 2009 influenza A(H1N1) appears to be notably different from seasonal influenza, with fewer hospitalizations and fatalities occurring in elderly persons. In contrast with the common perception that pandemic 2009 influenza A(H1N1) infection causes only mild disease, hospitalization and death occurred at all ages, and up to 30% of hospitalized cases were severely ill. Most hospitalized cases had identifiable established risk factors; obesity may be a newly identified risk factor for fatal pandemic 2009 influenza A(H1N1) infection and merits further study.

Clinicians should maintain a high level of suspicion for pandemic 2009 influenza A(H1N1) infection in patients presenting currently with influenza-like illness who are older than 50 years or have known risk factors for influenza complications, regardless of rapid test results. Hospitalized infected cases should be carefully monitored and treated promptly with antiviral agents.

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