

Incidence of influenza A H1N1 2009 infection in Eastern Saudi Arabian hospitals

Hatem K. Herzallah, MD, ScD, Salah A. Bubshait, BSc, MSc (Epidemiology), Amalraj K. Antony, MSc, PhD, Sultan T. Al-Otaibi, FRCPC, FACOEM.

ABSTRACT

الأهداف: توضيح المظاهر السريرية والوبائية لمرض الأنفلونزا أ H1N1 في مستشفيات شركة أرامكو السعودية.

الطريقة: أُجريت هذه الدراسة الاسترجاعية في قسم الطب الوقائي بمركز الظهران الصحي، الظهران، المملكة العربية السعودية، حيث تمت مراجعة السجلات الطبية الإلكترونية لجميع مرضى مستشفيات شركة أرامكو السعودية والذين قد أصيبوا بفيروس H1N1 خلال الفترة من يونيو إلى أكتوبر 2009م. جُمعت مسحات الأنف والفم من المرضى المشتبه بهم، وبعد ذلك تم إرسالها إلى المختبر الإقليمي بالدمام، وزارة الصحة، المملكة العربية السعودية للتأكد من صحة التشخيص.

النتائج: أشارت الدراسة إلى أنه قد تم تشخيص ما مجموعه 587 حالة مصابة بفيروس H1N1، وقد وصل معدل الإصابة إلى 3.5 لكل 1000 شخص. لقد كانت معظم الحالات المصابة بالفيروس من مرضى العيادات الخارجية. وانتشرت الإصابة بهذا المرض بين الفئات العمرية الصغيرة (متوسط العمر=22 عاماً)، والإناث بجميع أعمارهن عند المقارنة مع الفئات الأخرى، وهذه النتائج تختلف عن ما وصل إليه الباحثين الآخرين.

خاتمة: أثبتت هذه الدراسة انتشار الإصابة بفيروس H1N1 بين الفئات العمرية الصغيرة، والإناث وذلك عند المقارنة مع الفئات الأخرى، وكانت أعراض المرض شديدة بين النساء الحوامل مقارنةً بالفئات الأخرى. بالإضافة إلى ذلك لم يؤثر عامل السمنة على نسبة انتشار المرض، ولم تسفر النتائج عن ظهور وفيات بين المرضى المصابين بالمرض.

Objectives: To describe the clinical and epidemiologic features of pandemic influenza A (H1N1) cases.

Methods: This study was conducted in Saudi Aramco Medical Services Organization (SAMSO) facilities in the Eastern province of the Kingdom of Saudi Arabia (KSA). Electronic medical records for H1N1 infected patients who visited SAMSO between June and October 2009 were reviewed retrospectively. Nasopharyngeal and oropharyngeal swabs were

collected from suspected patients, and sent to the Ministry of Health (MOH) Regional Laboratory in Dammam, KSA to confirm the diagnosis.

Results: A total of 587 cases were diagnosed with H1N1 given an incidence rate of 3.5 per 1000. Most of the infected cases were outpatients. The study showed that H1N1 was more common in the younger age group (median age; 22 years), and in female dependents at all ages, which differs from that reported by other researchers.

Conclusion: Influenza A H1N1 was more common in the younger age group and in female dependents, and it was more severe among pregnant women. In addition, obesity did not affect the frequency of H1N1 infection.

Saudi Med J 2011; Vol. 32 (6): 598-602

From the Preventive Medicine Services Division, Dhahran Health Center, Dhahran, Kingdom of Saudi Arabia.

Received 11th December 2010. Accepted 18th April 2011.

Address correspondence and reprint request to: Dr. Hatem K. Herzallah, Dhahran Health Center, Saudi Aramco, PO Box 09384, Dhahran 31311, Kingdom of Saudi Arabia. Tel. +966 (3) 8776179. Fax. +966 (3) 8773429. E-mail: hatem.herzallah@aramco.com

Influenza A (H1N1) “swine flu” is a new influenza virus causing illness, and sometimes fatalities within a population. This virus was first detected in humans in the United States in April 2009.¹ It has spread from person to person worldwide, probably in much the same way that the seasonal influenza virus has spread.²⁻⁴ Since the declaration of the H1N1 influenza pandemic in June 11, 2009 by the World Health Organization (WHO), the virus has become the dominant influenza strain worldwide, and is described as the fastest moving pandemic ever. The worldwide clinical picture of the H1N1 pandemic has been consistent.⁴ In June 3, 2009

the Kingdom of Saudi Arabia (KSA) Ministry of Health (MOH) announced its first confirmed case of the Influenza A H1N1 virus in a female Filipino nurse who arrived on a Gulf Air flight from the Philippines.⁵ In July 27, 2009, the MOH announced the first influenza A H1N1 death in a man who resided in the Eastern province.⁶ The WHO has recently stated that KSA has the most confirmed pandemic H1N1 cases in the Eastern Mediterranean Region.⁷

Saudi Aramco is the world's largest oil company. One of its major organizations is the Saudi Aramco Medical Services Organization (SAMSO), which provides medical care to its employees and their families. This organization (SAMSO) has one tertiary hospital in Dhahran, and 4 ambulatory health care centers in Al-Hasa, Abqaiq, Udhayliyah, and Ras Tanurah. The aim of this study is to describe the clinical and epidemiologic features of pandemic H1N1 cases in SAMSO.

Methods. This study was conducted in the Preventive Medicine Services Division, Dhahran Health Center, Dhahran, KSA. All SAMSO population receiving their medical care at 5 SAMSO hospitals (Dhahran, Ras Tanura, Abqaiq, Udhayliyah, and Al-Hasa) were included in this study, and other local hospitals in the area were not included. Electronic medical records for H1N1 infected patients who had visited SAMSO between June and October 2009 were reviewed retrospectively. Cases were reported to the Epidemiology Services in the following manner: electronically by physicians; by collecting data through the Pharmacy Services (that is, obtaining a list of patients started on H1N1 antiviral medication); and confirmation by the laboratory. All SAMSO population who are eligible for medical care has equal access to laboratory testing. A suspected case is defined as a person with an acute respiratory illness who has close contact to a confirmed case of H1N1, and a confirmed case is defined when an individual infected with H1N1 has laboratory-confirmed H1N1 virus infection by polymerase chain reaction (PCR). Nasopharyngeal and oropharyngeal swabs were collected from suspected patients, and sent to the MOH Regional Laboratory in Dammam, KSA to confirm the diagnosis. This reference lab utilizes Roche LightMix kit inf A swine H1 TIB MOLBIOL (Roche Diagnostics GmbH, Roche Applied Science, Mannheim, Germany) using the ROCHE Diagnostics LightCycler 2.0 instruments (PCR technique) (Roche Diagnostics GmbH, Roche Applied Science, Mannheim, Germany). Only suspected H1N1 flu cases with pneumonia, or a critical illness require admission. All inpatient cases were admitted in the Isolation rooms equipped with Demistifier unit in each isolation room to maintain a negative pressure, and >6 air changes/hour. All H1N1 cases eligible for

medical care in SAMSO were included in the study, while those non-eligible subjects (visitors and other mobile populations) were excluded from this study. The denominator used in this study was the SAMSO population of 167,759.

The formula used here was number of H1N1 cases during the study period over the total number of exposed SAMSO population in the same period multiplied by 1000. Antiviral medication (Oseltamivir) was administered to confirmed H1N1 cases from June to October 2009 as the MOH decided to initiate the antiviral medication for all suspected H1N1 cases without the need to perform lab testing. Approval for the conduction of this study was obtained from the local ethics committee of Saudi Aramco prior to the commencement of this study.

Data were analyzed using the Statistical Package for Social Sciences version 18.0 (SPSS Inc., Chicago, IL, USA). Incidence rates with 95% confidence interval for associated variables were calculated by the number of H1N1 cases during the study period over the total number of exposed SAMSO population in the same period multiplied by 1000. Chi square test was adopted to find out the association between risk variables.

Results. During the study period, 587 cases of H1N1 infections were diagnosed in SAMSO. The median age was 22 years (range: <1-65 years), and 45 (7.7%) had risk factors for diabetes, hypertension, or cardiovascular complications. All patients (100%) received antiviral treatment. The overall incidence rate per 1000 SAMSO population was 3.5 with a 95% confidence interval (CI) of 3.4-3.6. The incidence rate of H1N1 was 3.8 (95% CI; 3.7-3.9) per 1000 men, and 3.2 (95% CI; 3.1-3.3) per 1000 for women. The age groups between 10-14 years had higher incidence rate of 5.4 (95% CI; 5.1-5.7) when compared with other age groups. Non-Saudis had a slightly higher rate of 5.2 (95% CI; 4.9-5.5) per 1000 as compared to Saudis with 3.3 (95% CI; 3.2-3.4) per 1000. The SAMSO employees and their dependents seemed to have a similar rate of infection (3.9 versus 3.4 per 1000) (Table 1). Most of those infected were outpatients as compared to inpatients (39 of 587 laboratory-confirmed cases required admission [95% CI; 4.64-8.64]). The incidence rate of H1N1 in the 10-14 years age group was statistically significantly ($p=0.034$) higher among males compared to females until age 40 (Figure 1). Figure 2 shows that the rate of H1N1 is higher among non-Saudis (15.3) compared to Saudis (4.7) ($p<0.001$). Further detailed analysis showed that the percentages of influenza A were similar in the male and female Saudi and non-Saudi populations. The percentage of H1N1 was higher in the female dependents (87.1%) as compared to male

dependents (62.3%). Those that required admission to the hospital for treatment included 7.1% males, and 6.1% females, which are not statistically significant ($p=0.62$). Among the females who were admitted to

the hospital, only 3 cases were pregnant with severe symptoms (fever of 39.8°C or higher, and difficulty in breathing requiring oxygen treatment by face mask), and they were considered as high risk group. However, these pregnant women were discharged in satisfactory condition. The rate of infection was similar in males and females according to their body mass index (BMI).

Table 1 - Incidence rate with of Influenza A H1N1 cases per 1000 Saudi Aramco Medical Services Organization (SAMSO) population.

Variables	Frequency	SAMSO Population	Rate/1000 SAMSO population (95% confidence interval)
Gender			
Male	324	85,180	3.8 (3.7 - 3.9)
Female	263	82,579	3.2 (3.1 - 3.3)
Age , years			
<1	10	2,262	4.4 (3.5 - 5.2)
1-4	28	12,461	2.2 (1.9 - 2.5)
5-9	62	19,021	3.3 (3.0 - 3.6)
10-14	118	21,744	5.4 (5.1 - 5.7)
15-19	66	22,875	2.9 (2.7 - 3.1)
20-29	75	20,126	3.7 (3.4 - 4.0)
30-39	53	14,095	3.8 (3.5 - 4.1)
40-49	95	27,201	3.5 (3.3 - 3.7)
50-59	50	15,649	3.2 (2.9 - 3.5)
60+	30	12,325	2.4 (2.1 - 2.7)
Nationality			
Saudi	486	148,386	3.3 (3.2 - 3.4)
Non Saudi	101	19,373	5.2 (4.9 - 5.5)
Relationship			
Employee	156	39,510	3.9 (3.7 - 4.1)
Dependent	431	128,249	3.4 (3.3 - 3.5)
Body mass index, kg/m²			
Under weight (<18.5)	102	37,778	2.7 (2.5 - 2.9)
Normal (18.5-24.9)	132	28,696	4.6 (4.3 - 4.8)
Over weight (25-29.9)	78	22,941	3.4 (3.2 - 3.6)
Obese (30-39.9)	73	21,471	3.4 (3.1 - 3.6)
Severely obese (>40)	14	3,684	3.8 (3.2 - 4.4)
Unknown	188	-	-

Discussion. It was noted that most H1N1 cases in our study are of younger age and in female dependents, which differs from that reported by other researchers. In the present study, the overall incidence rate of H1N1 was 3.5. The median age of infected cases was lower than that reported by Louie et al (22 versus 27).⁸ This is different from what was reported by Ebrahim et al,⁹ where children and young adults (>15 years and <49 years) had the highest illness rates during the early phase of the 2009 pandemic H1N1. Our study showed that non-Saudis (expatriates) had higher rate of H1N1 infection when compared to Saudis due to the fact that expatriates, mainly returning students, had a history of travel to endemic areas. In SAMSO, 100% of affected patients (confirmed and suspected) received Oseltavimvir compared to 79% reported by Louie et al.⁸ The population served by SAMSO is small compared to Hajj pilgrims where the administration of antiviral chemoprophylaxis was not feasible.^{10,11}

The H1N1 affected mainly the young for both genders, and for Saudis and expatriates.¹² In addition, H1N1 was statistically significantly higher among female dependents compared to male dependents or employees similar to other studies carried out in the

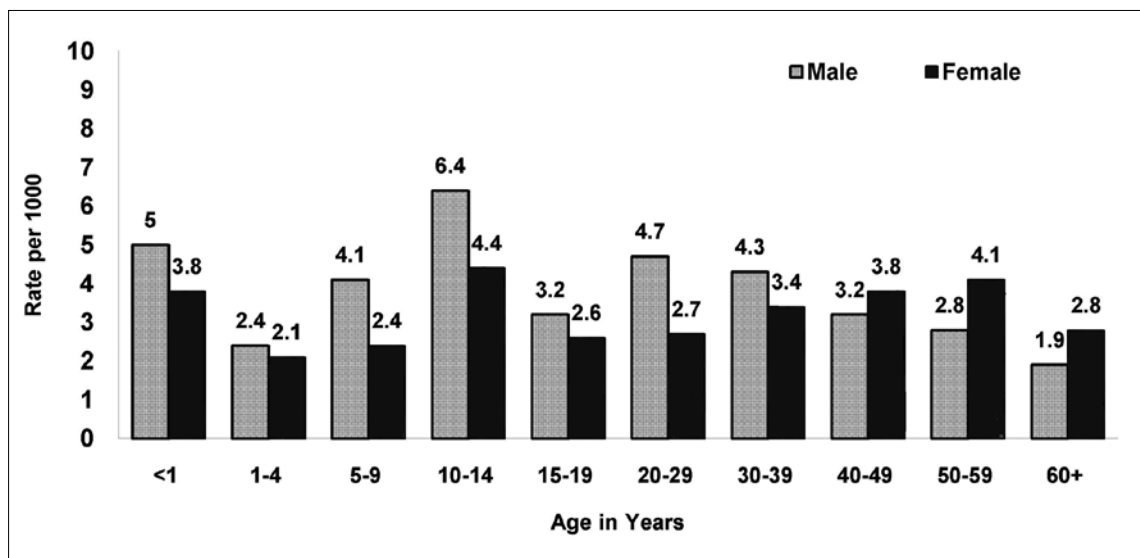


Figure 1 - Incidence rates of Influenza A H1N1 cases per 1000 Saudi Aramco Medical Services population by age and gender.

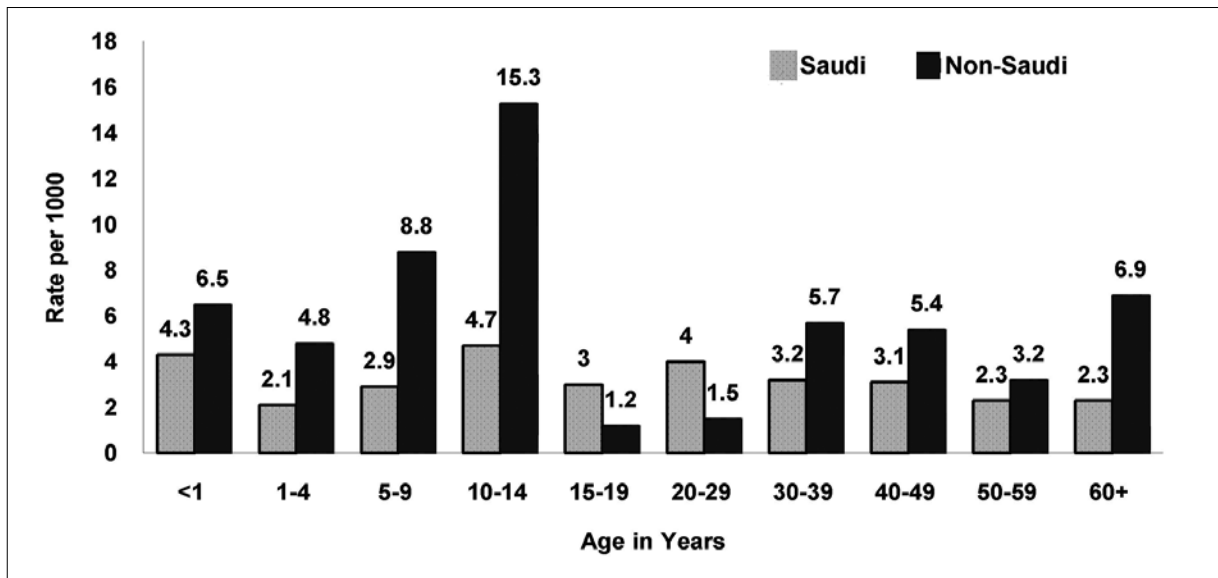


Figure 2 - Incidence rates of Influenza A H1N1 cases per 1000 Saudi Aramco Medical Services population by age and nationality.

US and Mexico.¹³⁻¹⁵ Dependents of employees that are eligible for medical treatment include: parents, spouse, and children. This might be due to the fact that most dependents were females, as males become ineligible to receive medical care after the age of 19. This study did not show obesity to be a major risk factor for severity or frequency of H1N1 infection for both genders, contrary to another study carried out in the US.¹⁶ Among the SAMSO population, the rate of infection was higher and statistically significant in patients admitted to the hospital as a result of early detection and intervention, compared to studies in the US.^{17,18} The overall fatality rate was 0% compared with a study by Louie et al,⁸ and in another study¹⁴ that reported values as high as 11%. There is no available data for the seasonal influenza at SAMSO to compare its pattern to our finding in this study, while other researchers reported some differences¹⁹⁻²².

Comparative analysis was not possible due to lack of controls, and this limits our study.

In conclusion, this study showed that H1N1 was more common in the younger age group (age 10-14), and in female dependents, in which the illness was more severe among pregnant women. In addition, obesity did not affect the frequency of H1N1 infection, and no infected patients died. A comparative case-control studies can be carried out in the future for a stronger evidence.

Acknowledgment. *The authors gratefully acknowledge the use of Saudi Aramco Medical Services Organization (SAMSO) facilities for the research data utilized. Opinions expressed in this article are those of the authors and not necessarily that of SAMSO.*

References

- Centers for Disease Control and Prevention (CDC). Self-Reported Influenza-Like Illness During the 2009 H1N1 Influenza Pandemic--- United States, September 2009--March 2010. *Morb Mortal Wkly Rep* 2011; 60: 37-41.
- Memish ZA, McNabb SJ, Ahmad QA, Hajjeh RA, Harmanci FH, Uyeki TM, et al. Hajj and 2009 pandemic influenza A H1N1. *Lancet* 2009; 374: 1724.
- Khan K, Arino J, Hu W, Raposo P, Sears J, Calderon F, et al. Spread of a novel influenza A (H1N1) virus via global airline transportation. *N Engl J Med* 2009; 361: 212-214.
- Memish ZA, McNabb SJ, Ahmad QA, Hajjeh RA, Harmanci FH, Uyeki TM, et al. Establishment of public health security in Saudi Arabia for the 2009 Hajj in response to pandemic influenza A H1N1. *Lancet* 2009; 374: 1786-1791.
- Saudi Ministry of Health. Ministry News. Riyadh (KSA): Ministry of Health; 2009. Available from URL: <http://www.moh.gov.sa/Ministry/MediaCenter/News/Pages/NEWS-2009-6-29-003.aspx>
- Saudi Ministry of Health. Ministry News. Riyadh (KSA): Ministry of Health; 2009. Available from URL: <http://www.moh.gov.sa/Ministry/MediaCenter/News/Pages/NEWS-2009-7-27-001.aspx>
- Pandemic H1N1 2009; WHO Eastern Mediterranean Region: Available from URL: http://www.emro.who.int/csr/h1n1/pdf/sitrep_5.pdf
- Louie JK, Acosta M, Winter K, Jean C, Gavali S, Schechter R, et al. Factors associated with death or hospitalization due to pandemic 2009 Influenza A (H1N1) infection in California. *JAMA* 2009; 302: 1896-1902.
- Ebrahim S, Memish Z, Uyeki T, Khoja T, Marano N, McNabb S. Public health. Pandemic H1N1 and the 2009 Hajj. *Science* 2009; 326: 938-940.
- [Mathematical modelling of the pandemic H1N1 2009] *Wkly Epidemiol Rec* 2009; 84: 341-348. English, French
- Ahmad QA, Arabi YM, Memish ZA. Health risks at the Hajj. *Lancet* 2006; 367: 1008-1015.

12. Centers for Disease Control and Prevention (CDC). Swine influenza A (H1N1) infection in two children--Southern California, March-April 2009. *MMWR Morb Mortal Wkly Rep* 2009; 58: 400-402.
13. Centers for Disease Control and Prevention (CDC). 2009 pandemic influenza A (H1N1) virus infections - Chicago, Illinois, April-July 2009. *MMWR Morb Mortal Wkly Rep* 2009; 58: 913-918.
14. Centers for Disease Control and Prevention (CDC). Outbreak of swine-origin influenza A (H1N1) virus infection---Mexico, March--April 2009. *MMWR Morb Mortal Wkly Rep* 2009; 58: 467-470.
15. World Health Organization. World now at the start of 2009 influenza pandemic. Available from URL: http://www.who.int/mediacentre/news/statements/2009/h1n1_pandemic_phase6_20090611/en/index.html
16. Centers for Disease Control and Prevention (CDC). Hospitalized patients with novel influenza A (H1N1) virus infection-California, April-May, 2009. *MMWR Morb Mortal Wkly Rep* 2009; 58: 1-5.
17. Thompson WW, Shay DK, Weintraub E, Brammer L, Bridges CB, Cox NJ, et al. Influenza-associated hospitalizations in the United States. *JAMA* 2004; 292: 1333-1340.
18. Thompson WW, Shay DK, Weintraub E, Brammer L, Cox N, Anderson LJ, et al. Mortality associated with influenza and respiratory syncytial virus in the United States. *JAMA* 2003; 289: 179-186.
19. Sng J, Koh D, Koh G. Influenza A (H1N1) infections among healthcare workers: a cause for cautious optimism. *Occup Environ Med* 2009; 66: 569-570.
20. National Center for Immunization and Respiratory Diseases, CDC; Centers for Disease Control and Prevention (CDC). Use of influenza A (H1N1) 2009 monovalent vaccine: recommendations of the Advisory Committee on Immunization Practices (ACIP), 2009. *MMWR Recomm Rep* 2009; 58: 1-8.
21. Fiore AE, Shay DK, Broder K, Iskander JK, Uyeki TM, Mootrey G, et al. Prevention and control of influenza: recommendations of the Advisory Committee on Immunization Practices (ACIP), 2008. *MMWR Recomm Rep* 2008; 57: 1-60.
22. Novel Swine-Origin Influenza A (H1N1) Virus Investigation Team, Dawood FS, Jain S, Finelli L, Shaw MW, Lindstrom S, et al. Emergence of a novel swine-origin influenza A (H1N1) virus in humans. *N Engl J Med* 2009; 360: 2605-2615.

Related topics

Guo WL, Wang J, Zhou M, Sheng M, Eltahir YM, Wei J, et al. Chest imaging findings in children with influenza A H1N1. *Saudi Med J* 2011; 32: 50-54.

Alenzi FQ. H1N1 update review. *Saudi Med J* 2010; 31: 235-246.

Al-Khuwaitir TS, Al-Abdulkarim AS, Abba AA, Yousef AM, El-Din MA, Rahman KT, et al. H1N1 influenza A. Preliminary evaluation in hospitalized patients in a secondary care facility in Saudi Arabia. *Saudi Med J* 2009; 30: 1532-1536.

Aljohani S. Swine influenza H1N1. Is your laboratory prepared? *Saudi Med J* 2009; 30: 872-875.